Mekelle University

College of Business and Economics

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Determinants of Demand for Health Care Services in Mekelle City

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A Thesis Submitted to Mekelle University, College of Business and Economics, Department of Economics in Partial Fulfillment of Masters of Science Degree in Economics

(Specialization of Development Policy Analysis)

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Statement of Declaration

This is to declare that this thesis work entitled **"Determinants of Demand for Health Care Services in Mekelle City"** submitted in Partial Fulfillment of the Requirements for the award of the degree of MSc. in Economics (Development Policy Analysis) to the College of Business and Economics, Mekelle University, through the Department of Economics is an authentic work carried out by me. All sources of materials used for this thesis have been duly acknowledged.

Name of the student: **Belay Mohammed**

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CERTIFICATION

This is to certify that this thesis "**Determinants of Demand for Health Care Services in Mekelle City"** submitted in Partial Fulfillment of the Requirements for the award of the degree of MSc. in Economics (Development Policy Analysis) to the College of Business and Economics, Mekelle University, through the Department of Economics, done by **Belay Mohammed** (ID N<u>o</u> CBE/PR 097/04) is an authentic work carried out by under my guidance. To the best of our knowledge the matter embodied in this thesis work has not been submitted earlier for award of any degree or diploma.

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Acknowledgment

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Acronyms

BPR - Business process reengineering

CSA-Central Statistics Agency

FIML -Full information maximum likelihood

FMOH -Federal ministry of health

HSDP - Health Sector Development Program

IIA -Independency of irrelevant assumption

LDCs -Least developed countries

LIML -Limited information maximum likelihood

MNL - Multinomial logit

NGOs -Nongovernmental organizations

NMNL -Nested multinomial logit.

PHCU -Primary health care unit

RHBs -Regional health bureaus

UN -United Nations

WB -World Bank

WHO -World health organization

Abstract

This study examines the factors that associated with the decision of consulting medical treatment and the choice between health care service providers using primary data collected from Mekelle city. While household level factors expected to affect the decision to consult medical treatment, patient and provider specific factors included as potential determinants of choice among different health care service providers. The nested multinomial logit NMNL) estimated using full information maximum likelihood (FIML) technique that estimates both levels of decisions simultaneously. In the upper level of the model, education of household head and number of days the patient individual suffered positively and significantly affect the decision to consult modern medical care. However, number of children in the household negatively and significantly affects the decision to consult modern care. In the lower level of the model, the probability of consulting both public and private health care increase with log of consumption and quality of treatment, but decline with patients age. While patients' primary education increases the probability of consulting public provider, secondary and above education increases the likelihood of consulting private care relative to the no-care. Computation of the arc price elasticities shows that elasticities are negative over all prices and income groups. In addition to that, demand is more price elastic at lower incomes and at higher level of prices. Therefore, the result indicates user fees would be regressive in that they would reduce health care services utilization of the poor segment of population than the rich. The low magnitude of price elasticities indicates government has the potential to generate more revenue by increasing user fee, but this measure should be supported by mechanisms that ensure enough utilization among the poor.

Key words: Demand for modern care, Health care provider choice, MNNL, Upper Level model, Lower level model

Chapter One

1. Introduction

1.1   Background

Health is a central to well-being and a prerequisite for successful development. The WHO, the key UNs agency concerned with global health matters defined health as, "A state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity"(WHO, 1947). Developing countries encountered a serious health problem than developed countries especially regarding infectious disease. Every year about 8 million children under the age of five die in developing countries (WHO 2011a). The main source of the death for these children is easily preventable diseases that could be prevented by spending few cents per child. This shows that their real enemy is poverty (M. P.Todaro and S. C. Smith, 2003).Thus, the provision of basic health service is an effective means to achieve goals of poverty reduction. This is because the health level of the population can influence economic progress through affecting the productivity of each worker. For this fact, all countries consider the provision of health service as an important aspect of the socio-economic development of their country.

According to various health status indicators, the Ethiopian population health status is very low. Generally, low life expectancy, high infant, child and maternal mortality, low immunization coverage, and low access to proper sanitation characterize Ethiopia.Under-5 year mortality and maternal mortality rates are very high; 166 per 1,000 live birth and 850 per 100,000, respectively (WHO 2011b). According to the report of Ethiopian Health Sector Development Program IV (HSDP IV, 2010), the major health problems of the Ethiopian population remain largely preventable communicable diseases and nutritional disorders which caused by low per capital income, high rates of illiteracy, inadequate access to clean water and sanitation facilities, and low access to health care services.

Despite major progresses have been made to improve the health status of the population in the last two decades, Ethiopia's population still face a high rate of morbidity and mortality and the health status remains relatively poor. Following changes of government in 1991, the new

government of Ethiopia introduced the health policy that was the first of its kind in the country and was among a number of political and socio-economic transformation measures that taken place. To achieve the objective of the health sector, the government of Ethiopia designed the Health Sector Development Programs (HSDP). This has been a 20-years health development strategy implementing through a series of four consecutive 5-year investment programs (MOH, 2010). The first phase (HSDP I) was initiated in 1996/97. This program had the objectives of increasing access of health care, improving service quality, improving health service management and increasing the participation of private and NGO sectors in health service provision. Moreover, decentralization of the health care delivery system is also considered as a measure to improve health service management and resource mobilization ((MOH, 2010), 2010).

Despite this effort, there is no significant improvement in health service utilization and health care financing aspects as compared to a significant increase in health facility construction. In addition, the participation of the private and NGO sectors has been below expectations as they are concentrated in urban areas (MOH, 2010).

One way of ensuring the effectiveness and sustainability of the programs and policies in the health sector would be the involvement of households in designing such policies and programs. For instance, identifying the factors that determine households demand for health care services could be of vital role in assisting of rational strategies. The utilization of health care services depends on demand factors such as income, cost of care, education, social norms and traditions, and the quality and appropriateness of the services provided. Therefore, interest should not only on merely provision of physical access, but also should ensure that effective utilization of those services among sick group of the population. (M. Lindelow, 2003). By keeping the above in mind, this study concerned with determining the factors that are associated with the decision of seeking medical treatment and the choice of health service providers.

1.2 Health care financing

In most developing countries provision of health care services considered as basic right for all individuals. This perception manifested by highly public subsidized health care systems that provide health care services with zero or little cost. However, insufficient fund for the provision of public health services became a critical problem in many developing countries in the 1980's.

This forced poor countries to adopt structural adjustment program and cost recovery in the provision of public health services. (I.Gupta & P. Dasgupta, 2002).

How to finance and provide health care services for a society is a challenging problem especially in low-income countries. In these countries, government is the main provider of health care services under the objective of ensuring equity in health service provision. In Ethiopia, the situation is the same that the government remains the main provider of health care services. This may partly due to the legacy of the past regime (Tesfaye A., 2003).

In many low income countries the provisions of public health services remain very low due to mainly insufficient fund. To overcome this problem in the 1980's and 1990's many developing countries especially those in Africa introduced fees for the provision of public health services as means of cost recovery to sustain the provision. In Ethiopia the history of cost recovery in public health care system was dated back to the early 1950s (Fairbank, 2001) as cited by Amarech G., 2007.

The World Bank through structural adjustment program advised the low-income countries to cut their expenditure on health care and other social services by introducing cost recovery. The World Bank and International Monetary Fund aggressively promoted cost recovery and used cost recovery as a condition for new loans and debt relief. In 1998, 75 percent of World Bank projects in sub Saharan Africa included cost recovery as a condition(Emmett,2004) as cited by Amarech G. Cost recovery will be used as an additional fund for the government's effort in the expansion of health service provision and to improve the quality and efficiency of the existing public health care providers.

Ethiopia has a critical shortage in the health care spending. In Ethiopia between the period 2004/05 and 2007/08 the total health spending increased from about USD 522 million in to about USD 1.2 billion. The per capita health spending also increased from USD 4.5 in1995/96 to the level of USD 16.10 in 2007/08. Even though, the health care spending increased both in gross amount and in per capita level; it is still low compared to the sub Saharan African average (MOH, 2007). In recent years cost sharing by the private users becoming the main source of total public health expenditure. The private share from the total health expenditure reached 62% from its level of only 16 % during 1986(Damen H. M., 2001).

The main argument against user fees is based on possible regressive impact on utilization of health services. According to Mawuli G. (2011), the user fees reform did not make any significant change on revenue but rather alienated people from the public health care system. This debate can be meaningfully analyzed in terms of the welfare implications of user fees, using a framework of utility maximization and estimating demand functions for health care (I. Gupta & P. Dasgupta, 2002). Keeping this in mind, this study focused to answer the possible impact of user fee on health care demand in the case of Mekelle city.

1.3 Health System Organization

In Ethiopia, the modern health care system characterized by the domination of public and private health care system. The responsible bodies in provision public health care are the ministry of health and regional health bureaus, which operates hospitals, health centers, and health posts.

According to the recently implemented BPR (business process reengineering), the health sector introduced a three-tier health care delivery system. The first level of a "Woreda" (District) health system comprise a primary hospital (with population coverage of 60,000 to 100,000 people), health centers (1/15,000-25,000 population) and their satellite Health Posts (1/3,000-5,000 population) that are connected to each other by a referral system (MOH, 2010). The primary health care unit (PHCU) formed by health center and health posts, and each health center has five satellite health posts.

The second level in the tier is a general hospital with population coverage of 1 to 1.5million people; and the third a Specialized Hospital that covers population of 3.5 to 5 million.

The Ethiopian Health care System is augmented by the rapid expansion of the private for profit and NGOs sector. The private for profit and the NGOs play a crucial role in boosting the health service coverage and utilization. The decision making process in the health care system share among the Federal Ministry of Health, Regional Health Bureaus and Woreda Health Offices. The FMOH and the RHBs focus more on policy matters and technical support while Woreda Health Offices have basic roles of managing and coordinating the operation of a district health system under their jurisdiction.

1.4   Statement of the problem

Health is a main target of all households and governments in all countries. The health status of the population is the reflection of the level of economic development of the country. In the same way, the economic progress of the country influenced by the health status of the population. Hence, the two are interdependent as people are both the driving force and final targets of socio-economic development. For this reason, the provision of health service becomes an important aspect of the socio-economic development of a country. Many studies (such as M. Lindelow, 2003,Kasirye et al.2004, Mwabu et al. 2004,I. Barnett et al.2010, and Mawuli G., 2011) indicate that health service interventions are important in the development of human resources and healthy society that contribute positively to the development of the economy.

Most developing countries consider promoting health care utilization as an important policy concern for two reasons; one is to improve health outcomes and the other is to meet international obligations to make health services broadly accessible. However, many policy and research initiatives focused on improving physical access rather to focus on both physical access and the pattern of health care service utilization. For this reason, not enough is understood about the factors that associated with low level of utilization among certain groups despite improved physical access (M. Lindelow, 2003). Physical access by itself is not an end and to achieve the target of healthy population it should accompanied by enough utilization among sick groups.

Ethiopia is among countries with lowest health status in the world. In addition to low level of health status, the problem in Ethiopia and most developing countries is the low level of health care utilization. This indicates the need to assess consumer behaviors that may affect the demand for health care besides the availability of low or free provision of health care services (Tesfaye A., 2003). Some findings suggest that demand-side barriers play a crucial role as the supply side factors in preventing patients from obtaining treatment. However, relatively little attention is given by policy makers and researchers to ways minimize their effect (T. Ensor and S. Cooper, 2004).Early policy and research initiatives focused on the need to improve physical access through an expansion of the network of facilities. However, a growing literature on health care demand has pointed out that individuals are not passive recipients of health services; rather they make active choices about whether or not to make use of provided health care services (M. Lindelow, 2003).

There are government efforts in Ethiopia to address problems facing the health sector with a bias on the supply side such as construction of new health centers. Howeve, we need to think beyond supply and consider individuals behaviour during illness. Further we need to understand the nature and the magnitude of the factors that affecting their demand for medical care (Kasirye et al. 2004). Therefore, it is important to identify the factors that determine the demand for health care services. As the policy priority area is improving the health status of the population, we should investigate in different factors that directly and indirectly influence the demand of the health care services. That is, it necessary to analyze the demand for health care services by identifying the factors that affect individuals' decisions to seek health care services and to choose among different providers (N. Asteraye,2002).

In general, this study is going to answer the following questions. What are the major determinates of demand of the society for medical treatment? What factors determine the choice of medical treatment seekers among different providers of health service? Are the health seeking behaviour differ across the poor and the non-poor? And what is the health seeking behaviour of the other socially vulnerable groups such a women ? By answering theses and related questions, the study provided policy implications that promote the health care utilization within the society that is a key to create healthy and productive society.

1.5   Objectives of the study

1.5.1 General objective
The general objective of the study is to explore the determinants of demand for health care services and show their implication on health care policy.

1.5.2 Specific objectives

- ❖ To assess the health care services utilization patterns of households in Mekelle city.
- ❖ To point out the determinants of demand for health care services.
- ❖ To explore the factors that affects the people's choice towards different health care providers.
- ❖ To estimate price elasticity to see how sensitive the demand for health care is to cost of treatment.

1.6   Significance of the study

Understanding of determinants of demand for health care services would enable policy makers to introduce and implement appropriate incentive schemes that could be used to encourage better utilization of health care services. Thus, the study can contribute some findings that may help policy makers to formulate effective policy for health care system that brings better health care services utilization. In addition, the study might have significant role in giving direction for those who want to undertake further research on the subject matter. In general, the study might have significant importance on provision of information based on stated objectives.

1.7   Scope of the study

Study was focused on determining the factors that are associated with the decision of seeking medical treatment and the choice of health service providers in times of illness by taking sample households from Mekelle city, which is the capital of Tigray regional state. Therefore, the study was limited to Mekelle city household respondents, in which the data was gathered to determine the factors that affect households demand for health care services.

1.8 Limitation of the study

Self-reported illness and first consultation with health care providers are used for this empirical analysis of demand for health care. However, Self-reported illness may produce biased results as the perception of illness may be different for poor and non-poor individuals and perception about a disease affects the choice of health care services and providers. Consumers may consult more than one provider for treatment for the same episode; therefore, analysis based on the first visit to health care provider may not capture the complex decision-making behavior of the people. Moreover, the study used perceived quality (subjective quality) of care, i.e. consumer's assessment of the relative quality of different health care providers as a proxy for provider's quality of treatment. However, consumers may not be able to evaluate the biomedical and technical aspects of modern treatment. Thus, it may not be a correct proxy for quality of treatment. The generalizations and deductions that come from this study may not indicate the whole country. Despite these problems, maximum effort is made to get the relevant information and to come up with a better finding and conclusion.

1.9 Study area

The study was conducted in Mekelle City, the capital of Tigray regional state. The city located 783 km away from Addis Ababa in northern Ethiopia. Total population of the city is estimated to be 273 thousands according to 2007 census. Administratively the town is divided into seven sub administrative units; namely Hawelty, Hadnet, Ayder, Semean, Kedamayweyane, Adihaki, and Quiha.

The city has one teaching referal hospital, two general hospital and nine health centers owned by the government and five general hospitals, 48 clinics (lower,medium and higher including special dental and eye clinics) owned by the private sector. There are also 10 rural drug vendors, 43 drug stores and 5 pharmacies in the city ((Mekelle city health office report,2011).

Chapter Two
2. Literature Review
2.1 Theoretical Review
2.1.1 Health

Health is a component of human capital, which in some recent literature is referred to as health human capital to distinguish it from education human capital. The world health organization (WHO), the key United Nations (UNs) agency concerned with global health matters defined health as, "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity" (WHO, 1947). Conceptually, to be healthy means more than not having disease or infirmity, but to be harmony with oneself and environment.

Health human capital expected to have a positive correlation with other forms of human capital. Healthy individuals, for instance, are on average better nourished and better educated than individuals in poor health. Both health and education increase labor productivity, but the unique feature that differentiate health from education is that health by reducing the time spent in sickness, it increases the total amount of time available to produce money earnings and commodities, as well as the time available for leisure (Grossman, 1972).

2.1.2 Health care

Conceptually health and health care are two distinct subject matters. The basic difference between health and health care is that health care is tradable in markets while health is not. However, health care markets are imperfect. The imperfection arises from the special characteristics of health care (Mwabu, 2007). Arrow to show the distinction between the health and health care he said that "It should be noted that the subject is the *medical-care industry*, not *health*" (Arrow, 1963, p. 940). The distinction is important because in the real world only markets for health care are observed but not for health.

2.1.3 The nature of demand for health care

The generalized framework under welfare analysis can be formulated under the consumer's demand analysis. Generally, demand analysis describes the relationship between quantities of goods and services desired to be purchased and the price charged for good and service, assuming that not all other factors (income level, tastes, needs, and demographic factors, cultural and traditional beliefs) are changed. However, behavior in health market is distinguished by the roles that physical needs and life cycle patterns play in determining demand.

The health care consumption decision is a result of circumstances like infections, accidents and pregnancies, and other health problems. Other reasons for medical consumption decisions related to age and age-sex specific, including the onset of degenerative disease rate in life, immunization in early life and the risk of pregnancy during fertile years for women (Akin et al.1985). Due to this reason, the demand for health, whether preventive or curative is a "derived demand ". This is because health is not only demanded for its own sake, but, also to enable individuals to lower the amount of time lost through ill health which can be devoted to the production of economic activities(Grossman, 1972).

Illness incidence that is the reason for medical care is irregular and unpredictable that makes health care demand is distinct from the demand for other commodities (Mwabu, 2007). According to Mwabu, Consumption of health care, particularly preventive care is often associated with positive externalities. For instance, treatment of a patient with a communicable disease does not only benefit the person treated, but also other persons because they are protected from exposure to disease. This may be one of the basic reasons for subsidization of health care services across countries. In most low-income countries, health care is typically provided by the government free of charge or at very low price, whereas in industrialized countries it is paid for through insurance (Mwabu, 2007).

Demand for a particular type of health care service produced by a given type of supplier is the quantity of that service people are willing and able to obtain as a function of the characteristics attributed to consumers and all the providers. Individuals make choices about medical care. They

decide to visit a health care service when they fall ill, whether to immunize their children and they also decides how often to have checkups. Therefore, by considering the costs and benefits of health care consumptions the individual decides whether to consume medical car or not. This decision may be depends on accumulating advice from friends, physicians and others, weighting potential risks and benefits different health care services and others.

There are two alternative models for describing the way individuals make choices regarding health care services utilization and related decisions. The first approach treats health as one of the several commodities over which individuals have well defined individual preferences and to use orthodox consumer theory to investigate the determinants of demand.

The second approach to analyze healthcare choice was to use an inter-temporal model of consumption decisions and to treat health as stock variable within a human capital frame work. This approach assumes healthcare is demanded to the extent that it improves the stock of health and increases productivity. In fact, the approaches originally pioneered by Grossman (1972) in a model that the demand for medical service is not for service per se; rather it is the demand for "good health".

In developed countries due to the existence of insurance, many health care services has been provided at zero or low monetary prices, and the standard model suggest that demand should be infinite or at least extremely high. This may be the cause for excess demand by some insured individuals that is considered as a problem in many industrial economies. However, in developing countries context under-utilization is generally more of a concern and lack of supply in some rural areas considered as the main cause for under-utilization. But even when health facilities are available utilization rate has been low due different barriers from demand side which related to financial cost of treatment, travelling cost and quality of services. Given these factors the individuals can choose among different health care providers which include public health care, private health care or traditional healer, as well as how often to visit. Knowledge of such demand patterns may also allow policy makers to target services more effectively.

2.1.4 Determinants of Demand for Health Care Services

There are a number of determinants of demand for health care services. In most health care literature, we can find that household characteristics, income and the price of health care services (both direct and indirect cost of care) are the main determinants of health care demand. In most studies, these variables are reviewed as economic, demographic and perceptions of health care need (Tesfaye Arega, 2003).

2.1.4.1 Economic determinants

The economic variables include the direct and indirect cost of treatment and household income. The direct costs of treatment include cash paid for registration, medical examination, drugs and transport. The indirect costs are the opportunity cost of travel and waiting time (usually referred to as barrier to access) to get the required service.

In most health care literature, we can found that price of treatment as an important determinant of demand for health care services. Theoretically, other things being equal, the price of treatment (the direct cost of treatment) should act as an important determinant of usage of health care services. For an individual with a particular health status, change in the price of medical care would affect her (his) demand for consumption of health care or consumption of other goods, and probably both. A surge in the price of health care services could possibly result either a reduction at least in one of the two goods (Consumption of health care or consumption of other goods) or both. If medical care use is not responsive to price change – that is, if it has price elasticity close to zero- the change in price do not affect the demand for medical care. In the situation when medical care is price inelastic a surge in the price of medical care services leads to a relative reduction in consumption of non-medical care services (reduce consumption of other goods). However, in a situation of high price elasticity of demand for medical care services there is a proportionate drop for demand of medical care services, and there is virtually no effect on the demand for other consumption. In most empirical works in third world applications of demand analysis have reached the conclusion that aggregate consumer welfare would be reduced with the imposition of user fees, with the burden of the loss being borne by the poor, although such fees would be useful in generating revenues (I. Gupta & P.Dasgupta, 2002).

The second cost factor is the cost associated with distance traveled to get the service.

Theoretically, other things being equal the closer physical availability of healthcare providers associated with better utilization of medical services. This implies that consumer of medical services usually gives value to the time spent on traveling to and from health facilities. Most literatures in health care demand conclude that distance (the opportunity cost of traveling time) has negative impact on the demand for health care.

The third cost factor is the opportunity cost of waiting time to get to medical services. Akin et al (1985) show that waiting time is not an important factor that determines the demand for health care. However, in a situation where the direct cost of medical services is very low or zero it has a significant role in determining the health care demand. In contrast to the result of Akin et al (1985), Acton (1975:559-61), in a study of the demand for health care using data from New York City Municipal Hospital, found that waiting time and travel time function as price and have negative coefficients in the demand equation. In addition, the study shows that working people and those with higher opportunity cost of time demand less time intensive medical care..

Another important economic variable that may affect the demand for health care is household income. Following the standard micro economic theory of consumer behavior; first, if health has been a normal good, for an individual in a given health state (that is, with a given value of β), health care would be normal as well. That is, other things being equal, a higher income leads to greater demand for health care services. Of course, one may well expect that income and health status as measured by β are negatively correlated, because those with higher income have better access to clean water, housing, sanitation, and the like, so the qualification " other things being equal " is important.

2.1.4.2 Demographic determinants

Demographic factors such as age, sex, family size and family structure of the household are also expected to play an important role in the demand for health care service. According to Ching (1992), in many societies, the perception that women have low economic value in the household leads to their low use of health care services. Levinson (1974) concludes that households allocate scarce food and medical resources away from females in order to ensure an adequate diet and

good health for males. However, empirical support is weak and there is only marginal differences in usage were detected.

In addition to sex, age of individual may also play an important role in the demand for health care services. The incidence of illness varies with age and in same the same way the need for health care varies with age. The frequency of illness may rise with the presence of children and elderly, which in turn the use of health care services. Theoretically, there is a U-shaped relationship between age and health care demand (Akin et al, 1985:92). That is, infants, and the aged would be expected to have a high level of health care demand because children are susceptible to infectious diseases (due to immature immunological system) and degenerative diseases which are common in old age. But this kind of relationship between age and health care demand carries with it no economic significance except to the extent that the very young and the very old are dependent on other people and demand more medical care than other group due to biological factors.

Household size is another demographic characteristic that may explain the demand for health service. Theoretically, it may not be possible to tell the effect of household size on the demand for health care or on the choice of health care providers. That is, since on the one hand in larger household, resources are shared with more people and this may lower the level of nutrition for each member and lower consumption of health care per person. On the other hand, larger families could supply more adults and older children who can supplement household income that will ease the resource constraint and may increase the demand for medical services.

Household structure as a demographic variable may also have an important role in health care demand. The relative degree of authority of the mother may affect the amount of attention paid to maternal and child care as well as the amount of health care expenditure as compared to mother's opportunity cost of using health care services. Very little evidence is available on the effect of family structure on the health care demand. Akin et al (1985) found out that family structure has little effect on the demand for health care.

2.1.4.3 Perception of Need determinants

The perception of health care need includes the individual's perception of the usefulness of modern medical treatment, the severity of illness, and the quality of health care providers. Perceptions of the need for health care may be influenced by the education and cultural belief of individuals and households (Tesfaye A., 2003).

At the level of health care provider, quality of health care is held as one of key determinants of choice of health care provider. The quality of health care that is perceived by individual and that is defined by health personnel is quite different (Tesfaye A., 2003). In accordance with the definition of medical personnel, Lavy and Germain (1994:11) propose five groups of quality measures namely, number of medical staff, the availability of essential drugs, functioning laboratory, electricity, and running water. Using these factors as quality variables, they found that availability of drug, infrastructure, operating room and medical personnel as factors that have strong positive impact on the demand for medical service and choice of health care providers. Akin et (1995),using operational cost per capita of the health facility, the observed physical condition of the facility and percentage of the year drug available as proxy for quality of treatment, report significant impact of quality on the demand for health care. Mariko (2003) using availability of drugs, qualified personnel, process of treatment and availability of functioning laboratory as a proxy for quality of treatment reports positive impact of these variables on the demand of health care, and in particular the availability of drug and process of treatment as the two main significant factors.

Quality improvements might increase demand for medical care by attracting new users or by increasing the intensity of service use by existing users. Poorly trained or insufficient levels of staff and inadequate drug supplies may inhibit use of care even if services are affordable. (Kasirye et al, 2004). As cite by Kasirye et al a review of more than 50 user fee experiences in Africa showed that use of health services increased when quality was improved and reduced when quality was deteriorated (Wills, 1993).

With regard to the perception of the usefulness of the medical treatment, it may depend on individual's psychological, cultural and information processing ability. Due to such factors little attention may be paid to illness in many developing countries because almost everyone is suffering from some sort of disorder. Moreover, the majority of the population suffers from malnutrition and exposure to parasitic diseases, and it may be difficult to determine when a person is sick enough to be labeled as "sick". Messing (1970) described that in rural Ethiopia the common definition of "sick" is when a person is to lie down and rest during the day time (Tesfaye A., 2003).

An individual's level of education plays a significant role in decision making regarding seeking health care. Education of the individual may also affect the demand for health care and the choice of health care providers by influencing the perception of the individual towards health care. The theory of household production treats education as microeconomic theory treats as technical change. It is viewed as allowing more output to be produced from a given set of inputs. Welch (1970) states educated households have good knowledge of the importance of sanitation, clean water, balanced diet and are more efficient in performing household activities. Thus, they are more efficient in producing health and are more likely to avoid modern medical treatment than illiterate households. However, there is another argument which states that educated household will not only be healthier but also will have time and desire to use health service due to awareness of modern treatment and its benefit (Tesfaye A., 2003).
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2.2 Health Care Demand Model and Methodologies

Health care markets are distinguished from other types of markets and consumption activities mainly on the basis the role of physical need plays in determining demand for health care services. Moreover, circumstances, such as accidents, pregnancies and infection tend to dictate consumer decision in health care markets. In addition, an information gap often exists between suppliers and consumers of medical services, the subsidy of medical service and the life cycle pattern of health need can affect the consumption of medical services. Modeling the effects of

these variables on the demand for health care has been developed over the years and this section tries to review some selected models of demand for health care.

2.2.1 Grossman's Human Capital Model of Health Care Demand (Inter-temporal Utility Model)

The demand for health is one of the most central topics in Health Economics. The canonical model of the demand for health and health investment (e.g., medical care) arises from Grossman (1972a, 1972b, 2000) and theoretical extensions and competing economic models are still relatively few (T. J. Galama, 2011).

Grossman (1972) developed a human capital model, using household production theory that treats demand for medical services as both an investment and consumption activity. In Grossman's human capital framework individuals demand medical care (e.g., invest time and consume medical goods and services) for the consumption benefits (health provides utility) as well as production benefits (healthy individuals have greater earnings) that good health provides. The model provides a conceptual framework for interpretation of the demand for health and medical care in relation to an individual's resource constraints, preferences and consumption needs over the life cycle. The model, for the first time introduced the concept that consumers do not demand medical care per se, but it is a derived demand generated through the demand for health *(S.* R. Adhikari, 2011)

As a consumption commodity, health care makes consumer feel better so that it directly enter to their preference function; and as investment commodity the state of health determines the amount of work and leisure time available to consumers. The lower the number of sick days the larger is the time available for work and leisure. Hence, the return to investment in health is the monetary value of the number of sick days. It can be thus concluded that the demand for medical service is not for service per se; rather it is the demand for "good health"

The Grossman model is given by:

$$\text{Max } U = U\ (\Phi_o H_o, \ldots, \Phi_n H_n,\ Z_o, \ldots, Z_n)$$
$$\text{s.t} \Sigma_i\ [\ P_i M_i + F_i X_i + W_i(TH_i + T_i + TL_i)] = \Sigma\ [W_i \Omega\ (1 + r)_i^{-1}] + A_o$$

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Given the household production relationships:

    a) $H_{i+1} - H_i = I_i - \delta_i H_i$

    b) $I_i(M_i, TH_i, E_i)$

    c) $Z_i = Z_i(X_i, T_i, E_i)$

Where:

Ho - Initial stock of health capital

Hi - Stock of health in the ith time period

Φ_i- Service flow per unit of health capital in the ith time period (healthy days)

Zi -Total consumption of other commodity in the ith time period

Pi -Price of medical care

Mi -Quantity of medical care

Fi- Price of market goods used in producing Zi

Xi – Market goods used in producing Zi

Wi - Wage rate

Ti -Time used in producing other commodities

r- Interest rate

$\Omega = TWi + THi + Ti + TLi$ -total time available in period i

Twi- hours of work

THi -Time used in producing health

TLi- Time lost due to illness

Ao – Discounted property income or initial asset

I_i - Gross investment in health

δi - The rate of depreciation of stock of health

Ei -Stock of human capital

According to this model the choice for the individual is whether to produce additional investment in health using his own time, human capital and market purchased medical care and other pleasure giving commodities. Moreover, choice is also affected by the depreciating stock of health. For this reason, the stock of health expands from period to period only if annual investments exceed annual depreciation.

From the model, Grossman derived the following relationships: The marginal cost of investment in health, which must equal the marginal rate of return to investments, i.e.

$$\sigma_i + \alpha_i = r - \Pi_{i-1}$$

Where:

σ_i - Marginal money rate of return to an investment in health (pecuniary return)

α_i - Marginal psychic return of improved health (consumption return)

r - Interest rate foregone by investing in health capital instead of other assets

Π_{i-1} - Percentage change in the marginal cost of health investment from the last period to the current period

δ_i - Rate of depreciation of health stock

$\sigma_i + \alpha_i$ – Total rate of return to investments in health

$r - \Pi_{i-1} + \delta_i$ - the user cost of health capital in terms of the price of gross investment.

If $\alpha i = 0$ no utility is derived from medical care and it can be treated as investment good. Using this condition Grossman treats the consumption and investment aspect of medical care separately.

Under the investment model, when $\alpha i = 0$, all returns to health come from the pecuniary return caused by more healthy days; there is no psychic return to better health. However, under the consumption model, when $\sigma i = 0$, the marginal return to healthy days is due to psychic benefits alone. Investments in health capital under this model, depends on the preference for present versus future health.

Grossman investigated the effect of age, income, and education on both the demand for health capital and the derived demand for medical care. He hypothesizes that the demand for health capital is negatively related to age, positively related to wage rates, and education. Whereas, the demand for market produced medical services is positively related to age, wage rate and education.

The advantages of the Grossman's model is that it enables us to study the effect of demographic variables like age and education without assuming that these variables are positively or negatively correlated with consumer's tastes for health. It also gives an idea that the demand for medical care is derived from the demand for good health. The model has also its own disadvantage in that it assumes complete certainty. However, people do not generally know how their stock of health can be affected by what they consume and practice. In addition to this, the author measures the need (illness) by the level of the rate of depreciation, which increases with age. But this contradicts the common sense notation that health status fluctuates widely through a lifetime.

2.2.2 Acton's Utility Maximization Model of Health Care Demand (Orthodox Utility Model)

The demand for treatment in response to a particular episode of illness or injury can be modeled in terms of the provider choice between opting for different kinds of care; for example the choice can be among public, private and no care. Primarily such an analysis is more relevant for the case of curative care. Empirical specification for such a model starts from a behavioral model of utility maximization, where utility depends on health and the consumption of other goods, besides medical care. On experiencing an illness, an individual is hypothesized to choose among various treatment alternatives (including the no treatment alternative) so as to maximize total utility subject to his/her budget constraint. In the 1980s several attempts to estimate demand for health care took place under the Living Standards Measurement Survey (LSMS) series of the World Bank, for many countries of the developing world (I. Gupta & P.Dasgupta, 2002).The utility derived by an individual from an increase in his/her health status was modeled as a function of the options available to the individual and a vector of individual characteristics. These body of work brought into focus the role played by several different factors in determining the efficacy of medical care, or its potential impact. These factors included the impact of both monetary outlays and non-monetary costs such as travel time and waiting time in accessing health facilities, which were seen as defining the quality of a particular facility or provider option (I. Gupta & P.Dasgupta, 2002).

Acton (1975) derived demand from maximization of individual's utility function which depends on the consumption of medical service and other consumption goods subject to time and budget constraint. The Acton model has the following form:

Max   U=U (m, x)   Subject to: $(p + wt) m + (q +ws)x \leq Y = y + wT$

Where:

p- Money price per unit of medical services

m - Medical services

x- Composite goods

t- Time price per unit of medical services

q- Money price per unit of other goods

s- Time price per unit of other goods

w- Wage rate per hour

Y-Full income (earned, unearned and opportunity cost of home production)

y- Unearned income

T-Total time available for market work and own production

Acton's model focuses on the role of time costs as a rationing device when insurance or subsidies derive the out-of-pocket costs of medical care to zero. The author derived comparative statistics for time and money cost. The comparative statistics shows that users of free medical services will be more sensitive to the time requirement (waiting and traveling time) than users who pay for medical services. In addition to this, the analysis shows that when consumers consider medical services as normal good, the effect of unearned income has positive effect whereas, the earned income has negative impact on the demand for medical services. This is because in the case of unearned income, people with higher incomes buy more of normal goods. In the case of earned income however the increase in wages raise income and the opportunity cost of time, which increases the time cost component of consumption activities. As a result, goods or services which require relatively large commitments of time in order to be consumed become more expensive and thus substituted by other goods and services which require little time.

 The advantage of the Acton's model is that of its simplicity, where as its disadvantage lies in its ignoring role of health need and demographic variables. In addition to this, the inclusion of time

is not logical, since it is not in accordance with household production theory, where time enters the budget constraint since the household is viewed as a production unit, which combines its own time with market, purchased goods to produce pleasure giving commodities. However, in Acton's model where the individual (not the household) derives pleasure directly from the consumption of medical services, consumption has to be a leisure activity and thus time should have zero cost.

2.2.3 Multinomial Logit Vs Nested Logit

In most demographic research involving choice among more than two alternatives,a multinomia logit specification has been used to estimate the model. The multinomial logit model offers the important advantage of being computationally feasible,even for relatively large choice sets. That feasibility is, however,obtained by assuming that the elements of the choice set are statistically independent of one another, and where the assumption is violated,the model yields incorrect predictions. In famous " red bus/bluebus" example of choice of commuting mode, the failure to account for the essentially identical characterstics of the two bus mode yields a faulty prediction of the likely reduction in auto usage when a new transportation alternative-a blue bus-is introduced (Hofffman et al ,1988).

A key feature of the multinomial logit model, namely the Independence of Irrelevant Alternatives (IIA), was viewed as particularly unattractive (Wooldridge, 2007). The IIA property assumes that all alternative subgroups are not correlated at all and the cross price elasticities are constant across subgroups, and as such it leads to biased estimates. Three approaches have been used to deal with this. Goldberg (1995) used nested logit models to avoid the IIA property. The other two approaches are multinomial probit and fixed effect or mixed logit.

To understand the difference between multinomial and nested logit, let's see McFadden's famous blue bus/red bus example. Suppose there are initially three choices: commuting by car, by red bus or by blue bus. It would seem reasonable be to assume that people have a preference over cars versus buses, but are indifferent between red versus blue buses. One could capture this by assuming that Ui, red bus = Ui, blue bus, with the choice between the blue and red bus being

random, where u is utility for individual. That would imply that the conditional probability of commuting by car, given that one commutes by car or red bus, would differ from the same conditional probability if there is no blue bus. Presumably taking away the blue bus choice would lead all the current blue bus users to shift to the red bus, and not to cars. The multinomial logit model does not allow for this type of substitution pattern. Another way of stating the problems with the conditional logit model is to say that it generates unrealistic substitution patterns (Wooldridge, 2007).

Recall the latent utility set up with the utility for individual i and choice j equal to

$U_{ij} = X^{'}_{ij} + \varepsilon_{ij}$.   Where X covariates that vary by choice, ε unobserved factors, and u is utility.

In the multinomial logit model we assume independent ε_{ij} with extreme value distributions. This is essentially what creates the IIA property. This is not completely correct, because other distributions for the unobserved, say with normal errors, we would not get IIA exactly, but something pretty close to it. The solution is to allow in some fashion for correlation between the unobserved components in the latent utility representation. In particular, with a choice set that contains multiple versions of essentially the same choice (like the red bus or the blue bus), we should allow the latent utilities for these choices to be identical, or at least very close. In order to achieve this unobserved component of the latent utilities would have to be highly correlated for those choices (Wooldridge, 2007).

One of those models without Independence of Irrelevant Alternatives assumption is nested logit model where the researcher groups together sets of choices. In the simple version with a single layer of nests this allows for non-zero correlation between unobserved components of choices within a nest and maintains zero correlation between the unobserved components of choices in different nests (Train, 2003). A nested logit model induce correlation between the choices is through nesting them. The nested logit model could capture the blue bus/red bus example by having two nests, the first B1 = {red bus, blue bus}, and the second one B2 = {car}. How do you estimate these models? One approach is to construct the How do you estimate these models? One approach is to construct the log likelihood and directly maximize it. That is complicated,

especially since the log likelihood function is not concave, but it is not impossible. An easier alternative is to directly use the nesting structure /two-step estimator (Wooldridge, 2007).

2.3 Empirical Reviews

William H. Dow in his study (1995 &1996) estimates both conditional and unconditional demand elasticities for Cote d' Ivoire. Based on his study, he advocates that conditional estimates can be interpreted only as short-run effects while to capture the long-run impacts of policy implications, it is more appropriate to compute unconditional demand elasticities which focus attention on the health needs of both healthy and sick people. According to Dow, healthy people are routinely ignored when analyzing curative health inputs. This practice overlooks people's ability to affect their chances of falling sick, and may have perverse effects on welfare analyses. In addition, conditional estimates may be biased from both sample selection and self-reporting of health status. However, in data from Cote d' Ivoire, Dow found that the usual conditional demand estimates do not suffer from selection bias. A dynamic model implies that input demand estimates conditioned on current illness can only be interpreted as short run effects, in contrast to the long run unconditional estimates.

A study by B. Hidayat (2008) examined the effects of health insurance on healthcare demand in Indonesia, using samples that are both unconditional and conditional on being ill, and compared the results. The results showed that both unconditional and conditional estimates yield similar results in terms of the direction of the most covariates. The magnitude effects of insurance on healthcare demand are about 7.5% (public providers) and 20% (private providers) higher for unconditional estimates than for conditional ones. Further, exogenous variables in the former estimates explain a higher variation of the model than that in the latter ones. Findings confirm that health insurance has a positive impact on the demand for healthcare, with the highest effect found among the lowest income group. Based on his findings the researcher concluded that conditional estimates do not suffer from statistical selection bias. Such estimates produce smaller demand effects for health insurance than unconditional ones do. Whether to rely on conditional or unconditional demand estimates depends on the purpose of study in question. Findings also demonstrate that health insurance programs significantly improve access to healthcare services,

supporting the development of national health insurance programs to address underutilization of formal healthcare in Indonesia.

A paper by Mwabu et al, (2004) developed a model of demand for outpatient health visits using data from rural Kenya. They separately modeled the probability of reporting an illness, the probability of seeking formal treatment when ill, the choice of a particular provider, and the choice of how to get a facility. The study had attempted to separate out the probability of illness from the probability of seeking treatment. The study had shown very strong differences between the two effects, with most of demographic variables influencing the probability of reporting an illness rather than the decision to seek treatment. The study found that the choice of mode of transportation is found to be is clearly endogenous, and affected by travel time, travel costs, and the income of the household. This study also found that facility quality strongly influences the choice of which provider to visit. The model estimated by Mwabu et al. has also been shown to be useful for attaching a monetary value to upgrade facility quality from the level of a dispensary to a health center.

Sahn et al. (2002) in their study in rural Tanzania found that quality is an important determinant of health demand. The demand for health care will increase if people have the option to see a better doctor/nurse, get access to pharmaceuticals, and attend a health center, clinic and dispensary that is cleaner, has a toilet and water, and a roof. However, the main weakness of their quality indicators was subjective and qualitative. They simply were asking households to provide an ordinal assessment of the quality of health care services along various general dimensions. Their study also found that consumers in rural Tanzania are highly responsive to the price of health care, and that this responsiveness is greater for individuals at the lower end of the income distribution. Own price elasticities are high, although, less so for public clinics and dispensaries than private providers. When prices of services are increased, there will be a precipitous decline in use of those services. This result also found by previous research on health demand in different countries. However, this research work found that high degree of substitution between public and private care. Consequently, price increases or user fees will result in a small percentage of people opting for self-treatment. This is true even if the private sector responds to the shift in demand by raising its own prices. Likewise, there is evidence that

government should have as its major goal improving the quality of care, regardless of whether it is in the private or public sector.

The study in Cote d' Ivoire to explain the reason for declining in health care utilization, had been conducted by Alimatou C. (2011). By determining the explanatory factors of recourse to health care providers, he employed multinomial logit model. The results show that the education level of the household head, the household's income, the price of medication, and the time to reach the health care provider (as a proxy for the distance to a health care provider) determine the choice for a specific health care provider. The level of education and the income positively influence this choice, while the cost of medication and the time to provider (time to reach the health provider) negatively influence the choice of health care provider

A study by Tesfaye A. (2003) on demand for curative care in Jimma town found that level of health status; number of children in the family and the expected maximum utility from health care providers are significant factors that affect households' decision of choosing modern medical treatment. The level of health status negatively affects the choice of modern medical treatment whereas; number of children in the family and the expected maximum utility affect the choice of modern medical treatment positively. Based on this study, the estimated result of the choice of health care providers indicates that, consumption, consumption squared, patient's age and perceived quality of treatments are important factors that affect the demand for curative health care. All these variables, except the perceived quality of treatment, have the same negative effect on both public hospital and private health care providers demand. Perceived quality of treatment has positive effect on the demand for curative health care even though its effect is significant only at private health care providers. The fact that consumption and consumption squared are important determinants of the demand for health care provider implies that household income, direct and indirect medical costs are important determinants of the demand for curative health care. To see the effect of these variables, the researcher computed arc price and arc waiting time elasticities for both public hospital and private providers. The result indicates that the demand for curative health care is price insensitive. This study further indicates that the poor are more waiting time and price sensitive than the rich.

A research study by Amarech G. (2007) examined the determinants of health care provider choice of urban households of Ethiopia. Particularly, the study was investigated the effects of user fees on the demand for health care by different segments of socio-economic group using multinomial logit model. The results of this study revealed that for a given rise in health care cost, the poor will reduce the demand for health care significantly in greater proportion relative to the better off. In other words an increase in user fee is likely to drive out the largest portion of the poorest households from receiving medical care. The study also found that the poor are required to pay significantly greater proportion of their income to health care than the better off in order to get treatment. This will aggravate the existing inequality in access to basic health care services. This researcher concluded that even though the principle of cost recovery had been advocated as alternative means of health care financing in most developing countries, increasing user fee may drive the poorest population out of healthcare market or deepen their economic situation unless some reliable protective measures are taken.

Chapter Three

3. Research Design and Methodology

3.1 Data Sources and Types

The data for this study was mainly primary and cross sectional that was collected from sample respondents of Mekelle city through household sample survey. The study used different secondary sources of information like the city health office report, journals, books and other secondary source of information that was necessary.

The survey was capture the first visits to health facilities. This is due the fact that patients may visit more than one provider for a single incidence of illness. Therefore,choice of provider is limited to a first outpatient consultation.The questionnaire was designed to illicit information on household characteristics and the perception of households regarding health and health care providers. The survey was undertaken during the month of February 2013 for one week. For this survey, five enumerators and two supervisors were employed and trained adequately to enable them to have full understanding of the purpose of the survey and the meaning of each question.

3.2 Data Collection Technique

The primary data used for this study was collected through structured questionnaire from the respondents of the city. The designed questionnaire was presented to the sample households that experience illness or injury over the one month immediately preceding the interview. Therefore, the analysis was depending on those individuals who face illness. The one-month period is used as a standard in health care demand literature to collect data from those who experience illness.

3.3 Sampling Procedure

According to the 2007 census report, Mekelle city has around **273** thousand population and 72 thousand households (CSA, 2011). The sample for the study was designed as two stage simple random sampling. In the first stage, the "kebeles" and then the households were selected. In the

first stage of sampling 3 "kebeles" out of 20 "kebeles" of the city were selected, and in the second stage of the sampling procedure 600 households were selected from the selected Kebeles. From the total 600 households188 (31.3%) of them reported at least one member of the household faced illness or injury within four-week period prior to the survey. Since in some households more than one member of their household may experience an illness, this study used household member who face illness or injury most recently.

3.4 Model specification

The model proposed for this study is based on the assumption that an individual consults a health care provider conditional to having reported illness (injury) during the last 30 days prior to the survey. A nested multinomial logit model with three options: no care (including self-treatment), care at public provider and care at private health facility are used for this study. Most of the previous studies specified this model as a multinomial logit (MNL). However, the multinomial logit model as discussed in Maddala (1983) suffers from the independency of irrelevant assumption (IIA) restriction. The IIA property assumes that not all alternative subgroups are correlated at all and the cross price elasticities are constant across subgroups, and as such it leads to biased estimates. This implies that the ratio of the probabilities of choosing one alternative over another is unaffected by the presence or absence of any additional alternatives in the choice set. The cross elasticity is the same for all alternative due to IIA assumptions. MNL, therefore, is not useful to estimate cross elasticity among the alternatives. Subsequent studies have employed alternative specifications that are not restricted by IIA property including the multinomial probit and nested multinomial logit (NMNL). However, the multinomial probit remains unpopular due to the difficulties involved in estimation (Kasirye et al. 2004).

The MNL model developed on the assumption that the unobserved parts of the conditional utility functions are uncorrelated across alternatives. McFadden (1981) suggests that, given this assumption on the distribution of the disturbance term, the demand functions will have nested multinomial logit (NMNL) form. First decided whether to seek care or not, and then conditional on seeking care deciding from which provider to seek care. For this reason, NMNL is more general than the more commonly used multinomial logit (MNL) specification, which assumes

that the decision to seek care between any two alternatives does not depend upon the characteristics of any other available alternative. (I. Gupta & P. Dasgupta, 2002).

The framework that is used in this study followed that used by Gertler et al. (1987), Mwabu et al. (1993), and Kasirye et al. (2004). Based on this previous works, the decision to consult a particular health care provider is a discrete choice problem and determination of demand involves estimating the probability that a particular health care provider will be chosen.

Following this procedure, the demand for health is based on the notion of utility maximization. An individual derives utility from consumption of both health goods and non-health goods. If a member of a household experiences an accident or illness, the household first decide whether to seek medical care or not. The advantage of consuming medical care is improvement in health and the cost of medical care is a reduction in consumption of other goods and services. Second, conditional on the decision to seek health care, an individual must choose the type of health care provider to consult from a finite set of alternatives based on expected health improvement and the cost incurred in getting the service. The costs include the direct cost (cash payment for service, drugs and transportation) and indirect cost (the opportunity cost of traveling and waiting time Due to difference in quality of treatment, consultation of different health care providers results different effect on one's health. These effects are a function of both the level of quality provided by the particular health care provider and individual characteristics at the time of illness.

Given the number of health care providers, an individual must choose one alternative, including the option of no care or self –treatment. Each option provides a given level of quality at a particular cost. The cost may be direct such as cost of treatment or indirect such as a travel time and waiting time specific to the provider chosen. Given an individual's severity of illness, cost faced at a particular provider and income, he or she chooses the provider option that maximizes utility. Thus, the ith individual's utility is derived from consumption of both health and non-health goods conditional on choosing the jth provider given as:

$$(1)\ U_{ij}=U_{ij}(H_{ij},C_{ij};T_j)$$

Where: H_{ji} - is expected health improvement of individual i after receiving treatment from provider j.

C_{ji}- consumption of non-health goods possible after meeting health care cost at j^{th} provider and

T_j- represents the indirect individual costs such as travel time incurred by consulting the jth provider.

The improvement in health status, H_{ij} is a function of individual characteristics (such as age, sex, type of illness, number of healthy days and education), households level factors (such as income, household size or composition and the socio-economic characteristics of the household head such as gender),X_i ;factors specific to a particular provider such as availability of drugs and qualified health staff, Q_j; and unobservable heterogeneity characteristics at individuals, household and facility level, ε_{ij}, that affect improvement in health, the health status can be expressed as follows:

$$(2) \ H_{ij}= h(X_i, Q_j) + \varepsilon_{ij}$$

For the no-care or self-treatment option, H_{ij} is equal to zero based on the assumption that there is no improvement in health status for those not seeking care. On the other hand, the disposable income held by the ith individual after consulting a health care provider is a function of her/his individual income, Y_i; and price, p_j ,she(he) pays at the jth provider representing both direct costs such as user fees and indirect costs such as travel and waiting time specific as expressed in equation (3). For the no-care option, the price paid is equal to zero and hence consumption equals income.

$$(3) \ C_{ij}=c(Y_i- P_j)$$

Substituting equations (3) and (2) in to (1), we get a conditional utility function as expressed in to (4).

$$(4) \ U_{ij}= h_{ij}(x_i, Q_j) + c(Y- P_j) + \varepsilon_{ij}$$

The utility further expressed as follows:

$$(5) \ U_{ij}=V_{ij}+ \varepsilon_{ij}$$

Where $V_{ij}=h_{ij}(x_i, Q_j) + c(Y_i - P_j)$ is the deterministic part of utility. The ith individual chooses the jth provider, which yields the greatest level of satisfaction given all alternatives even the choice of no-care or self-treatment. An individual will choose the

no-care option for instance if the utility derived from this option exceeds all other options.

We assume that $h_{ij}(x_i, Q_j)$ *is linear* in X_i and Q_j. The coefficient vectors for the X_i are denoted by β_j while those of Q_j as α_j and these coefficients are allowed to vary across options. Therefore, β and α are vectors of parameters to be estimated. On the other hand, a non-linear empirical specification of $c\,(Y_i - P_j)$ is employed to avoid responsiveness of prices being independent of income (Gertler et al., 1987; Gertler & Van der Gaag, 1990). This study will adopt the functional form used in Sahn et al. (2003) and Kasirye et al.(2004) as expressed in equation (6). In other words, the empirical specification is based on a semi-quadratic utility function, which is linear in health and quadratic in logs of consumption of non-health goods. Gertler and Van der Gaag (1990) show that if the utility function in Equation (1) is linear in health status and quadratic in consumption, it is consistent with well-ordered preferences.

$$(6)\ c(Y_i\text{-}P_j) = \alpha_1 \times \ln(Y_i - P_j) + \alpha_2 \times [ln(Y_i - P_j)]^2$$

where the αs are assumed to be equal across provider options. However, the function $C\,(Y_i\text{-}p_j)$ will be very similar across options as costs are small relative to income. Because this complicates the optimization, the function approximated as:

$$c(Y_i\text{-}P_j) \approx \alpha_1 [\ln(Y_i) + \ln(1 - P_j/Y_i)] + \alpha_2 [ln(Y_i) + ln(1-(p_j/Y_i)]^2$$

$$c(Y_i\text{-}P_j) \approx \alpha_1 [\ln(Y_i) + \ln(1 - P_j/Y_i)] + \alpha_2 [ln(Y_i)^2 + 2ln(Y_i)\,ln(1-(p_j/Y_i) + ln(1-(p_j/Y_i)]^2$$

$$(7)\ c(Y_i\text{-}P_j) \approx \alpha_1\ [\ln(Y_i) - P_j/Y_i] + \alpha_2 [ln(Y_i)^2 - 2\,ln(Y_i)(p_j/Y_i)]$$

However, $\ln(Y_i)$ and $\ln(Y_i)^2$ are constant across provider options. On the other hand, the logit identifies only the difference in utilities, $V_{ij} - V_{i0}$, where V_{i0} is a references utility, which in this case refers to no-care and we normalize it to zero. Thus after taking the difference in utilities we get: $$(8)\ V_{ij} - V_{i0} = \beta' X + \varphi' Q + \alpha_1(\text{-}\,p_j/Y_i) - \alpha[2ln(Y_i)(P_j/Y_i)]$$

Where V_{i0} is references utility (utility of no care), V_{ij} is utillity of provider j, Q is quality of provider j and p is cost of treatment at provider j.

3.5 Empirical specification

As stated above the alternatives(dependent variables)for this study are discret choices, determination of demand for a particular alternative involves estimating the probability that a particular provider or alternative will yield the greatest amount of utility. The nested multinomial logit specification,which allows correlation of sub groups of alternative (for example between public and private health care providers) and not the base option of no-care(self treatment), is employed. For example, if the price of private health care provider increases, demand will shift more than proportionately to public health care provider. Based on this assumption, this study was focused in three different health care options, using a two-level nest. On condition of being ill(injured), individuals choose between no care and formal care. When formal care is chosen, the individual faces two alternative provider options, namely private care and public care.This allows estimating cross-price elasticities that vary across choices.

The grouping scheme for this study was collecting the market alternatives (alternatives in formal care) into one group, given that they are more similar to one another than to the no-care option. If we consider these two different levels of a choice tree, the choice to visit a facility or not is in level one, and what type of facility to choose is in the second.

health care visit (formal care)   No visit (no- care)

Public provider   Private provider
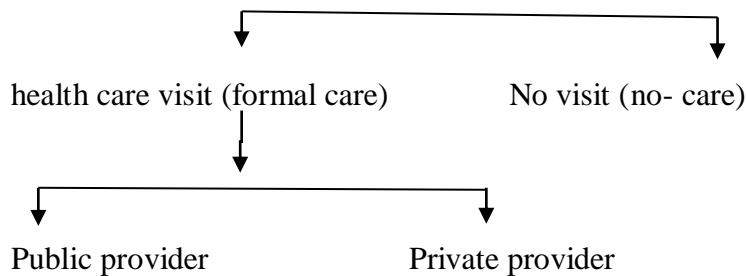
Figure 1 Nesting structure

Based on this empirical specification it is possible to achieve the objective of determining the probability of choosing a particular health care provider alternative. From expression (6) the probability of choosing a private health care provider for example, will equal to probability that the utility from private health care is greater than the utility from public health care or self treatment.Following the health care demand literature, the choice probabilities are expressed as

nested multinomial logit. In this case that the jth provider is chosen is expressed as in equation (9).

$$(9) \quad Pr\ (provider=j)= \frac{\exp\left(\dfrac{v_j}{\sigma}\right)\left[\displaystyle\sum_{k=2}^{K}\exp\left(\dfrac{v_k}{\sigma}\right)\right]^{\sigma-1}}{\left[\displaystyle\sum_{k}\exp\left(\dfrac{v_k}{\sigma}\right)\right]^{\sigma}}$$

Where ; j indexes the lower level nests (provider choice) such as private provider; k indexes the upper level nest (no care or care); Vj is the indirect utility associated with provider j; Vk is the indirect utility associated with upper level nest; and σ *is* the measure of the degree of independence in unobserved utility among the alternatives in nest *k*. **σ-1** is the correlation in the error term for private and public health care providers (McFadden 1981).

If **σ** is equal to one it implies that the correlation of the disturbances within the group is zero and the NMNL model will collapse to MNL model. On the other hand, if **σ** is zero the correlation between the errors terms of the nested groups are one. Therefore, the parameter of the inclusive value should lie within a unit interval to be consistent with a stable utility maximization (McFadden 1981, Maddala 1983, Greene1997). Researchers use this parameter to test whether the groping (nesting) structure of the model is appropriate. If for instance σ lies outside the range of 0 and 1, it implies that the nesting structure is inappropriate. The probability of seeking modern medical treatment expresses as

$$(10) \quad p_m = \frac{\exp\left[v_m + (1-\sigma)I_m\right]}{\displaystyle\sum_{i=1}^{2}\exp\left[v_i + (1-\sigma_i)I_m\right]}$$

The inclusive value for the modern treatment category expressed as;

$$(11) \quad I_m = \ln(\sum_{i=1}^{2}\exp(z_i))$$

Where: P_m is the probability of seeking modern medical treatment; V_m is the utility associated with modern treatment; $(1-\sigma)$ measure correlation coefficient within modern care; i is alternatives in modern care; V_i utility associated with alternatives in modern care; value of inclusive value in the modern care; and Z_i are factors that affect the decision of choosing between modern care alternatives.

3.6 Estimation issues

As stated above nested multinomial logit model is mostly employed to estimate a behavioural model like health care demand. In such discret choice demand is the probability of seeking different types of care conditional on illness, given the relevent individual, household and facility charactristics. Before the econometric analysis, descriptive analysis presented and discussed to see the trend of variable. The study alsoconcerned to estimate priceelasticities for key policy variables.

There are two ways of estimating the parameters of the nested multinomial logit model. These are full information maximum likelihood estimation (FIML) and the two-step procedure (limited information maximum likelihood/LIML). The former method simultaneously estimates the parameters of determinants of seeking medical treatment and health care provider choices. The second method is use two-step maximum likelihood estimation, and the procedure involves: first the parameters of the lower level nest (provider choice), then the parameters of the upper level nest (demand for modern care) estimated sequentially. However, the two-step method is not asymptotically efficient as a full information maximum likelihood estimator (Green, 2003). Therefore, this paper employed the full information maximum likelihood the estimate the coefficients of both levels simultaneously.

Other important estimation issue is that the sample will restricted to conditional of reporting illness in the previous 30 days prior to the survey. However,there is no agreement yet as empirical evidences is stilll mixed. For instance,while Dow(1996) and Budi Hidayat (2008) finds no statistical bia on limiting analysis on conditional of illness,Akin et al.(1998) reports sample selectivity bia. Despite this, almost all litrature in health care demand support and estimate conditional demand (demand conditioned on being ill/injured).

3.7 Variables definition and expected sign

The study included variables related to individuals, households and provider specific characteristics to identify and estimate the determinants of demand. In the following tables, the dependent variables with the associated explanatory variables are defined. In the first table, the household level factors and number of days lost due to illness included as potential determinants of decision to seek modern care. In the next table, individual patient's and provider specific characteristics included as potential determinants of choice among different health care providers.

Table 3.1: Variable Definition for Mode of Treatment Choice (Upper level model)

Upper level Dependent variable (Modern care Vs No-care)	Description of variable
1.No-care 2. Modern care	
Explanatory variables	
INV	Inclusive value (expected maximum utility form health modern health care providers).It is calculated from the result of NMNL model of health care provider choice equation
Agehhead	Age of the household in years
Sexhhead	A dummy variable for household head sex and It takes one if the patient is from male headed household and zero otherwise.
hhnoedu	Household head with no education and takes one if the household's education is in this category or zero otherwise.
hhpredu	Household head with primary and takes one if the household's education is in this category or zero otherwise.
hhsecedu	Household head with secondary and above education, and takes one if the household's education is in this category or zero otherwise.
Noadult	Number of adults in the household.
Nochild	Number of children in the household
Ndayssuf	Number of days lost due to illness within one-month period.

In general, the explanatory variables are categorized in to three main groups of individual patient specific variables, household level variables and provider specific variables.

Household Head Sex (Sexhhead)**:** In a country like Ethiopia female will be household head if there is no father in the family. Since female-headed are busy in home works and generate less income, the researcher expected positive effect for household sex on demand for medical treatment.

Number of Children and Adults: More adults may be translated in to more income and this may increase the demand for modern medical treatment. Thus, this study expected a positive impact of number of adults on demand for health care services. For the same reason relation between the demand for curative health care and the number of children in the family expected to have positive.

Number of days suffered (Ndayssuf)**:** Stands as a proxy for severity of illness and expected to have a positive relation with demand for health care services.

Education level of household head: the education level of the household head is important variable in the demand for modern medical treatment when the household head is the sole decision maker. In this case, the relation between education level of household head and the demand for modern health care services is expected to be positive

Household age (hhage): based on past literature a positive or negative result expected.

Patient's age (Agep): There are two different views about the effect of age on the demand for health care. Since this study is conducted in urban area where households are cautious for child health, the researcher expected negative effect of Patient's age on health care services demand.

Log of consumption (Logcons): In this study, the consumption (Cons) is considered as the residual income after the direct and indirect cost of medical treatment. Therefore, the log of consumption (Logcons) expected to have a positive effect on the demand for medical care services.

Table 3.2: Variable Definition for Health Care Providers Choice (Lower level Model)

Dependent variable	Description of variable
choice of type of health care provider 1. Public health care provider 2. Private health care provider 3.No-care(including self-medication)	
Explanatory variables	
PAge	Age of the patient in years.
Psex	Dummy variable for patient sex, takes one if the patient is male, and zero otherwise.
Pnoedu	Patient with no education and takes one if the Patient's education is in this category or zero otherwise
ppredu	Patient with primary education and takes one if the patient's education is in this category or zero otherwise
psecedu	Patient with secondary & above education and takes one if the Patient's education is in this category or zero otherwise
Logcons	Log of Consumption level after direct and indirect medical costs.
Qual	Continuous variable for perceived quality of treatment (weight out of ten for quality of treatment).

Perceived quality of treatment (Qual): better quality treatment expected to increase demand for health care services. Thus, this study has been expected a positive coefficient for quality variable.

Education level of the patient: The education level of the patient may positively influence the attitude of the individual patients towards modern health care and thus expected to increase the demand for medical treatment.

Chapter Four
4. Analysis and Discussion

In this chapter, the collected data both quantitative and qualitative is going to be discussed and analyzed using statistical tools of descriptive analysis and econometric analysis.

4.1 Descriptive analysis

This section provides the level of utilization of different health care providers by the sample households assessed using some demographic factors as well as the important determinants of demand such as economic factors like income, direct and indirect medical costs, and subjective variables such as perceived quality of treatment and behavior of the staff members while providing treatments. Economic, demographic, and subjective variables are analyzed to indicate factors that determine the decision of seeking treatment and factors that affect choice between health care providers.

Table 4.1 :Age and sex distribution of patients

Age in years	Sex				Total	
	Female		Male			
	Count	Percentage	Count	Percentage	Count	Percentage
Below 15	33	17.5	34	18	67	35.5
Between 15 & 30	24	12.7	23	12.2	47	24.9
Between 30 & 45	20	10.7	9	4.8	29	15.5
Between 45 & 60	18	9.6	19	10.1	37	19.7
Above 60	4	2.2	4	2.2	8	4.4
TOTAL	99	52.7	89	47.3	188	100

Source: Own survey, 2013

As table 4.1 shows, majority of the respondents are female in terms of sex and below 15 terms of age. These groups represent the majority number of people who were sick immediately one month before the data has been gathered. The results suggest that the socially vulnerable groups of the population (children and woman) are more prone to illness. This may be explained by higher incidence of disease among children due to weak immune system and among women due to their biological nature.

4.1.1 Medical treatment consultation

The survey revealed that out of the total 188 patients 52.7 % and 47.3 of them were female and male, respectively. From the total samples around 21.1% of them reported that they did not seek any medical treatment at all though they were sick in the past one month. Of the remaining 79% of the patients who sought medical treatment, about 58.1%, 41.2% and 0.7% are found treated in public, private and traditional health service providers, respectively. Since the proportion of traditional health care providers from the total treated patients is very small, the descriptive and econometric analysis is based on data set of 187 individual categorized in to no-care, public care and private care. From 187 patients, it is found that the highest proportions (46%) are treated in public health care and 32.6% in private one. The remaining 21.4% did not consult any health care provider (Table 4.2).

Table 4.2: Medical care seeking behavior and provider choices by sex of patients

	Seeking treatment						Chosen providers		
Sex	No		Yes		Total		Public	Private	Traditional
	Count	%	Count	%	Count	%	%	%	%
Female	21	21.2	78	78.8	99	52.6	61.5	38.5	0
Male	19	21.3	70	78.7	89	47.4	54.3	44.3	1.4
Total	40	21.2	148	78.8	188	100	58.1	41.2	0.7

Source: Own survey, 2013

Table 4.2 revealed that there is no significant difference in seeking medical treatment based on sex of patients. However, male patients are more likely to visit private health care relative to female patients. This may be due to low economic capacity among females. Amarech Guda (2007) found similar result in her study in urban Ethiopia.

Although the largest proportion (79.6%) of those reporting illness seek medical treatment, a significant number of patients did not consult any form of health care provider. Table 4.3 shows the main reasons why individual did not consult treatment from any health care provider. The majority (70%) identified mild illness have been the main reasons for not consulting treatment in specified period of time. It is also found that about 22% did not consult because of fear of cost of treatment, about 15% because of the belief that treatment doesn't help to recover, 5% due to lack of time and 10% due to other reasons.

Table 4.3: Reasons for not consulting medical treatment.

Reasons	Count of responses	Percentage of responses
Incapability to cover the cost of treatment	9	22.5
Non-seriousness of illness	28	70
The treatment does not help	6	15
lack of time	2	5
Others	4	10

Source: Own survey, 2013

On the other hand, those who sought medical treatment from different providers have also indicated their reasons for choosing a particular provider. Accordingly, the majority of the patients (44% and 37%) who consulted Public owned health care providers explained the lower cost of treatment and nearness of the providers, respectively are found their main reasons for consulting them. In private health care providers, the quality of treatment is the first main reason (77%), whereas short waiting time (42.6) and availability of drugs (41%) are the second and the third reasons of choosing treatment from private providers and the remaining reason accounted 9.8%. The result revealed that consultation of public provider mainly associated with lower cost of treatment and nearness of the provider, where the consultation of the private provider mainly explained by better quality and short waiting time.

Table 4.4: Factors determining choice between health care providers

Reasons	Public		Private	
	Count	%	Count	%
Short waiting time	18	21	26	42.6
Better quality of treatment	22	25.6	47	77
Nearness of the provider	37	43	3	5
Availability of drugs	13	15.1	25	41
Lower cost of treatment	44	51.1	2	3.2
Others	-	-	1	1.6

Source: Own survey, 2013

In the next sub-sections, different factors that might affect the decision to consult medical treatment and the choice of health care providers are cross tabulated against demographic, economic, and subjective factors.

4.1.2 Economic factors affecting demand for health care

Based on stated monthly income, households were divided in to four quartile representing income group ranging from quartile one (poorest) to quartile four (richest). The result revealed that the higher household income associated with higher probability of seeking medical treatment in times of illness. Thus, the richer patient was the more likely to seek medical care from any provider. Concerning to the choice of health care provider, households' preferences seems to shift from public health facilities to those of private ones as there income level rises. Further, lower income group household holds are observed to frequent contact public owned health providers (Table 4.5).

Table 4.5: Medical care seeking behavior and provider choice by income groups

Income Quartile in Birr		Option chosen			Total
		Public	Private	No-care	
0-1000	Count	11	2	15	28
	%within income group	39.3	7.1	53.6	100
1001-2500	Count	16	6	10	32
	%within income group	50	18.8	31.2	100
2501-4500	Count	42	21	9	72
	%within income group	58.3	29.2	12.5	100
4501 & above	Count	17	32	6	55
	%within income group	30.9	58.1	11	100
Total	Count	86	61	40	187

Source: Own survey, 2013

The direct and indirect cost of medical treatment may also play a significant role in health care demand and choice of providers. The direct cost of medical treatment includes the cash payment for drugs, consultation and transportation cost. On average the public and the private health care providers charged 85 and 257 birr for treatment, drug and transportation, respectively. Cross tabulation of the responses indicates that, given the type of illness that made patients visit physician, an increase in cost of treatment cause a decline in the number of patients who consulted public health care provider, whereas the for private health care provider first increase then decline. The result suggests that an increase in cost of treatment improve the probability of consulting private health care provider relative public provider. This may be explained by higher correlation between better quality and higher cost of treatment in private health care provider.

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Table 4.6: Health care provide Choice by cost of treatment

Cost Category in Birr		Health care provider Chosen	
		Public	Private
0-50	Count	46	0
	% within treatment	53.5	0
51-100	Count	17	16
	% within treatment	19.7	26.3
101-200	Count	15	23
	% within treatment	17.5	37.6
201-300	Count	6	13
	% within treatment	7	21.3
Above 300	Count	2	9
	% within treatment	2.3	14.7
Total	Count	86	61
	% within treatment	100	100

Source: Own survey, 2013

The indirect costs of medical treatment such as travelling and waiting time also play an indispensable role in choosing medical treatment among different health care providers. The average waiting time for treatment found to be 56 and 27 minutes for public and private health care providers, respectively. This may be one of the reasons for highly educated individual to prefer private providers at higher cost of treatment.

Table 4.7: Treatment Chosen by Waiting Time

Waiting Time in minutes		Health care provider chosen		Total
		Public	private	
Less than 30	Count	23	46	69
	% within treatment option	26.7	75	47
Between 30 & 60	Count	35	12	47
	% within treatment option	40.7	20	32
Between 60 & 120	Count	24	3	27
	% within treatment option	28	5	18.3
Above 120	Count	4	0	4
	% within treatment option	4.6	0	2.7
Total	Count	86	61	147
	% within treatment option	100	100	100

Source: Own survey, 2013

The result reveals that the indirect cost of medical treatment is higher in public health care providers than private providers. Table 4.7 shows 75% of those who consulted private care provider are found treated within 30 minutes and 95% within an hour. Only 5% waited above an hour to get the treatment in the private health care service providers. However, the picture is

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different for the public health care services provider; it is only 26.7% of who consulted public providers got treated within 30 minutes and 67.4% within an hour. Significant proportion (28%) of those who consulted public wait between one to two hours to get treated and the remaining 4.6% wait above two hours to get the necessary treatment. The result suggests that as the waiting time increase the patients prefer public to private provider. In general, publicly provided health care is associated with less direct cost and high indirect cost whereas the privately provided health care services are associated with high direct cost and low indirect cost (Table 4.7).

4.1.3 Demographic factors and demand for health care services

Cross tabulation of the result, suggest that consultation of medical treatment varied with education level of patient and household head. Consultation of medical treatment increases with education of patients and household head (Table 4.8). The behavior of seeking medical treatment at the time of illness is higher among those patients and household heads with education of above high school. Thus, it can be safely deduced that, education positively influence the decisions of individuals whether or not to consult medical treatment at the time of illness.

Table 4.8: Health care provider chosen by education level of household head and Patient

Treatment Chosen		Education of Household Head					Education of Patient				
		No education	Prim ary	Secon dary	Above Secon dary	Tot al	No educa tion	Prim ary	Secon dary	Above Secon dary	Total
Public	Count	11	32	12	31	86	7	29	23	27	86
	% Within Treatment	12.8	37.2	14	36	100	8.1	33.7	26.8	31.4	100
Privat e	Count	3	14	6	38	61	5	14	11	31	61
	% Within Treatment	4.9	22.9	9.8	62.3	100	8.2	23	18	50.8	100
No-care	Count	17	8	7	8	40	16	9	9	6	40
	% Within Treatment	42.5	20	17.5	20	100	40	22.5	22.5	15	100

Source: Own survey, 2013

Regarding the choice of health care provider, highly educated patients mostly utilize private health care services. This may be due to the fact that higher waiting time that prevail in public health care increase the opportunity cost of time for those individuals with higher schooling. Further, the result suggests public health care providers are mostly utilized by those patients with

primary educational attainment. Households seek modern medical treatment for more educated members of the family than less educated members of the family. In general, while education positively influence the decision to seek medical treatment, choice of private and public health care services respectively show a tendency of increasing and decreasing with the level of education (Table 4.8).

The other important demographic variable that may influence the decision to seek and choose treatment among medical care providers treatment is age of the patient. Cross tabulation of age groups against medical treatment, seeking behavior revealed that medical treatment seeking behavior decline with age of patients (Table 4.9). The result confirmed that children category associated with the highest medical treatment utilization. This tell us households give due emphasize for child health. Regarding provider choice the public health care mainly utilized by children category (below15 years) followed by age group of 15 to 30. Still the result indicates that the choice of public health care services decline by with the age of patients. Private health care services mostly utilized (40.5%) by age groups between 15 and 30 followed by children category (32.8%). In general, age of patient play a crucial role health care demand and provider choice (Table 4.9).

Table 4.9: Patients age category and choice of health care providers

Choice of provider		Age Group of the Patient				
		Below 15	15 to 30	30 to 45	45 to 60	Above 60
Public	Count	40	23	12	9	2
	% Within age category	59.8	48.9	41.4	25	25
Private	Count	22	19	6	11	3
	% Within age category	32.8	40.5	20.7	30.6	37.5
No-care	Count	5	5	11	16	3
	% Within age category	7.4	10.6	37.9	44.4	37.5

Source: Own survey, 2013

4.1.4 The effect of subjective factors on the demand for health care services

The perception of patients about the quality of health care services provided by different health care services providers may also play a crucial role in deciding to choose among different health care providers. Patients were asked to value the quality of treatment by considering the behavior and efficiency of staff, availability of the necessary health equipment, availability of drugs and other necessary facilities. Accordingly, it is found that about 20% and 63% of those who consulted public health care providers have been valued the quality of treatment as it is very good and good, respectively. However, from those who seek treatment from private health care service providers 39.4% and 54.1% valued that quality of treatment as it is very good and good, respectively (Table 4.10). On the other hand, 7% and 10.5 % of patients who consulted public health care services perceived quality as very poor and poor, respectively. None of patients who consulted private health care perceived quality as very poor and only 6.5% of them valued quality as poor. This probably explain the reason why individual patients preferred private providers than public at a higher cost of treatment.

Table 4.10: Perceived quality of treatment Vs choice of health providers

Provider type	Perceived quality of treatment			
	Very poor (%)	Poor (%)	(%)good	Very good (%)
Public	7	10.5	62.8	19.7
Private	0	6.5	54.1	39.4
TOTAL	4.1	8.8	59.2	27.9

Source: Own survey, 2013

Of the total respondents asked to evaluate the behavior of the health care staff while delivering the treatment, 26.7% and 57% of those who consulted public care valued the staff behavior as very good and good. In the same range, the proportion for the private provider is 36% and 57.4%. On the other hand, behavior of staff members on the range of bad to worse was found 11.6% and 4.6% respectively, for public ones. None of the patients consulted private health care valued the behavior of private health care staffs as worse and only 6.6% scaled as bad (Table 4.11).

Table 4.11: Evaluation of behavior of health staff and choice of health facilities

Provider type	Evaluation of behavior of staff members			
	Worse (%)	Bad (%)	Good (%)	Very good (%)
Public	4.6	11.6	57	26.7
Private	0	6.6	57.4	36
TOTAL	2.7	9.5	57.1	30.6

Source: Own survey, 2013

From the above trend we understand that there positive association between the perception of patients about health care staff behavior and quality of treatment. This further indicates patients may evaluate quality of treatment by taking in to account the behavior of health care staff.

Table 4. 12: Treatment chosen by number of adults and number of children in the household

Treatment Chosen		Number of adults		Number of children		
		1-3	Above 3	0	1-2	Above 2
Public	Count	60	26	25	55	6
	% Within adult/child category	48	42	50	46.2	33.3
Private	Count	37	24	15	41	5
	% Within adult/child category	29.6	38.7	30	34.5	27.7
No-care	Count	28	12	10	23	7
	% Within adult/child category	22.4	19.4	20	19.3	38.8
Total	Count	125	63	50	119	18
	% Within adult/child category	100	100	100	100	100

Source: Own survey, 2013

The last demographic factor that is expected to affect demand for health care services is household structure represented by number of adults and number of children in the family. As we can see from the table 12 from the first adult category (1 to 3), 77.6% of consulted medical treatment and the remaining 22.4% did not consult any modern treatment. From the second group of adult category 81.6% of them consulted modern medical treatment and the rest 19.4% did not consult any modern treatment provider. Table 12 show that 80 % and 80.7% of those household with children of 0 and 1 to 2 consulted modern medical, respectively. However, the utilization of modern treatment is significantly lower (61.2%0) among those households with children of above two.

4.2 Econometric Analysis

In this section, the estimation results of the nested multinomial logit (NMNL) are discussed. The first part of the nested multinomial logit model result highlights estimates of provider choice model while the second part estimates the mode of treatment choice (choice between no-care and care).The results of both models were obtained by estimating the full-information maximum likelihood nested logit procedure. Table 4.13 and 4.14 show the results of the simultaneous estimation of NMNL model. The sample household grouped is into those who seek care (care group) and those did not seek (no-care group). In the case of no-care, the inclusive value (σ) is constrained to be one since we have only one alternative in this branch. The estimated coefficient of inclusive value (σ) for the care group is 0.346 which is significantly less than one and greater than zero. The value of the inclusive value indicates the existence of correlation among the unobserved components of these alternatives and estimating a simple multinomial logit model may give biased results. The correlation coefficient (1- σ) of 0.654 shows there is moderate substitution among the modern health care options (between public and private alternatives) than other alternative (no-care).

The parameter of the lower level NMNL model (provider choice model) estimate is presented in Table 4.13 below. While it is difficult to interpret the magnitude of coefficients meaningfully, the signs and significance of the coefficients would reveal whether or not the model is able to explain the determinants of the choice of health care service providers. Individual patient characteristics and providers specific characteristics included as an explanatory variables that determine choice among different health care providers. However, number of days lost due to illness and household level factors assumed to determine the decision to seek treatment (between modern care and no-care). In both models the reference category is the no-care option. Therefore, all the estimated coefficients are relative to no-care option.

The effect of age is negative and significant for the choice of both health care providers. This shows that adults reduce utilization of medical care as they grow older. The negative effect of age is stronger for the private health care provider. Mawuli G. (2011) in Ghana using nested multinomial logit and Amarech G. (2007) in Urban Ethiopia using a multinomial logit model found the same result. The econometric result is also consistent with the descriptive analysis. The result confirms that household gives more emphasize for child health. The positive sign on the coefficient of patient sex indicates that males have high probability of seeking care from both public and private providers compared to females. However, the coefficient of patient sex found to be insignificant for both public and private providers that imply there is no significant difference in utilization of both health care service providers based on sex of patients.

Education of the patient enters in to the model in the form of dummy with no education as the base category. While education for adults refers to the level of education they attained, children under fifteen years were assigned education of the household head as proxy. The result suggested that primary education of the patient is associated with positive and significant utilization of public health care relative to illiterate patients. However, for those patients with secondary and above education, the sign of coefficient is positive but not significant. This implies that there is no significant difference between illiterate patients and those patients with secondary and above education in utilization of public health care services. Even though for private provider alternative the sign of coefficient for primary education is positive, it is found to be not a significant determinant of private health care utilization. However, utilization of private health care associated with positively and significantly with secondary education and above. The positive and significance association between secondary and above education, and probability of seeking private health care may be due to the fact that highly educated individuals earn more income and more likely to afford private care, keeping other determinants constant.

Table 4.13: FIML Model of Provider Choice Estimates

Variables	coefficient	Standard error	Z-value	p>|z|	[95%Conf.Interval]	
public						
logcons	.5802398	.199861	2.90	0.004	.1885195	.9719602
page	-.067644	.0313482	-2.16	0.031	-.1290853	-.0062027
psex	.04589	1.52097	0.03	0.976	-2.935164	3.026958
qual	1.38418	.4633408	2.99	0.003	.4760492	2.292312
ppredu	1.26549	.729119	1.74	0.083	-.1635573	2.694537
psecedu	.457486	.5922751	0.77	0.440	-.7033512	1.618325
private						
logcons	.9356325	.458185	2.04	0.041	.0376063	1.833659
page	-.0831133	.0322459	-2.58	0.010	-.1463141	-.0199125
psex	.0527959	1.501256	0.04	0.972	-2.889611	2.995203
qual	1.437592	.4698913	3.06	0.002	.516622	2.358562
ppredu	1.842953	2.194925	0.84	0.401	-2.459021	6.144926
psecedu	.7918051	.4686806	1.69	0.091	-.1267919	1.71040

LR test for IIA (tau = 1): chi2 (1) =   7.80   Prob> chi2 = 0.0052
 Log likelihood=-101.1
 Number of observations = 561
 Number of cases = 187
 Wald chi2 (19) = 76.68   Prob> chi2 = 0.0000

Quality of treatment enters in to the model as a continuous variable. The respondents asked to give weight out of ten for quality of treatment of the health care provider they visited by considering some aspect of quality measurement. The effect of quality is significant and of the expected sign for both providers. The result confirms that quality of treatment is a positive and highly significant determinant of demand for both public and private health care providers. This may reveal that health care service providers could attract more customers by improving their quality of treatment. Kasirye et al (2004) in Uganda and Hanson et al (2004) in Cyprus found the same result in their studies.

The log of consumption, perhaps the most important economic factor enters in to the model as interaction of income of the household and cost of treatment (both direct and indirect cost of treatment). The coefficient on log of consumption is statistically significant for both health care providers relative to no care as expected. The result indicates that income, direct and indirect medical costs of treatment are important determinants of the demand for medical care. The result is consistent with previous studies in health care demand such as Tesfaye A. (2003) in Ethiopia and Tito N. T. (2012) in Cote d'Ivoire. The positive sign of the log of consumption coefficient indicates the direct relation between consumption and the demand for health care for both health care providers. Since price and income enter in to the model in a highly nonlinear form, it is difficult to assess their influence on demand directly from the results. Later to assess the effect, price elasticity of the demand is estimated for different income groups following Gertler and van der Gaag (1990).

The parameter of the upper level FIML model estimation provided in the Table 4.14. At this level, number of days lost due to illness and households level factors assumed to determine the decision to seek treatment (between modern care and no-care).

Severity of illness as measured by duration of illness is found to be a significant determinant of seeking modern care. As expected the probability of seeking health care is positively correlated with the number of days lost due to illness. This result found to be highly consistent with the result of descriptive analysis as majority of the respondent explained mildness of illness was the main reason for not consulting modern treatment. Therefore, patients' perception regarding the

seriousness of illness plays a significant role in their decision of consulting modern medical treatment. The finding is consistent with what Amarech G. (2007) had found in her study of the impact of user fee on health care demand in urban Ethiopia.

Table 4.14: FIML Model of Mode of Treatment (no care Vs modern care) Estimates

Variables	coefficient	Standard error	Z-value	p>|z|	[95%Conf.Interval]	
Care						
Ndayssuf	.1051924	.021336	4.93	0.000	.0633746	.1470102
Agehhead	-.0072955	.0256985	-0.28	0.776	-.0576636	.0430725
Sexhhead	.4253033	.5572631	0.76	0.445	-.6669124	1.517519
hhpredu	.644012	.5745089	2.13	0.034	.0949652	2.346999
hhsecedu	1.220982	.1734684	2.08	0.037	-.4591165	1.747141
Nadult	-.0355698	.2473247	-0.14	0.886	-.5203174	.4491778
Nchild	-.7070361	.2804567	-2.52	0.012	-1.256721	-.157351
Inclusive value	0.34669	.1666779	2.08	0.038	.1317422	.5616378

Log likelihood=-101.1
Number of observations = 561
Number of cases = 187
Wald chi2 (19) = 76.68   Prob> chi2 = 0.0000

Among the household level factors age and sex of household head have negative and positive effect on the probability of seeking modern medical care, respectively. However, both variables found to be insignificant.

Number of adults in the household is negatively affecting the probability of seeking modern care. This indicates that the more the number of adults in the household the less likely the households opt for modern medical treatment, but the effect is found to be insignificant. This result is also consistent with the descriptive analysis. The demand for modern care decline with the number of children in the household and the coefficient is also found to be significant. The result reveals that the more the number of children in the household the less likely the households consult for modern medical treatment. This may be due that large number of dependent family member may reduce the income available for medical treatment. Alternatively, lower income generating

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ability of children may reduce the probability of consulting modern treatment at the time of illness. This finding is supported by Kasirye et al. (2004).

Household heads' education also enter into the model as a categorical variable with no education as a reference group. The results show that having primary education, and secondary and above education increase the probability of seeking modern medical care compared to those household heads with no education. The coefficient is significant for both groups that imply the likelihood of consulting modern medical care at the time of illness higher for those household heads with some education relative to illiterate household heads. This may be due to that more educated household heads earn more income that increases the probability of seeking modern medical care. This finding is consistent with Tito N. T. (2012), Mawuli G. (2011) & Lindelow M (2003).

The effect of different determinants of demand for health care services explained above except the income of the household and cost (price) of treatment. The income and cost of care are included in to the model in non-linear form that is why it was difficult to assess their individual effect on demand for care directly from the results. However, the significance of the consumption variable indicates that the income and cost (direct and indirect cost) of treatment are also important determinants of demand for different medical care providers. To explore the influence of income and cost of treatment, the arc price elasticity of demand is estimated following Gertler and Van der Gaag (1990).

Table 4.15: Arc Price Elasticities

Price change	Income group (in Birr)		
	0 to 1000	1000 to 2500	Above 2500
	Public provider		
0 - 80	-0.048857	-0.037526	-0.02428
80 - 160	-0.0625322	-0.05033	-0.037581
160 - 240	-0.08535	-0.075332	-0.058563
240 - 320	-0.0923683	-0.083849	-0.068958
	Private provider		
0 - 80	-0.04056	-0.038213	-0.022354
80 - 160	-0.0515684	-0.044847	-0.033386
160 - 240	-0.07485	-0.073242	-0.05081
240 - 320	-0.086372	-0.078241	-0.057265

To compute the arc price elasticity of demand initially the probability of choosing a particular provider at the lower and upper limit of price level estimated for all individual in a given income group by keeping all their variables at their mean value except income and price. Next, the arc price elasticities are computed for all income groups by dividing the average percentage change in the sum of probabilities by percentage change in price.

Computation of the arc price elasticities shows that elasticities are negative over all prices and income groups. In addition to that, demand is more price elastic at lower incomes and at higher level of prices. The magnitude of the prices elasticities varies greatly by income of the household and found to be highest among the lowest income group (poor) and lower for the highest income group (rich). For instance, a 10% increase in cost of care would reduce nearly 0.5% of demand of public provider among the poorest but it is only 0.25% among the richest income groups, keeping other factors at their mean. The result suggests poor households are more price sensitive than the rich households. Similar resulted obtained by Abay Asfaw in his study of health care demand and poverty in rural Ethiopia. Most literature in health care demand also found the same result in different African countries such Mawuli G. (2011) in Ghana, and Kasirye et al (2004) in Uganda.

Although magnitudes of the computed price elasticities for both providers are small, the estimate shows that demand for both providers is more price elastic at higher level of prices. Therefore, health care demand is more price elastic at higher level of prices. This indicates that the patients are more price sensitive at higher price range than at lower price ranges. Further, the result reveals that elasticities are higher for the public care providers than private providers for all income groups. For example, 10% increase in the price of treatment would result in a reduction in demand of the poorest by around 0.5% in public providers as compared to a reduction of 0.4 % in private provider, keeping other factors at their mean. This lower elasticity for private health care may be the result of patient positive perception about the quality of cares that prevailed in private health care services providers.

Chapter Five
5. Conclusion and Recommendation

5.1 Conclusion

The provision of proper health care services is considered as important aspect of the socioeconomic development of any country. However, there is a need to think beyond the provision of health care services, and consider factors that affect households' decision of consulting treatment and their choice among different health care services providers. An individual who experience illness or injury decision makes first whether to consult medical treatment or not and then decision of his (her) choice among different health care providers. Therefore, this paper tried to investigate those factors associated with both levels of households' decision-making.

The paper is based on a primary data collected from respondents in Mekelle city and tried to examine the factors that determine the medical treatment consultation behavior at times of illness and the choice of health care service providers using both descriptive and econometric analysis. To achieve the object of identifying the determinants of consultation behavior and choice between different health care services providers, this paper employed NMLM estimated using full information maximum likelihood technique.

Estimation of the lower level model (provider choices) indicates that, log of consumption, patient's age, patient's education, and perceived quality of treatments are found to be significant factors that affect the choices between health care services providers. All these variables have positive effect on the demand for both public and private health care providers except patient's age. At the same time the estimation results of the upper level model indicate patient education, number of days suffered and number of children in a household significantly affect the decision of consulting modern care. Education and number of days suffered are found positively related whereas and number of children negatively affects the decision to seek modern care. However, patient and household head sex, and household age are found insignificant determinants of demand for health care services.

Primary education of patient has found positive and significantly affect the probability of consulting public health care services providers. Similarly, the probability of consulting private health care service providers is affected positively and significantly by patients' secondary and tertiary education. The result indicates investing in education may increase the probability of consulting both kinds of health care service providers. Demand for modern treatment also positively and significantly affected by household head's education. The more educated the household head is the more likely to consult medical treatment at the time of illness.

Household structure is another factor that affects decision to consult modern treatment. Both number of children and adults in the family have negative effect on demand for modern treatment but the effect is significant only for the former groups. The demand for both private and public providers decline with patient's age and this suggest adults reduce health care utilization as they grow older.

Quality of services provided by different health care service providers is also another crucial factor that affects demand for different health care service providers. The effect found to be positive and significant for both providers. Severity of illness as measured by duration of illness is found a significant determinant of seeking modern care. As expected the probability of seeking health care is positively correlated with the number of days lost due to illness.

Further, log of consumption was found a significant determinant of demand for both health care services providers implying both income and cost of treatment are important determinants. To explore the effect of cost of care on health care demand, arc price elasticity estimated for different income groups. Computation of the arc price elasticities shows that elasticities are negative over all prices and income groups. Demand is more price elastic at lower incomes and at higher level of prices. Therefore, those in lower income group are more price sensitive than the rests. Health care demand is also more price elastic for public health care provider than private one.

5.2 Recommendations

The level of education of the person has a positive effect on the probability of consulting modern medical care. The result indicates education play a significant role in individual's decision to consult modern care at the time of illness. Hence, the policy lesson is expansion of education could be one component of creating healthy and productive society. Since significant proportions of adults are illiterate, the government needs to supplement the formal education with the informal one to create awareness about health among adult illiterates.

Individuals' perception about their illness plays a significant role in their decision of consulting modern care. This implies individuals are more willing to consult modern care if they think the illness is serious. This indicates the government need to design policies that pooled individual patient to modern care services at the time of illness. For instance, creating public awareness on health problem risks plays a crucial role in this respect.

Demand for modern care decline with the number of children in the household. This may be resulted from large dependent household members that reduce the resource available for treatment. Even though great achievements have been made in Ethiopia in the last three decades, the government still has serious homework in expansion of family planning services. Therefore, the government needs to strengthen the family planning even in urban areas.

Patients' perceived quality of treatment is another factor that increases the probability of consulting modern care. This necessitates the government need to invest more to improve the quality of services provided by the public health care service providers. The government also should design some mechanisms that ensure the quality of health care services provided by the private health care service providers.

The most important variable, the log of consumption included in to the model as the log of the difference between income of the household and cost of the treatment. To see the individual effect of cost of treatment, price elasticities are computed for different income groups. The result revealed that there is a difference in health care utilization among different income groups in

response to a change in cost of treatment. Further, the result shows demand for modern care is more price elastic at lower level of income. Therefore, user fees would be regressive in that they would reduce poorer individuals' utilization by more than that of richer individuals. This indicates that before any attempt to increase user fee, the government should introduce a mechanism that ensure enough utilization of health care services among the poor segment of the population. The other interesting result is because of more substitutability between modern cares, any price increase in one of the two modern health care services providers result in demand to shift more than proportionally to the other modern care health care services provider than no care (no treatment). The low magnitude of price elasticities indicates government has the potential to generate more revenue by increasing user fee, but this measure should be supported by mechanisms that ensure enough utilization among the poor.

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Appendix

1. Result of FIML estimation

```
tree structure specified for the nested logit model

 tree     N      providerch~e   N    k
----------------------------------------
 nocare 187 --- 1              187   40
 care   374 --- 2              187   86
            +- 3              187   61
----------------------------------------
                    total    561  187

k = number of times alternative is chosen
N = number of observations at each level


RUM-consistent nested logit regression      Number of obs     =        561
Case variable: hhid                          Number of cases   =        187

Alternative variable: providerchoice         Alts per case: min =         3
                                                            avg =       3.0
                                                            max =         3

                                             Wald chi2(19)     =      76.68
Log likelihood = -1o1.23044                  Prob > chi2       =     0.0000

--------------------------------------------------------------------------------
      choice |    Coef.    Std. Err.      z    P>|z|    [95% Conf. Interval]
--------------------------------------------------------------------------------
tree equations
--------------------------------------------------------------------------------
care         |
    Ndayssuf |    (base)
    Agehhead |    (base)
    Sexhhead |    (base)
     hhpredu |    (base)
    hhsecedu |    (base)
      Nadult |    (base)
      Nchild |    (base)
-------------+------------------------------------------------------------------
care         |
    Ndayssuf |   .1051924    .021336     4.93   0.000    .0633746    .1470102
    Agehhead |  -.0072955   .0256985    -0.28   0.776   -.0576636    .0430725
    Sexhhead |   .4253033   .5572631     0.76   0.445   -.6669124   1.517519
     hhpredu |    .644012   .5745089     2.13   0.034    .0949652   2.346999
    hhsecedu |   1.220982   .1734684     2.08   0.037   -.4591165   1.747141
      Nadult |  -.0355698   .2473247    -0.14   0.886   -.5203174    .4491778
      Nchild |  -.7070361   .2804567    -2.52   0.012   -1.256721    -.157351
--------------------------------------------------------------------------------
providerchoice equations
--------------------------------------------------------------------------------
providerchoice1|
     logcons |    (base)
        page |    (base)
        psex |    (base)
        qual |    (base)
      ppredu |    (base)
     psecedu |    (base)
-------------+------------------------------------------------------------------
providerch~2 |
     logcons |   .5802398    .199861     2.90   0.004    .1885195    .9719602
        page |   -.067644   .0313482    -2.16   0.031   -.1290853   -.0062027
        psex |    .04589    1.52097      0.03   0.976   -2.935164   3.026958
        qual |   1.38418    .4633408     2.99   0.003    .4760492   2.292312
      ppredu |   1.26549    .729119      1.74   0.083   -.1635573   2.694537
     psecedu |    .457486   .5922751     0.77   0.440   -.7033512   1.618325
-------------+------------------------------------------------------------------
providerch~3 |
     logcons |   .9356325    .458185     2.04   0.041    .0376063   1.833659
        page |  -.0831133   .0322459    -2.58   0.010   -.1463141   -.0199125
        psex |   .0527959   1.501256     0.04   0.972   -2.889611   2.995203
        qual |   1.437592   .4698913     3.06   0.002     .516622   2.358562
      ppredu |   1.842953   2.194925     0.84   0.401   -2.459021   6.144926
     psecedu |   .7918051   .4686806     1.69   0.091   -.1267919    1.71040
--------------------------------------------------------------------------------
dissimilarity parameters
--------------------------------------------------------------------------------
tree         |
 /nocare_tau |      1          .          .      .          .           .
   /care_tau |   0.34669   .1666779      2.08   0.038    .1317422    .5616378
--------------------------------------------------------------------------------
LR test for IIA (tau = 1):          chi2(1) =     7.80    Prob> chi2 = 0.0052
--------------------------------------------------------------------------------
```

Questionnaire for Household Survey on Determinants of Demand for Health Care Services in Mekelle City

Respondent's Name (optional) _____Respondent Code_____

House No_____ kebele _____ Sub City _____Patients Characteristics

1.1 Is there any member of the household who has been suffering from illness (injury) during the last one month? _____Yes _____No   **(if no stop here)**

1.2 If yes, how many they are? _____

Please, mention their age, sex, and education.

S.No	Patient's code	sex	Age	Education				
				Illiterate	Elementary	High school (including preparatory)	Above high school	Religious

1.3 If the age of the patient is less than 15 years, please specify the education level of the household head.

☐   Illiterate   ☐   Elementary   ☐ High school

☐ Above high school   ☐_____others specify

1.4 How severe was their illness?

S.No	Patient's code	Severity of illness		
		Not severe	Severe	Very severe

1.5 What was his/her illness or injury? If more than one, refer to the most serious

Type of Illness	Patient's code			Type of Illness	Patients Name		
MALARIA				HEADACHE			
Cold and Cough				HEART			
Stomach				LUNG			
DIARRHEA				SKIN ILLNESS			
EAR/NOSE/THROAT				STD			
LIVER				BROKEN BONE			
KIDNEY PROBLEMS				PREGNANCY/ DELIVERY COMPLICATIONS			
DENTAL				others			
EYE							

1.6 Did any one of the patients consulted to medical treatment? __**Yes** __**No (if no go to 1.16)**

1.7 If yes, where did they go first?

S.No	Patient's code	Public provider		Private provider		NGO (Mission)	Traditional healer
		Hospital	Health center	Clinic	Hospital		

1.8 What was the reason why they choose the mentioned health Institutions?

S.No	Patient's code	Reason for choosing the health facility					
		Short waiting time	Availability of drugs	Better quality	Proximity	low price	others specify

1.9 How many times did they visit the health institutions?

S.No	Patient's code	No of visits to the health facility			
		Once	Twice	Trice	More than three

1.10 How much money were the patients spent on treatment for a first visit?

S.No	Patient's code		Amount of money paid			
		For Card(registration fee)	For Laboratory service	Transport (round trip)	Drugs	Total

1.11 From where did the patients purchase the prescribed drugs?

S.No	Patient's code	Source of Drug Purchased			
		Public health Facility	Red Cross Pharmacy	Private Pharmacy Drug shops and vendors	Private health facility

1.12What means of transportation did the patients use to reach the health facility?

S.No	Patient's code	Means of transportation			
		By car (taxi)	On foot Others (Specify)	By horse cart	Others Specify

1.13 How far is the health facility visited by the patients in terms of physical distance traveling time and waiting time?

S.No	Patient's code	Distance in kilometer	Traveling time in hours(minutes)			Waiting time in Hours (minutes)
			by car	on foot	horse cart	

1.14 How do the patients view the behavior of health care personnel?

S.No	Patient's code	Health Workers Behavior			
		Worse	Bad	Good	v. Good

1.15 How is the quality of the treatment as evaluated by the patient?

S.No	Patient's code	Services quality			
		Very poor	Poor	Good	Very good

1.16 Give a weight for the quality of treatment out of ten----------------------

Questions for both patients who consulted and not consulted a medical care

1.17 How many days have the patients been suffering from illness and unable to perform their regular activity due to illness or injury in the past one month?

S.No	Patient's code	Number of days	
		Suffered	Absent from work

1.18 If there are any of the patients who were not visited the health facility, what was the reason for not visiting the health facility?

S.No	Patient's code	Reason for not visiting health facility				
		lack of money	The illness was not severe	lack of time	The treatment does not help	Others(Please specify

1.19 How was the previous (before illness) health status of the patients?

S.No	Patient's code	Previous Health Status of the Patients			
		Worse	Bad	Good	Very good

2. Households Characteristics

2.1 Household head's head name (optional) _____

2.2 Age of the household head _____ .

2.3 Sex of household head _____ Male _____Female

2.4 Education level of the household head
___ Illiterate _____Elementary _____ High school

___Above high school _____ Religious
2.5 What is the household head's occupation?

____Private employee _____ Self-employed ____ Government employee
_____Unemployed ____Retired ____ other (specify)

2.6 How much the household head earn (net Income) form the job?
_____Birr per week or_____ Birr per month

2.7 How much time the household head spend on this job?
_____hours per day and _____days per week

2.8 Do the household head have any other job apart from the main job? _____Yes ____No (**if no go to 2.11**)
2.9. If yes, how much the household head earn (net Income) from that job?
_____ Birr per week or _____Birr per month

2.10. How much time the household head spend on this job?
_____hours per day and _____days per week

2.11. Is the household head married? _____Yes _____ No (**if no go to 2.19**)

2.12. If yes, what is his or her (partner's) education level?
_____ Illiterate ____Elementary _____High School
____Above High School _____Religious

2.13. What is her/ his (partner's) occupation?

_____Private employee _____ Self-employed _____ Government employee
_____Unemployed _____Retired _____ other (specify)

2.14. How much time does she or he (the partner) spend on this job?

_____hours per day and _____days per week

2.15. How much does she/he (the partner) earn (net Income) from this job?
_____ Birr per week or _____Birr per month

2.16 Does he or she (the partner) have any job apart from the main job? ___Yes ___No **(if no go to 2.19)**

2.17 If Yes, How much does she or he earn (net Earning) from this job?
_____hours per day and _____days per week

2.18 How much time does she or he spend on this job?
_____hours per day or _____hours per month

2.19. What is the relation of the family's head to the family?
_____Father ___Mother _____Sister _____Brother _____Other (specify)

2.20. If the household head is other than father and mother, who is the person responsible for cooking, shopping and other similar activities?

_____ Household head _____ Housemaid _____Other (specify)

<div align="center">

3. General Households Conditions

</div>

3.1 What is the total size of the family? _____

3.2 What is the total number of children whose age is less than 15 years?_____

3.3 Is there any household member (apart from those reported above) who have job or income?
_____ Yes _____No **(if no go to 3.5)**

3.4 If yes, please mention their income, type of job, and amount of time spent on work daily or weekly?

S.No	code	Monthly income	time spent on job daily	Type of work			
				civil servant	privately employed	self employed	Other (specify)

3.5 Do you (the family) have Income from remittances? _____Yes _____No **(if no go to 3.6)**

3.6 If Yes, How much per month? _____Birr

3.7 Do you (the family) have livestock like cow, sheep, etc?

_____Yes _____No (if no go to 3.9)

3.8 If yes, please mention the amount of money that can be received, if they were sold at Current market price. _____Birr at current market price

3.9 Do you have any farm land? _____Yes _____No (if no go to 3.11)

3.10 If yes, how much do you earn form the farm land annually? _____Birr

3.11 Do you have any car, radio tape recorder, TV, own home etc? ____Yes ____ No (please tick the one which the family have)

Car	Radio	Tape recorder	TV	Own Home

3.12 Have you sold any household asset in the past one month? _____Yes _____No **(if no go to 3.14)**

3.13 If yes, what is the total amount of money received from the sales? _____ Birr

3.14 What is the total income of the family?

_____ Birr per week or _____Birr per month.

3.15 What is the main source of family's drinking water?

_____Pond _____ River _____Dam _____Private Pipe   _____Communal _____Others (specify)

3.16 Do you (the family) have any pit latrine? _____ Yes _____ No

3.17 Do you (the family) have any waste disposal site? _____Yes _____ No

3.18 If yes where do you dispose?

_____Open field in the family's compound _____Pit in the family's compound _____Communal disposal site

3.19 What is the religious denomination of the family?

_____ Orthodox Christian ____ Islam ____ Protestant Christian

_____Catholic Christian   _____Other (specify)

Thank you for your cooperation!