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THE IMPACT OF DISTANCE ON ACCESSING ANTENATAL CARE SERVICES: THE CASE OF DENDI WEREDA, WEST SHOA ZONE

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By
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A Thesis Submitted to The School of Graduate Studies of Addis Ababa University In Partial Fulfillment of The Requirements for The Degree of Master of Science in Population Studies

Advisor: Dr. Eshetu Gurmu

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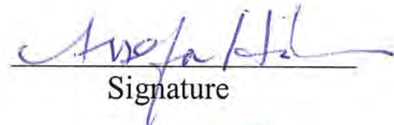
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List of Acronyms

ANC	Antenatal Care
CSA	Central Statistical Authority
CSPro	Census and Survey Processing System
DFID	Department for International Development
DHS	Demographic and Health Survey
ESRI	Environmental Studies Research Institute
FDRE	Federal Democratic Republic of Ethiopia
GIS	Geographic Information Systems
GPS	Global Positioning Systems
MoFED	Ministry of Finance and Economic Development
MOH	Ministry of Health
PASDEP	A Plan for Accelerated and Sustained Development to End Poverty
PHC	Population and Housing Census
SPSS	Statistical Package for Social Scientists
TBA	Traditional Birth Attendant
TTBA	Trained Traditional Birth Attendant
UNICEF	United Nations International Fund for Children
WHO	World Health Organization

ABSTRACT

This study is an attempt to examine the impact of distance on accessing antenatal care services in Dendi Wereda of west Shoa Zone. From the point that, Public health planners should be provided evidence to decide whether the maternity units are fairly distributed or not, this research, demonstrated how a Geographical Information System (GIS) can be used to provide information on distance to the closest maternity unit and determine whether distance really matter in accessing the services. The distributions of health facilities are mapped and localities and population groups that appear under-serviced are highlighted. Consequently, in order to achieve the objectives of this study, an attempt was made to collect data through questionnaire surveys of 806 households located at various distances from the available facilities. Descriptive statistics, Bivariate and Multivariate logistic regression analysis were employed to explore the relative importance of a number of physical, demographic and socio economic Variables in the likelihood of using these services. The study found that about 78.7percent of women had not attended antenatal care services for their recent child in the last five years. Moreover, out of the total users, only 21.1 percent of women had four and above four visits. Results from multivariate analysis indicated that there is a statistically significant variation in the use of antenatal care services as distance increases. Similarly, there was a significant variation in the use of the service with an increase in literacy level and woman decision making power. Therefore, the current endeavor by the government to narrow the gap in accessing ANC services by locating facilities within a ten kilometer radius should be strengthened. Parents should also be aware of the benefits of female education on the change of health status of the future mothers.

I INTRODUCTION

1.1 Background of the Study

Access to health care includes at least two dimensions: economic access in terms of affordability and geographic access in terms of proximity to providers. The poor, most of the time, tend to have the least access to health care services. The geographic aspect of access suggests that everything else being equal, people tend to seek health care at a closer distance than at greater distance. Furthermore, people may be discouraged from seeking health care if they have to travel beyond a certain distance. Other aspects of their lives might also be adversely affected because as distance increase, the level of utilization decreases (Gesler and Meade 1988 as cited in Lin, 2002).

A number of barriers can impede progression from potential to realized access. To mention some: availability, accessibility, affordability, and acceptability .The first two dimensions are spatial in nature while the third is economical and the fourth is attitudinal or normative adoption to cultural settings. Availability refers to the number of local service points from which a client can choose. Accessibility is travel impedance (distance or time) between patient location and service points. Affordability refers to the purchasing power of the people while acceptability refers to willingness of the population to use the service if made available to them (Guagliardo, 2004).

In Ethiopia, the 1993 health policy declares equitable, acceptable and accessible health to all who need the service and Ministry of Health is engaged in constructing more health institutions in order to improve geographic accessibility. However, there is no clear basis on the decision of

planning and distribution of health care facilities over the years. This is from the point of view of that there is no proportionality between population size and availability of medical services and health personnel in different parts of Ethiopia. According to Asmerom (1994: 61), Addis Ababa and other urban centers are taking the lions share.

Due to such uneven distribution and inability to provide health services for all, most of the rural Ethiopian women about two- third of the population live in areas that are more than five kilometers away from the nearest health facility.(MoFED,2006:29). Shortages of transportation service and poor road conditions often enforce most of the people including women in labor to walk long distances to the nearest health facility (WHO, 1998: 1).

In addition, there is lack of information on the level and pattern of maternity care services in the lower administrative units which, therefore, has been and is continuous to be, a major obstacle to improvement (Adekunle et al, 1990: 3).Measuring accessibility and indicating the pattern, therefore, is important because it indicates how effectively health care facilities would be in serving the community. Usually it is measured by the impact of geographical distance on the convergence of health service providers and consumers (Morjani et al, 2005: 1).

It is well-established fact that GIS has been applied in health care planning (Morjani et al, 2005: 1) and health data maps are significant resources particularly at the local level. With the help of GIS, it is easy to make access assessment. However, GIS being a technology having special soft ware that requires training of personnel, it is not readily available to the public (ESRI, 2005: 1).

In spite of all the difficulties, in 2001, the Nicaragua Ministry of Health conducted a census of the nation's health facilities to assess accessibility .Members of the Survey teams collected information about the facilities' services and staffing situation. A GPS receiver was used to collect latitude and longitude coordinates for every facility they visited. Today, these data continue to help planners in Nicaragua to analyze health accessibility and availability of services in the country (ESRI, 2005: 1).

Similarly, in Bayelsa, oil producing state of Nigeria, cartographic techniques was used to show the distribution of population, different categories of health establishments as well as spatial patterns of utilization and localities that are not physically accessible to modern health care services at the time of the study (Onokerhoraye, 1999: 11).

This study, also aimed at showing evidences on the magnitude of health related problems particularly utilization of antenatal care services in Dendi Wereda by measuring distance to health facility using information compiled through GIS. Attempt is made in measuring distance from the health services and health seekers and whether distance really matter in accessing the service

Although proximity is the most important determinant of health service utilization, there are also other factors that significantly affect the utilization of the service. The identification of these factors will also play a great role to address the problem effectively.

1.2 Statement of the problem

Maternal health is a priority issue in many developing countries and for a longer period the subject of major resource expenditure and research effort. This is because of repeated exposure of women to the risk of pregnancy and childbirth under the prevailing low level of medical and health facilities (Adekunle et al, 1990: 1). As a result, research identifying causes of maternal deaths have repeatedly emphasized access to antenatal care and availability of trained personnel to attend women during labor and delivery (Fauveau et al., 1988, as cited in Yared and Asnaketch, 2002:1).

As a result of complication in pregnancy and childbirth, every year more than half a million women die and many millions are disabled. African women are 175 times more likely to die in childbirth than women in developed regions of the world. The risk of maternal death is most acute in Sub-Saharan Africa. A woman living in sub-Saharan Africa has a 1 in 16 chance of dying in pregnancy or childbirth, while one out of 2,800 women has the risk in the developed regions. The deaths results in emotional disturbance to the family and community at large to socio –economic crises (WHO et al, 2003).

The maternal deaths are only the tip of the iceberg. Each year over nine million women suffer complications from pregnancy and childbirth that can result in life long pain disability and humiliation (DFID,2005: 2) .The illness and death are greatest especially in births before the age of 18; after the age of 35; after four births and at less than two year interval (Kessel and Awan, 1989).

The situation in Ethiopia isn't different. Inadequacies of the health service system coupled with under utilization in areas where the services exist contribute to the poor health of women (UNICEF, 1991:28).

According to the result of the Ethiopian 2005 Demographic and Health Survey, maternal mortality ratio, a measure that enable us know the obstetric risk associated with each live birth for the period 1998-2004 was 673 deaths per 100,000 live births. Similarly 95% of all births occur at home indicating the severity of the problem. In addition, proportion of maternal and neonatal deaths that occurs during the 48 hours after delivery is high basically due to lack of postnatal care. According to CSA and ORC Macro (2001), only one in ten mothers have not received postnatal care. The 2005 DHS also shows similar results without showing any improvement.

A situational analysis study made by UNICEF (1991:31) indicated that 90 percent of the causes of maternal death in Ethiopia are preventable if members of the community are provided with adequate knowledge and accessibility, effectiveness as well as efficiency of health service delivery.

1.3 Objectives of the study

1.3.1 General objective

The general objective of the current study is to examine factors that hinder the use of ante natal care service utilization in Dendi Wereda with a special emphasis on the effect of distance from the nearest health facility.

1.3.2 Specific objectives

- To examine socio-economic and demographic factors that affects the use of antenatal care services.
- To estimate the level of Antenatal care utilization in the Wereda.
- To identify localities that are beneficiary and not in accessing maternity care service using GIS mapping
- To examine the effects of the present patterns of health care distribution on the utilization behavior of the people living in various communities in the wereda.
- To examine the policy implications of the findings for future health care provision and utilization in the region

1.4 Significance of the study

This study is an important step in integrating geographic information system for assessing the impact of physical distance on the use of modern maternity care services. Though, the study specifically focuses in Dendi Wereda, the method can be applied any where in Ethiopia that have similar physical characteristics to Dendi Wereda. Moreover, it gives insight to planners whether the distribution of health facilities is fair or not and enables an identification of the most disadvantaged localities in terms of distance in accessing the services.

1.5 Limitations of the study

For the sake of this research it is assumed that the Euclidean distance to a facility is in proportion to the true network distance to the health facility. If planners intend to quantify distance effects for planning purposes, they need to convert the absolute Euclidean distance effects into network distance effects. In addition, potential distance is hypothetical since it assumes that patients will access a health facility based on some rational criteria (for example, closest facility). However, health seekers do not always go to the closest facility due to poor quality of the service and personal characteristics of the service provider. On the contrary, actual distance is based on the facility that is often used by a user although exact travel mode (e.g., car, transit, and walk) and routes may not necessarily be known. However, this research assumes that, in rural areas there is no alternative for households to attend health facilities of their choice but attending the nearest health facility. On the other hand, existing literatures suggest that this situation is not applicable for urban settlers.

1.6 Definition of Key Terms

Accessibility to health care: It is concerned with the ability of a population to obtain a specified set of health care services. In the context of this study, geographic accessibility often referred to as spatial or physical accessibility is concerned with the relationship that exists between the spatial separation of the population and the supply of health care facilities. Potential coverage within Ethiopia is defined as that segment of the population within 10 kilometer radius from the nearest health facility .The international standard for access is a distance of 5 kilometer .According to World Bank, adhering to international standard is important because most health

service users (90%) travel on foot to get the nearest health facility (World Bank and Ministry of Health: 2005:99).

Acceptability: In this study refers to the tendency of mothers to accept maternity care services irrespective of the culture they are living in.

Antenatal Care: It is health care received by mothers at the time of their pregnancy from health professional. Antenatal care is more beneficial in preventing adverse pregnancy out comes when it is sought early in the pregnancy and continued through to delivery. Health professionals recommend that the first antenatal visit should occur within the first three months of pregnancy and continue on a monthly basis through the 28th week of pregnancy and fortnightly up to the 36th week (or until birth).If the first ante natal visit is made at the third month of pregnancy, and as early as recommended, there would be a total of at least 12 to 13 antenatal visits (CSA, 2005:113). Components of ANC include measuring blood pressure and weight of a woman and taking blood sample and urine analysis, measure of height, physical examination, measure of uterus height and vaccination.

Women decision making autonomy: is a woman decision as computed from major and minor household purchase, decision on own health care and visit to relatives. As a result, index was prepared to say that a woman has high or low decision making power. If a woman has decision on all the characteristics, without consulting any one else, a value of 2 is assigned. In situations when a woman has consulted some one else a value of 1 is assigned. The index value therefore will range from 0 to 8. Therefore, a woman with less than four index value is considered to have low decision making and a woman above four index value is considered to have high decision making power.

Traditional Birth Attendants (TBAs): They are part of the birthing process throughout the developing world, assisting in the births of a substantial portion of the world's newborns. Usually they are self-taught or informally trained. TBAs also provide advice and practical help in cleaning, cooking and caring for the households of pregnant women and new mothers.

Trained Traditional Birth Attendant (TTBA): They are TBA who has undergone a training course conducted by the modern healthcare sector.

Skilled Birth Attendant: A midwife, nurse, or doctor who has undergone a prescribed course and is registered or legally licensed to practice. This excludes Traditional Birth Attendants (TBAs), even if trained.

Household: The household can be defined as "a group of related or unrelated people, who live in a dwelling unit or its equivalent, eat from the same pot, and share common housekeeping arrangements" (World bank: 1999:89)

Primary Health care: It is essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community .It is the first level of contact of individuals, the family, and the community with the national health system bringing health care as close as possible to where people live and work.

Maternal Death/Mortality: The death of a woman while pregnant, during delivery or within 42 days (six week of termination of the pregnancy, irrespective of the duration of pregnancy). The cause of death is always related to or aggravated by the pregnancy or its management; it does not include accidental or incidental causes.

GPS (Global positioning Systems): As the name indicates it is a system that comprises more than 24 satellites that rotates around the earth two times a day to convey information about

location of places. A GPS receiver collect signals send from the satellites and indicate position of a place in relation to Greenwich meridian and the equator in degrees of latitude and longitude.

Geographic Information Systems (GIS): It is a computer cartographic technique that is used for the measurement of physical accessibility and has been applied in many areas including retail site analysis, transport, emergency service and health care planning (Morjani et al ,2005). In the context of health care planning, the ability of GIS to identify the geographic extent of a health facility catchment area, which corresponds to the area which contains the population utilizing this facility, is a particularly important analytical capability.

Health extension worker: A health practitioner who takes one year health related training after selected by the community to do so. Generally, this health worker works preventive, promotive and primary curative activity (MOFED, 2002).

Wife's decision-making role: It refers to the ability of a woman to express her opinion and influence and participate equally in decision making processes in her family; while indicators for wife's autonomy are referred to a woman's capacity of taking initiatives and actions without asking for her partner's approval (Casique, I., 2001)

Locality: It is part of the lower administrative unit where people live either in proximity or far apart and has its own peculiar name to differentiate from others.

II REVIEW OF RELATED LITERATURE

2.1 Theoretical Background

Reproductive health is not given a due attention in many parts of the world. Especially matters related to maternity care should be given a great emphasis considering the high mortality level and lifelong pain or disability that would otherwise occur. According to WHO (1998), the underlining emphasis that should be given to this health matter has the following theoretical background.

> *Of all the health challenges that countries face, those posed in relation to sexual and reproductive health are perhaps the most daunting because they involve not only diseases but also normal components of life such as sexual maturation and pregnancy, surrounded by cultural, social, ethical and religious considerations. In no other aspect of health is the need for broad community involvement, alongside focused and effective interventions, so necessary" (WHO, 1998: 20)*

For this reason, millennium development goal also focuses on improving maternal health, with a target of reducing the maternal mortality ratio by three quarters by 2015. Progress towards this goal, however, is surprisingly low, especially in Sub-Saharan Africa and Southern Asia for various reasons (Pitchforth, et al, and 2006: 1).An identification of these factors therefore is pivotal in formulating evidence based policy. However, unlike the developed countries, there is little information about whether or not same variables can account for differential demand on the health services (Damen, 2000: 43).The conceptual basis for this study, therefore, is based on models and hypothesis from the developed and developing countries.

Casual Model

According to casual model, there are casual relation ship hypothesized as existing among a set of social, demographic and economic variables related to the availability and use of health services and health status (Anderson, 1973: 286)

The model used infant mortality as a measure of a country's health status. Accordingly, neonatal mortality is associated with income in eight cities of the U.S.A and later study in Cleveland also found similar result. The same is true for England and the Wales. In the model, place of residence is another factor that affects the health status of a population due to availability of health care services in urban areas unlike rural areas. Moreover, the presence of large minority racial ethnic groups in a country has profound effect on general health of a population. In this model education, also appear to be related to hospitalization. This is due to an increase in awareness of the population as level of education increases (Anderson, 1973: 286).

Geographic Accessibility Model

Different studies also approve geographic accessibility to the nearest health service as an important determining factor in the use of the service. It is typically measured from a population center, such as the geometric centroid of county of residence, depending on the available data. Travel impedance, sometimes referred to as travel cost, is often measured in units of Euclidean (straight line) distance, travel distance along a road and/or rail system, or estimated travel time via a transportation network. Travel impedance to nearest provider has been assumed to be a good measure of accessibility in rural areas where provider choices are very limited and the nearest provider is also the most likely to be used (Guagliardo,2004:5).

However, Fryer et al (2004:5 as cited in Guagliardo, 2004) have provided evidence to the contrary considering its applicability in urban settings due to the availability of provider options at similar distance from any reference point. Moreover, it is argued that geographical accessibility alone is not the only determining factor in utilization of health services. Some even suggest that it is not distance, but other geographic barriers such as big rivers, lakes and topography of the land that affect people's propensity for seeking health care (Kreher, et al, as cited in Lin, 2002: 2).

A model built by Lin had got impact of distance on health care service (hospitalization) that generally decline with distance. Compared to the 0-5 km distance category, being 5-10 kilometers from the hospital reduces the odds of hospitalization by 0.758, while being an additional 5 km further away more reduces the utilization of the services (Kreher, et al, as cited in Lin, 2002: 2).

Individual Decision Model

A model constructed after considering different socio- economic demographic and physical Characteristics of the population in Bamako indicated that an individual must decide among five options while seeking health care: to do nothing, to use self care, to use traditional healer or birth attendant, to use modern treatment at home or to use modern formal health facilities with hospital, public dispensary, for profit private provider or non profit private provider. Accordingly, Mariko (2003) formulated the following model:

Unj=U (Xj*, Dj, Mn, Qsj, Qpj, Qrj, Sn).

Where Xj* represent the anticipated price for the service,

Dj the distance covered to join the provider j,

Mn characteristics of the service provided to individual n,

Qsj, Qpj, Qrj respectively are structure, process and outcome of quality of care of the provider j selected by individual n,

Sn demographic and socio economic characteristics of individual n and his household.

Considering the relevance for this study, findings of the variables education, income and distance indicate that Education of head of household does not influence use of public facilities, for profit or non profit health facilities. Income has a weak but significant impact in two ways: positively on the choice of for profit health facilities, and negatively on that of non profit health facilities. In the former case, as income increase the proportion of the population to use better and well equipped facilities increases. The latter case is when individuals get richer; they are tempted to abandon non profit for clinics or hospitals with more equipment and qualified personnel. Moreover, distance is not a real problem in accessing health facility in Bamako. A possible explanation for this is urban residents can move easily as far as transport system is well developed (Mariko, 2003:1192)

A quality- distance tradeoff hypothesis

A quality- distance tradeoff hypothesis by the World Bank made in rural Ethiopia to decide whether distance really matter in accessing a healthy facility indicated that usage of health facility is sensitive not just to the distance to the nearest health facility but also to the quality of

health care provided .If the quality of the existing weak facilities is improved, usage would rise significantly (Collier, et al,2002: 425).But unfortunately quality of the service will not be assessed by this study.

2.2 Socio-Economic, Demographic and Physical factors affecting the use of antenatal care service

The reasons why women die in pregnancy are the result of a complex interaction of medical and those socio cultural factors that collectively determine the health status of women in a given community (Kessel and Awan, 1989: 81)

In the presence of health facilities, many countries in Sub-Saharan Africa face the problem of organizing health service delivery in a manner that provides adequate quality and coverage of health care to their population. About 35% of women living in developing countries receive no antenatal care during pregnancy, while half of them give birth to a child without getting assistance of medical practitioner. Over two-third of them do not also receive postpartum care in the six weeks following delivery (Family Care International.1998:1).

Once the service is accessible, it still needs to be acceptable to the population. Acceptability of the service, which could be affected by quality of the service and socio demographic characteristics of the consumer have also been shown to be associated with utilization in various studies (Assefa, 1989:9).To mention, even the few who seek to attend modern health facilities are heard of complaining about the professional competence of the service giving personnel. Moreover, health workers may be unsympathetic and uncaring, so women prefer to use the services of traditional birth attendants and healers (Family Care International.1998:1). On the

other hand, maternal Program advocates that every pregnant woman should seek care from a skilled provider from the point of view that TBAs did not have sufficient literacy or general knowledge when they started their training that causes in a failure of many maternal health programs (Kessel and Awan, 1989).

Further more, due to lack of health education and cultural reasons women are far from information access and do not know how to recognize, prevent or treat pregnancy complications, or when and where to seek medical help (WHO, 1998: 2).

In addition, in developing countries, women face scarcity of time because they spend more time on their multiple responsibilities for care of children, collecting water or fuel, cooking, cleaning, growing food, and trade than on their own health (Yared and Asnaketch, 2002:3) though vary by age. Studies indicate that younger and lower parity women tend to use services more frequently than the older and higher parity women. A great responsibility of older woman within the household including child rearing is a possible explanation given with this regard (Adekunle, et al, 1990: 3).

In many parts of the world, women's power to make decisions is limited, even on matters directly related to their own health. In Bangladesh, it is usually the mother-in-law and husband who make the decision to seek (or not seek) care. They are often the least likely to know about pregnancy-related complications and their possible fatal consequences (Family Care International, 1998:1). The situation in Ethiopia is not different. The Ethiopian Demographic and health Survey (CSA and ORC Macro:2005) indicated that 15 percent of currently married

woman make sole decisions on their own health care, one-third say that their husband makes such decisions without consulting them.

Higher education level is often associated with higher use of health services. Generally, as level of education improves, people may be more attracted by modern health facilities (Assefa,1989: 10) .According to ETDHS 2005 women's utilization of maternity care vary with level of education: the more educated being the more users of the service (CSA and ORC Macro,2005:112)

The other important acceptability factor in determining utilization of antenatal care services is household income. Some studies have shown that utilization rate increases substantially with increase in household income. However, others found little or no association between household income and utilization of antenatal care (Craig, N.:2005 60).

Different studies also indicate that there is ethnic and religious variation in the utilization of modern health services that also comprises maternal health care. Some also recommend care by traditional birth attendant due to preferences for privacy, modesty and female attendants. Among Saraguro Indians in Ecuador, hospital-based deliveries are perceived to violate privacy because many health providers are men, which are unacceptable culturally. As a result, affordable and accessible maternal health services are under-utilized (WHO, 1988: 3).

In Ethiopia, a case study undertaken by Assefa indicated the difference in utilization of modern health care among different ethnic groups (Assefa, 1989: 11).In Sudan, a study found that many

women were ashamed of being poorly dressed in front of health workers, and feel that the health workers would react negatively to such condition. These feelings deterred many women from using formal maternal health care services (WHO, 1988: 3).

2.3 Health Care Provision in Ethiopia.

Before 1992, Ethiopia's health service system was highly centralized; with resources remain heavily concentrated in Addis Ababa and other urban area, with an emphasis on curative, hospital based care. Nevertheless, the majority of Ethiopia's population lives in rural areas where health care coverage is very minimal in addition to diversified health problems (MOH, WHO, et al. 1999:41).

Considering the seriousness of the problem, the government well understood construction of primary health facilities at the lower administrative unit can at least minimize the situation (Collier, et al, 2002: 425). According to (MOH, WHO, et al 1999: 41) Primary health care units and their five satellite health posts are intended to serve a total of 25000 populations located with a 10 k. m radius catchments area. Next is the district hospital, each serving a population of 250000 and acting as a referral and training center for 10 primary health care units: the regional hospitals will provide specialized service and serve a population of one million each and the specialize hospital will provide comprehensive /unitary specialist service and act as a center for research and post basic training (MOH, WHO, et al 1999: 41).

In spite of all the above effort, there are still inaccessible population groups due to poor infrastructure and the difficult topography. If communities are to receive adequate health care

coverage, then services must either be brought to them or they must be brought to the appropriate health care facilities. Neither option, however, is successful, due to lack of adequate and reliable transport system. Throughout the country, shortages of adequate transport have had a major impact on accessibility of existing services.

The 2004 Welfare Monitoring survey of Ethiopia (CSA, 2004:21) indicates that a Very minimal amount of women have access to maternity care services. The following table best illustrates percentage distribution of households at varying distance from pre/post natal care.

Similarly, inadequate transport system has been a major constraint on social and economic development in Oromia region where the study area is found. The level of infrastructural development and of the provision of social amenities is very poor. Of the total households in the region, more than 50 and 40% is above 5 kilometers from the nearest all weather road and dry weather road respectively (CSA, 2004: 25)

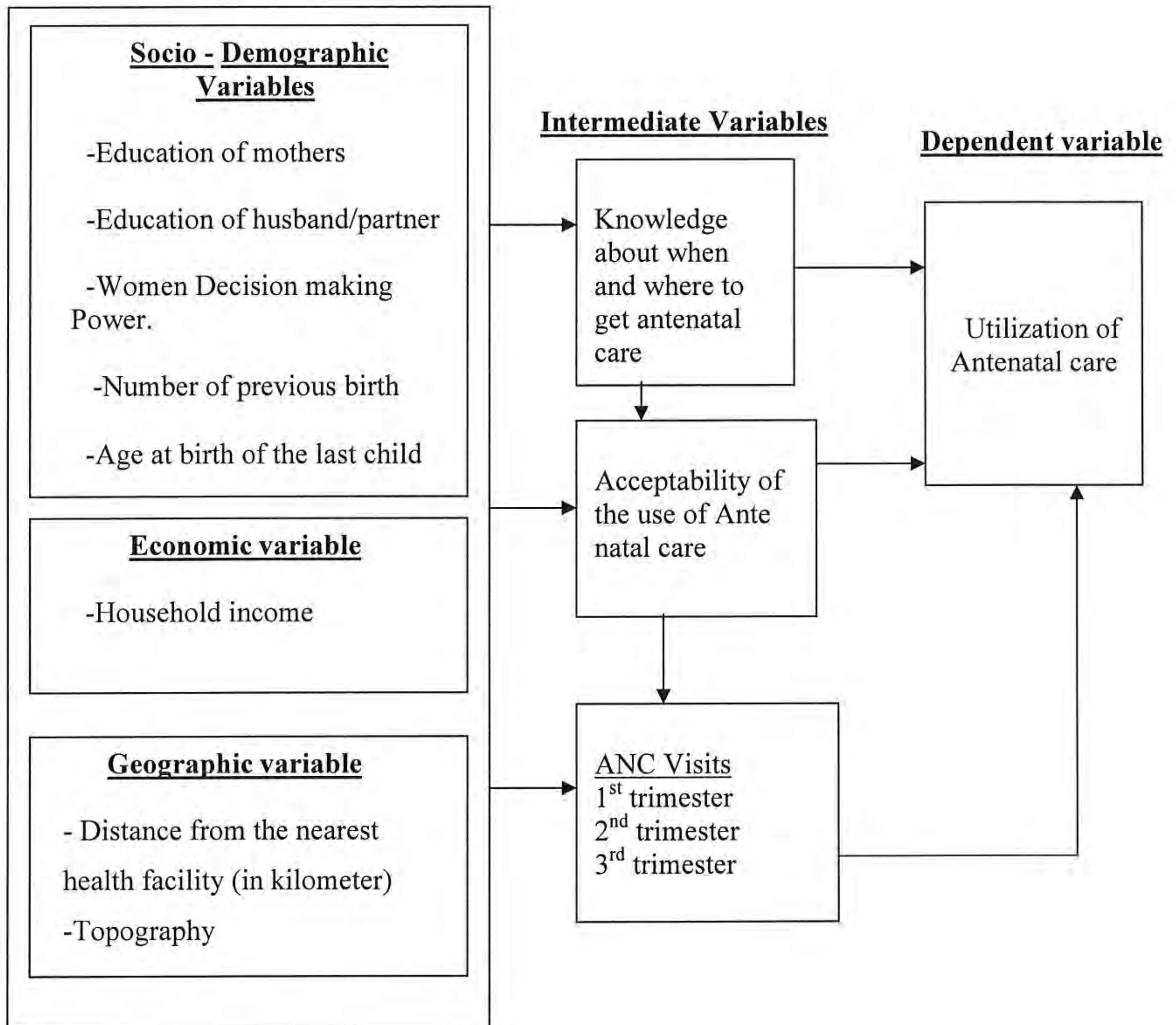
The quality of care of normal deliveries was also found to be inadequate. Not all hospitals and very few health centers provided essential care for obstetric complications. There is also a deficiency in the activities performed during the antenatal visits, particularly in the area of counseling and treatment of anemia and malaria (MOH, WHO, et al., 1999: 47) that enforce women to use traditional birth attendant.

2.4 Conceptual Framework

Based on the available models and related literature the following conceptual frame work is used in the study

Figure 1: Conceptual Frame work

Independent Variables



Source: Developed by the researcher from survey of available literatures

2.5 Research Questions

Based on the aforementioned objectives and review of the literature, the research will answer the following questions.

a) Does distance matter in the use of maternal care service i.e. <5 KM, 5-10 KM, above 10 KM?

b) Is maternity care determined by level of education of the couples?

c) Is age at last birth a determinant of the use of the service?

d) Does number of births a woman has given earlier determine the use of the service?

e) Does a woman decision making power determine the use of the service?

III METHODOLOGY AND DATA SOURCE

3.1 The Study Area

In Oromiya national regional state ,24.8% of women who had a live birth in the last 5 years received ANC from health professional which is below the country's average, 0.2% from trained traditional birth attendant, 0.4% from traditional birth attendant and the remaining are non users (CSA, 2005:112).

Health facilities in Oromia region as in other parts of Ethiopia include health post, health centers, and hospitals. The facilities in the primary health centers are largely managed by nurses, midwives and community health workers.

In the region in the year 2005/6 there were 21 Hospitals owned by MOH and 10 by others which can be private or church owned, 699 health stations,1,097 health post, 187 health center owned by MOH and 5 by others (MOH,2006:21).

According to the 2004 welfare monitoring survey ,only33%of households in the region are within a distance of less than 4 kilometers from the nearest pre/post natal care service and more than 65 % of the households are above 5 kilometers from the nearest maternity care service (CSA:25).

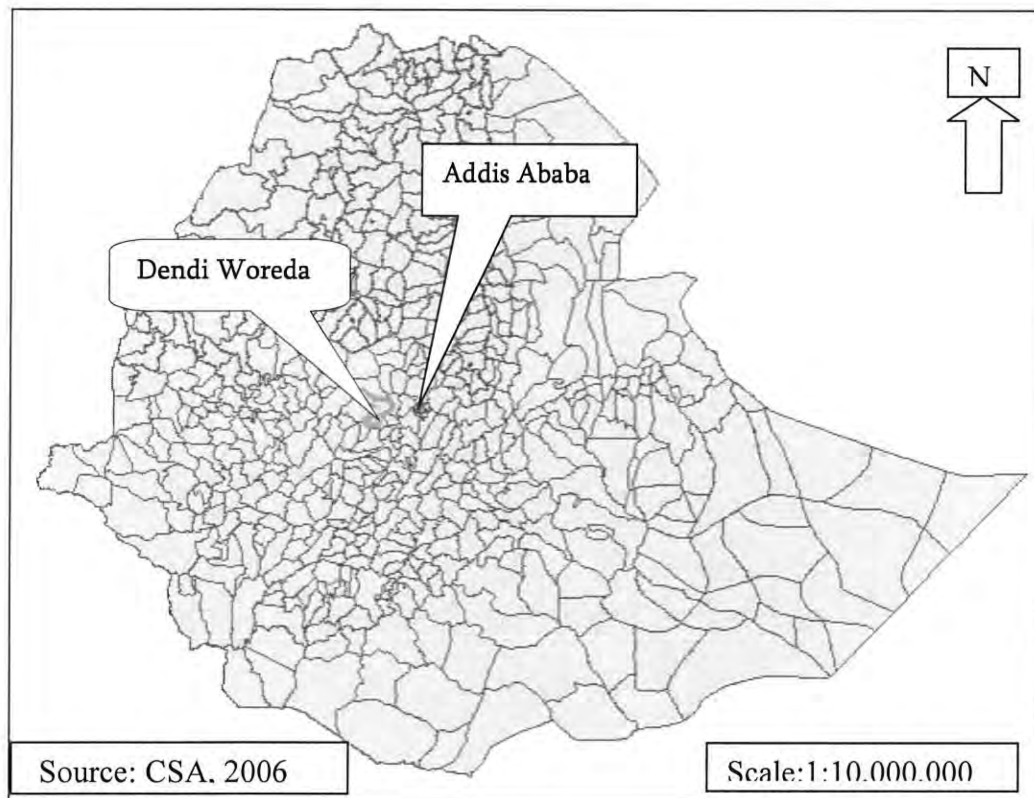
Considering spatial distribution of population in the region, there is variation at zonal level. According to the 1994 Population and Housing Census Report, Mirab Shoa administrative zone, where the study area is found stood first in population size constituting about 12.4% followed by

Arsi and Jima administrative zones with a population of 11.3 and 10.5 percent respectively. Of all persons in the zone, 90 percent belong to the Oromo ethnic group followed by Amhara (7%); Sebat bet Guraghie (2%) and others ethnic groups constituting the rest (CSA, 1996).

This study is undertaken in Dendi wereda, which is the largest in population size from West Shewa zone. The Wereda comprises 126,670 males and 129,226 females with a total land area of 1549.07k.m2 with density of 165.72 persons per square kilometer (CSA, 2005:34).
Indeed, many parts of the wereda do not have access to safe, potable drinking water in spite of the fact that it is an area with abundant surface and ground water reserves. The 1994 population and housing census report indicated that only 9.5% of the wereda had piped water supply and 52 percent got their water from river or lakes and 9.7 % from protected well/spring and the rest from unprotected source (CSA, 1996:127).

The 1994 Population and Housing Census cartography map indicated that Dendi wereda had 109 rural and 3 urban kebeles. Ambo, Wenchi, weliso, Dawa, Ejere and Jeldu weredas border it. According to this map, there was no a single health station in the rural part of the wereda indicating magnitude of the problem on health maters and specifically to Antenatal care utilization. Even at this time there are few health facilities serving the population that arouse the interest of the researcher in undertaking this study.

Map 1:- Relative location of the Study area with Addis Ababa



3.2 Sources of Data

This study is based both on primary and secondary data .Information concerning the socio economic and demographic determinants affecting accessibility to ANC is obtained from the sampled respondents using questionnaire prepared in English language which is translated into Oromiffa .Information was collected from women aged 15-49, who have at least one child under the age of five. Women were asked whether they were checked by a trained health professional, that is, doctor, nurse, or midwife, at least once during for their last child birth, i.e., antenatal care (ANC).

Concerning secondary data, information on physical accessibility of the health centers was obtained from map prepared by the C.S.A for the 1994 Population and Housing Census in the wereda which are geo-coded and digitized by the researcher and cartography experts. Since more than ten years has elapsed from the time of earlier census, important changes like names of locality, and additional health stations that are significant for this study are incorporated. Furthermore, the map is prepared from 1:50,000 scale topography sheet and only GPS readings of localities from their center is taken. Taking GPS readings of the selected households is futile due to the smallness of the scale of the map that creates no significant change of location between housing units within a locality.

On this basis, the researcher determines the distance between the centers of localities and nearest facility providing a specific maternal health service assuming straight line distance to a health facility as direct proportional to true net work distance. In the past, researchers often relied on self-report of survey respondents or of community informants to calculate distance, both of which tended to be highly unreliable.

3.3 Sample Size Determination

The sampling technique in this study is multi stage that ranges from identification of kebeles to identification of individuals in a household. Since the major objective of this study is to apply GIS technique in assessing the impact of Geographic distance on the use of modern ante natal care, localities that are at a distance of <5,5-10 and above 10 kilometer were first identified. The rational for such categorization is: First, the international standard for access is locating facilities within five kilometer radius. This research therefore examines any significant variation in utilization of ANC in women located above five kilometer radius and women below five

kilometer radius from the nearby facility. Second, in the Ethiopian context a ten kilometer radius is considered as accessible, therefore this research examines any variation in utilization with women located above ten kilometer radius from the nearest health facility. Therefore, a total of 806 samples are determined based on the following formula:

$$n_h = z^2(r)(1-r)(f)(k)(p)(n)(e^2),$$

Where,

n_h is the parameter to be calculated and is the sample size in terms of households to be selected

z is the statistics that defines the level of confidence desired

r is an estimate of a key indicator to be measured by the survey

f is the sample design effect, deff, assumed to be 2.0 default value if there is no pervious study

k is a multiplier to account for the anticipated rate of non response

p is the proportion of the total population accounted for by the target population and upon which the parameter , r, is based

n is the average household size(number of person per household)

e is margin of error to be attained (United Nations ,2005:44)

Accordingly,

z	confidence interval	1.96
r	ANC rate from DHS 2005	0.25
f	Anticipated design effect from DHS	1.5
k	Non response adjustment(5%)	1.05
p	Proportion of target population from total (PHC, 1994)	0.20415
n	Average household size(PHC ,1994)	4.9
e	Margin of error (15%(ANC rate))	0.0375
n_h	Required household size	806

Therefore, a total of about 806 households are required to obtain a 95 % confidence for the characteristic (ANC rate) to fall on the range 0.2125(21.2%) and 0.2875(28.75%).In addition, 45 households per locality are decided to be sampled which indicates all in all 18 localities are decided to be surveyed and for each distance category, a total of six localities are studied. It could have been more representative to take less household size per locality thereby increasing the number of kebeles. However, due to time and financial constraint it was impossible to increase the number of kebeles. The following table illustrates the selected kebeles and localities in each distance category.

Table 1: Selected Kebeles and localities by distance from the nearest health facility

Distance in k.m	Name of kebele	Name of locality
Less than Five kilometer	Tachignaw Bejiro	Teka Jemjem Chercher
	Boda Bosoka	Loko Boda Chobe
Between five and ten kilometer	Gatro Sheko	Ashagari Maderiya Sheko
	Dendi Sulu	Sulu Kera Bobe
Above ten kilometer	Galesa koftu	Awara Sidama Anifara
	Ketketa Werebulchi	Deniku Saki Hulam kotu

3.4 Sample Selection

After identifying each locality, household listing was employed in order of the random selection of the localities so that it could be easy to decide whether there was at least one birth in a household five years prior to the survey. Finally, eligible households were selected systematically. If a woman had more than one live birth in the past five years, only care received for the most recent live birth is considered. If there is more than one woman who gave birth in a household, one is selected randomly.

3.5 Training, Field work and Supervision

Training:-For this study, six enumerators and two supervisors were recruited based on their pervious experience in data collection and ability to read and write the local language (i.e., Afan Oromo). After the recruitment, training was conducted on basic concepts and how to complete the questionnaire.

Field Work and Supervision:-Immediately after the training, deployment was held. Enumerators were provided support letters from the wereda to facilitate the data collection in the selected kebeles. It was the sole responsibility of the researcher to facilitate every thing at the wereda administrative units and to assist enumerators and supervisors technically. The role of the supervisors is to follow enumerators whether the work is done properly as well as on editing the questionnaire after the field work.

3.6 Ethical consideration

Each of the selected households was first informed about the objective and significance of the study and consent was asked to make an interview. In addition, each respondent was told about the confidentiality of the information provided. Fortunately, all the respondents were willing to be interviewed. For women who did not at all use ANC during the study period and for women not consistent in their use, advice was given to use the service efficiently after the interview.

3.7 Method of Data Analysis

Since the major objective of this study is to decide whether distance matters in accessing antenatal care, three different models are used separately to identify any variation in accessing ANC services for households found in less than 5 kilometer, 5-10 kilometer and above 10 kilometer radius from the nearest health facility.

The data collected with the questionnaire was entered using CSPRO and analyzed using SPSS .Multivariate logistic regression analysis was used to examine differential effect of independent variables on Antenatal Care utilization. The rational for using multivariate logistic regression analysis model is its applicability in deciding to predict the presence or absence of a characteristics or outcome based on the scores (values) of independent variables (predictors). Accordingly, the outcome category is collapsed to create a dichotomous variable on the basis of whether or not the woman had received ante natal care. Since the interest is in identifying women at risk because they did not receive care, the outcome variables is coded as 1 if the women received antenatal care and as 0 if she did not receive antenatal care.

Therefore, Using the binary logistic regression model, it is possible to directly estimate the risk of an event occurring. For a case of a single independent variable, the logistic regression model can be expressed as;

$$\text{Risk of an event occurring}(p/1\text{-}p) = e^{B_o + B_1 X_1}$$

Where B_o and B_1 are coefficients estimated from the data, X is the independent variable, e refers to the base of the natural logarithms. Similarly, when a number of predictors are incorporated to estimate the likelihood of the occurrence of an outcome variable, the relation is build using the equation as follows;

$$\text{Risk of an event occurring } (p/1\text{-}p) = e^{B_o + B_1 X_1 + B_2 X_2 \ldots\ldots + B_n X_n}$$

Based on this equation the risk of the outcome variable not occurring can be estimated as 1- the risk of the event occurring.

Variables to be included in the model

Dependent variable: The dependent variable is whether a woman use antenatal care service or not.

Independent variables: Distance to the nearest health facility, women education, women decision making power, husband education, Age at last birth and number of pervious births.

Variables included in the analysis

Dependent variable	**Categories**
Use of Ante natal Care(ANC)	1= "Yes", 0="No"

Independent variables	**Categories**
➢ Age at last births,	15-24,25-34,35-49
➢ Number of previous birth	1 birth,2-3 birth,4-5 birth, above 6 birth
➢ Educational level of mothers	Illiterate, literate
➢ Educational level of Husbands	Illiterate, literate
➢ Distance to the nearest health facility	Less than 5 ,5-10,above 10 kilometers
➢ Mothers Decision Making Autonomy	High, low

Intermediate Variables	**Categories**
Knowledge of where to go	Know, do not know
Acceptability of ANC	Accept ,do not accept

Note:-Household income is not included in the analysis because ANC is free of charge. Moreover, majority (90%) of rural residents travel on foot to attend the nearest health facility with no cost in transportation (World Bank and Ministry of Health, 2005:99). In addition knowledge where to get ANC and acceptability of the service provided is forwarded only for the non users of ANC and are not included in the model.

IV DESCRIPTION OF STUDY AREA AND POPULATION

4.1 Distribution of the Health Facilities

It is pivotal to say something about the distribution of health facilities in the wereda before going to an in-depth analysis of findings from the questionnaire. In the wereda, there were only six fixed functional health posts in the rural part all providing ANC services. In Ginchi, the capital of the wereda, a health center was selected to show distance effect. In the two small towns of Olonkomi and Ehud Gebeya, two government health posts were taken to show distance impact on accessibility. Therefore, out of the total 955 localities in the wereda, 374 are found within 5 kilometer radius from the nearest health facility, i.e. health post or health center. The majority of the localities, i.e. 450 are found between five and ten kilometer radiuses from the nearest health facility Only 131 localities are found above ten kilometer radius from the health services.

From the perspective of health sector development (2002), population within ten kilometer radius from the nearest health service is in a better position than that population found above. And it is basically the aim of MOH in narrowing the gap created in accessing health services by at least bringing all population groups within a ten kilometer radius from the nearest health post by constructing additional facilities and by other alternative scheme like training health extension worker. However, the international standard for access is a distance of 5 kilometer radius from the nearest healthy facility .It is also argued that adhering to international standard is important because most health service users (90%) travel on foot to get the nearest health facility. From this perspective, it is important to see any change in the utilization of the service as one move from population group found in less than 5 K.M to 5-10 K.M and above 10 K.M. This can be shown in change in percentage and whether the change is significant or not as distance increases by

including the impact of other possible determinants. All localities that are at varying distance from the health facility are indicated in different colors as can be seen from the following map.

4.2 Socio Demographic Characteristics of the Respondents

Out of the 806 total sampled households in the study area, 97.4 percent belongs to the Oromo ethnic group while only 2.6 percent belong to the Amhara ethnic group .Similarly, the study area is predominantly dominated by the Orthodox religion (94.8%) followed by traditional (3.1%).About 85.5 % of the study population has no formal education at all and the remaining had some primary or above education. In addition information was gathered regarding the level of husband education .Accordingly, 56 percent of husbands do not attend any formal schooling, 31.1 % had some primary and above education (Table 2).Information was also gathered regarding the number of life time birth a woman had because in many studies (Yared and Asnaketch(2002), Adekunle, etal(1990), Mesganaw, 1992), it was found that a number of children a woman had given earlier significantly affect the use of ANC. In this research, the majority of the study population (35.2%) had 6 and more births whereas 11.9 % had only one life time birth. In addition, many studies confirm that women empowerment affects her decision on the use of health facilities. In this study only 33.6% of women had high decision making power and the remaining 66.4 percent of women in the wereda have low decision making power. For this, four specific questions were forwarded to each woman. A woman is asked about her decision making power about major household purchase, minor household purchase, visit to relatives and decision on own health care.

Table 2: Percentage distribution of women by selected Socio Demographic characteristic

Background characteristic		Number	Percent
Age at birth	15-24	297	36.9
	25-34	337	41.8
	35-49	172	21.3
Number of births	1	96	11.9
	2-3	233	28.9
	4-5	193	23.9
	6 and above	284	35.2
Ethnicity	Oromo	785	97.4
	Amhara	21	2.6
Religion	Orthodox	764	94.8
	Others*	42	5.2
Level of education	Illiterate	689	85.5
	Literate	117	14.5
			14.5
Husband education	Illiterate	451	56
	Literate	355	44
Women Decision making autonomy	High	535	33.6
	low	271	66.4

* Others include Protestant, Catholic, Muslim and Traditional

4.3 Bivariate Test for the utilization of ANC

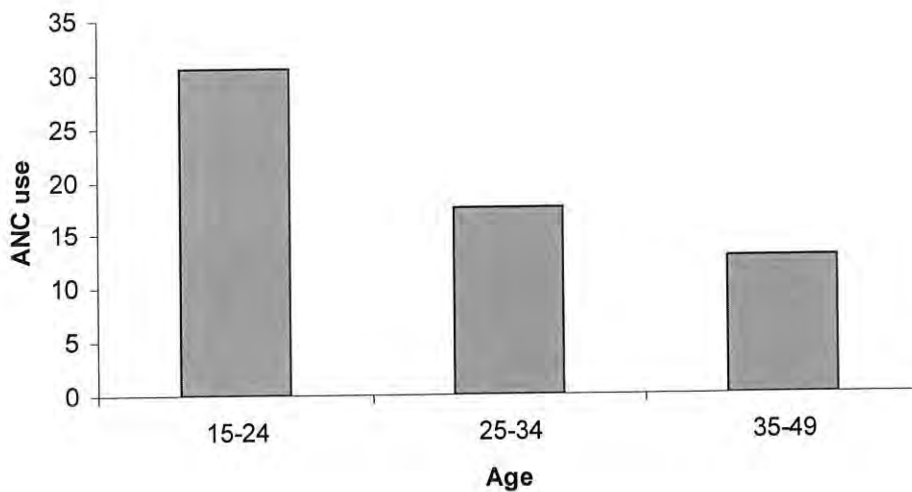
Table 3 shows percentage distribution of women with use/non use of the service according to some socio demographic and physical characteristic .Accordingly, percentage of women who used ANC in the five years period increase with an increase in level of education .The table depicts that 45.3% of women with primary education, 17.3% with no formal education had used antenatal care in the five years period before the survey. Similarly, ANC increases with an increase in level of husband education: 18.2% of women whose husband did not at all attend formal education had used ANC. However, this figure rises to 25.4 % for women whose husband had attended some primary or higher education.

Table 3: Distribution of Women by use or non use of ANC from health professional according to selected background characteristics.

Background characteristics		Antenatal Care		
		Do not use	use	Total
Mothers Education	Illiterate	570(82.7%)	119(17.3%)	689(100%)
	literate	64(54.7%)	53(45.3%)	117(100%)
Parity	1	61(66.4%)	35(36.5%)	96(100%)
	2- 3	178(76.4%)	55 (23.6%)	233 (100%)
	4-5	155(80.3%)	38 (19.7%)	193 (100%)
	6 and above	240(84.5%)	44 (15.5%)	284 (100%)
Distance in KM	<5	172(63.9%)	97(36.1%)	269(100%)
	5-10	222(82.5%)	47(17.5%	269(100%)
	>10	240(89.6%)	28(10.4%)	268(100%)
Age at last birth	15-24	206(69.4%)	91(30.6%)	297(100%)
	25-34	278(82.5%)	59(17.5%)	337(100%)
	35-49	150(87.2%)	22(12.8%)	172(21.3%)
Husband Education	Illiterate	369(81.8%)	82(18.2%)	451(100%)
	Literate	265(74.6%)	90(25.4%)	355(100%)
Ethnicity	Oromo	624(79.5%)	161(20.5%)	785(100%)
	Others	10(47.6%)	11(52.4%)	21(100%)
Women decision Making autonomy	low	454(84.9%)	81(15.1%	535(100.0%)
	high	180(66.4%)	91(33.6%)	271(100%)
Total		634(78.7%)	172(21.3%)	806(100%)

In this study, it was found that 30.6%, 17.5% and 12.8% of women in the age group 15-24, 25-34, and 35-49 respectively had used ANC indicating a decline in ANC utilization as age increases.

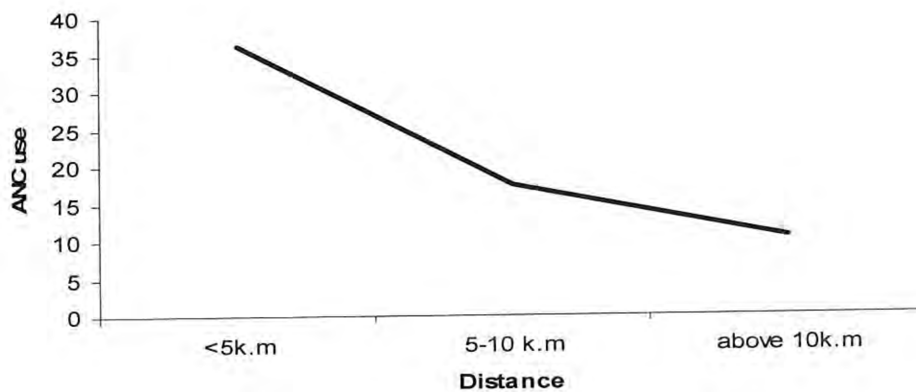
Figure 2: Use of ANC by Age



Source: own survey Data, 2007

Similarly, 36.1%, 17.5% and 10.4 % of women in distances <5k.m, 5-10 k.m and above 10k.m had used ANC indicating distance effect on the use of the service.

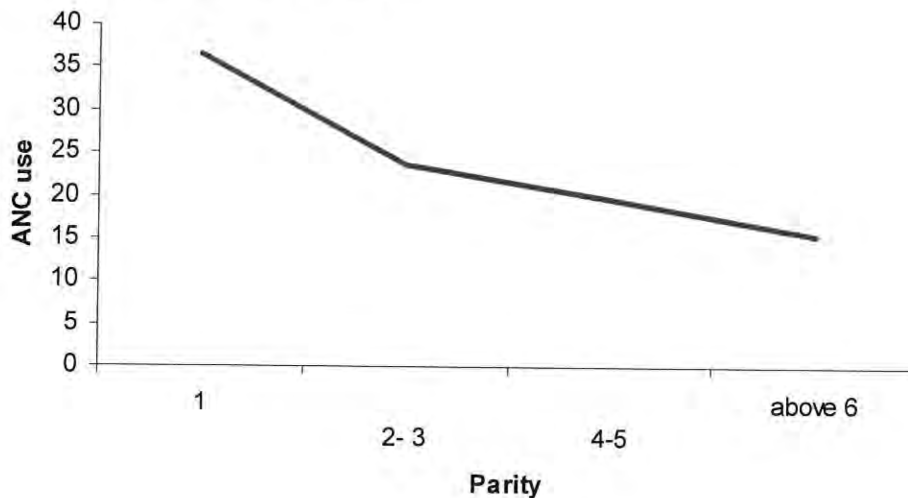
Figure 3: Use of ANC by Distance



Source: own survey Data, 2007

Moreover, the use of ANC declines with an increase in parity .The percentage of women who used ANC declines from 36.5% to 15.5 % when one goes from women having given one birth to six and more births.

Figure 4: Use of ANC by parity



Source: own survey Data, 2007

4.4 Reasons for non use of the service

Out of the total number of women who did not use ANC, an attempt was made to know the possible reason for the non use of ANC .This question is forwarded in three steps. In the first step all the respondents who did not use the service were asked whether they seek the service or not while giving their last child in the study period. Accordingly, 70.8 percent of women did not seek the service while 29.2 percent sought the service though they did not use it as can be seen from the following table.

Table 4: Seeking for ANC for last pregnancy

Response	Frequency	Percent
Yes	185	29.2
No	449	70.8
Total	634	100.0

Source: own survey Data, 2007

In the second step, all the respondents who seek ANC were asked whether they know where the service is provided and 69.2% know where it is provided while 30.8 % do not know where to get the service.

Table 5: Knowledge where to get modern ANC

Knowledge	Frequency	Percent
Know	128	69.2
Do not know	57	30.8
Total	185	100.0

Source: own survey Data, 2007

In the third step, information was gathered to know the possible reason for the non use of the service among women who seek and know where it is provided but fail to use for various reasons. Accordingly, 54.7, 10.9, 8.6, 6.3, and 19.5 percent of women mentioned distance, quality of the service, household responsibility, financial constraint and other reasons respectively as the major problem in accessing the service.

Table 6: Reason for not using Antenatal care

Major Reason	Frequency	Percent
Because the source was too far	70	54.7
I had no trust in its quality	14	10.9
I had many responsibility in the household	11	8.6
Financial constraint	8	6.3
Other	25	19.5
Total	128	100.0

Source: own survey Data, 2007

4.5 Timing and number of ANC

Health professionals recommend that, the first ANC visit is beneficial if sought early in pregnancy (within the first three months of pregnancy and continue until birth).However, among the total women, only 14 % had attended in the first trimester and the majority (41%) had attended in the last trimester as indicated in table 7 below.

4.6 Amount of ANC visit

In addition to the above recommendation , 12 to 13 antenatal visit is beneficial in protecting adverse consequence during pregnancy (CSA,2005:113) .However, this study found out that only 22 % of women made four or more pregnancy checkups and the majority of women (45%) made 2-3 times visit to health professionals.

Table 7: Use of ANC by months and number of visits

Months and Number of visits	Frequency	Percent
ANC use by month		
1-3 month	23	13
4-6 month	68	40
7 and above	72	42
Do not know	9	5
Number of visits		
Only 1 time	40	23
2-3 times	78	45
4 and more times	37	22
Do not know	17	10
Total	172	100

4.7 Service obtained during ANC Visit.

Women who attended ANC in the five years preceding the survey were asked whether their blood pressure is measured, whether their weight is measured, whether urine analysis and Blood checked for intestinal parasite. Accordingly, the majority of women (83.2%) had got weight measure. On the contrary, only 19% of women had their blood checked for intestinal parasite as indicated in the following table.

Table 8 : Services obtained during ANC visit

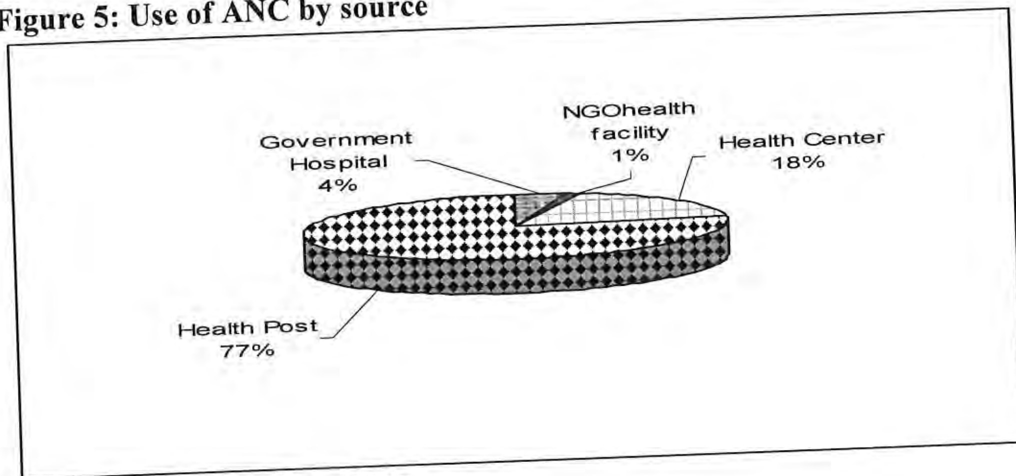
Service Obtained	Yes	NO	Total
Weight Measured	143(83.2%)	29(16.8%)	172(100%)
Blood pressure measured	73(42.8%)	99(57.2%)	172(100%)
Urine Analysis	20(11.6%)	152(88.4%)	172(100%)
Blood checked for intestinal parasite	19(11%)	153(89%)	172(100%)

Source: own survey Data, 2007

4.8 Use of ANC by source

In addition, among women who get ANC from health professionals' information was collected to know where they get ANC .Accordingly, 77%, 18%, 4% and 1% of women had attended from health post, health center, government hospital and NGO health facility respectively.

Figure 5: Use of ANC by source



Source: own survey Data, 2007

V. FINDINGS FROM BINARY LOGISTIC REGRESSION

This research was basically designed to investigate the impact of distance on the use of ANC services and assess the use of the service when distance increases. Since distance is a single variable, its impact is assessed in relation to other possible determinants of ANC usage. As a result, three different models were used to show any variation in the utilization of the service as distance increases. From the point that the international recommendation for access is a distance of five kilometer radius from the nearest health facility, attempt is made to examine any variation in the use of the service in women found in less than five kilometer radius and those women found above five kilometer radius. Second, a ten kilometer radius from the nearest health facility is recommended as accessible in the Ethiopian context. For this reason, an assessment is made to identify any variation in the use of the service comparing women located within a ten kilometer radius from the nearest health facility and those women found above ten kilometer radius. Lastly an overall model is built up to identify any variation in the utilization of the service in women located within five kilometer radius, between five and ten kilometer radius and above ten kilometer radius from the nearest health facility.

5.1 Assessing Multicolinearity

Since an independent variable can affect another independent variable, which again can produce a deceiving result, multi colleniarity is assessed in the variables which are suspected to have such characteristics. Accordingly, a value of less than zero indicated that the association between two variables is negative i.e., an increase in one variable results in a decline in the other variable. A positive value indicated that an increase in one variable results in an increase in the other

variable. A zero value indicated no association between variables(Hubert and Blalock.1988:397). In this particular study, education of women is negatively associated with husband's education.

Table 9: Correlation Matrix

Variable		Age (25-34)	Age (35-49)	2-3 birth	4-5 birth	6 and more births	Husband education	decision making power	Education of women
Constant		-.066	-.093	-.699	-.540	-.498	-.354	-.208	-.184
Age	(25-34)	1.000	.542	-.153	-.418	-.503	-.088	-.010	.069
	(35-49)	.542	1.000	-.077	-.293	-.537	.027	-.027	.121
Parity	2-3 births	-.153	-.077	1.000	.626	.602	.081	-.139	.070
	4-5 births	-.418	-.293	.626	1.000	.689	.022	-.140	-.001
	6 and more births	-.503	-.537	.602	.689	1.000	.066	-.129	-.029
Husband education		-.088	.027	.081	.022	.066	1.000	.033	-.263
Decision making power		-.010	-.027	-.139	-.140	-.129	.033	1.000	.060
Women Education		.069	.121	.070	-.001	-.029	-.263	.060	1.000

Source: own survey result, 2007

Therefore, it is possible to include both variables in the model at a time. However, the level of women's education is positively associated with decision making power. But there is a weak correlation, a value less than 0.5(in this case .084). Therefore, again it is possible to include both variables in a model at a time. There is also a weak negative relation between women's age life time birth (parity).

5.2 Findings in Population found within Five kilometer Radius and above five kilometer radius from the nearest Health Facility.

In this distance category, education of women and husband education and women decision making power are found to be positively related with the use of the service as indicated in table 10 (β value). Moreover, it was found that the difference between women with no education and primary and above education in the use of ANC was statistically significant (as $p<0.05$). The odds ratio (exp β) indicated that women with primary education are 3.5 times more likely to use the service .Like wise, there is a statistically significant variation in the use of the service in women with high decision making power and low decision making power (as $p<0.05$).The propensity of women with higher decision making power to use ANC is more than three times higher than women of low decision making power. In this category, distance, parity and age of women are associated negatively with the utilization of the service. There is statistically significant difference in the use of the service as one move from population group found less than five kilometer to that population found above five kilometer radius from the nearest health facility. In this study, there is no statistically significant variation in the use of the service comparing women with only one child and women with five and less births. However, it was found that there is a statistically significant variation in the use of the service with women of six and more births. It was also found that there is no significant variation in the use of the service taking women age 15-24 as a reference category and comparing it with women aged 25-34.However, there is a statistically significant variation in the use of the service considering women aged 35-49 in this case women aged 15-24 are more users of the service.

In this and all other models to be discussed, ethnicity and religion are not included in the model because the largest proportion (more than 95%) is concentrated to one category and does not allow for any comparison as indicated in table 2.

5.3 Findings in Population found within ten kilometer Radius and above ten kilometer radius from the nearest Health Facility

Similar to the above findings, in women that are located at less than ten kilometer and above ten kilometer radius, level of education, husband education and women's decision making power are positively related to the use of ANC services. The result depicts that there is a significant difference in the use of ANC with women's level of education. Women with some primary and above educational level are more than three times more likely to use the service than women with no education at all. In addition there is a significant variation in the use of ANC with the level of women's decision making power. Women with high decision making power are eight times more likely to use ANC than women with lower decision making power.

Similar to other studies, the use of ANC is negatively related with distance, parity and age at last birth. As indicated in table 11, there is a significant variation in the use of ANC with an increase in distance from women located at a distance of less than ten kilometer radius to women located at a distance of above ten kilometer radius from the nearest health facility. Moreover, there is a significant difference in the use of ANC with an increase in parity. As indicated in table 10 of model 2 ANC declines with an increase in life time birth. In this and the model discussed earlier age is negatively related with the use of ANC the difference with the reference category is significant only at the last age group (35-49).

5.4 An Overall Model

The third model is constructed basically to examine any variation in the utilization of ANC within the three distance categories. Accordingly, distance, age of women and parity are found to be negatively related to the use of the service (as indicated in β) and education of women ,her decision making power are found to be positively related to the use of the service. Similar to the above finding, there is no statistically significant variation in the use of the service comparing women aged 15-24 with 25-34.However, there is a significant variation with women aged 35-49.Similar to the previous finding (model 2), this model depicts the decline of ANC utilization with an increase in parity.

There is a statistically significant difference ($p < 0.05$) in the use of the service when one take less than 5k.m as a reference category and comparing it with women located above ten kilometer radius. However, there is no significant variation in the utilization of the service with women located between five and ten kilometer radius.

Similar to the two models discussed earlier, education also created a statistically significant variation in the use of the service. Women with some primary and above education are 3.8 times higher in the use of the service than women with no education.

Table 10: Parameter Estimate for the Binary Logistic Regression Model Using the Selected Predictors

	Model 1			Model 2			Model 3		
Variables	**β**	**S.E.**	**Exp(β)**	**β**	**S.E.**	**Exp(β)**	**β**	**S.E.**	**Exp(β)**
Age at last birth									
15-24 years [RC]			1.00			1.00			1.00
25-34 years	-0.39	0.26	0.68	-0.32	0.26	0.72	-0.31	0.26	0.74
35-49 years	-0.74	0.37	0.48*	-0.8	0.38	0.45*	-0.8	0.39	0.45*
Women Education									
Illiterate [RC]			1.00			1.00			1.00
Literate	1.27	0.25	3.56**	1.35	0.25	3.87**	1.34	0.25	3.82**
Husband Education									
Illiterate [RC]			1.00			1.00			1.00
Literate	0.19	0.2	1.21	-0.12	0.21	0.89	-0.56	0.21	0.95
Parity									
1 birth [RC]			1.00			1.00			1.00
2-3 births	-0.55	0.3	0.58	-0.63	0.31	0.53*	-0.61	0.31	0.54*
4-5 births	-0.63	0.35	0.53	-0.69	0.35	0.50*	-0.67	0.36	0.51*
6 and more births	-0.82	0.38	0.44*	-0.85	0.39	0.43*	-0.86	0.39	0.42*
Decision making									
Low [RC]			1.00			1.00			1.00
High	1.24	0.2	3.46**	2.15	0.24	8.61**	1.97	0.26	7.19**
Distance in KM									
Less than 5 [RC]			1.00						
5 and above	-1.36	0.2	0.26**						
Distance in KM									
Less than 10 [RC]						1.00			
10 and above				-2.22	0.28	0.11**			
Distance in KM									
Less than 5 [RC]									1.00
5-10							-0.46	0.25	0.63
10 and above							-2.3	0.29	0.10**
Constant	-0.48	0.29	0.62	-0.88	0.28	0.42*	-0.67	0.31	0.51*

N=806   * P<0.05   ** P<0.01

RC=Reference Category

VI DISCUSSION ON MAJOR FINDINGS

Pregnant Women are generally recommended to attend Antenatal care services for reasons like screening, identification and referral with risk factors. However, as previously documented elsewhere in the country, this study shows that the coverage of antenatal care services is very low in Dendi Wereda of West shoa zone. Only about 21.3 percent of women received ANC, in the five years preceding the survey. Such levels of service coverage are considered low even when we compare it with the country total (with ANC rate 28 %) or Oromia (ANC rate of 25%) region where the study area is found (CSA and ORC Macro, 2005:111).

Among the different reasons mentioned by women that trigger them from the utilization of ANC service, lack of interest to use the service, lack of knowledge where to get the service and financial constraint were mentioned by some respondents. In addition, respondents responded that quality of the services provided deterred them from using ANC.

Different studies indicated that distance from the health facility is the major reason for not accessing antenatal care services (Gesler and Meade 1988 as cited in Lin, 2002) .Also in this study, physical distance create a significant variation in the use of the service among women located at less than five kilometer radius and those women located above five kilometer radius from the nearest health facility. On the other hand, a Plan for Accelerated and Sustained Development to End Poverty (PASDEP) in Ethiopia proposes establishment of primary health care facilities to reach the target of one low-level health facility within 10 km for almost all of the population by 2010. On the contrary, the international standard for access is a distance of five kilometer radius. This study is also an important step to confirm such a variation in the utilization

of the service only comparing population group found below five kilometer and above five kilometer radius.

Similarly, there is a significant variation in the utilization of ANC among women located above ten kilometer radius from the nearest facility and among women located below ten kilometer radius. With this regard, the health policy is, therefore, a good step to narrow the gap in the utilization of the service which is created by distance.

The third model in this study is basically constructed to depict whether Ethiopia should accept the international standard for access or not .In this study ,there is no significant variation in the utilization of ANC services in women located within five kilometer radius and those women located between five and ten kilometer radius. This indicates that the current strategy adopted by the Ethiopian government to increase the level of ANC utilization by constructing health facilities within a ten kilometer radius is really the right strategy. In addition, the role played by health extension workers who along with personal and environmental hygiene provide maternal and child health care is pivotal in narrowing the gap created as a result of distance above ten kilometer radius from the nearest health facility.

Furthermore, even if health extension workers have identified pregnant women, the belief that pregnancy does not normally require medical attention is keeping many women from using the services. If this continues, workers cannot identify problem pregnancy to prevent emergencies. The other problem is that, even if it doesn't related to her pregnancy, for the sake of her own

health and the health of a child, women need medical attention for any illness or complication which is virtually unknown in the rural community (World Bank,1996:93).

Since distance is a single variable, the study has identified several other factors that have important influence on utilization of antenatal care services in the wereda. These include, level of women's education and women's decision making power .Considering the consequence, i.e. life long pain, disability or death, that comes as a result of non use of ANC Women with no formal education are at a greater risk than women with no education .Most of these findings are consistent with previous studies (Yared and Asnaketch, 2002) and (Mesganaw, 1992).There are many explanations given with regard to education as a key determinant of ANC use. To mention some, education is likely to enhance female autonomy so that women develop greater confidence and capability to make decisions about their own health (World Bank, 1996). Nowadays, the spread of women education is an issue of extraordinary importance in the less developed countries (CSA, 2001: 12). In Ethiopia, according to PASDEP, it is the major motto of the government to provide education service for all children who are ready for schooling by the year 2015 (MOFED, 2002).This implies that the future mothers will be in a better position to access ANC than the current mothers.

Further more, information was also gathered to determine the level of women's empowerment. This is because the degree of autonomy in decision making determine access to the outside world. Women are frequently forbidden to travel alone which has a profound implication on access to health care. The money they earn, the dwellings in which they are living are not under their control. In this study, it was found that a very small proportion of women (33.4%) had high

decision making power and the rest low. On the other hand, the multivariate analysis in this study confirms that women's decision making power has an affirmative impact on the utilization of the service. Therefore, much has to be done to minimize the risk that otherwise will come by bringing women to the front line. Actually, after 1995 the government of Ethiopia has shown a great commitment by facilitating conditions conducive to the speeding of equality between men and women; so that women can participate in the political, social and economic life of their country on equal terms with men and ensuring that their right to own property is respected. And that they are not excluded from the enjoyment of the fruits of their labor and from performing public functions and being decision makers (Abdu, 2006). However, percent of women who participate in the decision making process is very low in this study that demands special focus particularly to rural women.

With respect to the effect of parity on the utilization of ante natal care, the results appear to be consistent with most studies done elsewhere (Yared and Asnaketch, 2002, Adekunle, et al.1990, Mesganaw, 1992).It is indicated that women are significantly more likely to use Antenatal care services for their first child than later children. One possible explanation with regard to this is that women whose first pregnancy is uncomplicated are usually more likely to give up visiting health facilities for their subsequent pregnancy. The other possible explanation with this regard as discussed in the literature is a great responsibility of older woman within the household including child rearing (Adekunle, et al., 1990: 3)

In addition, there is a decline in the use of ANC when age of mothers increase. However, taking women in the age group 15-24 as a reference category, the variation is significant in the last age group, i.e. age 35-49.

VII SUMMARY, CONCLUSION AND RECOMMENDATION

7.1 SUMMARY

Despite its proximity to the capital city of Ethiopia, the overall coverage of ANC in Dendi Wereda is found to be 21.3 percent which is below the regional average (25%). In addition to the lower utilization rate, only 14 percent of women made their first visit to the facilities in the first trimester (from the first to the third months of pregnancy) and 21.1 % made only four or more visit even if a minimum of four ANC visit is recommended.

The multivariate analysis in this study indicated that there is statistically significant difference in the use of the service as one move from population group found less than five kilometer radius to that population found above five kilometer radius from the nearest health facility. Generally, this confirms the international standard for accessibility. Second, a comparison was made to assess whether the current strategy adopted by FDRE is conducive to the utilization of ANC. This research found that there is a significant variation in the utilization of ANC among women located below ten and above ten kilometer radius from the nearest health facility. This finding is, therefore, an important step to confirm the strategy adopted by the government as moving on the right direction. Third, an overall model was built up to investigate whether Ethiopia should adhere to the international standard for access(locating facilities within a ten kilometer radius).This research found that there is no statistically significant variation in the use of ANC whether women are located below five kilometer radius or located between five and ten kilometer radius.

Education of women and her decision making power are found to be positively related with the use of Antenatal care services. Moreover, it was found that there was a significant difference between illiterate and literate women in the use of ANC .Literate women are more than three times higher to use ANC service than illiterate women .Like wise, there is a statistically significant variation in the use of the service in women with high decision making power and low decision making power .The propensity of women with higher decision making power to use ANC is more than three times higher than women of low decision making power.

It was also found that there is a statistically significant variation in the use of the service with an increase in life time births. One possible explanation given with regard to this is that women whose first pregnancy is uncomplicated are usually more likely to give up visiting health facilities for their subsequent pregnancy. The other possible explanation is a great responsibility of older woman within the household including child rearing.

It was also found out that there is no significant variation in the use of the service taking women age 15-24 as a reference category and comparing it with women aged 25-34.However, there is a statistically significant variation in the use of the service considering women aged 35-49 in this case women aged 15-24 are more users of the service.

7.2 CONCLUSION

In conclusion, this study demonstrates that the utilization of antenatal care services is inadequate in Dendi Wereda. This study also shows that the most important factors affecting accessibility to ANC services in the wereda are demographic, social and geographic in nature. All these determinants however are seen separately in different distance category to see the relative importance of each variable. This is because in the situation of scarce resource, an identification of such variation enables policy makers to focus on specific area of intervention.

First, many other studies indicate that physical distance to the health facility is an important determining factor that affects accessibility. This finding also confirm that ,in rural Ethiopia, where the majority of the population travel on foot to attend the nearby facility, locating facilities in a ten kilometer radius is enough in bridging the gap created as a result of distance. Therefore, accessibility in rural Ethiopia should not necessarily be seen in line with the international standard for access, i.e. locating facilities within five kilometer radius.

Second, studies in developing countries in general and in Ethiopia in particular, have consistently documented a strong relation ship between mother's education and health care. The more educated a woman is, the more likely it is that her husband allows her to decide whether and when to seek health care for her self. Educated women are also more likely to seek care earlier at times of illness. This changes are not the direct result of health education acquired in school (although the potential for such education as source of change is obviously great), but rather of the sense of empowerment offered by schooling. This is because attending school is the first step in a process of familiarization with the modern outside world. The more educated a woman is the

more likely she is to want and be able to obtain preventive and curative health care for her children and herself. Similarly, in this study, education of women is found to have an important impact on the use of ANC services suggesting that improving educational opportunity for women may have a large impact on improving utilization of such services. With the current effort undertaken by the government, there is a great prospect in the future to increase in the utilization of ANC rate.

7.3 RECOMMENDATIONS

- Health program should emphasize on educating women in the community to inform all the benefits that will be obtained from using ANC and where to get the service. Besides, the inhabitants should be aware that ANC is free of charge.
- The quality of the service provided should be improved by discussing the issue with the clients and by adhering to universally accepted standard for equipment, drugs and staff qualifications
- Age of women should be taken into consideration in the campaign of increasing ANC by giving top priority to women aged 35-49.
- Life time birth a woman had should be taken into consideration in the campaign of increasing ANC utilization thereby focusing on women with high birth order.
- Parents should be aware of the benefits of female education on the change of health status of the future mothers. This is because education resulted in the empowerment of women.
- The current endeavor by the government to narrow the gap in accessing ANC services by locating facilities within a ten kilometer radius should be strengthened.

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Appendix-1 Listing form for Selecting Eligible Respondents For the study on The Impact of distance on accessing antenatal care services.

page___of___

Section I:-Area Identification

Region	Zone	Wereda	Kebele	Name of locality	Locality code

Section II: - Listing form for selection of mothers in the household

Household serial number	Name of household head	Was there any birth in the last five years? 1 Yes 2 No(end)	Is the mother alive? 1 Yes 2 No(end)	What is the marital status of the mother? 1never married(end) 2currently married 3 widowed(end) 4 divorced (end) 5 separated(end)	Eligibility *Circle the household that is eligible for the study*

Consent form

Hello. My name is ____ and I am collecting this data to Hibret Bireda who is a graduate student in Addis Ababa University. We are conducting a survey about the health of women .We would very much appreciate your participation in this survey .I would like to ask you about your health .This information will help the government to plan health services. Whatever information you provide will be kept strictly confidential and will not be shown to other persons.

At this time, do you want to ask me anything about the survey?

May I begin with the interview now?

APPENDIX-2-MAIN QUESTIONAIRE

SECTION I - AREA IDENTIFICATION

001	Region____________	☐☐
002	Zone____________	☐☐
003	Wereda____________	☐☐
004	Kebele____________	☐☐
005	Locality name ____________	☐☐☐
006	Name of household head__________	☐☐☐
007	Name of the Respondent__________	☐☐☐
008	Distance in kilometer______(To be filled by the researcher)	☐

SECTION II- DEMOGRAPHIC AND SOCIAL CHARACTERSTICS OF THE RESPONDENTS

101	How long have you been living Continuously in (name of current place of residence)? If less than one year, record '00'years.	Year…………… ☐☐ Always…………… 95skip to103
102	Just before you move here, did you live in a city, in town, or in countryside	City……………………………… 1 Town…………………………….. 2 Country side……………………… 3
103	In what month and year were you born?	Month…………………… ☐☐ Don't know month…………..98 Year………………… ☐☐☐☐ Don't know year …………..9999
104	How old are you?	Age in completed years ☐☐
105	How old were you when you had your last child?	Age in completed years ☐☐
106	Have you ever attended formal school?	Yes………………… 1 No…………………….. 2 skip to108

107	What is the highest grade you completed?	Grade…………………… ☐☐ Tech. /voc. Certificate... ………… 13 University/collage diploma ……. 14 University/collage degree or higher…15
108	What is your religious affiliation?	Orthodox………………………… 1 Catholic……………………… 2 Protestant………………………… … 3 Moslem…………………………………4 Traditional………………………………5 Other--6 (specify)
109	What's your ethnicity? Record the major ethnic group	----------------------------------☐☐ Oromo=1Amhara=2,Tigre=3,Others=4

Last time you told me that you have given birth in the five years period. I would like to ask some more questions about your birth(s).

110	Do you have any son or daughters to whom you have given birth who are now living with you?	Yes ……….. 1 No…… 2skip to 112
111	How many sons live with you? And how many daughters live with you? If none record '00'	Sons at home…… ☐☐ Daughters at home… ☐☐
112	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	Yes……………..1 No…………….. 2 skip to 114
113	How many sons are alive but do not live with you? And how many daughters are alive but do not live with you?	Sons elsewhere………… ☐☐ Daughters elsewhere…… ☐☐
114	Have you ever given birth to a boy or girl who was born alive but later died?	Yes……..1 No ……..2 skip to 116
115	How many sons and daughters have been died?	Sons ☐☐ Daughters ☐☐
116	Sum answers 112+114+116 and enter total	Total…… ☐☐

<table>
<tr><td>117</td><td>What is your house hold size?</td><td>☐☐</td></tr>
<tr><td colspan="3">Now I would like to ask you some questions about the health Care for yourself while pregnant for your last child</td></tr>
<tr><td>201</td><td>Did you see any one for antenatal care for the recent child birth?</td><td>Yes................1
No.................2 skip to 203</td></tr>
<tr><td>202</td><td>Whom did you see?
(There is a possibility of obtaining more than one answer)</td><td>Health prof...1skip to206
Other person trained traditional birth attendant ...2
Untrained trad .birth attendant.................... 3
Comm. health agent 4
Health extension worker.............................5 skip to206
Other.. 6
(specify)</td></tr>
<tr><td>203</td><td>Have you wanted any modern care at times of your last pregnancy</td><td>Yes................1
No.................2 skip to 212</td></tr>
<tr><td>204</td><td>Did you know where to go to get modern health care?</td><td>Yes.....................1

No.......................2 skip to212</td></tr>
</table>

205	What was your reason for not using modern care?	My husband /partner did not allow to use………… 1 because the source was too far………… …………2 I had no trust in its quality?...................................... 3 I had many responsibility in the household……… 4 My religion(culture) did not allow me to do so…. 5 Lack of transportation…………………………….. 6 Financial constraint………………………………... 7 Others specify……………………………………… 8

Interviewer:-For those who use trained or untrained traditional birth attendant (Question202 code 2, 3, or 4 or 6) Skip to 211

206	Where did you receive antenatal care for this pregnancy? Probe to identify the type of source and circle the appropriate code. ____________________ (name of place)	Gov.hospital….. 1 Gov clinic…….. 2 Gov.health center…… 3 Gov.health post……… 4 Other public………….. 5 (specify) (NGO) health facility…… Clinic………………… 6 Private Med. ------------…… 7 (specify) Other-----------------… 8 (specify)
207	What time does it take for you on foot to arrive at the nearest health facility?	Hour [ ][ ] Minute [ ][ ]
208	As part of your antenatal care, do you have the habit of attending care in the nearest health facility?	1 Yes skip to210 2 No

209	What is your reason for not attending the nearest health facility? If more than one reason ask the most	Quality of the service is poor....1 The health providers are rude 2 There is no female health Provider.......................... 3 Other .... 4 (Specify)
210	As part of your antenatal care during your pregnancy, were any of the following done at least once? Were you weighted? Was your blood pressure measured? Did you give a urine sample? Did you give a blood sample?	Yes No Weighted....... 1 2 BP............... 1 2 Urine.......... 1 2 Blood......... 1 2
211	How many months pregnant were you when you first received antenatal care for last pregnancy?	Months......... ☐☐ Don't know............ 98
212	How many times did you receive antenatal care during last pregnancy?	Number of times...... ☐☐ Don't know............98
213	During the last pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth?	Yes...........................1 No........................... 2 (Skip to216) Don't know.............. 8
214	During last pregnancy, how many times did you get this tetanus injection?	Times................... Don't know
215	Check 214	2 or more times ☐ other ☐ (skip to 217)
216	At any time before last pregnancy, did you receive any tetanus injection?	Yes.............. 1 No..................2 skip to218 Don't know...... 3 skip to218
217	Before last pregnancy, how many times did you get a tetanus injection? If 7 or more times, record '7'	Times..................... ☐ Don't know................8
218	During this pregnancy, were you given or did you buy any iron tablets?	Yes........................1 No..............2 skipto220 Don't know... 8 skipto220
219	During the whole pregnancy, for how many days did you take the tablets? If answer is not numeric, probe for approximate number of days.	Numbers of days ☐☐☐ Don't know...................998
220	During last pregnancy, did you have difficulty with your vision during daylight?	Yes..................................1 No................................. 2 Don't know........................3

221	During this pregnancy, did you suffer from night blindness [use local term]?	Yes.................................1 No.................................. 2 Don't know.................... 3
Section 3 Work Status ,Decision Making , Household Income and husband education		
301	Have you done productive work in the last 12 months?	Yes..............1 skip to303 No.............. 2
302	What is your reason for not working?	Going to school/studying ....1 Looking for work..... .... 2 Retired .... 3 Too ill to work .... 4 Handicapped, cannot work 5 House work/ child care ... 6 Other---------............. 96 (specify)
303	What is your household average annual income?	From own agriculture ☐☐☐☐ From household enterprise other than agriculture ☐☐☐☐ Gift and remittance ☐☐☐☐ Wages, salaries ,bonus overtime and allowance ☐☐☐☐ Pension or other social security benefit ☐☐☐☐ Other source ☐☐☐☐ Total ☐☐☐☐
304	***Interviewer: check 303Total***	<600..............................1 600-999............................2 1000-1399.........................3 1400-1999.........................4 2000-2599.........................5 2600-3400.........................6 >3400........................... 7
305	Does your husband /partner ever attend formal schooling?	Yes............... No... .... skip to307

306	What was the highest grade he completed?	Grade……………………..☐☐ Tec./voc. Certificate ……… 13 University/collage diploma...14 University /collage- degree ……………………. 15 Don't know…………….. 95
307	Who usually decide about making major household purchases?	Mainly Respondent ………..1 Mainly Husband/partner…. 2 Mainly Respondent and husband/partner jointly……. 3 Mainly Relatives………….. 4 Other ……………………….5
308	Who usually make decisions about health care for yourself?	Mainly Respondent……… 1 Mainly Husband/partner…. 2 Mainly Respondent &husband/partner jointly ………….. 3 Mainly Relatives………….. 4 Other ……………………. …..5
309	Who usually make decisions about visits to your family or relatives?	Mainly Respondent……… 1 Mainly Husband/partner…. 2 Mainly Respondent &husband/partner jointly ………….. 3 Mainly Relatives………….. 4 Other ……………………. …..5
310	Who usually make decisions about purchase for daily household needs?	Mainly Respondent……… 1 Mainly Husband/partner…. 2 Mainly Respondent &husband/partner Jointly ………….. 3 Mainly Relatives………….. 4 Other ……………………. …..5
311	At the time you became pregnant for your last child, did you want to become pregnant <u>then</u>, did you want to wait until <u>later</u>, or did you not want to have any (more) children at all?	Then………………………… 1 Later………………………… 2 Not at all………………….. …3

DECLARATION

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

Name Hibret Bireda

Signature

Date 14/08/07

This thesis has been submitted for examination with my approval as university advisor.

Eshetu Gurmu (Ph.D) 14/08/07

Advisor Signature Date