HEALTH INSURANCE AND DEMAND FOR MEDICAL CARE

M.A RESEARCH PAPER

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DECLARATION

This research paper is my original work and has not been presented for a degree in any other university.

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This research paper has been submitted for examination with our approval as university supervisors.

15.11.01
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for Ms. Mugo

DEDICATION

To my parents, brothers and sister.

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ABSTRACT

Under-utilization of medical facilities in African countries is believed to be a result of the high cost of medical care services. This paper uses data from a random survey of users of health facilities, enriched with exogenous information on health facility attributes, to examine more deeply the accessibility factor in health care demand in rural Kenya.

We find that income increase demand for medical care although by an insignificant margin. Thus large increases in income are required to increase demand significantly. Gender and education are important determinants of the choice of health facility. Quality is another major determinant of health care demand. Improvement in service quality significantly increases demand and therefore can be used as a policy tool to drive more people into the health sector. Drug availability increases demand in hospitals and reduces demand for ambulatory care services.

Distance, waiting time, and user fees reduce demand, particularly in the private care sector. Insurance increases demand in the hospital and dispensaries (where insurance pays for the medical care costs of the patients) and reduces demand in the private physician option. It increases the accessibility for the insured by reducing the money prices of medical care. On the other hand, it makes time prices and distance significant determinants of medical care demand.

Thus to increase access to medical care for the low-income earners, the insurance institution should be able to organize consumer's entry into the health system and remove the financial incentive that may encourage providers to increase volume and cost of services.

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CHAPTER I: INTRODUCTION

1.1 BACKGROUND

The Kenyan economy (and other sub-Saharan countries in general) has been experiencing a slow-down in economic activity brought about by severe droughts in the region, the worldwide recession, and unfavorable changes in the terms of trade for agricultural (and other primary) products. As a result of these internal and external shocks, the budgetary allocation of the Ministry of Health (MOH) has declined as a percentage of total government budget and on real per capital basis (Vogel, R.J., 1990). The reduced income of many communities, decreased assistance from donor organizations, and the increasing cost of health care services has led to a financial crisis in the health care system (McFarlane G.A., and Sammon A.M., 2000). Thus governments and other stakeholders in the health sector are faced with problems of mobilising more revenues for health, improving efficiency of investments in better health, and correcting persistent inequalities created by the current health care financing system (Shaw R.P., and Griffin C., (1997), Mwabu, G., (1990), and Kutzin, J., and Barnum, H.,(1992)).

It is in this context that the government and non-governmental organizations are seeking alternative methods to finance healthcare. There is increasing interest in community-based health insurance as a viable financing mechanism for health-care providers in Africa[1] (McFarlane, G.A., and Sammon, A.M., 2000). This financing mechanism will mobilize more resources for health to meet the health needs of the growing population, majority of whom are poor and rely on the Ministry of Health budget as an implicit or informal form of national health insurance or on traditional healers for whose care they must pay out of pocket – pay more for traditional healers

[1] Health insurance is one in a portfolio of options available to complement government budgetary allocations for health care spending. Other options include user fees, community financing, and international finance (loans and grants from financial institutions and international development agencies). Insurance should not be seen solely as a financing mechanism for health care delivery system. On the contrary, the primary role of insurance is a mechanism to reduce individual's exposure to risk. Thus insurance contributions that finance a given level of health care spending, risk reduction aside, represent just one of the multitude of financing options.

and drugs than they might copay on health insurance (Vogel R.J., 1990). This is also expected to foster private sector development as well as free up government funds that are currently allocated disproportionately to hospitals (Shaw, R., and Griffin, C., (1997), McFarlane, G.A., and Sammon, A. M., (2000), Shephard, D., et al., (1990), and Eklund Per and Stavem Knut (1990)). Many developing countries (like Zaire, Zimbabwe, Rwanda, Zambia, and Nigeria) have implemented health insurance schemes as an option for increasing available resources in the health sector, and offer an alternative to the tax-based, publicly funded health care systems.

Kutzin, J., and Barnum, H., (1992) and Nganda, B., (1994), however, argue that although insurance programs are often implemented as ways of mobilising resources for health, insurance also affects allocation of health resources by changing the signals sent to producers and consumers of health care services. Insurance generates incentives to providers and consumers, which can increase the use of medical services so much that health care costs escalate rapidly, resource allocation in the sector is distorted, medical technologies are inappropriately used, and access to services is affected. Thus insurance institutions may not create incentives that encourage producers and consumers to behave in a manner consistent with social goals.

Shaw, R., and griffin, C., (1997), and Jack, W., (1999) on the other hand argue that health insurance can increase access to health care services. However, this does not necessarily translate to equitable access. This arises because it may lead to a situation where health individuals have more care than they need whereas the less healthy individuals have considerably less than they need. Nganda, B., (1994) differentiates between equality and equity, and refers to equality as a case where the shares (of the entity whose distribution is the point of interest) resulting from a distribution rule are equal, whereas equity refers to a situation where they are fair and just. Thus in health, equity requires that patients (actual and potential) who are alike in "relevant" respects, ought to be treated in a like fashion (that is, horizontal equity), and patients who are unlike in "relevant" respects ought to be treated in an "appropriately" unlike fashion.

In this paper we analyse the demand for health care services using household survey data from one of the communities in Kenya. Our interest is to understand demand patterns better and to analyse how this new information might modify the strategies chosen to implement health policies.

1.2 STATEMENT OF THE PROBLEM

Health insurance is a means of access to medical services which might otherwise be difficult for many persons if prices for services, especially those provided in hospitals, are high enough to recover costs. When coverage is universal, differences in access arising from insurance status should not occur, although the poor may suffer a degree of limited access due to a limited lack of providers in rural areas and a heavier burden of formal and informal cost-sharing obligations. Kutzin, J., and Barnum, H., (1992), show that this is practically the case in Brazil and Korea. However, when only part of the population has such coverage, disparities are likely, as the cost of using health services facing the uninsured as compared to the insured population is radically different. Partial insurance typically exacerbates equity problems because the insured also tend to have higher incomes than the uninsured. The disparity in utilization of service does not necessarily imply that access for the uninsured is inadequate, but access for the most vulnerable should be examined in detail and measures should be taken that will guarantee a minimum standard of access to care for the population.

Expanding health insurance schemes to the low-income earners would be beneficial. First, it provides mechanism that enable household to reduce financial and/or health problems that could result from unexpected illness or injury. This makes insurance attractive to low-income regions. Second, it can be designed in a manner that spreads the cost of treating illness evenly over the sick and healthy, which makes the non-poor bear the greater share of the cost. Thus, it is a viable health financing mechanism as well as a system that will ensure the low-income gain access to health services.

Expansion of health insurance to cover the low-income does not automatically mean that more resources will be mobilised to the health sector. However, it creates expectations for better quality and more access to health services. On the other hand, it generates incentives to consumers and providers that make them change their behaviour. Kutzin, J., and Barnum, H., (1992) argue that.... "Prices and insurance also affect the allocation of health resources by changing the signals sent to producers and consumers of health services. Changes in incentives engendered by these alternative financing programs therefore have implications for the efficiency and equity of health care service delivery in addition to their more obvious impact on revenues". Arrow, K., (1963) stresses this point further and notes that ".... In medical policies the cost of medical care is not completely determined by the illness suffered by the individual but depends on the choice of a doctor and his willingness to use medical services". Nganda , B.,(1994) and Abel-Smith (1992) show that health insurance changes the behavior of hospitals (providers of medical care services) and consumers by removing incentives for consumers and producers to evaluate the opportunity cost of the service[2]. It is therefore frequently observed that widespread insurance increases the demand for medical care, that is, leads to moral hazard (Arrow, K., 1963).

Thus the incentives generated by health insurance will affect the demand and supply patterns of health care services. However, the direction of cannot be determined a priori. Access to services may be increased or not. But the increase could be for the non-target population, while the target population may be worse-off. This creates a need to review how health insurance affects demand for health-care services. We do this by carrying a survey in Mwimbi division, Meru-South District. The focus in this area is motivated by the fact that an insurance scheme was

[2] Since consumers face a zero or small price at the point of service, more will be demanded. If the costs are passed to the insurer (full retrospective cost reimbursement for health care services provided to patients) and physicians are paid on a fee- for- service basis, there is no incentive on the part of the provider to limit service use and there is no mechanism of ensuring that these dimensions of hospital activity are optimal.

initiated in the main hospital in the division with the aim of increasing access to medical services to the low-income earners. The study reviews several issues, which include;

I. Does health insurance remove/eliminate the barriers that prevent consumers from using medical services?

II. Does it increase utilisation of medical services by the target population?

III. Is it the appropriate financing mechanism, which does not distort prices for medical care services?

IV. What are the effects on allocation of medical resources, between the different providers?

Based on these aspects, we will draw policy recommendations that may be used in designing health insurance schemes, especially those that target low-income earners in rural areas. This is important because the responses of the consumers to the incentives generated by insurance will vary between regions. Health insurance schemes are common in urban areas. Their introduction in rural areas may have different effects on demand for medical care from those observed in urban areas. This forms the basis of this study, which tries to study health care demand patterns in a rural community.

1.3 OBJECTIVES OF THE STUDY

The main objective of the study is to examine how health insurance impacts on the equity objective (that is, access and utilization) of health care services. Specifically the study conducts an in depth case study in one of the communities, in rural Kenya. This case study is used to analyze the effect of health insurance on;

* Resource allocation between various medical providers.
* Equity of access to health care.
* Utilization of health services between the insured and the uninsured.

1.4 SIGNIFICANCE OF THE STUDY

Although health insurance has been given more attention due to its potential as a means for mobilizing resources and fostering private health sector development, there is need to investigate how it affects resource allocation and distribution in the health sector. Community-based health insurance schemes have been proposed as a means of ensuring provision of health services especially in rural areas where majority of the low-income live (Vogel, R., 1990, McFarlane, G., and Sammon, A., 2000, Shaw, R., and Griffin, C., 1997, Shepard, D., et.al., 1990, and Eklund Per and Stavem Knut, 1990). Nevertheless, unless we understand how the incentives generated by health insurance affects distribution and allocation of health resources, it will be difficult to design sustainable health insurance schemes that will be self-financing and guarantee that those with low incomes have access to health services. Understanding the agent's response mechanisms would offer an insight on how to design insurance schemes that organizes consumer's entry into the health system without generating externalities that might distort the health care delivery system. The study is motivated by the fact that the hospital has a network of dispensaries that covers a significant part of the population who are small-scale farmers with low-incomes. The prediction that health insurance scheme that would enable more people access to health services warrants a study in order to enhance our understanding of the different responses of the participants to the incentives and therefore offer an insight on how to design health insurance schemes.

CHAPTER 2: LITERATURE REVIEW

2.1 THEORETICAL LITERATURE

Health care demand studies have undergone major evolution since the early 1960's, when economists first became interested in estimating the demand for health services using reduced form equations derived from utility maximization hypothesis. Demand for a particular service, as measured by the number of visits to a health facility was hypothesized to depend on the price of the service, household income, and tastes. This formulation excluded from the demand equations variables that measured time costs associated with using a service, quality, insurance and the demographic characteristics of patients, such as, age and education, even though these variables have shown to be important determinants of health care demand (Acton, J., 1975, Sahn, D. E., et al. (undated), Mwabu, G., et al. 1993, and Akin, J., et al., 1986). Acton, J., (1975) focused on the effects of non-monetary factors (distance, travel time, and travel costs) on demand for medical care services, which turned out to be significant. Akin, J., et al. (1986) on their study on "The Demand for Primary Health Care Services in the Bicol Region of the Philippines" found that, contrary to predictions of the theory of consumer behavior, economic variables such as severity of illness, age group, cash costs of a visit, drug costs, transport costs, transport time, waiting time, quality of service and insurance coverage had no power in explaining visit choices-whether considered by patients as essential (outpatient and delivery) or for services that are more optional in nature (prenatal, well baby, and immunization care). The study concluded that other correlates of income; especially education and residence (urban or rural) tend to account for the behavior patterns of the poorest groups in the survey. Sahn, D. E., et al., (undated) and Mwabu, G., et al.,

(1993) focusing on quality of service effects on demand found that quality is an important determinant of health care demand and thus important for public policy.

Changes in money and time prices because of continued spread of private insurance, social insurance schemes, or through provision free care have significant effects on health care demand. Acton, J., (1975) argued that these factors make demand to be more responsive to time costs and therefore time will act as a price in determining demand. In such cases people with lower opportunity costs of time will purchase services away from those with higher opportunity costs of time because they will face a price that is relatively less costly. People with higher opportunity costs of time are expected to demand less time intensive care (demand less intensive outpatient and hospital care and more private physician care). It is also likely that a shift in demand will be accompanied by an increase in time needed to receive a unit of medical services[3]. This will further increase the relative shift in favor of those with a lower opportunity cost of time. Manning et al., (1987) on the other hand points out that insurance increases demand for medical services across all income groups, that is, time costs do not significantly limit demand for free medical care.

Shepard, D., et al., (1990), Kutzin, J., and Barnum, H., (1992), and Bogetic, Z., and Dennis, H., (1993) show that health insurance increases the demand for health care services, though they do not show explicitly how other demand factors like income, age, sex, distance, travel time and costs affect the demand. They concluded that the uninsured, who are mostly the target groups, have limited access. Health insurance leads to a situation where healthy individuals have more care than they really need whereas the less healthy have considerably less than they need. Thus the conventional argument, (Shaw, R., and Griffin, C., 1997, Eklund, P., and Staven, K., 1990), that health insurance can increase accessibility to health care services for

[3] This supply response is likely for a number of reasons, first it may be optimal from the point of view of the provider to have a queue to even out the variation in demand that he experiences without having to invest in significant capacity. Second, the suppliers may not be profit maxi misers, so they do not respond to a shift in demand by charging the highest possible monetary price but instead allow time prices to increase. In particular, physicians may be income satisfiers than maxi misers. Thirdly, there may be a conscious attempt to redistribute services by discriminating in favor of those with a lower opportunity cost of time.

the low income groups is not clearly evident from the studies. Elsewhere, analysis indicates that the greatest beneficiaries of health insurance in Sub-Saharan Africa are the relatively small middle classes (Vogel, R., 1990). Comparing his results with the richer nations, such as North America and Europe, he found the middle and upper classes enjoy greater financial and geographical access to health care, via health insurance, even national health insurance[4]. He concluded that the development of health insurance in Sub-Saharan Africa has not promoted greater equity in the access to health services by the poor, nor has it permitted greater access.

The notion of equity in health care services has been misconceived. Nganda, B., (1994), notes that most policy documents interpret equity as " increased access to health care services for greater proportion of the population", which need not necessarily translate to "equitable access" as noted by Vogel above. Equality of access has various interpretations; first it can be interpreted in terms of time and money costs incurred by individuals in searching for and using health care facilities, measured in terms of utility. Second, it could imply persons should be able to use health facilities when in need, that is, equality of opportunity. The equality of access will apply to those in equal need, but it will not necessarily guarantee equality of treatment amongst those in equal need, conventionally termed as utilization, and often used as a measure of equity in health care delivery services. Accessibility is the absence of barriers (monetary and non-monetary) that stand in the way of an individual desiring to use a service and the medical facilities that provide the care, that is, absence of barriers preventing a need from being converted to demand. Utilization refers to consumption, which is dependent on valuation in use as reflected in the individual's demand for health care[5].

The notion of equity based on equal treatment for equal needs when people have different demand functions (and access costs) is an infringement of consumer sovereignty. It ignores

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[4] He notes that in Sweden, where income is more equally distributed than in most countries and where there is a well-funded national health insurance, the Swedish government has a great deal of difficulty in finding physicians to serve in the rural areas of the north.

[5] If individuals incur different access costs, or have different demands, different utilization rates may occur.

consumer preferences. Nganda, B., (1994) distinguishes between several notions of economic accessibility to health care services as;

a) Characteristics and socio-organisation of the health care delivery system.

b) Characteristics of the population at risk, defined in terms of:

1. Predisposing factors such as age, sex, religion, attitudes to health, etc.

2. Enabling factors such as income, wealth, insurance, etc.

3. Illness level, either as perceived by the individual or by the health delivery system.

c) Outcomes, which depend on utilisation rate and consumer satisfaction.

d) Accessibility barriers relating to distance between the individual and provider facility.

1. Cost of traveling to use health care facilities, and

2. Time costs, viewed in terms of earnings forgone in seeking care.

e) Price paid at the point of consumption of health care.

f) Information costs, that is, the cost of obtaining information on availability, quality, etc.

g) Disutility of treatment, perceived in terms of social stigma arising from pain, embarrassment, inconvenience, etc.

These factors, individually or in combination, are significant to the specification of the equality of access to health care services and also suggest different policies for ensuring equity to services. However, given the differences that exist between individuals and regions (especially in terms of incomes and other enabling factors), it is doubtful that equality of access to medical services can be achieved.

Thus the problem of extending health care rights to those with low incomes (as noted by Abel-Smith, 1992), still remains a major issue[6]. The effectiveness of insurance in achieving this

[6] This follows the ethical foundation that views health and interventions to maintain and restore it as unique. Health care-as one of the principal mechanisms of intervention- is different from other good things of life like alcohol, tobacco, potatoes, etc. It is a good that individuals have a fundamental claim by right, like access to a ballot box or

objective warrants more investigation. Insurance generates incentives that influence decision-making by the providers (on how to allocate project resources to consumers, and how to treat patients, whether to hospitalize or treat them as outpatients, and so on) and consumers (on their health seeking behavior).

Shephard, D., et al., (1990) define health insurance (or health-care risk spreading mechanisms) as "the means by which risks, or uncertain events, are shared between many people." Vogel, R., (1990) however shows that there are conceptual problems in defining health insurance because the health-care risk-spreading mechanisms can either be mandated by the government, or government and the private sector can offer risk-spreading plans that are voluntary. He thus defines health insurance as a formal pool of funds, held by a third party, (or by the provider in the case of a Health Maintenance Organisation, which relies on prepayment by its insurees), that pays for the health-care costs of the membership of the pool. This third party can be a governmental social security or other public insurance fund-pool, or private fund-pool. This definition excludes employer-provided health care from being considered as health insurance.

Insurance or risk sharing mechanisms attempt to reduce the financial and non financial risk associated with chronic illness or injury since individuals are uncertain about health status and expenditures in future. The uncertain health states impose several risks to individuals. First, the loss of life itself, as well as the risk of incurring large financial costs associated with medical treatment aimed at maintaining or improving health. Second, health deterioration reduces the ability of an individual to work, or the productivity while working so that the individual faces the risk of lost (market and non-market) wages. Finally, the individual may be unable to enjoy other forms of consumption, like participation in sports, because of their health status, or they may suffer emotional trauma and Psychological trauma associated with physical deterioration. These

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to courts of justice. Thus its distribution should not depend in any way on the income and wealth, though it will necessarily depend on the income and wealth of the society in general and entitlement will clearly depend on the conditions of membership.

events and consequences are uncertain, both in size and in occurrence, thus individuals are willing to pay to have them reduced (Arrow, K., 1963 and Jack, W., 1999). Due to this risk aversion behavior, many individuals will seek insurance and they will effectively pool their risks through an insurer.

Historically, health insurance developed as a way of solving the problems of access to an income to replace earnings when sick, and generally later to secure the provision of an acceptable standard of health care. Those originally covered from the early nineteenth century were the more skilled workers and not the poor farmers (Abel-Smith, 1992). Some of the earliest funds were started by employers, but many others by groups of working men either engaged in a like occupation or living in a certain locality. Compulsory insurance started in Germany in 1883. This compelled employers to contribute to the health fund and therefore enabled the lower income groups and their dependents to be brought into the scheme. Thus the ideology of social security developed; people paid according to what they earned and the basic health needs of the earner were met-whatever the health needs and whatever the family size. Thus risk-rating was avoided.

With most of the regularly employed being covered, the problem of how to extend the rights to health care to the self-employed – especially farmers, fishermen and others with low earnings became a major concern. This led to the development of highly subsidized public hospitals of acceptable quality as in Scandinavia; voluntary organizations to provide health on an informal meanstested basis as in Britain; subsidization of all compulsory health insurance with public funds or only those funds for the self-employed; or make other funds cross-subsidize the low income self-employed (Abel-Smith, B., 1992). Different countries have achieved varying levels of health insurance coverage.

Arrow, K., (1963), and Lees, D., and Rice, R., (1965), however, show that many risks are not covered, and indeed the markets for the service of risk coverage are poorly developed or non-existent. Arrow, K., (1963) argues that to achieve Pareto optimality, insurance policy against all

risks should exist. Thus, absence of insurance policy would be a necessary and sufficient condition of market failure and therefore the government should undertake insurance in those cases where the market, for whatever reason, has failed to emerge". To approximate an optimal state it would be necessary to have collective intervention in the form of subsidy or tax or compulsion. Akerlof, G., (1970) also suggests that compulsory public insurance might produce an improvement over the market outcome.

Lees, D., and Rice, R., (1965), Pauly, M., (1968,1974), and Rothschild, M., and Stiglitz , J.,(1976) argue that in the absence of perfect information (or when buyer's and seller's costs are taken into account), absence of insurance policies for certain risks may be a requirement for optimality. Thus the failure of certain kinds of insurance to emerge in the private market may be no indication of non-optimality, and compulsory government insurance against some certain events may lead to inefficiency. Thus even if all individuals are risk-averters, some uncertain medical care expenses will not and should not be insured in an optimal solution because individuals differ in the strength of their risk aversion and tastes. In that case, insurance is more likely to be provided against those events (a) for which the quantity demanded at zero price does not greatly exceed that demanded at a positive price, (b) for which the extent of randomness is greater so that risk spreading reduces the risk significantly and (c) against which individuals have a greater risk-aversion[7]. Based on this argument, more generous coverage of inpatient services relative to outpatient services have been proposed. The more extensive insurance for inpatient services has been attacked as misguided on the grounds that lack of insurance for outpatient services deters ignorant individuals from seeking care at a time in their illness when they can be treated relatively cheaply. Others have also asserted that the more generous coverage of inpatient

[7] Arrow, K., (1963) shows that predictability has important implications for insurance against chronic illness or maternity. He argues lifetime insurance against chronic illness will make sense since it is both highly unpredictable and highly significant in costs. However, for those who already who have chronic illness or symptoms which reliably indicate it, insurance in the strict sense would be pointless, since, like in the maternity case, illness will be predictable. Lees, D., and Rice, R., (1965) point that routine expenditures are highly predictable and small in relation to individual or household resources and can therefore be budgeted in much the same way as grocery bills. Extraordinary expenses are both highly unpredictable and significantly large in relation to resources and therefore well suited for insurance.

services leads physicians to hospitalize patients who could be treated on an outpatient basis, thereby minimizing private but increasing social expenditure.

Universal health insurance coverage would lead to a situation where the insured individuals, paying a zero price or paying considerably less at the point of consumption, will tend to have more access and utilisation rates than the uninsured. The insured demand more services than they require, thus causing moral hazard. Moral hazard is the tendency of individuals once insured, to behave in such a way as to increase the likelihood or size of the risk against which they have insured. This results to over consumption (utilisation) of health services. Pauly, M., (1974) defines moral hazard as a situation where the insured is assumed not to know or to be able to monitor the present state of nature, but has the power and the incentive to change the unobservable state in response to insurance. Adverse selection is a case in which the insurer cannot determine some characteristics of the insured that are relevant to the determination of the probability of the future state of nature. Since the insured is assumed to know these characteristics, this is a case of unequal distribution of information[8].

Moral hazard can be classified either as hidden action or hidden information. Hidden action moral hazard occurs when individuals who are insured tend to be less careful in preventing illness or bad health than they would have done had they not been insured. This happens irrespective of the fact that individuals incur non-pecuniary costs associated with medical care, including inconvenience, time, pain and stress that are not covered by the insurance contract. If the insurer could observe the precautionary actions taken by an individual, the insurance contract could specify that the coverage would be offered only when suitable precautions are taken (e.g. not smoking, wearing seat belts when driving, attending pre-natal clinics, etc.). Since insurers cannot easily observe these actions, the premium required by an insurance company offering full coverage policy would be proportionately larger than that required of a policy with incomplete

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[8] Arrow, (1963), and Akerlof, (1970) shows that both problems of insurance arise out of information asymmetry.

coverage. The exposure of the individual to some risk is then desirable, because he saves (proportionately more) on the premium reduction than he suffers through risk exposure.

Pauly, M., (1974) and Jack, W., (1999) review a case in which the insurance purchaser has control over actions in the present that affect the future state of nature, but where the insurer cannot directly observe the insured's action. Using expected utility maximization approach, they solve for the level of insurance an individual would buy in two possible states of nature, S_1 if the individual i suffers no loss and S_2 if he suffers a loss equal to L dollars. The individual is able to vary some level of activity Z_i (which is not observable by the insurer) and affect his probability of loss[9]. Thus probability becomes endogenous, $\Pi(Z)$. Individual i buys X_i dollars of insurance and pays P_i dollars as premium for that insurance[10]. The expected utility is given by

$$EU = [1 - \Pi_i(Z_i)]U(S^0_i - Z_i - P_i) + \Pi_i(Z_i)U(S^0_i - Z_i - P_i + X_i - L)$$

Where $S^0_i - Z_i - P_i$ is wealth if S_1 occurs, $S^0_i - Z_i - P_i + X_i - L$ is wealth if S_2 occurs, and S^0_i is initial wealth. If $X_i = L_i$ (full coverage), then optimal Z_i will be set equal to zero. Similarly, $Z_i = 0$ for more values of X_i less than L_i. The amount of potential loss borne by the individual over the range is too small to make it worthwhile to spend anything on prevention. The level of preventive activity will be reduced as more insurance is bought, since the effect of increased X_i is to reduce the effect on the individual's wealth of a change in Z_i. Moral hazard is prevalent since no matter what the individual's level of Z_i for a given X_i, he will be charged the same premium, that is,

$$\left.\frac{\partial P_i}{\partial L_i}\right|_{Xi=Xi^*} = 0$$

This is true because with large number of buyers, the effect of each individuals variation in Z_i is to change $\Sigma_i \Pi_i X_i$[11] and hence P_i and $\Sigma_i P_i$ by only an infinitesimal amount. Insurance induces the

[9] The level of activity Z is measured by the cost of preventive activity, and it is assumed only the cost matters.

[10] The amount of insurance purchased by an individual X_i is assumed not to be observable by any firm, the firm only knows the amount sold to the individual.

[11] Competitive equilibrium, under the assumptions of net worth maximization by insurance firms requires the expected profits to be zero, $\Sigma_i \Pi_i X_i = \Sigma_i P_i$

individual to alter his values of Z because variations in Z, although they affect his expected insurance claims for any level of coverage, do not affect the premium he pays at all.

Insured individuals reflect hidden information moral hazard in excessive consumption of medical services. That is, insured individuals tend to use medical services more frequently than they would have had to had they not been insured. This occurs because medical insurance lowers the marginal cost (price) of medical care to the individual at the point of service, and therefore increases usage. Price barrier to consumption of health care services is reduced or eliminated allowing individual health care needs to be met, which is effectively demand. Pauly, M., (1968) argues that the response of seeking more medical care with insurance than in its absence is as a result not of moral deviation, but rational economic behavior. Each individual may recognize that excess use of medical care makes the premium he must pay rise. No individual will be motivated to restrain his own use, however, since incremental benefits to him for excess use are great, while additional costs of his use are largely spread over other insurance holders, so he bears only a tiny fraction of the cost of his use.

Thus, moral hazard leads to partial or incomplete insurance coverage because when individuals have high price subsidy, they tend to consume more health services. This happens because the insurer is unable to observe the state of health perfectly and this constrains the efficiency of service provision. Another major problem with conventional insurance schemes is that low utilization by consumers is not rewarded. Consumers may have a feeling that benefits of insurance are "lost" if no medical services are consumed. Since there is no way converting the foregone insurance benefits to some other reward, the insured will tend to utilize the services to avoid loss of benefits. Related to this problem is the fact that conventional plans lack direct incentives to encourage consumers to adopt healthier lifestyles. Even for those who exhibit low health risks, once insured, there is no incentive to make them maintain or improve their personal health habits. These are compounded by the fact that those seeking insurance may purchase the

wrong kind of care, for instance, by going to an expensive hospital when a visit to a health clinic could be adequate.

2.2 EMPIRICAL LITERATURE

Studies on demand for health have focused on different aspects of health care and adopted different estimation techniques. However, the findings are comparable. Mwabu, G., et al. (1993), on the study on the demand effects of medical care quality on four types of providers, (government hospitals, mission hospitals, private hospitals and self-treatment), found that income exerts strong positive effects on the probability of seeking care from mission and private health care providers (0.183), and government facilities (0.0699) relative to self-treatment. Education increases the likelihood of choosing a government health facility by 0.121 and private care by 0.083 and reduces the likelihood of using mission facilities by 0.124. Quality variables, proxied by the number of health workers in each of the facility, reduce the probability of using any of the health facilities by 0.0835. Similarly, lack of non-prescription drugs (aspirin) as measured by the number of days the facility did not have the drugs, reduces the probability of using any of the facilities by 0.253. Demand was lower for health facilities that did not have aspirin. Aspirin can be easily obtained in the market place so that if a patient needs aspirin, there would be no reason to go to a health facility. The coefficient of the number of days that the facility went without malaria drugs was positive (0.385), which indicates interaction of both supply and demand factors. The drug could be out of supply due to very high demand, and this could produce a correlation between lack of drugs and high demand. The study found that distance and user fees (with coefficients of –0.0143 and –0.0288, respectively) are both important price variables. The coefficients of gender showed more men going to private facilities (3.640) and mission health facilities (0.090) and less in government facilities (-1.025). However, controlling for all other factors, the study found out that women are more likely to consult all the three types of health care providers compared to self-treatment than men.

Sahn, D, E., et al. (undated) found that the poor are more responsive to prices than the non-poor. Price increases for any one service reduces the probability of a visit, and causes substitution into other health care services rather than none. Drug and doctor availability increases demand across all options. Raising the quality of doctor care from low to high reduces the probability of no-care by 0.2541 for the entire sample. Increasing quality of drugs availability at public clinics from low to high increases the probability of choosing care at a public clinic by 0.110, mostly as a result of decline in demand in private clinics. Increasing quality of health environment from low to high increases the probability of seeking treatment by 0.073. Education and age increases the probability of seeking care across all options. Result also showed that men are less likely to seek care than women, and this effect is more pronounced in public clinics and dispensaries. The longer the duration of illness, the greater the probability of demanding treatment from all providers except public clinics and dispensaries. Elsewhere, Akin, J., et al., (1986), found that severity of the illness substantially increased the probability of choosing a private modern practitioner by 30 percent and reduced the probability of no visit by 34 percent. It raises the probability of a public visit by 4 percent, while the probability of a traditional visit remained unchanged.

Acton J., (1975), estimated a simultaneous-equation system using two-stage least squares technique to study the effects of non-monetary factors in the demand for medical services. The results showed that distance functions as a price in determining demand for medical services, and produced an elasticity of -.14 for outpatient services, .07 for private physician services, and .18 for hospitalization services. He explained the positive elasticities in the private physician and hospitalization services by noting that private physician and outpatient services are substitutes, while private physician and hospitalization services are complements and therefore distance functions as a cross price to private physician and hospitalization. The coefficient of distance in the outpatient equation was –0.552, and 0.050 and 0.029 in the private physician and hospitalization equations respectively. Working people and people with higher opportunity costs

of time demanded less time intensive outpatient care (-0.805) and hospital care (-0.057) and more private physician care (0.222). The positive elasticity of demand for private outpatient care with respect to income (0.353) and negative income elasticity of demand for public hospitals (-0.089) and outpatient care (-0.245), supported the prediction that outpatient and hospital care are more time intensive. He also found that men are likely to seek less ambulatory care and more inpatient care than women, and age increased the probability of outpatient visits (0.631) and reduced hospitalization (-0.014) and private physician visits (-0.0003), which could imply older persons going to nursing homes. Education had a negative effect on outpatient visits (-0.089) but positive effects on private physician services (0.018) and hospitalization (0.005). The decrease in the outpatient visits was partly made up by the increase in private physician visits, so that the net change in ambulatory visits produced by the increase in education was negative. Although insurance was imprecisely incorporated in the equations, he found that those with health insurance would seek more medical services across all options, with demand elasticities of 0.150 in the outpatient department, 0.360 in the private physician care, and 0.063 in hospitalization.

Manning et al. (1987) produced more interesting results from the randomized experiment focusing on health insurance and the demand for medical care. The experiment enrolled families in six sites in USA. The families participating in the experiment were assigned to 14 different fee-for-service or to a pre-paid group practice. The fee-for-service insurance plan had different levels of cost sharing, which varied on two dimensions; the coinsurance rate (percentage paid out-of-pocket) and the upper limit on annul out-of-pocket expenses. The coinsurance rates were 0, 25, 50 or 95 percent, and each plan had an upper limit on out-of-pocket expenses of 5, 10, or 15 percent of family income, up to a maximum of $1,000. Beyond this limit, the insurance plan reimbursed all covered expenses in full. Covered expenses included virtually all medical services-inpatient and ambulatory services. The results showed that outpatient cost-sharing reduces total expenditures relative to free care and also reduce inpatient use, though by an insignificant amount. Income increased the probability of any outpatient use of medical services

for the insurance plans with 25, 50, and 95 percent coinsurance rates (also called family pay plans) than the free (zero coinsurance rate) plan, but reduced the probability of inpatient use. Adults had significantly lower use of outpatient and inpatient use in the family pay plans than they did in the free plan. The admission rates for children showed no response to insurance coverage. Comparing the plans, the free plan demand was 1.5 times that of 95 percent coinsurance rate. They concluded that technological change (new medical products and procedures) rather than health insurance could explain the increase in medical expenditures. Thus any welfare losses can be attributed to innovations induced by health insurance for which unsubsidized consumers are unwilling top pay.

The incentives to providers are also important because they determine the supply of services and can seriously affect demand. Nganda, B., (1994) notes that if health insurance arrangements are that there is full retrospective cost reimbursement for health care services provided to the patient, and the physicians are paid on a fee-for-service basis, hospitals tend to pursue objectives that may strictly not be in accordance with profit maximizing behavior or quantity and quality maximizing behavior for non-profit maximizing hospitals. This is because the system creates a situation in which suppliers, facing an essentially open-ended budget constraint, accommodate the objective of the consumer to obtain more high quality care available. Shephard, D., et al. (1990) in a study of seven insurance plans in Zaire found that, in those plans where utilization by the insured and uninsured individuals could be compared, insured persons used more services. In Bwamanda, insured persons were 6.7 times as likely as the uninsured to be hospitalized. At Bokoro health centre, plan subscribers had 5.0 times as many new ambulatory episodes as non-subscribers. In the Kinshasa survey, insured respondents reported more previous visits (2.0) for their current illness episode than uninsured (1.6). Utilization data for CASOP showed more visits per episode among individuals insured (2.5) than among those uninsured (2.0).

Similar study by Kutzin, J., and Barnum, H., (1992) in Brazil, China, Korea and Zaire showed evidence of higher utilization of medical services by the insured than the uninsured. Prior to 1983, curative care in Brazil was financed by the National Institute for medical Care and Social Security (INAMPS), the health component of Brazil's pay-roll financed social security system. Preventive care and basic curative care services for the poor were provided by the Ministry of Health, which was financed through government budget allocations. Physicians and hospitals were reimbursed on a fee-for-service basis, and no cost sharing was required for those covered by INAMPS which served largely as a third party payer for services delivered in private contract hospitals. From the late 1960's to 1983, (when reforms were introduced in the hospital reimbursement system), the number of private beds increased by over 40 percent, the hospital industry grew faster than the rest of the economy, and the health expenditures increased more than 20 percent annually. The growth of total health care spending occurred entirely in the market for curative services.

The fee-for-service reimbursement system encourages hospitals to increase the number of patients and the amount of services provided per patient as a means of generating profits. In Brazil, doctors were encouraged by the system to overuse services, drugs, tests, facilities and operations in order to enhance their incomes. For instance, in 1981, caesarean deliveries accounted for 31 percent of all births in Brazil, while diagnostic services, especially X-ray use grew rapidly between 1970 and 1981. This could be avoided without detracting from treatment. For example, in 1979, the Rio de Jeneiro state university hospital reduced the number of X-ray use by 40 percent and found no loss in diagnostic efficiency. The fee-for-service reimbursement system also encourages rapid expansion in the volume of services provided to patients. Substantial health expenditures were allocated towards costly high technology services, such as, renal dialysis, heart bypass operations, and computed tomography (CT) scans, which benefits relatively few people. For instance, in 1981, total expenditures on 12,000 high cost patients was greater than the amount spent to provide basic health service and disease control for 41 million

people in the north and north eastern poor regions of Brazil. Thus, investment decisions based on such signals would in the long run lead to more inefficient mix of facilities and equipment.

Elsewhere in Korea, which achieved universal compulsory social security health insurance in 1989, the retrogressive fee-for-service reimbursement system caused significant growth in health expenditures, from 2.8 percent of GNP in 1976 to 4.2 percent in 1985 and an estimated 7.0 percent in 1998. Although cost sharing was a significant requirement (inpatient coinsurance rate was 20 percent in all facilities) a study of one rural province found that insurance coverage effected a 37 percent increase in inpatient admission rates and 66 percent increase in inpatient days per 100 persons. In addition, the number of visits to outpatients departments at clinics and hospitals increased by 71 percent after introduction of the insurance coverage. The hospital charged fees, which were 15 percent more expensive than clinics, and the percentage co-payment for outpatient, were 50 percent greater. Despite these charges, the insured showed a marked tendency to use hospitals even for primary care.

Similarly, a study in Bwamada (a small region of Zaire) where an insurance program was initiated as a means of generating revenue for the reference hospital and organizing delivery of services in the zone, unequal access was identified. Unlike in Korea and Brazil, this was a direct insurance plan and was administered as a prepaid capitation health care organization. The insurance scheme covered two groups; the voluntary enrollees and employer-paid coverage. Only hospital (plus chronic treatment in health centers) was covered under the scheme. The insured persons (voluntary enrollees-representing 60.2 percent of the population) paid a co-payment equal to 20 percent of the case price charged to the uninsured residents of the zone, while those under the employer-paid category (representing 4.6 percent of the population) do not make any co-payments. For the uninsured, (representing 35.2 percent of the population), the non-residents were charged twice the resident rate and salaried employees 250 percent of this rate. Results from a sample of hospital patients by payment categories from 1988 to 1989 showed that the salaried employees in the plan represented 17.3 percent of the patients, while insured residents

and non-insured represented 76.7 percent and 6.1 percent of the patients respectively. Hospital admission rates in 1989 were lower among the non-insured than the insured by nearly 700 percent and much lower by nearly twenty-fold than the employer-paid group. This suggests a combination of limited access for the uninsured, moral hazard arising from the financial protection provided by the insurance and employer payments, and the hospital's incentive to admit salaried employees to receive highest employer payment.

To limit overuse of medical services (moral hazard), insurance schemes adopt cost-sharing (co-payments and deductibles) measures and referral systems[12]. However, the use of co-payments and referral systems may not be effective in controlling overuse of services. The implementation of referral system and care-based reimbursement system (rather than fee–for-service) to eliminate the financial incentive to over prescribe and over use complementary examinations and services in private facilities does not appear attractive in controlling cost because it creates another incentive for private hospitals to increase certain types of admissions (and technologies). This further worsens resource allocation and access to services as the health system become based towards curatives hospital care

Thus insurance gives the insured individuals less incentive to undertake personal activities that reduce the need for medical care (that is, an incentive that makes individuals less risk avoiders) and this leads to unhealthy life styles. Bogetic, Z., and Dennis, H., (1993) note that in Hungary, where mortality rate are among the highest in the world "...expenditures have not secured larger gains in health standards primarily because of unhealthy lifestyle and bias towards curative hospital care". He also notes that similar patterns exist in other eastern European

[12] Other approaches to control utilization and costs include Health Maintenance Organizations (HMOs), Preferred Provider Organizations (PPOs), Independent Practice Associations (IPAs), Second Clauses, and GateKeeper models. HMO, combine the roles of provided of both medical services and insurance. In PPOs and IPAs doctors join loosely integrated groups that contract with insurers and agree on certain medical practices in advance, thus giving medical care providers incentives to reduce costs of medical care. Second-Opinion clauses are where Individuals seeks opinions of several doctors to determine the appropriate course of actions, although this system may break down if doctors form collusive alliances. Gatekeeper model is where individual do not have immediate access to a specialist but must first consult a general practitioner, who if necessary refers the individual to the specialists, and the insurance will cover the specialist charges.

countries and the incidence of behavioral-induced diseases is high in some Latin America countries. These problems contribute to rising utilization rates and escalating health care cost.

2.3 OVERVIEW OF LITERATURE REVIEW

The literature seems to suggest that a consistent specification of demand models would entail inclusion of individual/household variables, access variables and provider specific variables. However, the focus of the study may to a large extent dictate the choice of variables. Results may also differ according to the characteristics of the sample and data. A summary of the studies reviewed shows that the effects of individual, access and quality variables cannot be determined a priori. Akin, J., et al. (1986) and Sahn, D. E., et al. (undated) found that age increases the likelihood of seeking medical care across all types of providers, but Acton, J., (1975) produces counterintuitive results that the aged are likely to use more outpatient services and less private and hospital care. The prediction by Grossman, M., (1972) that age would be positively correlated with the depreciation rate on health, which increases over the life cycle did not show clearly in the survey. Similar results were presented for education and gender variables. Acton, J., (1975) and Sahn, D. E., et al. (undated) found that education increases the probability of using medical services for all providers. On the other hand, Mwabu, G., et al. (1993) notes that the more educated people are likely to use more of public and private health facilities and less mission health facilities. Thus the assumption that more educated people are more efficient producers of health is not obvious. Sahn, D. E., et al. (undated) and Mwabu, G., et al. (1993) found that for all types of providers, women are more likely to medical services than men. Acton, J., (1975) reports that men will seek less ambulatory care and more of inpatient care than women, because men let their health deteriorate further than women before seeking medical care, so that when they seek medical care they receive more intensive care

Effects of income and quality are also ambiguous. Income increases demand for all providers in the study by Mwabu, G., et al. (1993), although Acton, J., (1975) found similar effects on the private physician only and negative effects on the public and outpatient care services. This is acceptable; if consumers perceive health care services to be normal goods, income will increase the demand for medical services, but if perceived to be inferior goods, then

we expect demand to decrease as income increases. Similar argument applies to quality variables. Quality improvements can increase demand by attracting new users or increasing the intensity of service use by existing users, as noted by Sahn, D, E., et al. (undated), or can decrease demand if quality improvements ear effective in dealing with patient problems or the underlying illness patterns, as in the case of Mwabu, G., et al. (1993).

Distance, time costs and user fee have more determinate effects on the demand for medical care. These factors reduce the demand for medical services for all types of providers. However, Akin, J., et al. (1986) noted that distance and waiting time did not reduce demand for medical services. The lack of importance of distance was the existence of a threshold beyond which distance becomes important. This threshold was not attained in the survey. For waiting time, people may prefer to wait for longer periods for a doctor or healer who has good reputation or may choose health providers where they wait for less time if they have higher opportunity cost of time. Thus waiting time can have positive or negative effects on demand. Severity of the illness and insurance coverage also show determinate results. Both increase the likelihood of seeking medical care from modern health facilities relative to traditional care or no-care. The greater use of services by the insured reflects moral hazard arising from insurance coverage, but may also mean that access to the uninsured is limited by their inability to pay. The latter is of greater concern, but the magnitude of this problem is unknown and therefore warrants more investigation.

CHAPTER 3: METHODOLOGY

3.1 MODEL SPECIFICATION

Behaviour in medical markets is distinguished by the roles that physical needs and life cycle patterns play in determining demand. Circumstances, such as accidents, pregnancies, and infections, often dominate health care consumption decisions. Many needs are age and sex specific, such as immunization early in life, the risk of pregnancy during fertile years for women, and the onset of degenerative diseases in life. Institutionally, medical markets are distinguished by intentional interference with the price system, both by the governments, which subsidize medical care consumption through welfare programs, and by health insurance, which spreads the risk and reduces direct costs to consumers. Akin, J. et al., (1986) notes in low-income countries, the major policy issues for demand analysis, is access to health facilities, capturing true demand patterns (especially the use of traditional practitioners and self care), and demand creation, or how to assure that new government services are used. We develop a model that captures these aspects of medical care. The demand we model is the selection of a health care provider, given that a person is sick. This is a discrete choice, so that the estimates are for the probability that one selects a given option. The specification used is a multinomial logit model with four options; self care (those individuals who purchase drugs in the market to treat themselves), care at a private clinic, care at a dispensary, and care at a hospital. The model follows Mwabu, et al. (1993), Akin, et al. (1986) and Sahn et al. (undated). The utility derived by individuals from using a facility and can be expressed as:

$$U_{ij} = U_{ij}(h_{ij}, c_{ij}) \quad \text{..... (i)}$$

Where U_{ij} is the direct utility that individual i expects from medical services j; h_{ij} is the expected improvement in health status for person i after using medical services j, and c_{ij} is the consumption of non-health care goods. The amount of c_{ij} depends on h_{ij}. These unobservable variables can be presented as follows to allow identification of c_{ij}.

$$h_{ij} = h_{ij}(x_i, z_{ij}) \quad \text{.....} \quad \text{(ii)}$$

$$c_{ij} = y_i - e_{ij} \quad \text{..... (iii)}$$

Where x_i is the observable socioeconomic attributes of individual – age, education, health status, and sex; z_{ij} is a vector of medical and physical characteristics faced by individual i when using medical services j, such as availability of drugs and medical equipment, medical personnel and sanitary conditions (a quality index will be used as a proxy for of all these variables), y_i is annual income of household i, e_{ij} is the value of resource individual i devotes to medical care services. e_{ij} is determined by the treatment fees, waiting time, and access variables such as distance, travel time and costs. The medical expenditures, e_{ij}, determines the level of c_{ij} for a given level of y_i , and this can be expressed as

$$e_{ij} = D_{ij} + wT_{ij} \quad \text{..... (iv)}$$

where D_{ij} is the monetary cost of seeking treatment from health facility j for individual i, T_{ij} is the time cost of seeking health care service (includes travel time costs and waiting time costs) and w is the shadow wage rate.

Expressions (iii) and (iv) enable identification of c_{ij} and are accounting identities. Equation (i)-(iv) represents a general structural specification of a behavioral model of health care demand. Given that consumer preferences are well defined, then individuals can be assumed to be maximizing an indirect utility function[13],

$$v_{ij} = v_{ij}\,(g_{ij}, x_i, z_{ij}, y_i, k_i) \quad \text{..... (v)}$$

where x_i, y_i and z_{ij} are as defined above; g_{ij} is the total cost of health care service received by individual i, from health facility j, and k_i is the price of non-health care goods consumed by individual i.

The functional form of the model chosen should be consistent with actual demand behavior and rational choice. The indirect utility function (v) is assumed to be stochastic, that is of the form

$$v_{ij} = v^*_{ij} + u_i \quad \text{.....(vi)}$$

[13] See estimation and analysis section for an exposition of the assumptions.

where v^*_{ij} is the systematic component of utility and u_i is the disturbance term. This can be also expressed as:

$$v_{ij} = h_i (x_i, z_{ij}) + f(y_i - e_{ij}) + \varepsilon_i \quad \text{.....(vii)}$$

Data on e_{ij}, y_i z_{ij} and x_i is observable but data on v_{ij} is unobservable. The choice or use of medical service j is based on rational choice. Option j must have higher utility than any other option L, such that

$$h_{ij} (x_i, z_{ij}) + f_i (y_i - e_{ij}) + \varepsilon_i > h_{iL} (x_i, z_{iL}) + f_L (y_i - e_{iL}) + \varepsilon_L \quad \text{.....(viii)}$$

This can be re-written as:

$$h_{iL} (x_i, z_{iL}) - h_{ij} (x_i, z_{ij}) + f_L (y_i - e_{iL}) - f_i (y_i - e_{ij}) < \varepsilon_i - \varepsilon_L. \quad \text{.....(ix)}$$

With a linear specification in income, the utility function will be inconsistent with the axiom of preference maximization. Following Mwabu et.al (1993) we assume a utility function that is log-linear in health status and consumption, so that the systematic part of (vi) is expressed as;

$$V^*_{ij} = \beta' Q_{ij} + \delta'_j S_i \quad \text{.....(x)}$$

Where Q_{ij} is a vector of attributes, in log form, that individual i faces when using medical services j; S_i is a vector of attributes in log form specific to individual i. β and δ are vectors of parameters to be estimated. Assuming U_i (that is, ε_i-ε_L) follows a logit distribution, equation (vi) leads to a logit specification. The probability ρ_{ij} that individual i will use service j can then be expressed as

$$\rho ij = \frac{\exp (\beta' Q_{ij} + \delta'_j S_i)}{\sum \exp (\beta' Q_{iL} + \delta'_j S_L)} \quad \text{.....(xi)}$$

To obtain estimates for β and δ we maximize the likely hood function.

$$L = \prod_{i=1}^{n} \prod_{j=0}^{mi} F_{ij}^{\Pi ij}$$

Or the log-likelihood function

$$\tau = \Sigma_i \Sigma_j \Pi_{ij} \text{ Log } \rho ij \quad \text{.....(xii)}$$

Where τ is the logarithm of the likelihood function and Π_{ij} = 1if individual i chose health facility j, zero otherwise.

3.2 MODEL ESTIMATION DATA ANALYSIS

The model is estimated using maximum likelihood method. With a vector of independent variables X* (that is, individual specific characteristics (S_i) and facility attributes (Q_{ij}) and a vector of unknown parameters A (β and δ), we write the multi-response model as

$$\text{Prob } (\Pi_i = j) = F_{ij}(X^*, A) \quad \text{.....(xiii)}$$

$$i = 1,2,3,\ldots,n$$

$$J = 1,2,3,\ldots,m_i$$

i denotes the i^{th} individual and the dependent binary variables takes $m_i + 1$ values, $0,1,2,3,\ldots,m_i$. We let m_i depend on i because individuals face different choice sets. Prob $(\Pi_i = 0)(\equiv F_{i0})$ need not be specified since it must be equal to one minus the sum of the m_i probabilities defined (xiii).

Assuming the random variables Π_i are independently distributed, a function H (X*, A), which is known up to the parameter vector A, is chosen, and the function F is set up in the model as

$$\text{Prob } (\Pi_i = j) = F_{ij}[H(X^*, A)] \quad \text{.....(xiv)}$$

We choose the specification $H(X^*,A)=X_{ij}'B$ so that we write

$$\text{Prob } (\Pi_i = j) = F(X_{ij}'B) \quad \text{.....(xv)}$$

where the vector of independent variables X_{ij} is a logarithmic transformation of the original variable X*. The functional form of F (probability function) used is the logit model,

$$F(X) = \Omega(X) = e^x/(1 + \Sigma e^x) \quad \text{.....(xvi)}$$

where Ω is a logistic distribution.

The analysis assumes that consumers are rational in the sense that they make choices that maximise their perceived utility subject to constraints on expenditures. There are many errors in the maximisation because of imperfect perception and optimisation, as well as the inability of the analyst to measure exactly the relevant variables. However, Maddala, G., (1983) and Amimeya, T., (1981) show that this problem can be overcome by assuming that utility is a random function [equation (vi) above]. The residuals u_i in equation (vi) captures unobserved variations in tastes and in the attributes of alternatives, and errors in the perception and optimization by the consumer. We also assume that the residuals are independently and identically distributed with type I extreme-value distribution. This gives a distribution function, $\exp(-e^{-u_i})$ and a density function, $e^{-u_i} \exp(-e^{-u_i})$ with a unique mode at zero and a mean of approximately 0.577. Given these assumptions therefore, the conditional probability, $\text{prob}(\Pi_i = 1 \mid X)$, is defined as in equation (xii) above.

Since Π_i is not observable, we therefore define a latent variable V* [equation (v) above] which denotes the level of indirect utility associated with the i^{th} choice.

Defining $\sum_{i=1}^{n}(mi+1)$ binary variables as,

$\Pi_{ij} = 1$ if $\Pi_i = j$ or $\Pi_i^* = \max(\Pi_1^*, \Pi_2^*, \ldots \Pi_m^*)$ $\quad i = 1,2,3,\ldots,n$

$\Pi_{ij} = 0$ if $\Pi_i \neq j$ or zero otherwise $\quad j = 0,2,3,\ldots,m,$

where the condition $\Pi_i^* = \max(\Pi_1^*, \Pi_2^*, \ldots \Pi_m^*)$ implies equation (Vii) and (Xi) above.

Given a set of N individuals facing m choices, we define

Π_{ij}^* = the level of indirect utility for the i^{th} individual making the j^{th} choice.

$\Pi_{ij} = 1$ if the i^{th} individual making the j^{th} choice.

$\Pi_{ij} = 0$ otherwise.

With equation (X) identified, then prob (Π_{ij}=1) is defined by equation (Xi). The results are obtained by maximizing equation (Xii). The maximum likelihood estimate $\hat{A}$ of A is defined as a solution of the normal equation

$$\frac{\partial \text{Log } L}{\partial A} = 0$$

The matrix of second derivatives is negative definite hence there is a unique maximum, and the iterative procedure converges to the maximum (Amemiya, T., 1981, and Maddala, G., 1983). The estimated values of β and δ show the marginal effects of social and provider characteristics on conditional utility from a medical care provision alternative. The signs of the coefficients of individual characteristics and quality variables cannot be predicted a priori, but we expect that income, insurance, and severity of illness to increase demand for medical care services. Distance, waiting time and user fees should have negative effects on demand, that is, reduce demand for all health care providers. In estimating the behavioral parameters, we assume that each individual faces four distinct health care provision alternatives, namely: the mission hospital, H, the nearest dispensary, D, the nearest private clinic, P, and a self-treatment alternative, S. S includes traditional healers as well as retail shops, where patients often buy drugs when they fall sick or when they are not available in modern health facilities. An individual is presumed to pick and choose treatment from these four treatment options. Since there is no a priori way of determining the correct decision structure of patients, we assume that health care decisions are not nested. This means that the perceived benefits from treatment options are not correlated.

3.3 EMPIRICAL BASE

The data used for this study comes from a survey of users of outpatient and inpatient departments of health facilities in Mwimbi division, Meru-south district in Eastern province of Kenya. The health facilities used in the study include Chogoria hospital (which is a mission hospital and the only hospital in the division) and its affiliate dispensaries, and private health clinics. Chogoria hospital has a health insurance scheme that covers inpatient and outpatient services at the hospital and outpatient services at its affiliate dispensaries. Some background information about the health insurance scheme is provided in section 3.3.1 below. Government health centers are not included in the study because of lack of data on these facilities. There are only three public health centers in the division, and of the 377 individuals interviewed, only six reported using a health center. Data on quality of the public health centers was not available, as respondents did not give this information. Verifying this information in these facilities was also not possible due to bureaucracy complications. The health workers were not willing to give this information. Also traveling to these facilities was a problem since they located in very remote areas. Short study period also made it difficult to arrange for constant trips to the public health facilities. The respondents were selected randomly from the population and questioned on their use of medical facilities in the division and a number of social demographic characteristics. Data on individual characteristics (age gender, education level, income, and severity of illness), quality of the facilities, and access variables (Distance, travel time and cost, waiting time and user fees) are obtained directly from the respondents using questionnaires. A sample of the questionnaire used to interview the respondents is attached on page 48. To increase validity of the data, some of the responses, for instance, user fees and distance were checked independently. Some drawbacks of the survey data were also noted. There was under reporting of some variables, especially medical utilization and income. Lack of a reliable individual (or household) income variable was a major problem in the study, but this was compensated by using expenditures. Also, absence of market work or wage data prevents proper weighing of time costs

by the individual's shadow value of time. Using unweighted time cost variables is tantamount to assuming constant opportunity cost of time across individuals, which is unsatisfactory. Also evident in the sample was the problem of measuring travel time and costs, because respondents could not precisely give reliable estimates for these variables. We overcome this problem by using distance, as it can be used as measure of several things; first, it includes the physical distance one has to travel and the money and time costs of travel, thus it is directly related to the magnitude of the out-of-pocket costs of traveling to a facility to obtain medical care. Second, it is also associated with higher information costs. The information cost represent the fact that patients have less difficulty in finding out about the quality and suitability of a close-by health facility (for instance, by asking neighbours or by having experienced the care themselves) than in finding out about a distant health facility. Thus money costs and information costs will tend to be positively correlated with the distance traveled. However, change of residence may make those who previously lived near one health facility and now live farther away (perhaps near another) have a lower informational cost with the former, more distant, health facility.

3.3.1 BACKGROUND INFORMATION OF THE STUDY AREA AND THE HEALTH INSURANCE SCHEME

Meru-South district has five divisions. According to the 1999 population census, the district had a total population of 205,451 (Population and Housing Census, 1999). Table 3.1 below presents the population distribution and density by division.

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Table 3.1 Population Distribution And Density (Persons/Km²) by Division

District	Division	Location	Population	Households	Area in km²	Density
Meru-South			**205,451**	**46,984**	**1,092.90**	**317**
	Mwimbi		**64,380**	**14,673**	**203.4**	**106**
		Kiera	9,061	2,040	85.7	456
		Murugi	13,360	3,089	29.3	501
		Maara	11,128	2,395	22.2	502
		Chogoria	15,008	3,523	29.9	436
		Ganga	15,823	3,626	36.3	316
	Chuka		**53,517**	**12,596**	**169.6**	**316**
		Kiangondu	12,191	3,356	12.6	968
		Gitereni	7,897	1,800	20.6	383
		Kithangani	3,679	859	40.2	92
		Muiru	4,755	1,045	8.7	547
		Karingani	15,549	3,496	72.9	213
		Mugwe	9,446	2,040	14.6	647
	Magumoni		**32,715**	**7,433**	**64.2**	**510**
		Mwonge	5,839	1,334	9.6	608
		Thuita	11,082	2,447	18.2	609
		Mukuuni	7,758	1,799	21.2	366
		Rubate	3,732	847	9.1	410
		Kabuboni	4,304	1,006	6.1	706
	Muthambi		**31,539**	**7,194**	**84.8**	**372**
		Muthambui	7,671	1,826	16.6	462
		Gitije	9,747	2,139	34.4	283
		Mitheru	14,121	3,229	33.8	418
	Igambang'ombe		**23,300**	**5008**	**210.9**	**110**
		Kamaindi	2,532	530	32.3	78
		Mutino	7,456	1583	66	113
		Kamwimbi	4,454	975	41.1	107
		Kajuki	6,130	1302	49.8	123
		Itugururu	2,728	698	21.3	128

Source: Population and Housing Census, Central Bureau of Statistics.

The distribution of health facilities in the district is uneven. There are three hospitals, six health centres, and thirty-seven dispensaries. Table 3.2 below shows the distribution of health facilities in the district. Among these facilities, two hospitals, four health centres, and thirty-four

dispensaries are sponsored by Non-Governmental Organisations (NGOs) while all the others are Government of Kenya facilities. Among the thirty-four dispensaries sponsored by NGOs, thirty-one are under Chogoria mission hospital. It is the only hospital in Mwimbi division, which also serves as a referral hospital to the bordering district (Tharaka and Meru central). The division also has the highest number of health facilities (Tharaka-Nithi District Development Plan 1997 - 2001), and also the highest population compared to other divisions in Meru-South district.

Table.3.2 Health Facilities in the District Per Division

Division	Hospital	Health Centre	Dispensary	**Total**
Chuka	2	1	9	**12**
Magumoni	-	-	5	**5**
Muthambi	-	1	10	**11**
Mwimbi	1-	3	11	**15**
Igambangombe	-	1	2	**3**
Total	**3**	**6**	**37**	**46**

Source: Tharaka-Nithi District Development Plan, 1997 – 2001

Majority of the population in the district are subsistence farmers. The high agricultural potential zones, (that is, Mwimbi, Chuka, Magumoni, and Muthambi divisions) have higher incomes mainly from cash crop farming (coffee and tea) and also support larger population compared to Igambang'ombe division which is dependent on seasonal rainfall for food and livestock production.

Chogoria hospital has a capacity of 312 beds and a network of 31 outlying dispensaries. There are also community-based healthcare services mainly concentrated in the semi-arid region in Tharaka district. Specialist services available at the hospital include surgical, medical, paediatric and obstetric, gynaecological, X-ray, and physiotherapy units. The outpatient department offers eye, ENT, and dental services.

A health insurance scheme (Akiba health scheme) was introduced in Chogoria hospital in 1991, as part of a number of measures introduced to assist bridge the gap between hospital income and healthcare costs. It had two main objectives;

1. To reduce the number of patients leaving the hospital with debt, and

2. To allow those within the community to receive services at the hospital.

The medical cover on the scheme includes inpatient and outpatient care at the hospital and its affiliate dispensaries .for diseases like include malaria, typhoid, a woman's first caesarean section, family planning methods (Norplant, IUCD, BLT, vasectomy, etc), ear infections, eye infections, emergency dental extractions, skin diseases, laboratory tests, and X-ray. Diagnosis, treatment, and medicines for chronic diseases, which include arthritis, asthma, diabetes, epilepsy and hypertension, are covered under the scheme if the problem first occurs while the person is an enrolled, paid-up insurance member. No attempt has been made to cover treatment given at other hospitals or clinics and only drugs available in the hospital formulary are available on the scheme. Several exclusions are listed on the medical cover, such as age over 65 years, pre-existing medical conditions, pregnancy and childbirth (apart from the first caesarean section), dental treatment, reading glasses, hearing aids, and cosmetic surgery. A limit is put on treatment for AIDS and psychiatric illness to cover the first admission only.

Individuals can join the insurance scheme individually (family health scheme) or as a group. Group membership was introduced to limit adverse selection. A group may join Akiba if it has at least 50 members (families) and if at least 60% of the members (families) do join. For the family health scheme, individuals who are members of National Health Insurance Scheme (NHIF) are required to pay an annual premium of Kenya shillings 2,600 and for a couple Kenya shillings 4,800. To enroll a child (under 18 years of age) an annual premium of Kenya shillings 1,600 is charged per child. For non-NHIF, an individual is required to pay an annual premium of Kenya shillings 3,300 and for a couple Kenya shillings 6,000 per year, and for any child enrolled, Kenya shillings 2,000 per year per child. For the group health scheme, members of NHIF are charged annual premiums as follows; Kenya shillings 1,300 per individual, Kenya shillings 2,400 for couples and Kenya shillings 800 per child. For non-NHIF members, individuals pay an annual premium of Kenya shillings 1,650, couples pay Kenya shillings 3,000 and Kenya shillings 1,000 for each child enrolled. For all the schemes, the coverage for outpatient and

inpatient care is Kenya shillings 30,000 per person per year. Under the insurance scheme, a co-payment of Kenya shillings 30 is charged to those who seek medical services at the dispensary, and incase referred to the hospital, no co-payment is charged. The hospital outpatient department and dispensaries charges a co-payment of Kenya shillings 50 for each visit, unless for referral cases. This difference in fees is to encourage members to use the dispensaries, where provision of healthcare is less expensive.

3.4 VARIABLE DEFINITION

The dependent and independent variables are defined in appendix 2. There are four dependent variables indicating the type of health facility used by the patient. There are three groups of explanatory variables; access, quality (as perceived by the respondent), and individual characteristics, which are defined appropriately in table 3.1 below. Quality indices used include availability of drugs, medical personnel, clean water, laboratories, condition of the structures, and cleanliness of the facility. The seriousness of the illness of individuals is ascertained by finding out for how long the individual was unwell before seeking treatment, how many attempts had been made to cure the illness, and how long the illness took to heal after medication. To assess the differential impact of health insurance on the demand for health care, the insurance variable is interacted with individual characteristics (age and sex) and access variables (distance and waiting time).

TABLE 3.3 Variable Definition

Dependent variable

f =1 if the patient self-treated.
f =2 if the patient used a private clinic.
f =3 if the patient used the dispensary.
f= 4 if the patient used the hospital.

Explanatory variables

Age	An individual age in years.
Sex	sx=1 if individual is a male, sx=0 if female
Education	Education level of the individual. ne = if no education, zero otherwise, pe=1 if primary education, zero otherwise. se=1 if secondary education, zero otherwise. te=1 if tertiary education, zero otherwise.
Income	inc = Annual income of the individual in Kenya shillings (Ksh.)
Seriousness of the illness	hs = 1 if serious illness, and hs =0, otherwise.
Marital status	mss=1 if married, zero if single.
Distance*	ds_H Distance traveled (in km.) to the hospital. ds_P Distance traveled (in km) to the private clinic. ds_D Distance traveled (in km) to the dispensary. ds_S Distance traveled (in km) to other facilities including self treatment (values normalized to zero).
Quality	qdr=1 if prescription drugs are available at the facility, zero otherwise. qcex = 1 if the quality of the facility is perceived to be excellent, zero otherwise. qcvg =1 if the quality of the facility is perceived to be very good, zero otherwise. qcgd =1 if the quality of the facility is perceived good, zero otherwise. qcs = 1 if the quality of the facility is perceived to be satisfactory, zero otherwise. qcp =1 if the quality of the facility is perceived to be poor, zero otherwise.
User fees	ch_H Adult outpatient charges in the hospital. ch_D Adult outpatient charges in the dispensary. ch_P Adult outpatient charges in the private clinic. ch_S Adult outpatient charges for self treatment (values normalized to zero).
Waiting time	wt_H Waiting time (in hours) at the hospital. wt_D Waiting time (in hours) at the dispensary. wt_P Waiting time (in hours) at the private clinic. wt_S Waiting time (in hours) for self treatment.
Insurance	ins =1 if the individual has insurance, zero otherwise.
IiXage	Insurance interacted with age of the individual.
IiXsx	Insurance interacted with the sex of the individual.
IiXwtm	Insurance interacted with waiting time.
IiXds	Insurance interacted with distance traveled to the health facility.

CHAPTER 4: DATA ANALYSIS AND ESTIMATION RESULTS

From the data collected, we first estimate a general multinomial equation model that contains all the arguments listed in table 3.1, except the insurance dummy variable. Second, we estimate a model that contains insurance interacted with the access (distance and waiting time) and individual (gender and age) variables but excluding the facility quality dummy variables and the secondary education dummy. The first specification enables us to empirically derive the general individual demand for medical care using the simple assumption that the perceived utility from the different treatment options are not correlated. Another assumption that is made when estimating this general model is that multicollinearity does not seriously impair the results. There is correlation between the education dummy variables and also in the quality dummy variables. The correlation matrix in table 4.1 below shows that there is a high negative correlation between secondary and tertiary education (-.7513).. Similarly, we find negative correlation between the health condition of the facility quality dummies. There are several indicators of facility quality in the survey, including the availability of medical personnel, clean water, laboratory services, condition of structures and general cleanliness. Due to the small sample of facilities (20) multicollinearity across characteristics and sometimes correlation between a characteristics and a service type may exist. Although the correlation between the facility quality variables is not strong (less than .5 in absolute terms in all cases), these variables and the secondary education dummy are dropped in the second estimation, since there presence in the model produces large and highly significant coefficients and also indeterminate standard errors and z-values, and therefore spurious results.

Table 4.1 Correlation matrix.
(obs=360)

	f	age	sx	mss	ds	wtm	ne
f	1.0000						
age	0.0041	1.0000					
sx	0.0151	0.0254	1.0000				
mss	-0.0053	0.5035	0.0428	1.0000			
ds	0.0804	-0.0096	-0.0430	0.0521	1.0000		
wtm	0.2457	0.0734	-0.0590	0.0613	0.0801	1.0000	
ne	-0.0551	-0.0763	0.0012	-0.0905	-0.0168	0.0065	1.0000
pe	-0.1257	0.1218	-0.0663	0.0804	-0.0375	0.0251	-0.0297
se	0.0952	-0.1295	-0.0239	-0.1238	-0.0209	-0.0201	-0.0680
te	-0.0004	0.0578	0.0704	0.0831	0.0499	0.0018	-0.0617
hs	0.0750	0.0820	0.0761	0.0623	0.1061	0.0566	0.0131
inc	0.1123	0.2552	0.0349	0.1569	0.0722	-0.0149	-0.0565
ins	0.2713	0.1049	-0.0215	0.0581	0.0417	0.0449	-0.0448
ch	0.1721	0.0173	0.0658	0.0053	0.2292	0.0678	-0.0224
qdr	0.1756	0.0654	-0.0092	0.0660	0.0354	0.0335	-0.1355
qcp	-0.1270	-0.0302	0.0916	0.0236	0.0222	0.0455	-0.0120
qcs	-0.0728	-0.0556	0.0684	-0.0215	-0.0058	-0.0128	0.2144
qcgd	0.0198	-0.0200	-0.1128	0.0046	0.0052	0.0094	-0.0470
qcvg	0.0700	-0.0236	0.0292	-0.0387	0.0383	0.0510	-0.0506
qcex	0.0023	0.0946	0.0039	0.0426	-0.0492	-0.0700	-0.0454

	pe	se	te	hs	inc	ins	ch
pe	1.0000						
se	-0.3611	1.0000					
te	-0.3279	-0.7513	1.0000				
hs	0.0447	-0.0506	0.0181	1.0000			
inc	-0.0576	-0.2628	0.3152	-0.0037	1.0000		
ins	-0.0906	-0.0635	0.1344	0.0855	0.2451	1.0000	
ch	0.0510	0.0767	-0.1100	0.2091	-0.0335	0.0722	1.0000
qdr	-0.0300	-0.0128	0.0544	0.0769	0.0391	0.0323	0.0108
qcp	0.0402	-0.0027	-0.0236	-0.0262	-0.0338	-0.0555	-0.0344
qcs	-0.0341	0.0061	-0.0149	-0.1114	-0.0612	-0.1276	-0.0357
qcgd	0.0740	0.0844	-0.1302	0.0223	0.0231	-0.0408	0.0518
qcvg	-0.0066	-0.0501	0.0631	0.0879	-0.0769	0.0160	0.0493
qcex	-0.0585	-0.0367	0.0849	-0.0273	0.1117	0.1336	-0.0670

	qdr	qcp	qcs	qcgd	qcvg	qcex
qdr	1.0000					
qcp	-0.1641	1.0000				
qcs	-0.1035	-0.0558	1.0000			
qcgd	-0.0175	-0.1007	-0.2192	1.0000		
qcvg	0.0618	-0.1083	-0.2358	-0.4253	1.0000	
qcex	0.0834	-0.0972	-0.2117	-0.3819	-0.4108	1.0000

4.1 DESCRIPTIVE STATISTICS.

The sample statistics in table 4.2 below reveal the following characteristics; among the 377 adults interviewed in the survey, 54 percent used Chogoria hospital, 17 percent used dispensaries, 16 percent used private clinics, and 7 percent sought treatment from traditional healers or bought drugs from shops. Another 3 percent sought treatment from hospitals outside the division and 2 percent used health centers in the division. Approximately 2 percent of the sample reported that they had not used any of the health facilities themselves but had prior knowledge on the facilities.

Table 4.2 Utilization of Health Facilities by Individuals

Sample size = 377

Health facility	**Number of Individuals**	**Percentage of the sample**
Hospital	203	53.84
Dispensary	63	16.71
Private clinics	61	16.18
Public Health centers	6	1.59
Self-treatment	27	7.16
Other Hospital	11	2.917
No response	6	1.59
Total	**377**	**100**

Among those who used the hospital, 39 percent reported that there was a dispensary nearer to their place of residence than the hospital, and 30 percent of these had their medical care expenses covered by Akiba health plan. Among the 377 respondents interviewed, 71 individuals are covered by Akiba health plan. Also evident from the survey is that most people self-treated themselves (approximately 31percent of the sample) before seeking medical care in any of the health facilities, approximately 4 percent had sought care in a dispensary and only 0.5 percent of the whole sample had attended a public health center. In the analysis that follows we exclude the users of health centers due to the reasons highlighted in section 3.3 above and other eleven individuals who did not give complete information on their health facility utilization. The sample size will therefore reduce to 360.

Other sample statistics are shown in table 4.3 below. The average age of the respondents is about 33 years of age, and about 59 percent are married, 26 percent have their medical care costs covered by medical insurance, the sample is almost evenly split between males and females. About 41 percent of the respondents reported the illness to be serious, 14 percent have attained primary education, 45 percent have secondary education, and 41 percent have tertiary education. The average annual income is Kenya shillings 174,790.

TABLE 4.3: Summary statistics of the sample

n = 360

Variable	Obs	Mean	Std. Dev.	Type	Min	Max
age	360	33.08889	9.901908	Quantity	13	67
sx	360	.4916667	.5006263	Binary	0	1
mss	360	.5944444	.4916826	Binary	0	1
pe	360	.1361111	.3433838	Binary	0	1
se	360	.4527778	.4984579	Binary	0	1
te	360	.4055556	.4916826	Binary	0	1
hs	360	.4138889	.4932146	Binary	0	1
ins	360	.2638889	.4413532	Binary	0	1
inc	360	174790.1	183918.7	Quantity	2000	1000000

4.1.1 SUMMARY STATISTICS BY HEALTH FACILITY

Table 4.4 below presents the summary statistics of the users of hospital inpatient and outpatient departments. Most of the users of hospital inpatient and outpatient services have formal education; approximately 41 percent have attained tertiary education, 48 percent secondary education, and 11 percent primary education, while only 5 percent do not have any formal education. About 51 percent of the users are males and 61 percent are married. The average waiting time in the hospitals is 0.88 hours (approximately 52.8 minutes) and the average distance to the hospitals is 7.33 kilometers. Around 46 percent of the users reported the illness to be serious while 48 percent had health insurance cover. Majority reported that the hospitals had good supply of drugs, 87 percent, and about 90 percent described the hospitals to be in good environment. The average age of the users is 34 years of age.

Table 4.4 Summary Statistics of Hospital Users

Sample size = 203

Variable	Obs	Mean	Std. Dev.	Type	Min	Max
age	203	33.60591	10.12312	Quantity	15	67
sx	203	.5123153	.501084	Binary	0	1
mss	203	.6108374	.4987914	Binary	0	1
ne	203	.0492611	.7018624	Binary	0	10
pe	203	.1133005	.3177433	Binary	0	1
se	203	.4778325	.5007432	Binary	0	1
te	203	.408867	.49284	Binary	0	1
ds	203	7.331773	20.63273	Quantity	.1	200
wtm	203	.8801314	.9466863	Quantity	0	5
hs	203	.4630542	.4998659	Binary	0	1
qdr	203	.8719212	.3350037	Binary	0	1
qcex	203	.2807882	.4504952	Binary	0	1
qcvg	203	.3300493	.471393	Binary	0	1
qcg	203	.2906404	.4551804	Binary	0	1
qcs	203	.0837438	.2776881	Binary	0	1
qcp	202	.0148515	.1212589	Binary	0	1
ch	203	2233.453	5529.848	Quantity	30	50000
inc	203	191832.8	190384	Quantity	2000	1000000
ins	203	.3743842	.5337463	Binary	0	1

From table 4.5 below, majority of the users of dispensaries have secondary education, 52 percent, while around 37 percent have tertiary education, 10 percent and 2 percent have primary and no education respectively. Compared to the hospitals and private clinic (as shown in table 4.4 below) we find fewer people with less education using dispensaries. The average age is 31 years of age, slightly less than the users of hospitals (34 years), private clinics (33 years) and self-treatment (35 years). About 41 percent of the users are men. 55 percent are married, and only 25 percent reported the illness to be serious. The average distance to the dispensaries is 3 kilometers and waiting time 0.46 hours (approximately 27.6 minutes), which are both significantly less than in the hospital case. Almost 50 percent reported that the dispensaries had enough supply of drugs, and around 84 percent reported that the dispensary environment was good. 48 percent had health insurance against their medical care costs, and the average charges were Kenya shillings 359, which is significantly lower than in the hospitals (2233.45).

Table 4.5 Summary Statistics of Dispensaries Users

N = 63

Variable	Obs	Mean	Std. Dev.	Type	Min	Max
age	63	31.09524	8.626131		17	55
sx	63	.4126984	.4962739	Binary	0	1
mss	63	.5555556	.5008953	Binary	0	1
ne	63	.015873	.1259882	Binary	0	1
pe	63	.0952381	.2959013	Binary	0	1
se	63	.5238095	.5034444	Binary	0	1
te	63	.3650794	.4853196	Binary	0	1
ds	63	3.014286	2.816977	Quantity	.1	15
wtm	63	.4611111	.463478	Quantity	0	2
hs	63	.2539683	.4387759	Binary	0	1
qdr	63	.5079365	.5039526	Binary	0	1
qcex	63	.2857143	.4553826	Binary	0	1
qcvg	63	.3015873	.4626334	Binary	0	1
qcg	63	.2698413	.4474425	Binary	0	1
qcs	63	.1269841	.3356296	Binary	0	1
qcp	63	.015873	.1259882	Binary	0	1
ch	63	358.9841	966.5297	Quantity	30	6500
inc	63	170807	208278.6	Quantity	12000	980000
ins	63	.4761905	.5638904	Binary	0	1

Table 4.6 Summary Statistics of Private clinics Users

N = 61

Variable	Obs	Mean	Std. Dev.	type	Min	Max
age	61	32.81967	9.875067	Quantity	13	62
sx	61	.5081967	.5040817	Binary	0	1
mss	61	.6557377	.4790701	Binary	0	1
ne	61	.0163934	.1280369	Binary	0	1
pe	61	.2131148	.4129065	Binary	0	1
se	61	.3606557	.4841758	Binary	0	1
te	61	.4098361	.4958847	Binary	0	1
ds	61	2.763934	3.083898	Quantity	.1	16
wtm	61	.3355191	.3038712	Quantity	0	1.5
hs	61	.4918033	.5040817	Binary	0	1
qdr	61	.6721311	.4733326	Binary	0	1
qcex	61	.147541	.3575875	Binary	0	1
qcvg	61	.3114754	.4669398	Binary	0	1
qcg	61	.3114754	.4669398	Binary	0	1
qcs	61	.1967213	.4008188	Binary	0	1
qcp	61	.0327869	.1795562	Binary	0	1
ch	61	403.2131	424.3369	Quantity	40	2800
inc	61	131636.4	131292.4	Quantity	10000	620000
ins	61	0	0	Binary	0	1

Table 4.6 above reveals the following characteristics about the users of private clinics. The average age of the patients is approximately 33 years of age and more men (51 percent) than women use private clinics. A significant number of users are married, around 66 percent, while those with tertiary education account for almost 41 percent. 36 percent of the users have secondary education, which is significantly lower than in hospitals and dispensaries. On the other hand, a significant number reported primary education, that is 21 percent, which compared to the hospitals and dispensaries, is a large increase. Distance and waiting time in the private clinics is lower than in the hospitals and dispensaries. The average distance to the private clinics is 2.76 kilometers and waiting time is 0.34 hours (approximately 20.13 minutes). None of the users had insurance cover and the average charges were slightly than in the dispensaries. 67 percent reported that drugs were available in the clinics and around 76 percent described the general environment as good. Approximately 49 percent reported the illness to be serious.

Only 27 respondents used self-treatment and the mean age is 35 years of age, greater than in the hospitals, dispensaries, and private clinics. We also find more men, almost 52 percent, using self-treatment, and a significant number is married, approximately 67 percent. Approximately 30 percent reported the illness to be serious, which is significantly less than in the hospital (46%) and private clinics (49%). None of the users of self-treatment reported having not had any formal education. However, a significant number had primary education, 26 percent, as compared to the users of hospitals and dispensaries. The average distance is 6.77 kilometers and waiting time is 0.56 hours (approximately 33.6). Majority, almost 81 percent reported that drugs were available. None of these individuals had health insurance. The average charges is Kenya shillings 748.8 are higher than in the dispensaries and private clinics. The average income for this category is Kenya shillings 142,600. This is higher than in the private clinic category (Ksh. 131,636.4) but lower than in the hospital (Ksh. 191,832.8) and dispensary (Ksh. 170,807.6) categories. Table 4.7 below summarizes these statistics.

Table 4.7 Characteristics of users of self-treatment

n = 27

Variable	Obs	Mean	Std. Dev.	Type	Min	Max
age	27	35.37037	11.52305	Quantity	18	53
sx	27	.5185185	.5091751	Binary	0	1
mss	27	.6666667	.4803845	Binary	0	1
ne	27	0	0	Binary	0	0
pe	27	.2592593	.4465761	Binary	0	1
se	27	.3703704	.4921029	Binary	0	1
te	27	.3703704	.4921029	Binary	0	1
ds	27	6.77037	12.00076	Quantity	.5	50
wtm	27	.5611111	.6052654	Quantity	0	2
hs	27	.2962963	.4653216	Binary	0	1
qdr	27	.8148148	.3958474	Binary	0	1
qcex	27	.4814815	.5091751	Binary	0	1
qcvg	27	.1481481	.362014	Binary	0	1
qcg	27	.2222222	.4236593	Binary	0	1
qcs	27	.0740741	.2668803	Binary	0	1
qcp	27	.1111111	.3202563	Binary	0	1
ch	27	784.8148	1234.769	Quantity	45	5000
inc	27	142600	133407.2	Quantity	2000	550000
ins	27	0	0	Binary	0	0

Based on these summary statistics, we find that the sample gave the data of interest for this particular study. The sample is evenly split between males and females, and also covers a sufficient age range of the adult population, that is over 18 years. Although there are few cases with age below 18 years, these were reported by adults who make decisions for the children on where to seek medical care and also accompany them to the health facilities. Also the sample cuts across all income groups. The lowest annual expenditure reported was Kenya shillings 2,000 and highest recorded was Kenya shillings 1,000,000. We also find that all levels of education (primary, secondary and tertiary) are represented in the survey. The survey also covered a sufficient number of health facilities, which cover the whole division.

4.2 MAXIMUM LIKELIHOOD ESTIMATION RESULTS

Maximum likelihood estimates of the demand parameters in the three equations of the model are presented in table 4.8 below.

TABLE 4.8 Maximum Likelihood Estimation Results

Number of obs = 360

Log likelihood = -320.6098

Wald chi2(48) = 218.10
Prob > chi2 = 0.0000
Pseudo R2 = 0.3576

f		Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
2	age	-.0214717	.024939	-0.861	0.389	-.0703512	.0274077
	sx	-.0403352	.4837219	-0.083	0.934	-.9884127	.9077423
	mss	.1877752	.5114589	0.367	0.714	-.8146658	1.190216
	ds	-.1342697	.0492672	-2.725***	0.006	-.2308317	-.0377077
	wtm	-1.218831	.636833	-1.914*	0.056	-2.467001	.0293383
	pe	.6067698	1.417936	0.428	0.669	-2.172333	[illegible]
	se	.8861543	1.320869	0.671	0.502	-1.702702	3.475011
	te	1.275134	1.328098	0.960	0.337	-1.32789	3.878159
	hs	1.21584	.5304031	2.292**	0.022	.1762685	2.255411
	inc	5.93e-07	1.73e-06	0.343	0.732	-2.80e-06	3.98e-06
	ch	-.0003774	.0001972	-1.913*	0.056	-.0007639	9.17e-06
	qdr	-1.357998	.7355033	-1.846*	0.065	-2.799557	.0835624
	qcs	3.500634	1.223225	2.862***	0.004	1.103158	5.898111
	qcgd	2.571461	1.131509	2.273**	0.023	.3537445	4.789177
	qcvg	3.048368	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	qcex	1.067917	1.15025	0.928	0.353	-1.186532	3.322365
3	age	-.0559171	.0250405	-2.233**	0.026	-.1049957	-.0068386
	sx	-.2690082	.477919	-0.563	0.574	-1.205712	.6676958
	mss	.4686179	.502332	0.933	0.351	-.5159348	1.453171
	ds	-.0764465	.043175	-1.771*	0.077	-.161068	.0081749
	wtm	.0333781	.5079617	0.066	0.948	[illegible]	[illegible]
	pe	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	se	1.131912	1.419088	0.798	0.425	-1.649449	3.913273
	te	.7283934	1.407014	0.518	0.605	-2.029303	3.48609
	hs	.2564747	.5321024	0.482	0.630	-.7864269	1.299376
	inc	2.21e-06	1.64e-06	1.350	0.177	-9.98e-07	5.41e-06
	ch	-.0005173	.0006094	-0.849	0.396	-.0017116	[illegible]
	qdr	-1.795419	.730768	-2.457**	0.014	-3.227698	-.3631397
	qcs	3.983193	1.37374	2.900***	0.004	1.290712	6.675674
	qcgd	3.413555	1.340854	2.546**	0.011	.785529	6.04158
	qcvg	4.279328	[illegible]	[illegible]	[illegible]	1.621703	6.936944
	qcex	[illegible]	[illegible]	[illegible]	0.041	[illegible]	5.347333
[illegible]	age	[illegible]	[illegible]	[illegible]	0.115	[illegible]	.0085741
	sx	[illegible]	[illegible]	[illegible]	0.800	[illegible]	.939815
	mss	.2127963	.4136038	0.514	0.607	-.5978523	1.023445
	ds	-.0147332	.0107226	-1.374	0.169	-.0357492	.0062827
	wtm	.8536842	.4367871	1.954*	0.051	-.0024027	1.709771
	pe	-1.393391	1.309754	-1.064	0.287	-3.960462	1.17368
	se	.1375857	1.184201	0.116	0.908	-2.183406	2.458577
	te	-.1574768	1.229974	-0.128	0.898	-2.568182	2.253228
	hs	.6039661	.4716405	1.281	0.200	-.3204323	1.528364
	inc	2.73e-06	1.42e-06	1.918*	0.055	-5.92e-08	5.52e-06
	ch	.0001816	.000087	2.088**	0.037	.0000112	.000352
	qdr	.102615	.7003053	0.147	0.884	-1.269958	1.475188
	qcs	2.012581	1.103298	1.824*	0.068	-.1498445	4.175006
	qcgd	2.123699	.9453537	2.246**	0.025	.2708395	3.976558
	qcvg	2.721082	1.017066	2.675***	0.007	.7276702	4.714494
	qcex	1.335907	.9685081	1.379	0.168	-.5623335	[illegible]

(Outcome f==1 (self treatment) is the comparison group)

* Coefficient statistically significant at 10 percent level of significance.

** Coefficient statistically significant at 5 percent level of significance.

*** Coefficient statistically significant at 1 percent level of significance.

1,2, 3 and 4 represent the self-treatment, private clinics, dispensaries and hospital equations respectively. In all the three equations, the quality variables exert a strong effect in the probability of seeking care from a private clinic, dispensary, and hospital relative to self-care. The coefficient of the drug availability dummy (qdr) has a negative sign in the private clinic (-1.357998) and is statistically significant at the 10 percent level of significance It is also negative in the dispensaries equations (-1.795419) and statistically significant at the 5 percent level of significance. A positive coefficient in the hospital equation (0.102615 is as expected. This could imply that availability of drugs increases demand for medical care in the hospital. Past research by Mwabu, G., et al., (1993) found a positive demand effect of availability of drugs in a health facility. This is because as the variety of drugs increases, people can expect to find medicines for their ailments at health facilities. The counterintuitive results in the private clinic and dispensaries equations could indicate that these facilities have been effective in dealing with patient problems, thus reducing demand for medical care at both types of facilities. Another possible explanation could be that patients can obtain drugs (especially non-prescription drugs) from the market to cure minor illnesses rather than seek medical care from these facilities. Other quality dummies representing the general status of the health facilities have positive signs and are significant at the 5 percent level of significance except the excellent quality dummy (qcex) in the clinic and hospital equations and the satisfactory quality (qcs), which is statistically significant at the 10 percent level of significance. They show strong positive effects in increasing demand in all the specifications relative to self-care. Another major observation related to the quality issue is the strong movement of patients towards private physicians (clinics) for illnesses perceived to be serious. This could be explained by the fact that patients would expect to be attended faster in private clinics than in other health facilities. Infact, private clinics have on average less waiting time (0.33 hours) compared to hospitals (0.88 hours) and dispensaries (0.46 hours). It is also possible that doctors working in the hospitals moonlight in the private clinics and therefore

patients would prefer to go to private clinics where they expect to find the doctor who can recommend the best treatment to them. The doctors may refer the patient to a hospital if the illness worsens, but patients may have the loyalty of consulting a doctor first. However, we do not have an objective measure of what the sample views as poor, satisfactory, good, very good, and excellent. The results however, confirm the prediction that quality is an important determinant of the choice of medical care facilities. Akin, J., et al. (1986), Sahn, D. E., et al., (undated), and Mwabu, G., et al., (1993) had similar results.

The coefficients of education dummies have positive signs in the private clinic equation, but none is statistically significant. The higher the education level, the greater the probability of seeking care from the private clinics. The coefficients of the education dummies increase with the level of education. They are 0.6067698, 0.8861543, and 1.275134 for the primary, secondary, and tertiary education dummies, respectively. This result can be explained by the fact that those with higher education have higher opportunity costs of time, and therefore prefer using the private physicians due to shorter waiting time (average waiting time = 0.33 hours in the clinics compared to 0.88 hours and 0.46 hours in the hospital and dispensary respectively) and less travel distance (2.7 kilometers compared to 3 kilometers in the dispensary and 7 kilometers to the hospital). The coefficients of secondary and tertiary education dummies in the dispensaries equation and the secondary education coefficient in the hospital equation also have positive signs, but none is statistically significant. Similar explanation can be used to explain this phenomenon. The signs of the primary and tertiary education dummies in the hospital equation and primary education coefficient in the dispensary equation are negative. However, none of the education dummy coefficients is statistically significant.

The coefficients of age in all the three specifications do not conform to the expectations, that demand for medical care increases is positively correlated with the depreciation rate on health, which increases over the life cycle. Only the coefficient of age in the dispensary equation (-0.0559171) is significant at the 5 percent level. The coefficients of age in the private clinic and

hospital equations are –0.0214717 and –0.03513 respectively. These coefficients are also not quantitatively different from the dispensary equation. These results shows that as people age they are more likely to seek medical care from the informal health sector, (buying drugs from shops and obtaining treatment from traditional healers). This shift from the modern health sector (hospitals, dispensaries and clinics) to the informal sector is almost uniform across the three options.

The gender of the respondents is statistically insignificant in all the specifications at the 1, 5, and 10 percent level. The coefficient of gender (sx) is negative in the clinic and dispensary equations (-.0403352 and -.2690082, respectively), and positive in the hospital equation (.1076396). This implies that men are more likely to seek medical care from hospitals and the informal than women. The reasons why women are more likely to seek ambulatory care services than men include; (a) females are more prone to illnesses (they have obstetrical care needs that are not relevant to men, for example) and (b) they are more likely to accompany children to health care facilities, and thus report and seek treatment for their own conditions at the same time. Males, on the other hand, let their health deteriorate more than females do before seeking medical care, so that when they do, they require more intensive care in hospitals. We also note that the negative effects are stronger in the dispensaries equation, showing fewer men are likely to use outpatient services compared to women. Acton, J., (1975), found similar trends in his study on the effects of travel distance in determining demand for medical services in New York city. He found that men used more hospital services and private physician services where they could get more intensive care relative to outpatient services. Akin, J., et al. (1986), however, found that men are more likely to use private sources of care or self-treatment than females.

Also insignificant in all the equations but showing strong quantitative effects is the marital status (mss) coefficient. All the coefficients have positive signs, implying that married people are more likely to seek medical care in types of facilities than the unmarried. This can arise because many health needs are age and sex specific such as, (a) immunization early in life,

so that parents can report their illness as they accompany children for immunization, (b) the risk of pregnancy during fertile years, thus the need for family planning services and pre-and-post natal care, and (c) the onset of degenerative diseases late in life.

Seriousness of the illness (hs) is also an important determinant of demand for medical services. All the coefficients in the three equations confirm our expectations, that the seriously ill are likely to use the modern health facilities than self-care. The coefficient of severity of illness is quantitatively significant in the clinic equation (1.21584) and also statistically significant at the 5 percent level. The coefficient also shows strong positive effects in the hospital equation (0.6039661), but weak effects in the dispensary equation (0.2564747). These results conform to the sample statistics described in section 4.1.1 above. On average, 49 percent of the private clinic users, 46 percent of the hospital users and 25 percent of the dispensary users reported to be seriously ill. This could be attributed to several reasons. On average the distance and waiting time are less in the clinics than at the dispensaries and the hospital so that the seriously ill will prefer to use the private clinics. Also this can be a quality related phenomenon; patients expect to be attended by a doctor in the private clinics and hospitals. Although they also expect to be attended by a doctor in the hospital, the effects of longer travel distance and more waiting time in the hospitals compared to private clinics, can make patients use more of private physician services. The less use of dispensaries, although patients travel shorter distances and wait less than in hospitals, could arise because they do not expect to get specialized services in the dispensaries. The aspect of drug availability can also explain the higher use of hospital services than dispensary services for the seriously ill in the sample. Akin, J., et al. (1986), in the study of the demand for primary health care services in the Bicol region of the Philippines found similar result, that serious illness causes adults and children to use some practitioner rather than none and substantially increases the probability of choosing a private modern practitioner.

Health care services in the survey are perceived to be normal goods. All the coefficients of income in the three equations are positive, but quantitatively insignificant. Only the coefficient

in the hospital equation is significant at the 10 percent level. This shows that income is not an important determinant of whether or where medical services are purchased. The effects of earned and non-earned income may explain this phenomenon. It could be that non-earned income determines to a greater extent the choice of facility to use, so that the effects of earned income will be weak. Most of the population is not on formal employment, and therefore does not have constant incomes. Therefore non-earned income could be a major determinant of demand for health care. However, the study does not analyse the effects of non-income.

User fees reduce the demand for medical services in the private clinics and in the dispensaries, although the reductions is significant statistically at the 10 percent level in the private clinic equation. However, the coefficient user fees (ch) in the hospital equation is positive (.002) and statistically significant at the 5 percent level. The results are consistent with theory and with the results of Mwabu, G., et al (1993), that user fees reduce demand for medical services. The positive coefficient in the hospital equation can be a result of those who move out of the private clinics and dispensaries will seek medical care from the hospital rather than in the informal health sector.

The effects of other access variables are consistent in all the specifications. The coefficients of distance are negative in all the equations, and statistically significant at the 1 percent level in the private clinic equation and 10 percent level in the dispensary equation. The negative effects are strongest in the private clinics option, and less pronounced in the hospital option. Patients are willing to walk for longer distances to the hospital and less to the private clinics, maybe because the hospital offers a wide variety of services the other facilities. Acton, J., (1975) produced similar results that distance functions as a price in determining demand for medical services, but the prediction that distance is a major impediment to using medical services does not show out clearly in the survey. The coefficients are not quantitatively significant (-0.1342697, -0.0764465, and –0.0147332 in the private clinics, dispensaries, and hospitals respectively). This could be due to the existence of a threshold beyond which the travel distance

becomes significant, which is not achieved in this study. Once this threshold is achieved, distance would a major constraint in the use of medical care services. Waiting time (wt) is statistically significant in the private clinic and hospital equations at the 10 percent level and insignificant in the dispensary equation. However, it produces strong negative effects in the clinic equation (-1.218831). An increase in waiting time in the private clinics will significantly reduce demand for medical services. The positive coefficients in the dispensary (0.0333781) and hospital (0.8536842) equation could be showing the compensatory effects of the declining demand in private clinics, but the effects are more pronounced in the hospitals. It is possible that patients are willing to wait for longer time periods in the hospitals because they expect to receive whichever treatment they require. On the other hand, private physicians can frustrate patient and they end up in hospitals, especially if they are unable to cure severe illnesses. Availability of drugs may also account for this trend. Patients expect to receive all services (diagnostic, drugs, etc.) from the hospital more cheaply than in the private clinics, so this may prefer to wait for longer in the hospitals.

4.3 INSURANCE AND DEMAND FOR MEDICAL SERVICES.

An important issue in policy is whether insurance coverage affects the demand for medical care. Table 4.9 presents the results for the three equations in table 3.1 with the addition of interaction terms between insurance and the access and individual specific variables.

TABLE 4.9 Interaction and Main Effects of Insurance.

Multinomial regression — Number of obs = 360; Wald chi2(44) = 124272.53; Prob > chi2 = 0.0000; Log likelihood = -321.30442; Pseudo R2 = 0.3562

f	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
1 age	-.005909	.0173103	-0.341	0.733	-.0398366	.0280187
IiXage_1	.0000942	.022813	0.004	0.997	-.0446184	.0448069
sx	-.1602708	.3803034	-0.421	0.673	-.9056517	.5851102
IiXsx_1	-.2431093	.4702225	-0.517	0.605	-1.164729	.6785099
inc	-1.50e-06	1.52e-06	-0.986	0.324	-4.49e-06	1.48e-06
Ipe_1	.9099416	.5541976	1.642	0.101	-.1762657	1.996149
Ite_1	.4332152	.471197	0.919	0.358	-.490314	1.356744
ds	.0035413	.0102431	0.346	0.730	-.0165349	.0236174
IiXds_1	-.0096726	.0124111	-0.779	0.436	-.0339979	.0146528
wtm	-.918007	.4043752	-2.270**	0.023	-1.710568	-.1254461
IiXwtm_1	.4185217	.4623502	0.905	0.365	-.4876681	1.324712
Ihs_1	-.6227551	.4817073	-1.293	0.196	-1.566884	.3213738
mss	.2001431	.3921939	0.510	0.610	-.5685429	.9688291
qdr	-.8467288	.3678582	-2.302**	0.021	-1.567718	-.1257399
2 age	.0325089	.015782	2.060**	0.039	.0015768	.0634411
IiXage_1	.252461	.0939375	2.688***	0.007	.0683468	.4365751
sx	-.1057406	.3631147	-0.291	0.771	-.8174323	.6059512
IiXsx_1	22.66401	2.140621	10.588***	0.000	18.46847	26.85955
inc	-1.55e-06	1.11e-06	-1.400	0.162	-3.72e-06	6.20e-07
Ipe_1	1.053425	.4789925	2.199**	0.028	.1146173	1.992233
Ite_1	1.058267	.3952163	2.678***	0.007	.2836577	1.832877
ds	-.0859064	.0365073	-2.353**	0.019	-.1574594	-.0143534
IiXds_1	-3.348644	1.350765	-2.479**	0.013	-5.996095	-.7011932
wtm	-1.963323	.4481513	-4.381***	0.000	-2.841684	-1.084963
IiXwtm_1	-6.172366	3.132631	-1.970**	0.049	-12.31221	-.0325229
Ihs_1	.4570322	.3516821	1.300	0.194	-.2322521	1.146316
mss	-.1040328	.4252769	-0.245	0.807	-.9375601	.7294946
qdr	-1.319811	.3945091	-3.345***	0.001	-2.093035	-.5465876
3 age	.0200249	.0149536	1.339	0.181	-.0092837	.0493335
IiXage_1	-.0333625	.0305559	-1.092	0.275	-.093251	.0265261
sx	.1357606	.3840816	0.353	0.724	-.6170255	.8885468
IiXsx_1	-1.087886	.6334946	-1.717*	0.086	-2.329513	.1537405
inc	-7.10e-07	1.00e-06	-0.707	0.480	-2.68e-06	1.26e-06
Ipe_1	-.0317375	.5656423	-0.056	0.955	-1.140376	1.076901
Ite_1	.0056039	.3675684	0.015	0.988	-.7148169	.7260246
ds	-.046891	.0308223	-1.521	0.128	-.1073016	.0135196
IiXds_1	.0309912	.0424345	0.730	0.465	-.0521788	.1141612
wtm	-.5942011	.3141392	-1.892*	0.059	-1.209903	.0215005
IiXwtm_1	-.3622151	.4914638	-0.737	0.461	-1.325466	.6010362
Ihs_1	-.7033543	.3695741	-1.903*	0.057	-1.427706	.0209976
mss	.0336276	.3947898	0.085	0.932	-.7401463	.8074015
qdr	-1.727942	.363239	-4.757***	0.000	-2.439877	-1.016006

(Outcome f==4 [hospital] is the comparison group)
* Coefficient statistically significant at 10 percent level of significance.
** Coefficient statistically significant at 5 percent level of significance.
*** Coefficient statistically significant at 1 percent level of significance.

The education dummy variables are statistically insignificant, except in the clinic equation where the primary education coefficient is significant at the 5 percent level and the tertiary education dummy is significant at the 1 percent level. Education increases the likelihood of using private practitioners. The coefficients are 1.053425 for primary education and 1.058267 for tertiary education. This could be a result of the higher opportunity costs associated with using the dispensaries and hospitals. Education increases the likelihood that those with primary education (coefficient is 0.9099416) will use more of self-care than those with tertiary education (coefficient is 0.4332152). It reduces the probability of using dispensaries, for those with primary education (coefficient is –0.0317375) and increases the probability for those with tertiary education (coefficient is 0.0056039). Primary education reduces use of dispensaries and increases use of private care and self-care. We also note that more educated people are less likely to self-treat themselves but more likely to use dispensaries compared to the less educated.

Income is also statically insignificant in all specifications, and also an unimportant determinant of choice of type medical services to use, although the results show that those with higher incomes are more likely to use the hospital than the dispensaries, clinics, and self-treatment. Serious illness reduces the probability of self-treatment (-0.6227551) and use of dispensaries (-0.7033543), relative to hospital care. However, it increases the likelihood of using private physicians (0.4570322), probably a quality-related phenomenon. However, only the coefficient of serious illness in the dispensary equation attains statistical significance at the 10 percent level. Marital status is also insignificant in all specifications, but shows that the married are more likely to use the self-treatment option (coefficient is (0.2001431) and dispensaries (coefficient is 0.0336276) and less of private clinics (coefficient is –0.1040328) relative to hospital services. This could be attributed to the fact that private clinics do not offer most of the pre-and-post-natal services and family planning services. Availability of drugs coefficients (qdr) are statistically significant in the private clinic and dispensary equations at the 5 percent level and in the self-care option at the 5 percent level. This indicates effects that availability of drugs

reduces demand for medical care in the facilities relative to hospital. This could be attributed to the fact that these facilities are efficient in dealing with patient problems, especially minor illnesses or preventive care services, or that patients can easily acquire the non-prescription drugs from the market. Infact, these effects are more pronounced in the dispensary option and least in the self-treatment option.

The interaction effects of insurance and individual characteristics show that men are less likely to use the self-treatment option than women, and insurance coverage reinforces these effects. The coefficient of sex in the self-care option is -0.1602708 and when interacted with insurance -0.2431093. This shows that insurance coverage drives more men than women from the self-treatment option to other options. Men are likely to use the dispensaries than women (the coefficient of sex is 0.1357606), but the presence of insurance coverage reverses the trend significantly; we find women using the dispensaries more than men, the coefficient reverses to -1.087886. Possibly due to the fact that women can readily acquire well-baby, immunization, pre-and-post natal care, and other obstetric-related treatment cheaply at the dispensaries. All these services are covered under the health insurance scheme in all the dispensaries affiliated to Chogoria hospital. Insurance, on the other hand, reverses the trend that men are less likely to use private physicians compared to women. We find that, with insurance, men are using more private care. The coefficient is 22.66401 and statistically significant at 1 percent level of significance. Perhaps this could be due to congestion and queues in hospitals and dispensaries. Men could also have higher opportunity costs of time, so that they choose less time intensive private physician care.

Age, although statistically significant at the 5 percent level in the clinic equation only, does not in quantitative terms significantly affect demand for medical services in all the specifications. The aged are more likely to use private sources of care and dispensaries than self-treatment. The coefficients of age are -0.005909, 0.0325089, and 0.0200249 in the self-care, private clinic and dispensary equations respectively. We find that insurance coverage reduces the

likelihood of the aged using dispensaries (-0.333625), and increases the likelihood of using private clinics (0.252461) and self-care (0.0000942) relative to the hospital. We also note that this type of care is not available in dispensaries, so that demand for care by the aged will decline in these facilities. Some of the aged turn to private care due to the fact that the doctors in the hospitals also moonlight in private clinics, so that we find the aged visiting these option to consult the doctors. Since the aged persons mainly seek treatment that is curative in nature, from hospital or private sources, they would be willing to use these facilities irrespective of the distance traveled, provided they expect to obtain specialized care not available in the nearest hospital.

A small proportion will turn to self-care option, may be because they may have minor illnesses that may not require specialized treatment. Due to the fact that the aged mainly require specialized curative care services, availability of subsidized care will increase demand for medical care in the hospital by the aged. Of major importance in the study is the effect of insurance on the accessibility of health care services. Distance is a constraint in the use of medical services, especially in the use of private physician care. Distance as in the previous results, significantly reduces the likelihood of seeking medical care from the private clinics (the coefficient is –0.0859064) and also slightly constrains the use of dispensaries (coefficient is –0.046891) relative to hospital care. Distance to the self-treatment option is not a constraint relative to other source of care. However, insurance coverage reduces the likelihood that the insured will travel longer distances to obtain care from the informal health sector (the distance-insurance interaction coefficient becomes negative, -0.0096726). More notable effects are in the clinic equation; distance is a major impediment to the insured in the use of private physician services. It reduces the likelihood of using these facilities by 3.348644. On the other hand, insurance coverage reduces the effects of distance as a constraint in the hospital and dispensary options. The distance-insurance interaction term change to positive 0.0309912. We note that in the self-care option and private physician care all medical care costs are paid out-of-pocket,

unlike in the dispensary and hospital options where insurance pays for the medical care costs of the insured. However, these coefficients are statistically significant at then 5 percent level in the private clinic equation only.

Waiting time is also a significant factor in demand for medical care. It reduces demand in the three options, though the effects are more pronounced, statistically and quantitatively, in the private clinic option (-1.963323). The effects are also strong in the self-treatment option (-0.918007), but weaker in the dispensary option (-0.5942011). Insurance coverage significantly reinforces these effects in the private physician case; the insured are less likely to use this option as waiting time increases. The coefficient of the waiting time-insurance is -6.172366), which is also statistically significant at the 5 percent level. This is because patients would pay more in terms of waiting time costs and visit costs. They would thus prefer to use hospital and dispensaries where they pay relatively less. They pay a small co-payment and nothing for drugs but face positive waiting time costs. From the dispensary equation, we find that insurance coverage slightly dilutes the effects of waiting time in reducing demand. The insured are willing to wait for longer time to obtain medical services from the dispensaries, rather than use private clinics. Since the insured pay relatively fewer charges at the dispensaries and hospital, time costs functions as a price in determining demand for medical care. That is, as money prices are reduced due to spread of insurance, demand becomes more responsive to time costs. It is also true that, since patients are willing to wait longer to obtain medical care services in the dispensaries, they will also be willing to wait for longer to obtain care from the hospital. The result that the insured are willing to wait longer in the self-care option could be associated with queues and congestion in the dispensary and hospital, so that those with higher opportunity cost of time may purchase for services in the self-care option. The prediction that time costs functions as a price in determining demand for health care services holds in this survey. We also find that individual characteristics, rather than income and user fees are important determinants of whether and where medical care services are purchased.

CHAPTER 5: CONCLUSION AND POLICY RECOMMENDATIONS

5.1 CONCLUSION

This paper has empirically examined the effects of health insurance on access and utilization of medical facilities in rural Kenya. We find that distance, though not significant in all specifications, consistently reduces demand. Waiting time also reduces demand for health care especially in the private physician's option. Results for quality variables reflecting drug availability and the general status of the health facility (cleanliness, availability of water, toilets, etc) show that they are significant determinants of demand. We also find that although income is not major determinant of whether or where medical services are purchased growth of income shifts demand from the informal health care sector to the modern sector, much the demand ending up in the hospital.

Insurance reduces the role of money prices in determining demand, and makes time prices function as prices. It significantly reduces the effects of distance and waiting time in hospital and dispensaries, where insurance is available and increases the role of distance and waiting time as prices in clinics and self-care options. However, it does not increase demand for health care with age but increases the likelihood of men shifting to private clinics.

5.2 POLICY IMPLICATIONS

Several policy implications emerge from this survey; first, quality is an important determinant of health care demand. Demand for health-care will increase if people have the option to get access to pharmaceuticals and attend a health facility that is cleaner, has a toilet and water, good structures, and enough medical staff. The main weakness of our quality data is that they are subjective and qualitative. Simply asking individuals to provide ordinal assessment of the quality of health care facility along various general dimensions prevents us from estimating the cost of providing better quality. We know people value adequate environmental condition than the poor ones, and good than adequate, and so on, but the survey data does not allow us to estimate the corresponding cost of providing the changes. It would be more useful to collect date on specific, costable attributes of health delivery options. Similarly, the availability of drugs, reflects supply and demand aspects, and thus creates endogeneity problems. This gives researches a great difficulty measuring the potential effects of quality improvements of this nature using non- experimental data, due to endogeneity issue noted above. Measuring the impact of service improvement may require an experimental design, in which the inputs are exogenously varied by the researcher. Improving quality should, however, be one of the main focus areas for the health care providers.

Second, reducing distance to the health facility will likely raise demand. The idea that distance is a major impediment to using modern medical services does not hold persistently for all providers. This effect is highly significant in the private clinic option, and less pronounced in the hospital and dispensary option. A possible explanation for this lack of significance of distance for the hospital and dispensary equation is the existence of a threshold beyond which distance becomes important. We apparently do not reach this threshold for our survey. The implications are that, if there is a threshold beyond which distance and travel time dictates medical care choices for our sample, it appears to be outside the very large range of distances

observed. If this finding can be generalized, the use of more centralized dispensaries that offer high quality care may be feasible alternative to fielding large number of paraprofessionals. Although distance or travel time are less important in the two options, this does not suggest that policies aimed at lowering costs should be abandoned, only that marginal benefits of reducing travel time to zero virtually for everyone may not be worth the effort. However, this suggests a policy instrument for delivering more services to target groups. By moving clients, either by improving transportation, locating clinics closer, or by establishing satellite clinics around central facilities, the consumption of selected population can be increased.

Third, waiting time produces similar effects as distance. Waiting time significantly reduces demand in the private clinic option and self-care option relative to dispensaries and hospital. This effect may partially be explained by quality considerations; people may simply wait for a doctor who has a good reputation. Effects to reduce waiting time will undoubtedly reduce patients costs, however, unless the costs and quality effects are isolated from each other, this exercise may have less impact on patient's behavior than intended.

Forth, health insurance effects redistribution in services due to changes in money and time prices. As money prices out of pocket are reduced, because of the spread of insurance, demand becomes more responsive to time prices. This permits people with lower opportunity costs of time to bid services away from those with higher opportunity costs of time because they will face a price that is relatively less costly. Its likely that this will be accompanied by a shift in demand, and this will be also accompanied by an increase in the time needed to receive a unit of medical care. This will further increase the relative shift in favor of those with lower opportunity cost of time. Thus inequality of access and utilization may occur, so that insurance worsens the distribution of medical services.

Another related issue is the presumed importance of income as a determinant of medical care use. From the results, we find that other correlates of income (like education) and severity of illness tend to be significant factors in explaining the observed consumer behavior. Thus efforts

to build more dispensaries where medical care is relatively cheap, (or for that case the governments effort to build health centers where care is free or cheap), as a way to reach the poor may, from our survey result in the services not reaching the intended recipients because of their unexpected consumption behavior. However, given the small estimated demand effects of income in this rural area, very large increases in income are needed to substantially shift demand from the informal health sector to the modern health facilities. Significant shifts in demand to these modern health facilities are therefore only likely in the longrun.

To achieve the goal of delivering health services equitably to the population, an insurance institution that effectively organizes consumer's entry into the health system must be created.

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ATTACHMENT 1

QUESTIONNAIRE ON HEALTH INSURANCE AND DEMAND FOR MEDICAL CARE

The information that will be filled in this form is purely for academic purpose and will remain confidential. Your assistance and contribution is highly appreciated.

Questionnaire number _____

Name of interviewer _____

Section A

1. Name of respondent_____
2. Place of residence:
   i. Location _____
   ii. Sub-Location _____
   iii. Village _____

3. Year of birth _____

4. Gender (Tick appropriately)

   Male ☐

   Female ☐

5. Marital status (Tick appropriately)

   Single ☐

   Married ☐

Others (specify)_____

6. Which level of formal education have you attained? (Tick appropriately).
   1. None ☐
   2. Primary ☐
   3. Secondary ☐
   4. Tertiary ☐

Section B

7. Which health facilities are available for use in your community? (Tick appropriately).

Government hospital	☐
Mission hospital	☐
Private clinics	☐
Government health centers, dispensaries, and clinics	☐
Mission dispensaries and health centers	☐
Traditional healers	☐
Others specify_____	

8. During your last attempt to cure an illness, which health facility did you use?

_____

9. How far is this health facility from your place of residence? _____ Kilometers.

10. Which transport means did you use when going to the health facility? (Tick appropriately).

Walking	☐
Bicycle	☐
Own car	☐
Public means	☐
Others (specify)	_____

11. How long did it take you to reach to the health facility? _____ Min/hrs.

12. How much money did you spend on transport? _____Kenya shillings.

13. How long did you wait before receiving treatment _____min/hrs.

14. (a) Were you admitted or released after treatment? _____

(b) If admitted, how many days did you spend in the hospital? _____days.

15. (a) Did the doctor/ clinical officer prescribe any drugs to you? (Tick appropriately).

Yes ☐

No ☐

(If no, proceed to 15 © below).

(b) If yes, were all the drugs available in the health facility?

Yes ☐

No ☐

(c) If no, where did you get the drugs? _____

16. How long did it take you to recover after treatment? _____days.

17. Does the health facility have the following amenities? (Tick appropriately)

	Yes	No
Medical Staff		
Clean Water		
Toilets		

18. How would you rate the health facility based on the following aspects; (Tick appropriately).

	Condition of the structures	cleanliness
Excellent	☐	☐
Very good	☐	☐
Good	☐	☐
Satisfactory	☐	☐
Poor	☐	☐
Very poor	☐	☐

19. How much were you charged for treatment, including drugs? _____ Kenya shillings.

20. (a) Do you have health insurance that covers your medical care costs?(Tick appropriately).

Yes ☐

No ☐

(b) If yes, who provides the insurance coverage? _____

21. Before seeking care, for how long had you been ill? _____ day(s).

22. (a) Had you made any attempts before to cure the illness? (Tick appropriately).

Yes ☐

No ☐

(b) If yes, how many attempts had you made? _____

(c) Where did you seek the treatment? _____

Section C

23. (a) Which health facility among those listed in Section B, is nearest to your place of residence?

_____

(If the health facility is the same as the one indicated in 8, proceed to section D. If otherwise, fill 27 and 28).

(b) How far is it from your residence? _____ Kilometers.

(c) Why did you not seek treatment from this health facility?

_____

_____

_____

_____

_____

_____

Section D

24 What is your main occupation? _____

25 How much money do you spend annually in each of the categories listed below?

Category	**Kenya Shillings**
Food	
Accommodation	
Clothing	
School fees	
Transport	
Farming (crops/livestock/poultry)	
Others	

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