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**IMPACT OF HEALTH INSURANCE ON HEALTH CARE UTILIZATION  
CASE STUDY OF NAIROBI PROVINCE, KENYA**

BY

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C/50/7231/2002

Research paper submitted to the Department of Economics, University of Nairobi, in fulfillment of the requirement for the Degree of Masters of Arts in Economics.

UNIVERSITY OF NAIROBI  
EAST AFRICANA COLLECTION

September 2004

University of NAIROBI



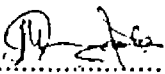
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## DECLARATION

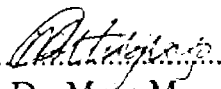
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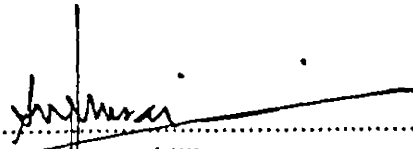
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## APPROVAL

This project has been submitted for examination with our approval as university supervisors

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## DEDICATION

To my Parents Mutua and Nduku and my entire family for their prayers, encouragement and moral support

## ACKNOWLEDGEMENTS

I thank God for his abundant love, sound mind and good health upon my life. All glory and honor to the King of Kings.

I have to take this grand opportunity to appreciate the support both intellectual, moral and financial support which have been able to get from first and foremost the University of Nairobi and the Department of Economics for giving me a chance to pursue MA Economics.

My sincere gratitude to my supervisors Dr. Mugo and Prof.W.Masai for taking me through my research process. My appreciation goes to the African Economics Research Consortium (AERC) for funding the project and part of my studies.

The next acknowledgement goes to Prof. Mwabu for his tireless assistance in my studies, to the MA economics (2004) support for their company and assistance whenever needed.

To my parents and family whose sacrifice and support cannot be gainsaid.

However, this views expressed in this paper are my own and do not bear the views of the named persons or institution. I bear all the responsibility for any errors and omissions

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## ABSTRACT

This paper uses data from "The Kenya National Health Accounts, Household Health expenditure and Utilization Survey, 2003."- Ministry of Health, to examine the impact of health insurance on health care utilization in Nairobi. Health care utilization is categorized into preventive health care, outpatient services and inpatient services. Using probit regression model, the findings are that insurance coverage increases utilization of modern health care, while it does not have any effect on the use of inpatient health care services. Education plays a significant role in the use of preventive health care as is individual's health status and other social demographic characteristics. The higher the income the more the intensity in outpatient visits.



## CHAPTER ONE

### 1.0 Introduction

Health insurance is a mechanism of protecting families against the unexpected high costs of illness. This is done by sharing the risks of future costs among healthy and sick population in the form of regular predictable payments. Utilization of health care is simply measured by counting the health services events/consultations (example, a hospital stay or visit to a physician). There is a mutually dependent relationship between an individual's health insurance decision and medi-care utilization is quite. On one hand, health insurance and in particular, the characteristics of one's health insurance plan influence consumption of medical care. On the other hand, one's expected medical care utilization and expenditure influence the decision to purchase health insurance and choices among different plans (Arrow 1963).

User fees in Kenya took effect in 1987 after the introduction of World Bank cost recovery measures. They were suspended in August 1990 and reintroduced back again in April 1992 (Collins et al, 1996a, 1996b). Several studies provided ex-ante guidance on the effects of user fees in Kenya and in other developing countries. For instance, Ellis (1987) studied the effects of user fees in Kenyan health facilities and concluded that user fees had the potential to generate revenues but would exclude a substantial portion of the population from the healthcare. Proponents argue that people may be more willing to pay for health insurance rather than being heavily taxed or charged user fees. However, other studies (Akin et al 1985; Mwabu and Wang'ombe 1997) argued that demand for healthcare was price inelastic and utilization rates would not be affected by changes in user fees, while other studies showed that it was price elastic (Yoder 1989; Waddington & Enyimayeh; 1990).

According to Bedi et al (2004), user fees promote allocative efficiency, by reducing potentially unnecessary utilization of free health care services, which could be facilitated by social health insurance. But Nganda's (2002), findings showed that overall service utilization in public health facilities declined by only 10% in Nairobi, despite upwards adjustments in user fees in all government facilities. There were increased utilization of some categories of preventive care services, notably antenatal and child health services. However, Nganda's work was based on a limited survey of health facilities.

With health insurance one does not have to pay at point of use unless the insurance contract has some deductibles or co-payment. Therefore, health insurance tends to increase an individual utilization of health care services (laws of Demand), which in turn could lead to better health outcomes. There is a twin causal link between health insurance and utilization of health care, that is , from insurance to the utilization of health care services and from utilization to health status. A number of papers [e.g. Cartwright et al (1997), Cameron et al (1998)] have examined the relationship between insurance status and health services utilization. Most of them have been observational studies, which analyze outcome differences between insured and uninsured population (Levy and Meltzer 2001). Having insurance increases the utilization of health care services, (Brown et al 1998). But observational studies are compounded by observable and unobservable differences between patients with insurance and those without. This can lead to inconsistent estimates of the impact of insurance coverage on health care utilization.

Kenya's health insurance can be broadly categorized into public (National Hospital Insurance Fund, (NHIF)) and private (employer based, individual, community based, others). The measures of usage are mainly inpatients and outpatients services. This proposal focuses on the effects of health insurance (mainly: private individual, NHIF, employer based insurance and other types of insurance) on health care use in Nairobi, Kenya.

## ***1.1 Background***

### ***1.11 Health Insurance Coverage in Kenya***

According to Kinuthia (2002), approximately 300,000 Kenyans have health insurance cover with private firms either through their employees or individual initiatives, with an estimated premium income of approximately (Kenya shillings) KShs. 3 billion.

This figure (300,000) is approximately about 10% of the Kenyan population, implying that a huge segment of Kenyans are still not covered hence the burden of paying hospital bills lies with themselves or through fund raising. Most of the insurance firms or Health Maintenance organizations (HMOs) are located in urban areas where a substantial number of population can afford as compared to rural areas. Hence leaving the population in the rural areas uninsured.

The government has stated its intention that all the citizens obtain social health insurance cover that is yet to be rolled out (subject to parliament bill consent). This is a commitment of health sector reforms to guarantee accessibility of basic packages of health services to all, based on need and not ability to pay. The step towards realization of this goal was the creation of National Hospital Insurance Fund (NHIF) in 1966 under NHIF Act. The members of NHIF contribute a mandatory fee ranging from Kshs30 and Kshs 320 per month, which is primarily low compared to other types of insurance like employer based insurance scheme and private individual insurance.

Manda et al (2004) show that health insurance in Kenya has been provided by both private and public systems. As in insurance definitions the main objective of the health systems has been to insure Kenyans against health risks that they may encounter in future. The two categories can be divided into the following:

#### *1.12 Private health insurance*

Health insurance is referred to as private when the third party (insurer) is a profit-driven organization, however with a pursuit to promote the general health of a people [Government of Kenya, (2003)]. In private health insurance, people pay premium related to the expected cost of providing services to them. Thus, people who are in high health risk groups pay more, and those at low risk pay less. Cross-subsidy between people with different risks of ill health is limited.

There are two categories of private health institution in Kenya: direct private health insurance and employer based insurance (Wang'ombe et al, 1994). Direct private health insurance is very expensive and only the middle and high-income groups afford it (Nderitu, 2002). For the employer-based plans, the employer provides care directly through employer owned on site health facility or through which the employer relies on contracts with health facilities or health care organizations. Under direct private health insurance we have HMOs which can be categorized into two. Those that provide health care through their own clinics and hospitals (example AAR Health services) and second category of HMOs provides health care through third party facilities (Example: Health First International).

HMOs are registered under the Companies Act. The concept originated in the US, where HMOs also help the government to disseminate preventive messages to the public. They were introduced in Kenya in 1994. In HMOs, the patients pay a fixed annual fee, called a capitation fee to cover their medical costs. They are accused of restricting their members to visit their own doctors except in specialized cases where reference is by HMO family doctors. HMOs operate neither under the insurance nor under the health laws and as a result take advantage to operate both as health insurance and s healthcare provider.

### *1.13 Public Insurance - The National Hospital Insurance Fund (NHIF)*

The NHIF was established by an Act of parliament in 1966 as a department in the Ministry of Health, which oversaw its operation but was responsible to the government treasury for fiscal matters. The fund was set up "to provide for national contributory hospital insurance scheme for all residents in Kenya."

The law establishing the NHIF provided for the enrolment in the NHIF of all Kenyans between the ages of 18 and 65 and mandates employers to deduct premium from wages and salaries. The level of contribution is graduated according to income, ranging from Kshs. 30 to Kshs. 320 per month. Contributions and membership are compulsory for all those salaried employees earning a net salary of Kshs 1000/month or more. The fund covers up to 180 inpatients hospitals days per member and his/her beneficiaries per year. Besides self-financing and self-administering, the fund monitors its own collection and distributes benefits to providers. The NHIF Act also provides for the fund to make loans from its reserves to hospitals for service improvement.

The fund was transformed into an autonomous parastatal with a board of Directors, according to the NHIF Act, 1998. Its goal is to have as many Kenyans as possible with access to quality and affordable health care against a background of dwindling share of resources. The current NHIF membership stands at 1.8 million.

According to the amended act, beneficiaries are both in-patients and outpatients, but outpatients' services are yet to be operational. NHIF management Board pays benefits to

declared hospitals for expenses incurred at those hospitals by any contributor, his/her named spouse, child or other named dependant. According to the NHIF Act, the benefits payable from the fund are limited to expenses incurred in respect of drugs, laboratory tests and diagnostic services, surgical, dental, or medical procedures or equipment, physiotherapy care and doctors' fees, food and boarding costs (Government of Kenya, 1999). However, a member cannot claim benefit from the fund if he or she is entitled to compensation for hospitalization and illness from another source such as the workmen's compensation Act.

For NHIF, financing medical delivery involves the paying for the actual delivery of medical services by physicians and other health care providers who are the major determinants of what services are delivered, their frequency and intensity, cost incurred, and outcomes in terms of patients' satisfaction. Private and mission providers may provide uncovered services, which have additional cost implications for members in terms of co-payments. At present the Fund exercises little influence over providers, the intensity and type of care provided to members and the cost.

All NHIF approved facilities (hospitals, maternity homes and nursing homes in the public, non-governmental organization (NGO) and private for profit sectors) make claims for reimbursement for care provided to NHIF members and beneficiaries. Facilities are reimbursed a flat rate per day irrespective of the type of ailment. In order to qualify to make claims from the NHIF, the Ministry of health acting through the agency of the Medical Practitioners and Dentists Board must first approve inpatient facilities. Facilities are thereafter inspected by the NHIF and approved if the minimal condition is met.

The criteria used in determining the reimbursement rates for these hospitals are based on facilities available like X-rays, Intensive Care Units, number of doctors, nurses and clinical officers among others. Points ranging from one to five are awarded to each of these facilities according to the crucial role each plays in life saving. Those with highest points are put in category "A" and attract rebates of Kshs. 2000 per day, whereas those with the lowest points are placed at a rebate of Kshs 400. Kenyatta national hospital is considered special hospitals and is granted a reimbursement rate of Kshs. 2000 per day per person.

According to the NHIF Act Section 5(8), special contribution for those in polygamous unions, who wish to name beneficiaries from among those who do not qualify for the compulsory contribution and those who earn less than Kshs 1000. Married women/men are only exempted from contributing if their spouses have named them as beneficiaries under the scheme. However, a member under the scheme is allowed to name only one spouse and his or her children as beneficiaries. As noted by Muchai et al (1995), many people are not aware of the special contribution option and, therefore, few exercise it. Moreover, the Act does not stipulate who is liable to pay the special contribution and under what circumstances.

At the onset of NHIF, members were supposed to pay a standard contribution each month. This limited the amount of funds that it could collect, limiting the claims that it could manage to settle. However, when contribution was changed from standard to a sliding scale, membership contribution rose from Kshs. 88million in 19981/82 financial year to 738 million in 1990/91. Medical claims also started to drop, as in the case of 1989/90, where it dropped from 81% of the contributed income to about 44% in 1990/90. This led to a surplus of about 1billion Kenya shillings in the financial year 1992/93 (Manda et al, 2004).

With the accumulating surpluses came increased pressure to spend NHIF's reserves. More private facilities were gazetted for reimbursement purposes and daily rates increased. The result was that within one year, beginning financial year 1992/93, contribution net of benefit fell by almost 50 percent while reimbursement, primarily to non-government facilities skyrocketed. The NHIF suddenly was on the verge of insolvency. Until recently NHIF was highly centralized in Nairobi, where all claims were processed. Health facilities in the rest of the country were required to make monthly trips to Nairobi to pursue claims but it has now decentralized the claims. NHIF has a strong branch network with twenty-three branch offices, which are spread across all provinces, both in urban and rural areas to serve contributors in over 400 accredited health providers countrywide. This has made it easier for the members and accredited health providers to make claims at a relatively low cost (Manda et al, 2004).

## **1.2 Statement of the Problem**

Use of health care services is a multidimensional phenomenon. Family dynamics, economics factors, insurance status and characteristics of health care systems and health care provider may affect health behaviors (Johnson and Rimsza, 2003).

Most studies (Cameron et al 1988, Meer and Rosen 2002; Johnson and Rimsza 2003; Holly et al 1997; Domenighetti et al 1996) indicate a positive correlation between having insurance and utilizing health care services. This means that an individual's probability (frequency) of using medical services is increased if s/he is insured. The fact that these studies have been done in developed nations is caution enough, not to generalize their findings to developing countries, for instance, Kenya because of the obvious differences in social, economic and political settings and the health care institution structures. Even though, the priori expectation is a positive relationship between the two, this prompts a study to be done on the effects of health insurance on health care use in Nairobi, Kenya. Is the difference in health care utilization really a function of insurance coverage or are factors to access health conditions income, education among others, equally important? The fact that previous studies have shown a positive correlation between health insurance and health care use, could depend on whether its outpatient or inpatient services or some particular measures of health care like dental care, physical check up and the like. Therefore, the interaction between insurance coverage and other characteristics (demographic and Individual) could determine the true direction and magnitude of insurance effects on health care use.

There seems to be no clear picture on the direction of causality between insurance and health care use in Kenya. Could the problems of health insurance: moral hazards and adverse selection lead to under/overestimate of health insurance effects?

## **1.4 Objectives of the Study**

The objective of this study is to establish the relationship between health insurance and the utilization of health care in Nairobi province. The study aims to achieve the following specific objectives:

- i) To assess the patterns of healthcare utilization in Nairobi province.
- ii) To test the significance of insurance status (NHIF, private individual and employer based insurance schemes) on health care utilization compared to other social economic factors like age, education, income among others;

### **1.5 Justification of the study**

The overall goal of the Kenyan governments is to promote and improve the health status of its population by making health services more effective, accessible and affordable. The health status of a country plays an important role in its economic growth, evidenced by the causal link between health status, labor productivity and economic growth (Bloom et al 2003). Financial barriers and other access variables like distance have hindered health care access. Firstly, people have been forced to think about alternative solutions, as health care at the public facilities is no longer offered for free and the introduction of user fees has had negative effects. Secondly, the cost of illness as evidenced in the literature has shown that illness/ health shocks often force households to high cost implications/risk. Access to insurance could reduce these costs substantially. (Weinberger & Jutting 2000, Asfaw et al 2001)

However, there is a lack of information in Kenya on the relationship between health insurance and the utilization of health care services. Also, the reasons that promote and foster the development of health insurance have not been analyzed in depth so far. Although health insurance is neither necessary nor sufficient to obtain health care yet coverage remains one of the most important factors in obtaining access to health services. Health insurance coverage has been deemed to be an essential element of gaining access to health services. And the receipt of health services is critical to maintaining and improving health

The objective of this study is to find out whether this relationship leads to better health care outcomes (like good health, longevity) with the influence of individual characteristics, so as to advice policy makers in the health sector accordingly. This would contribute to ways of alleviating health problems brought about by declining health care use.



## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### *2.1 Theoretical Literature*

Historically, health insurance developed as a way of solving the problem of access to an income to replace earnings when sick, and generally later to secure the provision of an acceptable standard of health care (Abel-Smith 1989).

The current meaning of health insurance has two aspects: first, it is a way of raising all or part of the money to pay for health care and secondly, it is a way of securing the provision of services. The ways of securing the provision of services is classified into the direct method and the indirect method, according to International Labor Office. In the former classification, professionals are salaried and the fund built and organized the facilities where the services were provided. While in the latter the existing local providers are contracted.

The literature has largely emphasized that the demand for health care is conditioned by the health insurance status of the user. Arrow (1963) suggested that there is an intimate relation between the demand for health care and health insurance: there is moral hazard problem given that effective price of health care is distorted by the presence of health insurance. More comprehensive insurance coverage encourages more use of health services. In addition, the insurance decision itself depends on expected future consumption of health services; thus, individuals who anticipate more health care utilization select more comprehensive insurance (the adverse selection problem). The research on the relationship between health insurance and health care demand is extensive, however the majority of studies have been done for the US and other developed countries. One important set of studies use the RAND health insurance Experiment 1970. Individuals were randomly assigned to insurance plans, in order to eliminate selectivity problem that characterizes health insurance demand.

Geil et al (1997) examine the effects of socialized insurance on demand for hospitalization in Germany. Their results suggest that insurance status is not an important determinant of hospital demand. Cartwright et al (1997) inspects the impact of private supplemental insurance to Medicare on health services utilization in the elderly population. They find that

higher levels of coverage are associated with higher utilization levels. Manning et al (1987) used data from the RAND medical experiment to study the impact of cost sharing on health care utilization. They found that insurance status affects health care demand and the coinsurance elasticity of demand is approximately  $-0.2$ . Cameron et al (1998) used Australian data to model the simultaneous demand for health insurance and health care. They find that insurance status affects utilization positively. Deb and Trivedi (1997) use a finite mixture approach to investigate the effect of insurance status on health care demand. Their results indicate that insurance status is an important determinant of some types of health care.

### *2.12 Empirical Literature*

Jutting (2001) carried out a study, in rural areas of Senegal using a Dakar household survey to analyze the impact of mutual health organization<sup>1</sup> on the access to health care. The survey was carried out in two phases (a pre test and a final survey).

The paper adopted a two step logit and log linear models (by Manning et al 1987) to measure the effect of health insurance on utilization of health care and financial protection. The results of the study were based on the individual, household head and community characteristics. The findings of the estimates suggested that members of an insurance scheme had a better access to health care services to non-members. The probability of making use of hospitalization increases by a 2% age point with membership and expenditure in cases of need reduced by about 50% compared with non-members.

Holden et al (2001) uses four measures of healthcare utilization in their study namely: visits to a physician, registered nurse (RN) or physician assistant (PA); dental visits; scheduled health checkups and having a usual source of medical care. Overall rates of health care utilization differed substantially. The results based on bivariate data analysis showed that utilization rates vary positively with insurance coverage.

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<sup>1</sup> Mutual health organization is synonymous to community-based health organization. (Atim 1998)

**Table L1. Utilization of Health Care by Insurance Status, Wisconsin, 1998 and 1999**

	Insurance Coverage		
	None	Part year	All year
% Visiting a Doctor, RN or PA in the Last Year	63.9	85.2	85.5
% Having a Check-Up in the Last Year	37.6	56.6	63.9
% Visiting a Dentist in the Last Year	45.4	57.3	76.3
% Having a Usual Source of Care	78.7	91.3	97.3

*Source: 1998-1999 Family Health Survey, Wisconsin Department of Health and Family Services*

From table 1 above, we can see that the difference between those with full and part year coverage is insignificant. All the four measures (as listed above) of health care utilization rates tend to increase with insurance coverage. The major difference in utilization rates is witnessed in reported check ups and dental visits across the insurance coverage.

As compared to no insurance, people with full insurance coverage were 4 times likely to have visited a doctor, 3.3 times to have had a scheduled checkup and 6 times have visited a dentist. While compared to partial insurance, individuals with full insurance coverage were as likely to have visited a doctor, 1.6 times as likely to have had a scheduled check-up and 2.5 times as likely to have visited a dentist. However other factors besides insurance coverage have an effect on health care use. Further analysis of this relationship included "control for" effects of other factors that are related to use of health care services: age, gender, race, education, household structure, residential location, poverty status and health status. All these factors had independent statistically significant effects on utilization.

Holly et al (1998) investigates the effects of alternative insurance plans on the utilization of health care services in Switzerland. Their econometric analysis was based on 1992-1993 Swiss Health Survey (SHS) data. It contained information on participants utilization of health services in the course of the twelve preceding months, in terms of: frequency of

recourse to different care providers, indicators of the quality of benefits provided and the alternative health insurance plans purchased. The insurance plans were mainly separated into basic insurance, semi-private and private. But the latter two supplemental health insurance plans were grouped together. They considered a simultaneous two equation model which related use of medical services per person during the twelve preceding months. The first simultaneous equation is a reduced form equation determined by a set of exogenous variables. It shows that once a person is ill, the determination to use inpatient services depends on the insurance plan he/she purchased. While the second equation is a structural form equation, which is simultaneously determined by, the dichotomous variable associated with the first equation and a set of exogenous variables. It shows the propensity that someone will have at least one inpatient stay, given that s/he has used some medical treatment, conditional on the type of insurance plan s/he has selected.

They found out that insurance plan has a significant effect on the probability of inpatient use if we "control for" all other covariates, with a coefficient of 0.2033 and significant at 1%. The effect of supplemental insurance is to increase the probability of a person to have at least one inpatient stay given that he has used some medical treatment holding other variable constant. In a related study Domenighetti et al (1996) used SHS data to analyze the variation in the consumption of 5 specific surgical procedures across subgroups of the Swiss population. It showed that surgical rates were much lower for those who had basic insurance and higher for those with semi-private or private insurance. Hence, came up with the same conclusions as the study undertaken by Holly et al (1998)

Yourkavitch (2003) evaluated the predictors of health services utilization based on secondary data in Iran. She assessed the effects of a package of intervention on two potential outcomes: utilization of antenatal care and utilization of health workers as birth attendants to evaluate predictors of health service care. The odds of health services utilization for demographic characteristics assessed before and after an intervention in district. Data is analyzed in both univariate and multivariate logistic regression models in a baseline and final data. Overall results show that religion and education (measured by literacy) are statistically significant main predictors of health service utilization and should be considered in rural Irian Jaya.

Meer and Rosen (2003), used the Medical Expenditure Panels Survey (MEPS) drawn from 1996, 1997 and 1998 to examine the effects of health insurance on the utilization of health care services. The MEPS provides information on the utilization of health care services which include: visits to providers (such as physicians, dentists), and preventative care (such as blood pressure check, breast exam, flu shots)

In their analysis, they wished to estimate how a variety of medical services utilization measures depend on insurance status and other covariates. These covariates include age, age-squared, gender, race, family size, education, indicator for insurance and region. Their study was carried out in two different alternative model specifications. The first one used a conventional probit model without taking care of endogeneity problem of insurance.

From the estimated results, there was a positive and significant effect of insurance on most measures of utilization with the exception of 2 measures. For example having insurance increases the probability of visiting office based care provider by 24.9 percentage points (marginal effects 0.2491 (32.9)).

However, as noted insurance status may well be endogenous to utilization of health care decisions (Gruber 2000). To deal with this problem of endogeneity they used a two-stage estimation procedure with an instrumental variable (IV) framework. They chose individuals self-employment status as the suitable instrument to be used.

The findings were similar to the first specification but increased the magnitude effect of insurance. For example, the effects of insurance on visiting an office based provider increases from 24.9 percentage points to 35.2 percentage points.

The change between the two alternative specifications is even more pronounced for the preventative care measures. It appears that ignoring endogeneity leads to underestimates of impact of insurance coverage on utilization.

Johnson and Rimsza (2003) used a 1999 Yuma County Community Health Data System for 30,504 children (0-19 years old) from a rural Arizona County, US, to estimate the independent influence of demographic characteristics, insurance coverage and access to pediatric care on emergency department (ED) utilization. They designed a multivariate logit model for the estimation. Children who received care from a private practice pediatric group were 73% less likely to utilize ED if insured and 93% less likely if uninsured than children who had not visited a pediatrician, after controlling for the demographic factors. Uninsured

children were nearly 4 times more likely to use the ED than insured children. Among insured children those covered by Medicaid (public insurance) were 54% less likely to use the Ed than children with private insurance. They conclude that, access to pediatric care is associated with a marked decrease in ED utilization regardless of the insurance status.

### *2.13 Literature Overview*

The consensus of the literature review shows a positive relationship between insurance and health care utilization. They find that higher levels of coverage are associated with higher utilization levels regardless of varied estimation methods used. With the exception of Geil et al (1997) and Johnson and Rimsza (2003) which show health insurance not to be an important determinant in health care use. The reasons for these contrary findings could be that first, universal social health insurance could bring opposite effects of demand through long queues and waiting time costs. Most of the studies used multivariate estimation method like logit estimations, probit estimations and simultaneous equations. This study best suited estimation technique is probit method because it's supposed to show a unidirectional impact of health insurance on health care use, unlike a simultaneous estimation technique which shows both the demand for insurance and health care. The empirical literature also underscores the fact that individual socio-demographic characteristics play a big role in determining or influencing health care utilization. The different insurance status/plans bring about varied rates of utilization across the measures of insurance from inpatient services to outpatients' services.

## CHAPTER THREE

### 3.0 Methodology

#### 3.1 Theoretical model

This model is based on Cameron et al (1988) and Bertranou (1998), on their use of a basic individual utility maximizing model for linearized versions of both the demand for health insurance and the utilization of health care services. This model relies on the economic proposition that choices about utilization of health services depend on the same variables and parameters, as do choices about insurance. The only difference being that the choice of insurance is made before uncertainties about health states while the decision of demand for healthcare services is made after the occurrence of an illness.

Consumer theory can be used to integrate these two demands through maximization of the utility functions that yields both the choice of health insurance coverage and the amount of healthcare services that maximize utility. Thus, the insurance coverage decision is made before the individual knows whether s/he will be sick or not, and the individual chooses the level of coverage that provides the maximum expected utility over different health states. Once the individual knows whether s/he is sick or well, they demand health care services in order to maximize utility.

This model considers a consumer with an intertemporal utility function  $U[C_1, C_2, H(D, s/A, B)]$  where consumers derive utility ( $U$ ) from their health ( $H$ ) and consumption in two periods  $C_1$  and  $C_2$ . Health is produced through a production function that depends on health care services,  $D$  and health status,  $s$ , conditional on vectors  $A$  and  $B$ .

Vector  $A$  refers to consumers' exogenous characteristics such as age, gender, education; while vector  $B$  refers to the insurance attributes. The utility function is as follows:

$$U = U [C_1, C_2, H (D, s/A, B)] \quad (1)$$

The following assumptions hold:

- i. There is uncertainty in the model because when, health insurance is chosen, the future health status of consumers is unknown. Consumers health status follows the conditional probability with  $A$  given by  $\pi_i = \pi_i(s/A)$ .

- ii. Models assume a limited number  $j$  of different health insurance coverage types (NHIIF, private (employer and individual based), community based or no insurance coverage at all.)
- iii. Consumers can defer consumption by buying certain risk free assets  $a$ , which yield an interest rate,  $r$ . The individual solves the following expected utility maximization problem:

$$\text{Max } E(U) = \int_s U[C_1, C_2, H(D, s/A, B)] d\pi(s/A) \quad (2)$$

Subject to:

$$Y_1 = Y_{1i} + I_1 \quad (3)$$

$$Y_{1i} = C_1(s) + a(s) \quad (4)$$

$$Y_2 + (1+r) a(s) = C_2(s) + P_j D(s) \quad (5)$$

Equation (3) states the allocation of autonomous income  $Y_1$  to insurance premium  $I_1$  and income  $Y_{1i}$  (for consumption of goods and savings in the 1<sup>st</sup> period).

Equation (4) individual allocates  $Y_{1i}$  for consumption  $C_1(s)$  and the risk free asset  $a(s)$ .

Finally, the constraint (5) shows that  $Y_2$  (2<sup>nd</sup> period income) and the savings accruing from 1<sup>st</sup> period  $(1+r) a(s)$  is allocated to goods for consumption  $C_2(s)$  and health care services  $D(s)$ .  $P_j$  is the price per unit of health care services  $D$  net of reimbursement under health insurance plan  $j$ .

Therefore, the lifetime budget constraint becomes:

$$Y_1 + Y_2 / (1+r) = C_1(s) + C_2(s) / (1+r) + P_j D(s) / (1+r) \quad (vi)$$

Where lifetime income is assumed to finance health insurance premiums, consumption of other goods besides, health care in both periods and health expenditures in second period.

Assumptions:

- i. Income in the first and second periods  $Y_1$  and  $Y_2$  respectively does not depend on health states.



- ii. Health capital and past health states are not incorporated in the health production functions.

Solving the maximization problem to get demand equations for  $C_1$ ,  $C_2$ , and  $D$ .<sup>2</sup>

The expected demand function for health care services, ( $D$ ) conditional on the choice of insurance plan  $j$  is:

$$E [D_k (s / j)] = \exp [X'\beta_k + \delta HI_j] \quad (7)$$

Where:

$X$  the vector of explanatory variables (socio-economic and demographic characteristics).

$HI$  a vector of dummies for different health plans.

$\beta$  and  $\delta$  Coefficients to be estimated

The linearized form of demand for health care services is:

$$D_{ik} = X_i\beta_k + \delta HI_{ij} + \mu_{ik} \quad (8)$$

Demand for health insurance ( $HI$ ) equation is as follows:

$$HI = X_i\beta_k + \varepsilon \quad (9)$$

Since this paper is dealing with a qualitative dependent variable, that is, probability to utilize health care, regression procedures that can be used are either linear probability models (LPM), logit models or probit models (Aldrich and Nelson 1984). However, linear probability models have some serious limitation that would make it second to the other two regression techniques. These limitations include:

- Non-normality distribution of estimators and the error term
- The predicted values of the probabilistic dependent variables stretch outside the interval (0, 1).
- The model is heteroscedastic because the variance of the error term is not constant

Therefore, logit and probit models would serve as the alternatives to LPM. These models have similar regression estimates, the only difference being the cumulative distribution function of the error term. The choice between the two models is sometimes left at the

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<sup>2</sup>See Cameron et al 1988 for a tractable function calculation of utility problem to the final demand functions.

discretion of the researchers, because of the profound similarities of the two models in terms of the estimates. Probit model follows a cumulative normal probability distribution function.

### 3.1 Empirical Model

This model tries to estimate the effect that insurance affiliation has on use of health care services, taking into account endogeneity of the affiliation variable. It examines health care variables that represent use (dichotomous variables) such as being hospitalized, having medical consultations and consumed medicines as well as variables that show intensity of use, such as the number of hospital days or visits. The study is divided into two sections.

Firstly, to estimate how a variety of medical services utilization measures depend on insurance status and other covariates. In the model of the utilization of various health care services, the dependent variable ( $D_{ik} = Y$ ), takes a value of one if the individual used the services in question during that year and zero otherwise. The independent variables in the basic model include; age, gender, household size, education, household income, dummies for health status and dummy variables for health insurance status (HI) (public and private insurance or no insurance).

This can be denoted as follows:

$Y_i = 1$  if an individual  $i$  used medical services.

$Y_i = 0$  otherwise

To model this outcome, we denote it as follows

$$Y_i = \beta X_i + \delta(HI) + \varepsilon_i \quad (1)$$

$$\text{prob}(Y = 1) = \Phi[\alpha_0 + \beta X_i + \delta(HI) + \varepsilon] \quad (2)$$

This is going to be estimated by the following maximum likelihood function

$$L = (Y / X, \beta, \delta) = \prod_{i=1}^N [\Phi(\beta X_i + \delta(HI))]^{Y_i} [1 - \Phi(\beta X_i + \delta(HI))]^{1-Y_i} \quad (3)$$

Taking logarithms:

$$\log L = (Y / X, \beta, \delta) = \sum_{i=1}^N [Y_i \log P_i + (1 - Y_i) \log(1 - P_i)] \quad (4)$$

The probability of utilizing health care services is also estimated using a two-part model (TPM) (e.g. Manning et al 1987). The two step process is:

1. Whether or not to use medical care
2. How much care to use given that one is already using care.

The first part of the uses a probit model. Whether or not an individual makes use of health care services is a dichotomous outcome: an individual uses/consults medical services or does not.

This can be expressed as follows:

$$P_i = \alpha Y_i + \beta_i(ins) + v_i \quad v_i \approx N(0,1) \quad (5)$$

$$prob(P = 1) = \Phi(\alpha_0 + \alpha_1 Y_i + \beta(ins) + v_i) \quad (6)$$

where:

Y is a set of explanatory variables

ins – dummy for the insurance status

$\Phi(\bullet)$  the cumulative normal distribution

In the second part of the model we use a log linear model to determine the intensity of healthcare use (I).

$$Log(I / P > 0) = \delta Y_i + \gamma(ins) + e \quad (7)$$

The empirical strategy will use OLS estimation by first controlling for health insurance status using a dummy variable for health insurance. There could be some endogeneity problems caused by the interrelation between health insurance and health care use as evidenced in the literature. This will have to be accounted for by carrying out a Hausman specification test, which will require a different estimation method if it exist.

### 3.11 Hypothesis of study

The hypothesis to be tested is a Two-Tail test depicted below:

H<sub>0</sub>:  $\beta_i = 0 \rightarrow$  there is no significant impact of health insurance on health care utilization.

H<sub>1</sub>:  $\beta_i \neq 0 \rightarrow$  there is a significant impact of health insurance on health care utilization.

### *3.2 Diagnostic tests*

Information matrix (IM) test for probit models, which examines issues of specification, heteroscedasticity, endogeneity and validity of instruments.

Hausmans specification model to test for exogeneity is used. However, if endogeneity is encountered from the insurance status and utilization, it will be corrected using Instrumental Variable (IV) framework.

Given that the variable of hospital days takes positive integer values, the study will employ a count data model, namely the negative binomial II (negbin II) model for this application.

### **3.3 DATA SOURCES**

Data from "The Kenya National Health Accounts-Households Health Expenditure and Utilization Survey, 2003."- Ministry of Health is used. The target population for the study was households in Kenya, but only data for Nairobi is extracted as the area of study. The choice of Nairobi is based on the fact that it is well entrenched with both public health insurance and moreover, private health insurance institutions than the rest of Kenya. The National representative survey collected information from 8844 households in all 70 districts in the country. Nairobi has a cluster of 1080 households. The survey was conducted between February and March 2003. The Central Bureau of Statistics (CBS) National sampling frame (NASSEP IV), which, is stratified by urban and rural was used to draw the sample. There are six major towns that were covered and further sub-stratified into five socio-economic factors. The household survey covered a wide range of economic, demographic and health-related behaviour, utilization and expenditure patterns of each member of the household

#### **Variable Selection**

The dependent variable is mainly the probability/likelihood of utilizing health care services which are divided into health provider visits/outpatient, admission to health facility/utilization of inpatient services and lastly preventive health care use.

The explanatory variables used in this study are socio-economic and demographic characteristics of the individuals and of course their insurance status and health status as evidenced in related literature.

Insurance is used as a dummy, having insurance cover or not, or used as a set of dummies (three) for different types of insurance: NHIF, private individual based insurance and employer based insurance. The insured are expected to show positive sign.

The main socio – economic variables will be the individuals monthly income proxied by their monthly household expenditure. The expected sign between health care utilization and income levels is positive. The choice of household expenditure as a proxy for monthly income is believed to be the true estimate for the monthly income as opposed to the figures for income variable entry that is full of blanks. Income levels appear to be important in explaining health insurance choice. The other variable for socio economic status is the individual's employment status. Those individuals who are employed are expected to depict positive relation towards health care use. Employment status is very important for the Kenyan case because it determines those who are insured and in which type of insurance. For instance, NHIF cover is for the in the formal sector, who could also have other insurance types like employer based or private individual insurance. The other variables used here are dummies for marital status, with a positive sign expected for the married, household size (+ sign). These variables influence once decision to be affiliated with insurance scheme. Also, once family size determines the beneficiaries of the insurance scheme especially so, for NHIF.

The education level has four dummies – nursery, primary, secondary and university level. The expected sign for education level to health care utilization could be u-shaped in that the primary level (+ sign) and – sign for university level.

Lastly, a dummy for health status indicating whether individual is in good health condition or a poor one. Its important has been pointed out in literature several times and its wrong specification of health status could lead to biased estimates. This variable determines the demand for health care use. The only variable not used in this study of Nairobi, although used the literature is the residence variable. The reason for not capturing residence of an individual is that Nairobi is generally urban homogenous, although there are differences in housing conditions: urban class, middle class and low class slum areas.

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

#### 4.1 Descriptive statistics

In this section we give a description of the main variables that have been used in estimation of the model and their associated summary statistics as shown in Table 1. Some of the variables used have observations (N value) less than the total sample size. This may be attributed to missing values in the primary data or other unexplained errors and omissions.

**Table 1: Definition of Variables and Descriptive Statistics**

Explanatory variables	Description	Obs	Mean	Std Dev.	Min	Max
Age	Age of individuals in years	3374	24.82306	16.25227	0	93
marsts	Marital status, dummy, 1 if single, 0 otherwise	3279	.5727356	.4947567	0	1
employstst	Employment status, dummy, 1 if employed, 0 otherwise	3283	.3588182	.4797268	0	1
hlsts	Rating of health status, dummy, 1 if good status, 0 if poor status	3330	.8861862	.3176327	0	1
sex	Sex of individuals, dummy 1 if male, 0 if female	3359	.4876451	.4999218	0	1
hsize	Household size, the number of members in a family	3379	4.721515	2.211102	1	15
nursery	Dummy, 1 if attained nursery schooling 0 otherwise	3379	.1876295	.3904738	0	1
primary	Dummy, 1 if attained primary schooling, 0 otherwise	3379	.3566144	.4790704	0	1
secondary	Dummy, 1 if attained secondary schooling, 0 otherwise	3379	.353359	.4780837	0	1
university	Dummy, 1 if attained university schooling, 0 otherwise	3379	.0938147	.291614	0	1
ins	Insurance cover, dummy 1 if individual has ins, 0 otherwise	3068	.243807	.4294476	0	1
hinc	Household income proxied by monthly household expenditure	3379	17,151.29	25682.25	0	223,505
lnhinc	Log of income, proxied by monthly household expenditure	3373	9.136001	1.112948	2.995732	12.31719
privins	Dummy, 1 if private individual insurance, 0 otherwise	3379	.0639242	.2446541	0	1
employins	Dummy, 1 if employer based insurance, 0 otherwise	3379	.0538621	.2257788	0	1

self	Dummy, 1 if NIIII <sup>2</sup> insurance, 0 otherwise	3379	.1059485	.3078173	0	1
mmmins	Dummy, 1 if community based insurance, 0 otherwise	3379	0	0	0	0
thersins	Dummy, 1 if other type of insurance, 0 otherwise	3379	.0029595	.0543284	0	1

**Table 2: Frequency distribution for the dummy explanatory variables**

Explanatory variables - dummies	Frequency		Missing values	
Marital status -single	1878	55.6%	100	3.05%
Health status - good	2951	87.3%	49	1.5%
Employment status - working	1178	34.8%	96	2.8%
Insurance cover - insured	748	22.1%	311	9.2%
nursery	634	18.8%	-	-
primary	1205	35.7%	-	-
secondary	1194	35.3%	-	-
University	317	9.4%	-	-
Education level (Missing)	-	-	29	0.8%
Sex - male	1638	48.5%	20	0.6%

We can see that about 49% of male averaging 25 years of age sought medical care from the health providers mentioned in the survey (Table 2). These providers range from modern health care to traditional health care and self care. The overall insurance coverage stood at a mere 748 (22.1%), bearing in mind the presence of some missing information, which accounted for 9.2% out of the total number of respondents' interviewed-3379.

From table 1 above, household size had a mean size of 5 members per family, while the household income, averaged Kshs 17, 151. The household size ranged from 1 to 15 which was the largest family size interviewed in Nairobi.

The education levels between primary level and secondary level show a little disparity in terms of enrollment, with 35.7% and 35.3% respectively. This could be supported by the fact

that the survey was done in Nairobi, capital city of Kenya, which has fairly high levels of literacy and school enrolment as compared to other districts in the country.

The number of respondent who are single (never married) was 1878 which is about 56% of the total respondents in the marital status category. At the same time those individuals who reported to having good health status compared to other individuals of the same age were 87.3%. The average household income was Kshs. 17,151.30 per month with the maximum income being Kshs. 223,505 per month, while the proportion of those formally and informally employed stood at around 35 %. The remaining percentage is composed largely of students at 13.5% and a category of others (27%). This is a group that could not be categorized under any of the groups in the employment status question.

**Table 3: Incidence of illnesses and the distribution of insurance cover, and medical services**

Variables	Valid (N)	Missing	Frequency		percent	
			yes	no	Yes %	No %
Illness in the last 4 week	3379	0	469	2910	13.9	86.1
Visit to health provider	3379	2910 (86.1%)	424	45	12.5	1.3
Preventive health care	3379	15 (0.5%)	149	3215	4.4	95.1
Admission to health facility	3379	3274 (96.9%)	96	9	2.8	0.3
Insurance cover	3379	311 (9.2%)	748	2320	22.1	68.7
Private individual insurance	3379	3150 (93.2%)	229	-	6.8	-
Employer based insurance	3379	3196 (94.6%)	183	-	5.4	-
NHIF	3379	3008 (89%)	371	-	11.0	-
Other types of insurance	3379	3369 (99.7%)	10	-	0.3	-

The estimation will not include the missing values but will be based on the yes and no responses under the frequency column (Table 3).

There are several measures of health care utilization mentioned in the survey which were captured broadly as inpatient medical services, outpatient services and the preventive health care services. Out of a population of 3379 individuals, the incidences of illnesses reported were 469 cases, in the preceding 4 weeks to the survey. This represents a prevalence rate of 13.9% of the total population.



According to the survey, persons who reported an illness were asked whether they consulted a health provider, preventive/promotive health care or whether they needed admission in a health facility. From table 3 above, we can see that those individuals who consulted/visited a health provider were 424 representing 12.5 % of the total observations. In all 469 individuals reported being ill but 45 individuals did not consult medical care services. These health providers comprise three categories:

- i) modern health care (government, private, mission hospital, dispensaries and nursing homes)
- ii) traditional health care ( traditional healers, self care, village health workers, among others
- iii) pharmacy/chemists

There were various reasons given for seeking health care, mainly: illnesses, showing signs/symptoms and other health related services. Out of the 469 respondents' who reported illness cases, 424 (12.5%) visited health providers (outpatient services), 149 respondents' utilized preventive health care and lastly 96 individuals were admitted in a health facility (inpatient services). Some of the illnesses mentioned are malaria, TB, respiratory infections among others, while the symptoms that prompted some people to seek health care included high blood pressure, sudden weight loss plus many more. Lastly the health services offered were mostly preventive in nature and included physical check ups, immunization, family planning, voluntary counseling test (VCT) and other counseling and therapeutic services as well as dental, prenatal/antenatal care, delivery, physiotherapy among others.

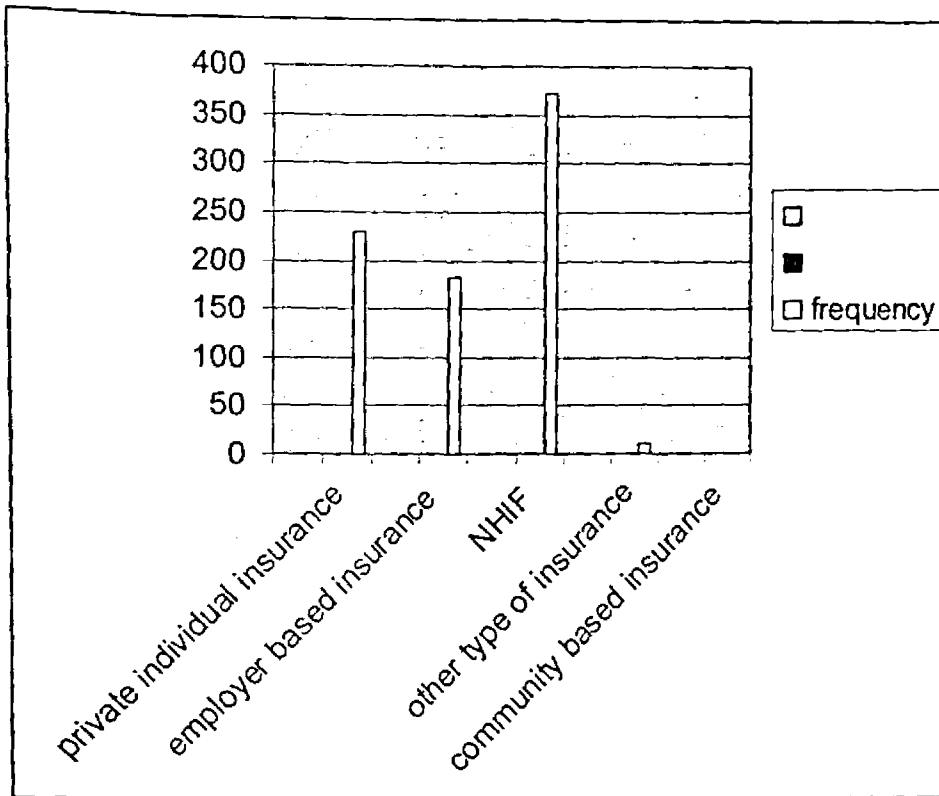
**Table 4: Cross tabulation of insurance cover and the type of medical services offered**

Cases		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Private Individual Insurance	Scheme * Inpatient	11	.3%	3368	99.7%	3379	100.0%
Private Individual Insurance	Scheme * Out patient	7	.2%	3372	99.8%	3379	100.0%
Private Individual Insurance	Scheme * Both	25	.7%	3354	99.3%	3379	100.0%

Inpatient	Employer Insurance Scheme	*4	.1%	3375	99.9%	3379	100.0%
Out patient	Employer Insurance Scheme	*4	.1%	3375	99.9%	3379	100.0%
Both	Employer Insurance Scheme	*22	.7%	3357	99.3%	3379	100.0%
	NHIF * Inpatient	31	.9%	3348	99.1%	3379	100.0%
	NHIF * Out patient	5	.1%	3374	99.9%	3379	100.0%
	NHIF * Both	5	.1%	3374	99.9%	3379	100.0%

Out of the 469 respondents who reported illness cases, it's only about 81 respondents that were insured by the various health insurance schemes. Those covered by private individual insurance numbered 23, employer based insurance scheme had 21 and NHIF covered 39 respondents. Table 4, shows those individuals who reported sick cases and are covered by the three insurance schemes as shown. 31 individuals with inpatient cases are covered by NHIF. The total number of people covered by all the health insurance types is 748 (22.1%), with 92 individuals reported sick. The true figure is 81, the difference of 11 coming from those people who reported use of both outpatient and inpatient services.

**Figure 1: Frequency distribution for health insurance types**



NHIF has the largest coverage between (350 and 400 individuals) as depicted in the graph (figure 1) followed by private individual insurance with just under 250 insured respondents. Employer based insurance coverage follows closely, while community based insurance (no coverage) and other types of insurance have an insignificant coverage size.

## 4.2 Tests for Multicollinearity

Multicollinearity is a common feature in cross-section studies. It occurs when a set of independent variables are linearly dependent or can be expressed as linear combination of the other. A high degree of correlation could lead to rejection of null hypothesis when it should actually be the contrary. There are several ways of dealing with multicollinearity, namely:

- Dropping one of the two variables that is bringing about this collinearity
- Secondly, one could increase the sample size, by going back to the field drawing board in order to reduce precision problems.
- If the multicollinearity is not serious then the variables that are collinear to each other can be retained.

Table A1, in the Appendix, presents tests for multicollinearity and it shows that employment status to be highly co-related with marital status. The level that constitutes multicollinearity is  $p > 0.5$ .

## 4.3 Empirical results.

The following probit estimate results are based on the respondents who reported illness cases in 4 weeks preceding the survey. Hence conditional on being ill reduces the sample size to 469 observations.

**Table 5: Probit marginal effects - probability of visiting health provider/ outpatient services** (Standard deviations in parenthesis)

Variable	Model 1	Model 2	Model 3	Model 4
Constant	2.11158** (.8647)	1.9028** (.8561)	1.82314 (.84334)	1.71111 (.83111)
Age	.0016 (.0013)	.0014 (.0012)	-.0121 (-.0223)	-.0111 (-.0211)
Marital status (1=single)	.0825* (.0504)	.0911** (.0484)	0.112 (.0775)	0.111 (.0771)
Health status (1=good health)	.0184 (.0346)	.0183 (.0328)	-.0114 (-.0334)	-.0111 (-.0331)
Household size	-.0034 (.0068)	-.0046 (.0063)	-.0111 (-.0211)	-.0111 (-.0211)

Sex (1=male)	-0.0589** (.0294)	-0.0541** (.0273)	0.0255 (.0510)	0.0122 (.0527)
Primary	-0.0835* (.0481)	-0.0862* (.0460)	0.0471 (.0691)	0.0334 (.0735)
Secondary	-0.0376 (.0489)	-0.0290 (.0447)	0.0190 (.0767)	0.0041 (.0735)
University	-0.1391 (.1480)	-0.0408 (.1037)	0.0387 (.1596)	0.0103 (.1443)
Log of income (expenditure per household member)	-0.0158 (.0143)	-0.0109 (.0134)	0.0340 (.0270)	0.0279 (.0264)
Insurance cover (1=if individual is insured)	.0375 (.0316)		.1201* (.0671)	
Private based insurance		-0.0444 (.0807)		0.0921 (.1164)
Employment based insurance		.0466 (.0398)		.1547 (.1103)
NHIF		.0478 (.0328)		.0761 (.0583)
Number of observations	410	450	407	417
Pseudo R2	0.0499	0.0607	0.0171	0.0136
LR Chi2 (10)	13.07	16.93	9.61	8.31
Prob>chi2	0.2198	0.1521	0.4750	0.7526
Log likelihood	-124.53825	-131.11517	-276.40776	-284.26164

\* Significant at 0.1 level

\*\*significant at 0.05 level

\*\*\* significant at 0.01 level

The results in table 5 show the marginal effects of the probit analysis for the probability of visits to health provider/outpatients services. Four different models were evaluated, differing in their dummy for insurance and visits to health providers. Model 1 and 2 represent the probit estimation of the probability of visits to health providers which comprised both modern health care and informal/traditional health care. But Model 1 has insurance status as a dummy (1 if an individual is insured, 0 otherwise). Model 2 is estimated against a set of insurance plan dummies, namely NHIF, private insurance and employer based insurance. Models 3 and 4 represent the probability of using modern health care services, with model 3 and 1 similar in the treatment of insurance status. Lastly, model 4 is also similar to model 2 in the estimation of insurance plan dummies.

It (table 5) shows the probit results for the probability of outpatient service use given insurance status and other regressors after dropping employment status which is collinear to

marital status. Both models 1 and 2 have similar results, in that variables; sex, marital status and primary school level are significant at 5% and 10% levels.

In model 1 - having insurance increases chances of visiting/consulting health providers but this variable is not significant. This could be explained by the few numbers of the insured (22%) bearing in mind that NHIF (11%) only covers inpatient services. Model 2 indicates a positive sign between, the probability of visiting health providers for both NHIF and employer based insurance, but negative for private individual insurance, which is rather unexpected. Although the coverage for outpatient is relatively low. These insurance plans are however, not significant. Model 4 has similar results as model 2. There is a positive relationship between having insurance and visiting modern health providers, like government, private mission hospitals, and nursing homes among others, in model 3. Insurance cover is statistically significant to the use of modern health care, though not significant at 5% level. Therefore, insurance cover increases the chances of visiting modern health providers by 12 percentage point.

In model 1 and 2, marital status is statistically significant to the probability of consulting outpatient services at 5% level (model 2). There is a positive relationship between the two variables. This implies that the singles (never married) tend to utilize outpatients services more than the married. The only explaining factor could be their numbers 287(63%), which may be contributing to the high demand. Being single increases the probability of visiting health providers by 8.3% percentage points in model 1 while this probability is increased by 9.1 percentage point in model 2. When it comes to visits to the modern health care providers, model 1 shows that a positive sign between the probability of visits to modern health care and marital status, while in model two it is negative. However, this variable is insignificant when it comes to the probability of visiting modern health care.

Again from Model 1 and 2, the female population seems to utilize outpatient services more than their male counterparts. The gender variable is also statistically significant in explaining the probability of visiting/consulting health provider for medical purposes. The reason why the female population chances of visiting health providers has to do with their obstetrical needs and the fact that they end up visiting physicians as they take their children to the

hospital (i.e for the mothers). These models show that, the probability of visiting health providers' increases by 5.9 and 5.5 percentage points for female respondents in model 1 and 2 respectively. For models, 3 and 4, the chances of visiting modern health providers increases with male respondent though not significant.

Primary school education level is statistically significant to the probability of visiting health provider in models 1 and 2, even though they are inversely related. This implies that attaining this level of education would make one less likely to visit health provider, by 8.4 percentage points in model 1 and 8.6 percentage point in model 2. This is contrary to economic expectations. Having attained primary school level increases chances of visiting modern health providers, for model 3 while it is contrary for model 4 and insignificant for both models.

Since the sample size has reduced tremendously from 3379 to 469 (sick respondents) the pseudo R2 is affected and tends to be rather low. A low sample size for probit model brings about model specification problems hence high Prob>chi2. This affects the significance of variables, but not in a major way. The number of observations is deviating from the 469 illness cases because of some missing information.

Whole data for the preventive health care. The reasons for using the whole data is that preventive health care use does not necessitate anyone to be ill, even though its use is dependent on characteristics like gender for pre/antenatal services and age for immunization services among other preventive services.

**Table 6(a): Marginal coefficients for the probability of seeking preventive health care**

variable	dy/dx	Std. Err.	z	P>z	[ 95% C.I. ]	X
age	-.0012474	.00028	-4.39	0.000	-.001804 -.000691	25.0870
marsts*	-.0390154	.00975	-4.00	0.000	-.058122 -.019909	.564799
hlststs*	-.0372265	.01295	-2.87	0.004	-.06261 -.011843	.883809
hhsz	-.0086691	.00155	-5.59	0.000	-.011711 -.005627	4.67686
sex*	-.0259622	.00592	-4.39	0.000	-.037559 -.014365	.488484
primary*	-.0220608	.00681	-3.24	0.001	-.035406 -.008716	.360605
second~y*	-.0190476	.00761	-2.50	0.012	-.033964 -.004131	.355792
univer~y*	-.0282551	.00506	-5.58	0.000	-.038178 -.018332	.090409
lnhinc	.0001692	.00277	0.06	0.951	-.005266 .005604	9.10150

ins*	-0.106888	.00608	-1.76	0.079	-.022609	.001231	.242695
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Probit estimates

Number of obs(N)	= 2915
LR chi2(10)	= 134.84
Prob > chi2	= 0.0000
Pseudo R2	= 0.1276

Log likelihood = -460.87887

- After dropping employment status due to multicollinearity

Table 6(a), above, presents maximum likelihood estimates of equation (2). The dependent variable is the utilization of health care services which will be divided into three groups, preventive health care, outpatient medical services and lastly inpatients services. This table will deal with the probit estimates of the impact of insurance and other explanatory variables on the probability of seeking preventive health care services.

After carrying out a multicollinearity test, employment status is dropped from the equation because it was linearly dependent with the variable marital status. The reason for dropping the variable employment status is that its effect could be captured in similar ways by the household income variable which is in logarithm form. In overall, the results indicate that the equation fits the model well, according to the log likelihood ratio Chi2 of 134.84. The variables in a bold face were found to be statistically significant at 1% and 5% levels.

The insurance status variable is not statistically significant to the probability of seeking preventive health care, hence the fact that it is shows a negative relationship with the dependent variable is really not relevant. From health economic theory preventive health care services are offered as public/merit goods because they are meant to provide a greater social benefit as opposed to private benefit. This health care service is generally not covered by insurance firms but provide to the public completely free of charge or subsidized by the government. However, it still falls under health care use and the determining insurance effects on its use is important as some services like antenatal care may be covered by insurance.



estimates in the table 6(a) above show that there exist an inverse relationship between age and the probability of seeking preventive health care. This implies that older respondents are less likely to seek preventive health care (immunization, family planning VCT). This variable was found to be highly statistically significant at 1% level. This shows that it is an important variable in explaining the probability of seeking preventive health care. The results seem to concur with economic theory in that most of these services like immunization are geared towards children under the age of five years, while family planning is directed towards the reproductive age group and VCT and other counseling services are meant for the youth (15-35 years old). The young age group increases the likelihood of seeking preventive health services by 0.1 percentage point, though this marginal effect is rather low.

One's marital status is highly significant in explaining one's likelihood/chances of seeking preventive health care. There is a negative relationship between being single and seeking preventive health care. This means that those respondents who are married are more likely to seek preventive care as compared to the single individuals. We can not really explain the reason for this negative relationship. The services cover mainly the lower age group (immunization), and middle age group (reproductive health, VCT). However, the mean age of the respondents which stands at 25 years could be linked to a fairly large proportion which is married and as a result family planning or other preventive services like prenatal/ante natal care could be having a higher demand as compared to the other services. Being married increases the probability of seeking preventive health care by 3.9 percentage point.

It appears like the respondents in good health condition/status do not utilize preventive health care services (negative sign). These services seem to be utilized more by the individuals in poor health condition. Health status variable is important in explaining its relationship with preventive health care use. There are several factors that contribute to a good health status like good nutrition, clean environment and good sanitation regular exercising, among other factors of which preventive health care is included. One's health condition determines the usage of preventive health care more so, if it's poor. The likelihood of seeking preventive health care increases by 3.7 percentage point for those in poor condition.

the bigger the household size the less the use of preventive health care, this seems to be in contrary to economic theory in that numbers would tend to have a high demand for a public good like preventive health care service. There could be a number of reasons for this behavior, of which literacy levels come to mind. For instance, 54 % percent of the total population has attained nursery and primary education level and may not attach much importance to preventive health care. Though, it is highly significant in its effect on preventive health care. The significance is diminished by the fact that the probability of using preventive health care increases by a mere 0.9 percentage point, the smaller the household size.

The gender variable has a negative effect on the probability of seeking preventive health care. This implies that female respondents are more likely to seek preventive health care as compared to their male counterparts. Hence, a gender disparity in terms of the use of preventive health cares. This variable (sex) is also highly statistically significant in explaining its impact. Female respondents increase the chances of preventing health care use by 2.6 percentage point.

Education status is also important in explaining its impact on the use of preventive health care. There are four dummies for education levels with nursery acting as the base dummy/reference point. Primary, secondary and university education levels are expected to show a positive sign towards utilization of preventive health in reference to nursery the lowest education level. More education is associated with less preventive health care use. As much as higher educated individuals may assign higher value to benefits of using health services, on the other hand, education can be correlated with medical knowledge; therefore higher educated people improve their health more efficiently by using services less often. Having attained primary education level decreases use of preventive by 2.2 percentage point, while the secondary and university education level decreases the same by 1.9 and 2.8 percentage points respectively.

the higher the income the more the use of preventive health care, this is depicted by their positive correlation. However, income is not an important variable in explaining the effects/determinants of preventive health care use. It is statistically insignificant.

The following is a disaggregated (illness cases in the last 4 weeks) data for the probability of using preventive health care.

**Table 6b: Marginal effects – probability of seeking preventive health services.**  
(N=407)

variable	dy/dx	Std. Err.	z	P>z	[ 95% C.I. ]	X
age	-.0056792	.00184	-3.09	0.002	-.009285 -.002073	22.0934
marsts*	-.1021096	.06196	-1.65	0.099	-.223559 .01934	.614251
hltsts*	-.0838821	.05006	-1.68	0.094	-.182 .014236	.756757
hhsz	-.0446793	.01134	-3.94	0.000	-.066897 -.022461	4.22850
sex*	-.1072565	.03743	-2.87	0.004	-.180627 -.033886	.481572
primary*	-.0507082	.04974	-1.02	0.308	-.148195 .046779	.312039
second~y*	-.0124639	.05785	-0.22	0.829	-.125842 .100915	.302211
univer~y*	-.0644686	.11389	-0.57	0.571	-.287694 .158757	.036855
lnhinc	-.0101937	.0204	-0.50	0.617	-.050186 .029799	8.98530
ins*	-.0579961	.04539	-1.28	0.201	-.146966 .030974	.189189

Probit estimates

Number of obs = 407  
LR chi2(10) = 45.43  
Prob > chi2 = 0.0000  
Pseudo R2 = 0.1126

Log likelihood = -178.99493

When the estimation is disaggregated into those respondents, who were ill according to the survey, the probit results (Table 6b) show that age, household size and sex variable are statistically significant at 1 % level. Again, insurance cover is insignificant to the likelihood of utilizing preventive health care services and income level is not insignificant but also showing a rather unexpected sign.

The younger the respondents the more likely to use preventive health services by 0.5 percentage points, while female respondent are more likely to use preventive health care more than their male counterparts by 10.7 percentage points. The smaller the household size the higher the probability of using preventive health care by 4.5 percentage points.

**Table 7: Marginal coefficients for the probability of utilizing inpatient services/admission to health facility**

Variable	dy/dx	Std. Err.	z	P>z	[ 95% C.I. ]		X
constant	9.676033	4.852683	1.99	0.046	.1649484	19.18712	
female	-.0009806	.00135	-0.72	0.469	-.003635	.001674	26.1029
male	-.2827854	.14124	-2.00	0.045	-.559602	-.005969	.441176
age	.0000613	.02072	0.00	0.998	-.040554	.040676	.705882
age <sup>2</sup>	.001811	.00598	0.30	0.762	-.0099	.0135224	.17647
married	.0189788	.02962	0.64	0.522	-.039069	.077027	.308824
primary	-.1520088	.21421	-0.71	0.478	-.571853	.267835	.352941
second-y	.0082273	.02917	0.28	0.778	-.048938	.065393	.352941
never-y	-.4669657	.60755	-0.77	0.442	-1.65775	.723815	.029412
inhinc	-.0141631	.01892	-0.75	0.454	-.051243	.022917	9.11858

Probit estimates

Number of obs = 68  
 LR chi2(9) = 15.89  
 Prob > chi2 = 0.0692  
 Pseudo R2 = 0.3915

log likelihood = -12.349212

These results according to the table 7, above show a decrease in the observation numbers compared to the previous tables. The reason is that these estimates were for those respondents who sought hospitalization/admission in the health providers. The insurance status variable does not have any effect in the model and its dropped out due to co linearity. There are very few people who are insured and this brings about precision problems.

The only variable that seems to be explaining the probability of seeking inpatient health care services is marital status. The married individuals are likely to be hospitalized more than the unmarried. We can see that being married increase hospitalization chances by 28 percentage point. This is largely confirmed from a theoretical perspective where women in child bearing age and older people do need hospitalization care more often. The rest of the variables are not significant at all.

**Table 8: OLS estimates of the log-linear model for the intensity of outpatient health care visits - equation (7)**

Source	SS	df	MS	Number of obs =	F(10, 57) =
				68	1.13

Model	1.01724135	10	.101724135	Prob > F	= 0.3554
Residual	5.12233514	57	.089865529	R-squared	= 0.1657
				Adj R-squared	= 0.0193
Total	6.13957649	67	.09163547	Root MSE	= .29978

Lnoutpatno	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
age	.0083051	.0062975	1.32	0.193	-.0043055 .0209157
marsts	.150656	.1524985	0.99	0.327	-.1547169 .4560289
hlsts	.0170427	.08951	0.19	0.850	-.162198 .1962833
hlsize	.0299595	.022988	1.30	0.198	-.0160733 .0759923
sex	-.0368926	.0760706	-0.48	0.630	-.1892214 .1154362
primary	-.1128212	.1262821	-0.89	0.375	-.3656968 .1400543
secondary	-.0693331	.1559431	-0.44	0.658	-.3816037 .2429375
university	-.3867977	.3563761	-1.09	0.282	-1.100429 .3268331
<b>lnhinc</b>	<b>.1147585</b>	<b>.0576353</b>	<b>1.99</b>	<b>0.051</b>	<b>-.0006542 .2301713</b>
ins	.0747771	.1088951	0.69	0.495	-.1432816 .2928358
_cons	-.4451026	.5337046	-0.83	0.408	-1.513828 .6236224

The probit estimate models were used to measure the rate of utilization of outpatient, inpatient and preventive health care services. The intensity of outpatient health care use is defined as the number of outpatients health care visits during the time period surveyed, this include revisits.

Insurance coverage has a positive relationship to the intensity of outpatient visits but it is not statistically significant. Other variables like age, household size and sex have the expected sign towards the intensity of outpatient visits, even though insignificant. The problem with insurance is that very few are covered and NHIIF which is the biggest component of the five types of insurance plans does not cover the outpatient health care service. The only variable that seems to explain the intensity of outpatient health care visits is the logarithm of household income. The more the income the more one frequents health care providers, a one percent change/rise in income increases the number of outpatients/visits to health providers by 11.5 %. The rest of the explanatory variables do not explain the intensity of outpatient visits. Intensity of inpatient/hospital days hindered by the sample size in the data, as explained in the limitations section (5.3)

## CHAPTER FIVE

### 5.0 CONCLUSIONS AND RECOMMENDATIONS

The paper has examined the impact of health insurance on health care use in Nairobi province, Kenya, controlling for other covariates of interest, like education, gender, health status, age, marital status, household size, household income and employment status.

First, the respondents in Nairobi who utilized outpatient health care/visits to health provider were 424 (12.5%). [Table 3], as compared to the other two measures of health care use: preventive health care and inpatient medical services. Preventive health care was second in terms of utilization rate with a total of 149 (4.4%) respondents and inpatient services trailed with 96 (2.8%) individuals. These percentages are out of the whole sample size which was 3379. The difference in these frequencies can be attributed to the fact that for one to be an inpatient, s/he may have started as outpatient. The only astounding fact is that preventive health care is not leading in terms of utilization and yet it's not conditional on being ill. The illness prevalence rate was 13.9%.

Secondly, the number of the insured was found to be about 748 respondents (22.1%) out of the whole population sample size. Those without an insurance cover were 2320 individuals. NHIF had the highest coverage of 11% followed by private individual insurance (6.8%), employment based insurance (5.4%) while the others category was last with a mere (0.3%), which totals up to 23.5% instead of 22.1% due to rounding off the decimals (Table 3).

The empirical results can be divided into three categories of health care services measures. Most of the explanatory variables in the estimation (age, marital status, household size, education, sex and health status) are statistically significant ( $\alpha = 0.05$ ) to the probability of seeking preventive health services. They have the expected sign with the exception of

education level and household size which were negative instead of the expected positive sign. Insurance status is not only insignificant but also inversely related to the probability of seeking preventive health care. A higher income leads to a higher use of preventive health care but is rather insignificant.

Insurance coverage is also not significant in the use of outpatient services/visits to health providers (formal and informal), although, positively related to it. Both NHIF and employer based insurance are positively related to health care provider visits. The only surprising thing is that private individual insurance has a negative sign and NHIF which does not cover outpatient services has a positive sign. Sex, marital status and primary school education level, are the only significant variables towards health care provider visits. However, primary school level has unexpected negative sign contrary to priori expectations. Insurance cover only becomes statistically significant and positive when we estimate probit results for visits to modern health care service. Having insurance increases the probability of visiting modern health care by 12 percentage point. The higher the income levels the more the intensity of visits to health provider. Insurance is positively related to the number of visits to health provider only that it is insignificant.

There is a problem of model specification which leads to unbiased estimates brought about by the low number of those insured and hence rendering insurance status insignificant. This is very odd bearing in mind that inpatient services account for high medical cost hence necessitating use of insurance cover (NHIF). The only variable significant to the probability of using inpatient services is marital status. The married individuals tend to use more of inpatient services than the single.

Most of the variables in the regression for the intensity of outpatient use were not significant. It is only income that was statistically significant to the intensity of outpatient/visits to providers.

## **5.1 POLICY RECOMMENDATION**

There are some policy implications that can come out of the findings of this study. First, increasing insurance coverage will definitely increase utilization of modern health care services/outpatients utilization. This is supported by the fact only modern facility providers participate in health insurance schemes. But of course not all of them do, especially the primary care facilities. It is not clear which insurance plan contributed to increased modern health care utilization, but employer based insurance had a positive sign as the contrary was for private individual insurance

Second, our results indicate that high income levels would increase the intensity of visits to health care providers, both formal and informal. This implies that insurance status does not have much influence on the frequency of outpatient service use. This means it's only the rich who can afford to have several visits to health care providers. The recommendations here need to be channeled in a way of countering adverse effects of over-utilization, like waiting time costs. Since the poor are the culprits in this situation, the policy makers can consider subsidies if they want to raise the intensity of health provider visits in a certain community or have some of social health insurance scheme, like community based insurance schemes which provide a channel for pooling of risk.

Lastly, use of preventive health care is not dependent on insurance but positively related to income even though not significant. Education status is highly significant to disbursement of preventive health care. Therefore to increase utilization of preventive health care, policy makers will have to increase the education levels too. Higher literacy levels would be associated with higher use of preventive health services.

## **5.2 AREAS FOR FURTHER RESEARCH**

Future research should include the study of the relation between specific insurance types (private, employer based insurance) on specific measures of health care utilization like dental visits, physical check ups, hospitalization and the like. Due to the low insurance coverage one should think of estimation methods that can work well with small sample size.

Another issue to explore is the demand or determinants of participation or affiliation to a certain health insurance, which could help clarify the viability of a universal social health



insurance. Also how private and social insurance interact, so as to come up with policy reforms intended to mitigate adverse selection and moral hazard problems

### **5.3 LIMITATIONS**

This study is limited to the secondary data in this survey. Some factors like cultural background and other inherent factors tend to influence health care utilization but are not captured in the data. Also, this data does not provide precise and detailed measures of coverage (such as coinsurance rates, deductibles). Carrying out an intensity of inpatient health care use/hospital days is hampered by the low sample size of 21 respondents who spent more than a day in the health facilities. Even a combined inpatient and outpatient estimation is not possible since outpatients questions were for a period of 4 weeks preceding the survey while inpatient admission was for the last one year preceding the survey.

The data did not address the question of respondents' residence in Nairobi. For instance, the upper class residents, middle class and the low class (slums) residents and so on. There was also a problem of missing information especially in the area of access to insurance and medical services covered by the various insurance types. This has led to precision problems in the estimation procedure.

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APPENDICES

**Table A1: Multicollinearity test**

	marsts	employ~t	hlsts	privins	employ~s	nhif	commins
marsts	1.0000						
employstst	<b>-0.6844</b>	1.0000					
hlsts	0.0442	-0.0073	1.0000				
privins	-0.0720	0.0559	0.0493	1.0000			
employins	-0.0574	0.0939	0.0462	-0.0296	1.0000		
nhif	-0.0575	0.0934	-0.0363	-0.0455	0.0082	1.0000	
commins							
othersins	-0.0064	0.0145	-0.0220	-0.0146	-0.0134	-0.0193	.
hhsz	0.1842	-0.2448	0.0158	-0.0398	-0.0292	0.0072	.
sex	-0.0316	0.2260	0.0139	0.0125	0.0187	0.0014	.
nursery	0.3366	-0.3331	-0.0092	-0.0608	-0.0329	-0.0278	.
primary	0.0671	-0.0988	-0.0138	-0.1366	-0.0898	-0.0627	.
secondary	-0.2422	0.2399	-0.0213	0.0189	0.0227	0.0876	.
university	-0.1550	0.2067	0.0693	0.2839	0.1610	0.0021	.
ins	-0.1143	0.1405	0.0276	0.4806	0.4439	<b>0.6403</b>	.
lnhinc	0.0049	0.0071	0.0315	0.2079	0.1671	0.0196	.
age	-0.4705	0.4797	-0.0682	0.1504	0.0452	0.0090	.

	others~s	hhsz	sex	nursery	primary	second~y	univer~y
othersins	1.0000						
hhsz	-0.0457	1.0000					
sex	0.0273	-0.0753	1.0000				
nursery	-0.0257	0.0623	-0.0235	1.0000			
primary	-0.0256	0.0921	-0.0584	-0.3609	1.0000		
secondary	-0.0258	-0.1065	0.0336	-0.3625	-0.5555	1.0000	
university	0.1217	-0.0606	0.0671	-0.1532	-0.2347	-0.2358	1.0000
ins	0.0929	-0.0367	0.0212	-0.0675	-0.1708	0.0779	0.2563
lnhinc	0.0646	0.1865	-0.0201	-0.0924	-0.1535	0.0606	0.2876
age	0.0222	-0.1704	0.0724	-0.4873	-0.0705	0.3045	0.2640

	ins	lnhinc	age
ins	1.0000		
lnhinc	0.2186	1.0000	

age 0.1089 0.0988 1.0000

cor age marsts employstst hltsts lhsize sex nursery primary secondary univers

**TABLE A2: NORMALITY TEST**

Skewness/Kurtosis tests for Normality

----- joint -----

Variable	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
age	0.001	0.696	9.48	0.0087
marsts	0.000	0.841	14.99	0.0006
hltsts	0.001	0.000	26.08	0.0000
lhsize	0.016	0.092	7.76	0.0206
sex	0.062	.	.	.
primary	0.001	0.000	30.29	0.0000
secondary	0.000	0.077	14.73	0.0006
university	0.000	0.000	.	0.0000
ins	0.000	0.013	26.23	0.0000
lnhinc	0.073	0.134	5.33	0.0697
lnoutpatno	0.005	0.023	10.83	0.0045

**TABLE A3: HETEROSCEDASTICITY**

Cook-Weisberg test for heteroskedasticity using fitted values of lnoutpatno

H0: Constant variance

chi2(1) = 0.01

Prob > chi2 = 0.9178