OUT-OF-POCKET HEALTH EXPENDITURES AND HOUSEHOLD POVERTY: EVIDENCE FROM KENYA

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DECLARATION

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

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ABSTRACT

Background: Out-of-pocket health expenditures leave households exposed to the risk of financial catastrophe and poverty, whenever they entail significant dissaving, borrowing or the sale of key household assets. However, by enabling households to consume essential medical care in the event of a major illness or injury out-of-pocket outlays help households to restore health, and can thus increase their future labour productivity. Therefore, the effect of catastrophic health expenditure on household welfare is an empirical matter on which little evidence currently exists in Kenya.

Methods: Using Kenya Household Health Expenditures and Utilization Survey (KHHEUS) data of 2007 (n = 8414), the thesis investigates impacts of out-of-pocket expenditures on health and on other dimensions of wellbeing. In particular we estimate a negative binomial model to examine the impact of out-of-pocket expenditures on health care utilization, a logit model to analyze determinants of catastrophic health expenditures, and a Two Stage Residual Inclusion (2SRI) model to measure effects of catastrophic expenditure on household poverty. In all cases, the common estimation problems of endogeneity, heterogeneity, multicollinearity and heteroskedasticity are addressed. Sensitivity analysis is used to check the robustness of the estimates.

Findings: Descriptive statistics indicate that 17 percent of those who reported illness did not seek health care, with more than 50 percent quoting lack of money as the main hindrance. Among those who utilized health care, 12 percent experienced catastrophic expenditures, and 4 percent (2.5 million individuals) were impoverished or made poorer by these payments. The poor experienced the highest incidence of catastrophic expenditures. The econometric analysis reveals that out-of-pocket expenditures are a deterrent to health service utilization, are significantly and positively associated with catastrophic expenditure and with household poverty. It is further shown that catastrophic expenditures impoverish households through their large negative effects on health and wealth. Catastrophic expenditures exclude low-income households from health care, and conditional on them getting care, they get it in insufficient quantity, and are forced into indebtedness or sale of assets to pay for it. Furthermore, even when catastrophic health expenditure enables the household to improve

the health of its members, labour market failures often prevent realization of potential gains from health investments. The findings of the thesis strongly point to a need to explore mechanisms for cushioning households against catastrophic out-of-pocket expenditures.

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LIST OF ABBREVIATIONS AND ACRONYMS

AERC	African Economic Research Consortium
AIE	Authority to Incur Expenditure
APHRC	African Population and Health Research Center
CBHI	Community-Based Health Insurance
EAs	Enumeration Areas
FBOs	Faith Based Organizations
GOK	Government of Kenya
GDP	Gross Domestic Product
HBM	Health Belief Model
HIV/AIDS	Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome
HSSF	Health Sector Services Fund
IFAD	International Fund for Agricultural Development
IIA	Independent of Irrelevant Alternative
IMR	Infant Mortality Rate
KCBHFA	Kenya Community-Based Health Financing Association
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KEPH	Kenya Essential Package for Health
KHHEUS	Kenya Household Health Expenditures and Utilization Survey
KHPF	Kenya Health Policy Framework
KIHBS	Kenya Integrated Household Budget Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KMTC	Kenya Medical Training College
KNBS	Kenya National Bureau of Statistics
KNHA	Kenya National Health Accounts
KRMA	Kenya Registered Midwives Association
KShs	Kenya Shillings
MDGs	Millennium Development Goals
MMR	Maternal Mortality rate
MOH	Ministry of Health

MoMS	Ministry of Medical Services
MoPHS	Ministry of Public Health and Sanitation
MPRA	Munich Personal RePEc Archive
NASSEP	National Sample Survey Evaluation Programme
NB	Negative Binomial
NBER	National Bureau of Economic Research
NCAPD	National Coordinating Agency for Population and Development
NGOs	Non-Governmental Organizations
NHA	National Health Accounts
NHIF	National Hospital Insurance Fund
NHSSP II	National Health Sector Strategic Plan II
NMR	Neonatal Mortality Rate
NSHIF	National Social Health Insurance Fund
NURRU	Network of Ugandan Researchers and Research Users
OBA	Output-Based Aid
OLS	Ordinary Least Squares
OOP	Out-of-Pocket
PRB	Population Reference Bureau
STI	Sexually Transmitted Infections
THE	Total Health Expenditure
U5MR	Under-5 Mortality Rate
UNDP	United Nations Development Programme
UNU	United Nations University
US$	United States Dollar
WHO	World Health Organization
WIDER	World Institute for Development Economics Research
ZINB	Zero-Inflated Negative Binomial
ZIP	Zero-Inflated Poisson

CHAPTER 1 : BACKGROUND AND CONTEXT

1.1 Introduction

The fundamental goal of health care systems is to ensure that its population has access to high quality care. While trying to achieve this goal, the health systems should ensure that households are protected from incurring health care expenditure that is too high relative to income. This is often referred to as the ófinancial protection' goal of the health system (Baeza and Packard, 2006). In countries where out-of-pocket expenditure is the most important source of health care financing, the effect of health expenditure on household economic status can be severe, particularly among the poor.

According to World Health Organization (WHO) (2000), direct out-of-pocket (OOP)[1] payment for health at point of service is considered an inequitable means of financing a health system, since there is danger of burdening different social sub-groups unequally, especially the poor and the elderly. In such systems, the greatest financial burden tends to be placed on the household, and if the cost of health care exceeds the ability to pay at the time of service use, it can give rise to avoidance of necessary care or to a delay in seeking health care. Poor families are often forced by OOP expenditures to choose between satisfying basic needs such as education, food and housing and saving loved-ones from illness and suffering (Knaul *et al*., 2006a). Thus, health spending can be an important cause of poverty (Baeza and Packard, 2006; Van Doorslaer *et al.*, 2006; Wagstaff and Van Doorslaer, 2002)

The threat that out-of-pocket (OOP) expenditures pose to householdsô living standards is increasingly recognized as a major consideration in financing health care (van Doorslaer *et al.*, 2006). Such a concern is justified based on: a) the unpredictability of OOP expenditures; b) their large magnitude relative to household resources; and c) their uneven distribution in relation to that of income. Thus, any health care system with the welfare of its citizens in

[1] Out-of-pocket payments are direct payments made by a patient to a health care provider at the time of service delivery. They are health care funds which are not channeled through any financing intermediary. They include user fees paid directly to public health facilities, co-payments made by members of a health insurance scheme, and payments made to private providers by individuals not covered by any form of health insurance (McIntyre, 2007).

mind, must work to reduce the adverse effects of OOP expenditures and especially catastrophic expenditure.

Catastrophic expenditure is any health expenditure that threatens a household's financial capacity to maintain its subsistence needs. Even relatively small expenditures on health can be financially disastrous for poor households (Su, Kouyate and Flessa, 2006). In the same vein, large health care expenditures can lead to financial catastrophe and bankruptcy even for rich households (Xu et al., 2007).

In Kenya, out-of-pocket payments for health care are a substantial share of total health care costs accounting for 54 percent in 2001/2002, 39.3 percent in 2005/2006 and 36.7 percent in 2009/2010 (Government of Kenya, 2007; 2010c). They are charged for health services sought from both the public and private sectors. Out-of-pocket expenditures have impacted negatively on utilization of health care services in Kenya (Mbugua, Bloom and Segall, 1995; Ministry of Health, 2004; Government of Kenya, 2009). According to Elgazzara et al. (2010), out-of-pocket spending on health care has become a policy concern for three reasons: First, households may be pushed into poverty or deeper into poverty as a result of paying directly for health services. Second, households facing these health expenses may cut back on other essential household spending such as food and clothing. Third, households may, in fact, choose to forgo necessary health care services rather than face the steep financial consequences, thus creating a vicious cycle of ill health, disability, and poverty.

Though the share of OOP expenditures in total health expenditures has been decreasing over time, the 36.7 percent currently being financed by households is quite high bearing in mind the high poverty levels in Kenya. In 2005, 47 percent of the population was estimated to be living in poverty (World Bank, 2008). It is not known with certainty how poverty has changed since then, as there has not been another poverty estimate due to lack of data. However, World Bank projections using national health accounts data suggest that Kenya's poverty rate is around 42 percent (World Bank, 2013).

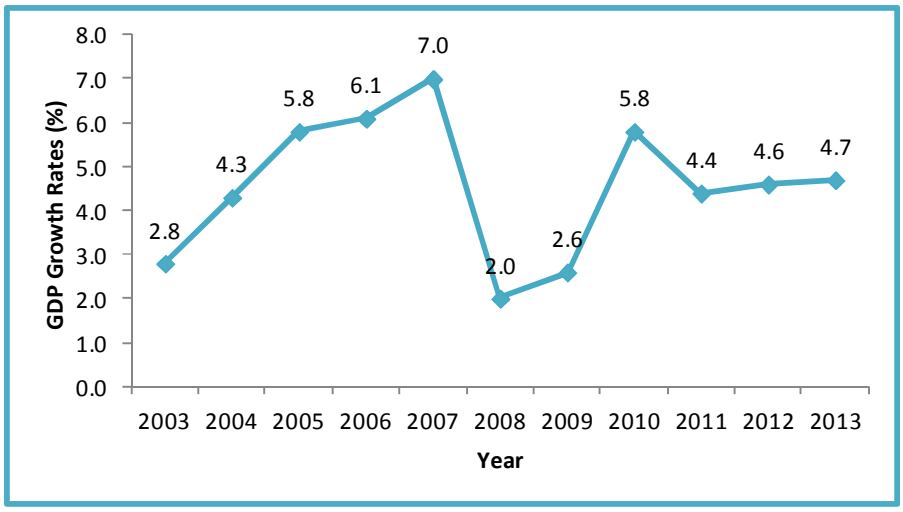
Kenya's economic performance witnessed remarkable improvement between 2003 and 2007, when the Kibaki government came into power. The economic growth was on an upward

trend up to 2007 (Figure 1.1). However, the 2007/08 post-election violence, the food and fuels crisis, the global financial crisis and the 2009 drought, almost caused Kenya's economy to stagnate. Growth dropped from 7.1 percent in 2007 to 1.6 percent in 2008, before reaching 2.6 percent in 2009 (World Bank, 2010).

Kenya experienced a strong recovery in 2010, driven by favourable weather conditions which led to the recovery of agriculture and also contributed to more reliable energy. In addition, the economic stimulus programme contributed to the economic rebound. However, in 2011, Kenya's economy declined compared to 2010. Growth in 2011 was curtailed by an unstable macroeconomic environment characterized by rising inflation, exchange rate depreciation and high energy costs. The country also experienced limited rainfall in the first half of 2011, which affected aggregate food production (World Bank, 2011). In 2012, the country recorded a growth rate of 4.6 percent, higher than what had been predicted (4.2 percent) (World Bank, 2013). However, given the domestic and global environment, growth was satisfactory in 2012. Over the course of 2012, the government succeeded in stabilizing the economy, where inflation declined to 9.6 percent thereby stabilizing the exchange rate, and allowing for a gradual ease of monetary policy[2]. After a peaceful election and transition in 2013, growth was projected to rise to 5.7 percent in 2013 and 6.0 percent in 2014, supported by lower interest rates and higher investment growth (World Bank, 2013). However, the economy grew less than expected in 2013, recording a growth rate of 4.7 percent due to weak investor confidence as a result of security concerns World Bank, 2014). The country's economic performance for the past eleven years has been very uneven as shown in Figure 1.1.

[2] The Central Bank of Kenya had employed contractionary policy, that is expanding the money supply more slowly than usual or even shrinking it in order to slow inflation that the country was experiencing in 2011.

Figure 1.1: Kenya's GDP Growth Rates (2003 - 2013)



Source: Economic survey, various issues.

With the high levels of poverty and poor and uneven economic performance, Kenya faces major financial challenges in meeting all sectoral needs, specifically in improving the health care sector (Wamai, undated). A number of initiatives have been undertaken to address these challenges. For instance, the Kenyan government attempted to introduce National Social Health Insurance Fund (NSHIF) and the 10/20 policy with the aim of reaching the poor and realizing the health vision set in the Kenya Health Policy Framework (KHPF) of 1994[3]. NSHIF aimed at expanding coverage and benefit package of the current National Hospital Insurance Fund (NHIF). Under the 10/20 policy, the fee charged at government dispensaries and health centres was Kshs 10 and Kshs 20, respectively. In addition, exemptions for user fees were introduced for some specific health services, including treatment of children less than five years, maternity services in dispensaries and health centers, TB treatment in public health facilities, and immunization services. However, NSHIF was never implemented and the 10/20 policy did not achieve its objectives. A review of 10/20 policy by Chuma *et al*. (2009), though conducted in only two districts (Kwale and Makueni), indicated that adherence to the policy was poor in both districts, with drug shortage, declining revenue,

[3] KHPF was developed in 1994 to guide health reforms for the next 15 years. It expired in 2010 and a new policy framework for 2012 - 2030 is in place to guide implementation of health reforms in line with Kenya Vision 2030.

poor policy design and implementation processes being the main reasons for the poor adherence.

The governmentôs efforts notwithstanding, access to health care in Kenya remains a challenge. The Kenya Household Health Expenditure and Utilization Survey of 2007 found that 17 percent of those who needed health care services could not access the services from both government and private health facilities largely due to financial constraints. There is increasing evidence that out-of-pocket expenditures act as a financial barrier to accessing health care, are a source of impoverishment, and can exacerbate poverty (Xu *et al.*, 2007; van Doorslaer *et al.*, 2006). Therefore, eliminating the financial barrier imposed by out-of-pocket expenditures can have profound effects on access and utilization of health services.

1.2 Problem Statement

The cost of treating an illness or injury can force households to cut non-medical consumption and may curtail human capital accumulation. Further, expensive health care can plunge households into poverty and perpetuate poverty for the already poor (Baeza and Packard, 2006). For this reason, policy makers need to maintain and improve the health status of the people through cost-effective public health interventions and by ensuring that households are protected from falling into poverty.

The government has over the years initiated a number of policy interventions with the aim of cushioning the citizens from high out-of-pocket expenditures and enhancing access to healthcare. These interventions include 10/20 policy, waiver and exemptions, reforms in National Hospital Insurance Fund (NHIF), Output-Based Aid (OBA) for reproductive health, Health Sector Services Fund (HSSF), and abolition of all fees for maternity services at public health facilities. These efforts notwithstanding, out-of-pocket expenditures remain high at 37 percent and access to health care is still a challenge to many households, especially the poor.

WHO suggests that it is only when OOP direct payments fall below 20 percent of total health expenditure that a country can achieve financial protection which is demonstrated by a negligible incidence of financial catastrophe and impoverishment (WHO, 2010). While

National Health Accounts (NHA) of 2008/09 indicate that the share of OOP in total health expenditure is 36.7 percent, recently, WHO Global Health Expenditure database 2012 estimates this share to have risen to 48 percent (WHO, 2012). This being the situation, Kenya has a long way to go to achieve the WHO target of 20 percent.

There exists sketchy or only subjective evidence on welfare effects of OOP expenditures. For example, an old woman from Ghana was quoted in *Voices of the Poor* (Narayan *et al.*, 2000) as saying: *"If you don't have money today, your disease will take you to your grave"* (pp 110). The same study recorded remarks of another respondent from Ghana: *"We watch our children die because we cannot pay the high hospital bills"* (pp 111). There is also qualitative evidence that lack of access to medical services traumatizes mothers. In the *Voices of the Poor*, a mother from the Phillipines said: ñ[she found herself] *holding and singing lullabies to my baby until she died in my arms"* (pp 115). While there is no shortage of anecdotal evidence such as this, firm empirical evidence on the welfare consequences of OOP expenditures due to health shocks is hard to come by, especially in a developing country such as Kenya.

Despite such evidence, little work has been done on the impact of OOP expenditure on household welfare and the impoverishing effects of health care costs. Furthermore, the few studies that have attempted to carry out research on impoverishing effects of OOP expenditures (Xu *et al.*, 2006b; Rivera *et al.*, 2006; Wagstaff and van Doorslaer, 2002) examined the extent to which they have led to catastrophic health expenditures and impoverishment, without controlling for confounding factors such as income, household size, area of residence and age among others. In addition studies on poverty (Geda *et al*., 2001; Oyugi, 2000; Mwabu *et al*., 2000; Muyanga *et al*., 2006; Kabubo-Mariara *et al*., 2006; Mberu *et al*., 2011) have not included catastrophic health expenditures and health care utilization as explanatory variables. This thesis not only estimates the impact of OOP expenditures on health care utilization and catastrophic health expenditures, but also estimates their impact on poverty, while controlling for confounding factors such as household size, income, age, region and type of illness.

1.3 Research Questions

The research questions which this study seeks to answer are:

1. What are the effects of out-of-pocket expenditures on health service utilization?
2. What is the incidence and intensity of catastrophic expenditure and how is it linked to household impoverishment?
3. What are the determinants of catastrophic health expenditures in Kenya?
4. What are the effects of health service utilization and catastrophic expenditures on household poverty?

1.4 Objectives

The overall objective of the thesis is to investigate the impact of out-of-pocket health expenditures on household poverty in Kenya. It examines the extent to which OOP expenditures act as barriers to access to health care and ultimately to catastrophic health expenditures, which in turn increase poverty.

The specific objectives are:

1. To analyze effects of out-of-pocket expenditures on health service utilization.
2. To estimate incidence and intensity of catastrophic expenditures and impoverishment.
3. To identify the determinants of catastrophic health expenditures.
4. To analyze effects of health service utilization and catastrophic expenditure on household poverty

1.5 Justification and Motivation of the Study

Financing health care through out-of-pocket expenditures by households is the most inequitable means of financing a health system (WHO, 2000). In order to achieve effective and efficient management of the health care system, it is important that policy makers are informed on the impact of OOP expenditures on poverty. Through such information they will know the extent of impoverishing effects of OOP expenditures and what policy measures to put in place to tackle the problem. While the level of OOP expenditure is well known, the

evidence describing and examining whether it is catastrophic or not, is lacking. By providing this information, the government will prioritize on reducing the burden of OOP expenditures on households.

In addition, information on household health expenditures is important because of its potential to significantly contribute to a design of an equitable health services financing system. Information on the effects of OOP on health care demand is relevant in addressing health care access concerns, as well as in the design of anti-poverty initiatives.

1.6 Organization of the Thesis

The rest of the thesis is organized as follows: Chapter two presents an analysis of health care system in Kenya. It provides information on health status, the prevailing disease burdens, the health infrastructure situation, health sector reforms and on sources of health care finance. Chapter three investigates the effects of out-of-pocket expenditures on health care utilization. Chapter four analyzes catastrophic expenditure, linking it to household poverty. Chapter five presents estimates of the effects of out-of-pocket expenditures on poverty, while chapter six concludes the thesis.

CHAPTER 2 : THE KENYAN HEALTH SYSTEM

2.1 Introduction

The health sector is one of the key components of Kenya Vision 2030ôs social pillar. Good health is recognized in the Vision as a critical factor for ensuring individual, household, community and countryôs prosperity. In pursuit of population health, the government needs to ensure that the health care system is effective, and that the health services delivered to the population are of high quality. This chapter describes the key aspects of the Kenyaôs health system with a focus on its governance and leadership roles in ensuring the best possible quality of care for the population; on health service delivery organization; and on inputs available to it such as infrastructure, and human and financial resources. All these aspects have a bearing on health status, health care utilization, out-of-pocket expenditures and household poverty -- the core concerns of the thesis.

2.2 Governance and Organization of the Ministry of Health

The key players in Kenyaôs health sector include health services providers, regulators, financiers and consumers. Providers of health services include both the government and the private sector. The government and donors provide the bulk of the health care finance. The regulation of the health sector is the sole responsibility of the government. However, there are government mandated bodies which regulate the health professionals and the health sector as a whole, such as the Kenya Medical Association, the Medical Practitioners and Dentists Board, the Pharmacy and Poisons Board, and the Clinical Officers Council, among others.

The provision of health care services in Kenya is the responsibility of the Ministry of Health. The 2007/08 post election violence led to the formation of coalition government in a bid to bring back peace to the country. This led to the split of the Ministry of Health into two ministries; Ministry of Medical Services (MoMS), and Ministry of Public Health and Sanitation (MoPHS). MoMS was directly in charge of all medical facilities falling under the provincial, district and sub-district hospitals within the public health sector and regulates their equivalents in the private sector. It also oversaw the two national/referral hospitals, both

of which are semi-autonomous government agencies and teaching hospitals. MoPHS was in charge of health centres and dispensaries. Table 2.1 shows the core functions and responsibilities of the two ministries at the time.

Table 2.1: Kenya Health Ministries' Key Functions and Responsibilities

Ministry of Medical Services	**Ministry of Public Health and Sanitation**
Medical services policy	Public health and sanitation policy
Curative services	Preventive and promotive health services
HIV/AIDS and STI treatment and management	Community health services
Maternal services	Health education
Rural medical services	Reproductive health
Clinics and hospitals	Food quality and hygiene
Registration of doctors and paramedics	Health inspection
Nurses and midwives	Quarantine administration
National Hospital Insurance Fund (NHIF)	Oversight of all sanitation services
Clinical laboratory services	Preventive health program
Kenya Medical Training College (KMTC)	National public health laboratories
Kenya Medical Supplies Agency (KEMSA)	Government pharmacists
Regulatory bodies for pharmacy and medicine	Dispensaries and health centres of KEMRI
Member of Kenya Medical Research Institute (KEMRI) board	Radiation Protection Board
	Member of KEMSA board
	Member of KMTC board

Source: Luoma *et al.* (2010)

The March 2013 elections ushered in Jubilee government under the presidency of Uhuru Kenyatta. The new government merged most of the ministries under the coalition government, reducing them from 42 to 18. The two ministries of health were merged to one Ministry of Health. In addition, the Constitution of Kenya 2010 introduced a devolved system of government to achieve broad access to health services, especially in rural and hard to reach areas. The two levels of governments were assigned specific health system functions. In 2013, the National Government assumed leadership role in health policy development, in the management of national referral health facilities and in skill

development, while the County Governments took over the responsibility of service delivery. Thus, for the first time in the countryôs history, the health service provision was devolved to local levels, significantly compressing the health system pyramid.

2.3 Health Status

The indicators of health status discussed in this section include life expectancy, mortality rates and disease burdens. The most commonly used health indicators world-wide relate to life expectancy, adult mortality rate (AMR), maternal mortality rate (MMR), under-5 mortality rate (UMR), infant mortality rate (IMR), and neonatal mortality rate (NMR). Adult mortality rate is the number of deaths per 1000 adults; maternal mortality ratio is the number of women who die during pregnancy and childbirth per 100,000 live births; neonatal mortality rate is the probability of an infant dying within the first 28 days; infant mortality rate is the probability of dying before the first birthday, and under-five mortality rate is the probability of dying between birth and the fifth birthday (Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010).

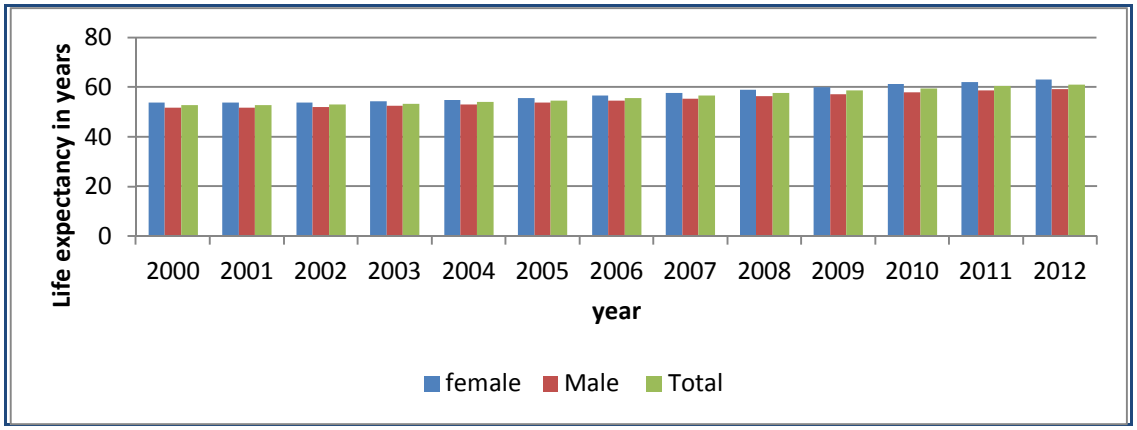
Life expectancy at birth is the number of years a newborn infant would live if prevailing patterns of mortality at the time of his/her birth were to stay the same throughout his/her life and is an indicator of the overall health of a population (Smith and Haddad, 1999). Life expectancy can fall due to problems like famine, war, disease and poor health. Improvements in healthcare and the material standard of living are positively associated with life expectancy.

Figure 2.1 shows life expectancy by gender in Kenya. Life expectancy was 53 years in 2000 and fell to 52 years in 2001, where it stagnated until 2005. It then improved slightly in 2006, probably due to steady economic growth and improvement in infant and maternal mortality rates. Life expectancy rose to 54 years in 2007 but stagnated in 2008, due to unfavourable effects of post-election violence and drought. In 2009, it started rising again and has since been on the rise until 2011.

A closer look at life expectancy by gender reveals that the life expectancy of females has consistently been above that of males. The reasons for the difference are not fully

understood. While some scholars argue that women are biologically superior to men and thus live longer, others argue that men are employed in more hazardous occupations (factories, military service, etc) (Rosenberg, 2007).

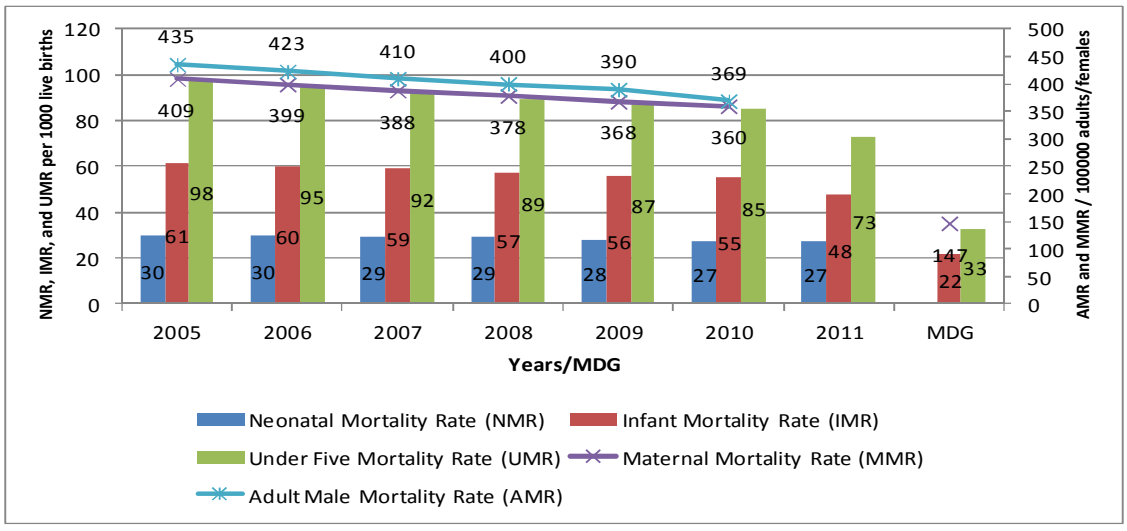
Figure 2.1: Trends in Life Expectancy at Birth 2000 - 2012 (Years)



Source: World Bank Database (2013)

There have been remarkable declines in all the mortality rates between 2005 and 2011 for under-five, infant and neonatal mortality rates, and between 2005 and 2010 for adult and maternal mortality rates (Figure 2.2).

Figure 2.2: Mortality Rates Trends versus MDG targets (2005 - 2011)



Source: KNBS and ICF Macro (2010); World Bank Database (2012)

These gains in mortality trends were probably largely due to: a) increases in immunization rates, b) the increased use of mosquito nets, and c) the positive rate of per capita economic growth in that period (WHO, 2009). However, the mortality rates are still far above the MDG target of 33 deaths per 1,000 live births for under-5 mortality rates, 22 for infant mortality rates and 147 deaths per 100,000 live births for maternal mortality rates.

Morbidity and mortality rates in Kenya are driven by the underlying social and economic determinants such as household and individual characteristics, environment, and health system. Individual level factors include low level of maternal education (74% female literacy, compared to 85% for males); and poor nutritional status (34.7% of children stunted). The environmental determinants of health include poor access to clean water, inadequate sanitation, soil degradation, and a variety of diseases vectors that thrive in certain ecological systems (WHO, 2009).

Burden of disease is a concept that describes death and loss of health due to diseases, injuries and risk factors (WHO, 2008). It refers to the collective, negative impact of disease on the population. Disease burden can be attributed to either specific diseases (e.g. HIV, TB, obesity, diabetes) and also risks for ill health (unsafe sex, overcrowding, smoking, excess cholesterol). The measurement of disease burden helps to address preventable diseases in a region or country, and to know how much risk to health can be avoided (World Bank, 1993). Table 2.2 shows the ten major causes of mortality in the country by province in 2012.

Pneumonia was the leading killer disease with 19,011 cases accounting for 11 percent of 173,012 cases nationally. Malaria contributed 10.8 percent of the total cases, with 18,746 cases of all deaths followed by cancer, HIV/AIDS and tuberculosis. Regionally, Rift Valley has the highest reported cases of mortality and North Eastern province the least, probably due to lack of reporting. For a long time, malaria has been the leading cause of death but pneumonia has taken over with Central province being the most affected followed by Rift Valley province. The distribution and campaigns for use of mosquito nets by the Ministry of Health could also have played a role in reversing the trend.

Table 2.2: Causes of Death by Province, 2012 (Numbers)

Cause of death	Nairobi	Central	Western	Coast	Nyanza	Eastern	Rift Valley	North Eastern	Total
Pneumonia	1,971	4,680	1,964	1,236	2,383	2,410	4,288	79	**19,011**
Malaria	831	786	5,872	1,443	4,520	2,672	2,395	227	**18,746**
Cancer	1,041	1,993	1,985	859	2,092	1,492	2,341	60	**11,863**
AIDs	865	1,310	1,686	900	1,579	869	2,204	23	**9,436**
Tuberculosis	1,190	1,121	1,133	787	1,637	1,632	1,623	113	**9,236**
Anaemia	459	793	1,329	1,029	1,288	833	1,128	72	**6,931**
Heart disease	1,438	615	390	278	854	1,063	816	38	**5,492**
Road traffic	797	721	243	432	707	536	977	44	4,457
Other accidents	1,156	534	325	366	405	432	903	10	**4,131**
Menengitis	694	556	373	322	849	377	776	21	**3,968**
Other diseases	9,390	11,242	10,667	7,510	12,980	12,593	14,951	1,308	**80,641**
Total	**19,832**	**24,351**	**25,967**	**15,162**	**29,294**	**24,909**	**32,402**	**1,995**	**173,912**

Source: Government of Kenya (2013)

2.4 Health Service Delivery

Health service delivery in Kenya has been guided by the *Kenya Health Policy Framework* since 1994. The framework emphasizes "health care services that are effective, accessible and affordable" (GOK/MOH, 1994, pp 19). The implementation of this framework was divided into two five-year strategic plans: the National Health Sector Strategic Plan 1 (NHSSP I) (1999 to 2004) (Ministry of Health (MOH), 1999) and the National Health Sector Strategic Plan II (NHSSP II) (2005 to 2010) (MOH, 2005). A review of NHSSP I shows that not much was achieved during its implementation period (National Coordinating Agency for Population and Development (NCAPD) *et al*., 2005), and the bulk of the policy framework achievements occurred in NHSSP II.

The primary purpose of the NHSSP-II was to reduce the inequalities in health care and reverse the downward trend of the health impact indicators. Moreover, NHSSP II shifted the emphasis from reducing the burden of disease to promoting healthy life styles of individuals and communities, through the introduction of the Kenya Essential Package for Health (KEPH). KEPH system identified health needs of individuals through six stages of human

life cycle (referred to as cohorts), recognizing that each cohort has unique health needs. The six life phases include:- a) Pregnancy and newborn; b) Early childhood (two weeks to five years); c) Late childhood (6 to 12 years); d) Youth and adolescence (13 to 24 years); e) Adulthood (25 to 59 years); and, f) Elderly (60+ years) (National Coordinating Agency for Population and Development (NCAPD) *et al.,* 2011).

The KEPH approach also defined six service delivery levels. The government-run health care system comprises six levels of facilities, namely; level 6 - tertiary hospitals; level 5 - secondary hospitals; level 4 - primary hospitals; level 3 - health centres, maternities, nursing homes; level 2 ï dispensaries and clinics; and level 1 ï the community, that is villages, households, and individuals.

2.5 Health Inputs

The inputs into the health system include physical facilities and human and financial resources.

2.5.1 Health Facilities

The quality of health service delivery is influenced by the availability of adequate and serviceable facilities. The health sector is pluralistic in nature where health services are provided by many players including the public sector through the government of Kenya and parastatal organizations, the private sector comprising the Faith Based Organizations (FBOs), Non-Governmental Organizations (NGOs) and private for-profit facilities. Table 2.3 provides a breakdown of health care facilities by ownership type. The latest data on type of ownership show that public sector health facilities accounted for 47 percent of all the health facilities in the country (Government of Kenya, 2010d).

Table 2.3: Health Facilities by Type of Ownership (2009)

Type of facility	Public	Private				Total
		For profit	Not for profit	Faith Based Organization	Total private	
Tertiary hospitals	2	2	0	0	2	4
Secondary hospitals	8	2	0	0	2	10
Primary hospitals	247	53	64	75	192	439
Health centres	473	23	88	139	250	723
Nursing homes	3	89	54	9	152	155
Dispensaries	2394	75	381	509	965	3359
Clinics	20	1126	693	102	1921	1941
Laboratory - stand alone	0	52	2	0	54	54
Dental clinics[4]	0	10	1	0	11	11
	3146	**1429**	**1282**	**834**	**3545**	**6696**

Source: Government of Kenya (2010b)

Table 2.4 shows the distribution of health facilities and the number of health facilities per 100,000 population by province between 2009 and 2012.

Table 2.4: Distribution of Public Health Facilities by Province (2009 - 2012)

Province	2009		2010		2011		2012*	
	Number	No./100,000	Number	No./100,000	Number	No./100,000	Number	No./100,000
Nairobi	406	13	423	13	505	15	562	16
Central	1,251	29	1,345	30	1,413	31	1,438	31
Coast	770	23	754	22	852	24	873	24
Eastern	1,106	20	1,256	22	1,441	24	1,548	26
N. Eastern	232	10	264	11	278	10	291	10
Nyanza	773	14	745	13	932	16	965	17
Rift Valley	1,732	17	1,867	18	2,076	19	2,166	19
Western	426	10	457	10	509	11	532	11
Total	**6,696**	**17**	**7,111**	**18**	**8,006**	**20**	**8,375**	**20**

Source: Government of Kenya (2013) and Government of Kenya (2010c) *Provisional

[4] While dental clinics are stand-alone facilities in private sector, there are dental units in all public hospitals.

The number of health facilities has been increasing between the period 2009-2012. The total number of health facilities stood at 8,375 in 2012. In absolute terms, Rift Valley province has the highest number of health facilities followed by Eastern province. However, these facilities serve a large number of population. Table 2.4 shows that Central and Eastern provinces have the highest number of health facilities per 100,000 population, while North Eastern and Western provinces have the lowest. Nairobi province is below the national average of 20 health facilities per 100,000 population. It is important to note that some of the health facilities in Central province, especially those in Kiambu county, also serve Nairobi. The shortfall in Nairobi province is thus supplemented by Central province facilities.

2.5.2 Human Resources

Health professionals play a central and critical role in improving access and quality health care for the population. Effective health service delivery depends on well trained health workers capable of providing services at all levels of health care system. Table 2.5 presents the number of registered medical personnel per 100,000 populations between 2007 and 2012.

Table 2.5: Number of Health Workers per 100,000 Population, 2007 - 2012

Type of health personnel	**2007**	**2008**	**2009**	**2010**	**2011**	**2012***	**WHO recommended**
	No/100,000	No/100,000	No/100,000	No/100,000	No/100,000	No/100,000	No/100,000
Doctors	17	17	18	18	19	20	20
Dentists	3	3	2	2	2	2	N/A
Pharmacists	7	7	8	8	6	6	N/A
Pharmaceutical Technologist	5	5	5	6	11	13	N/A
Nursing officers	33	37	70	77	80	86	100
Enrolled Nurses	86	83	88	89	62	65	100
Clinical Officers	16	13	20	23	25	28	N/A
Total	**167**	**165**	**211**	**223**	**205**	**220**	**250**

Source: Government of Kenya (2013) *Provisional N/A - Not Available

Though there has been an increasing trend in the number of medical personnel per 100,000 population, the numbers are below the World Health Organization recommendations for doctors, nurses and total health personnel. WHO recommends 20 doctors and 100 nurses per 100,000 population in order to meet the Millennium Development Goals (MDGs) and 250 health workers per 100,000 population. In 2012, the number of doctors per 100,000 population hit the recommended number by WHO. However, for nurses and total health personnel per 100,000 population, the country has achieved 80 percent.

2.5.3 Financial Resources

At the time of independence in 1963, the Kenyan government committed itself to providing free health care to all and abolished user fees for people seeking care in public health facilities using its own funds (Sikosana, 2010). Health services were funded primarily through the general tax revenue. In 1988, the government introduced user fees and other major reforms in the health sector owing to poor economic performance, inadequate financial resources, declining budget allocations and international donor pressure (Chuma *et al*., 2009). Some of these reforms included expansion of social health insurance, decentralization, and a greater role for the private health sector (Collins *et al*., 1996). Introduction of user fees in the government health facilities was a major challenge to the governmentôs pledge of free health services for all. This resulted in widespread protest from the citizens. Consequently, user fees were suspended in 1990, but reintroduced in phases in 1991. The first phase covered the national and provincial hospitals; second, district hospitals, and finally, the health centres (Collins *et al*., 1996).

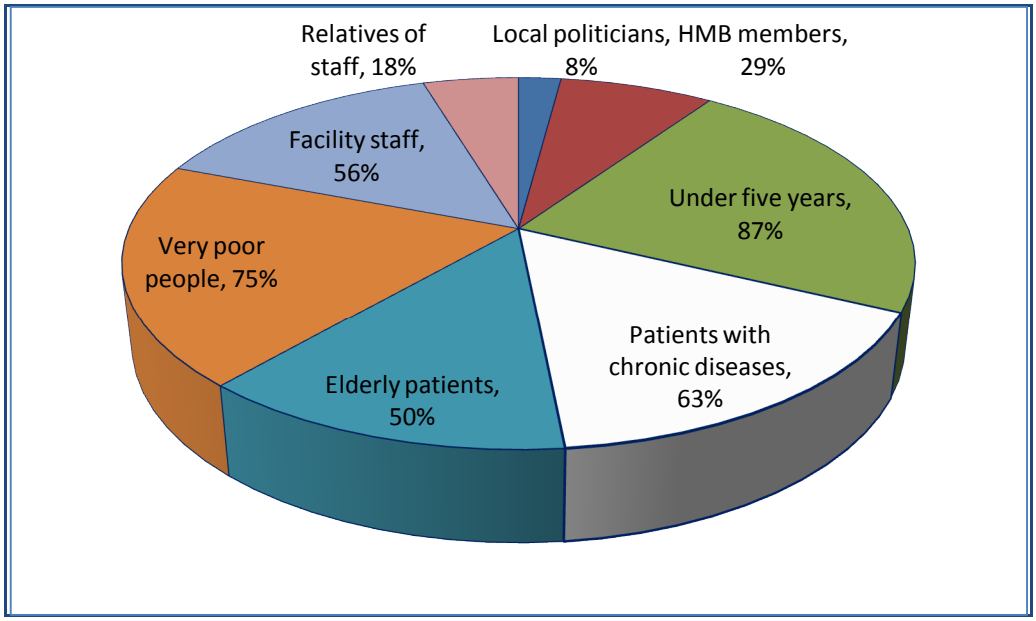
During the period of implementation of the user-fee, the programme created access barriers, especially for the poor and vulnerable. Its viability as a financing mechanism was limited by the high levels of poverty, and inability to pay by majority of Kenyans (Government of Kenya, 2005). To overcome the challenges of user fees, in 2004, the Ministry of Health stipulated that health care at dispensary and health centre levels should be free for all citizens, except for a minimal registration fee of Kshs 10 and Kshs 20, respectively (Carrin *et al.*, 2007). Under this policy (commonly referred to as the 10/20 policy), children aged below

five years and specific health conditions such as malaria and tuberculosis were exempted from payment. Registration fee was also waived for the poor.

The introduction of 10/20 policy had an immediate effect of increasing utilization of health care services to 70 percent, but the increases were not sustained due to the reduction in financing supplementary drugs and non-medical supplies, pay for support staff and allowances for staff outreach activities (Chuma *et al.*, 2009).

The government intervened to cushion the very poor and vulnerable against the adverse effects of user fees by introducing waivers and exemptions. Exemptions for user fees were made for specific health services including treatment of children under 5 years; maternity services in dispensaries and health centres; TB treatment in public health facilities; and vaccinations (Chuma and Okungu, 2011). Figure 2.3 shows percent of rural health facilities and the beneficiaries of exemptions.

Figure 2.3: Percent of Rural Health Facilities Giving Exemptions



Source: Government of Kenya (2010a)

Although findings show a large proportion of health facilities were exempting deserving cases, for example 87 percent of the rural health facilities were exempting under-fives, 75 percent the very poor people and 63 percent patients with chronic conditions, of concern are

the exemptions of local politicians, relatives of staff and Health Management Board members (Government of Kenya, 2010a).

The most important event in the history of health financing in Kenya since the introduction of user fee policies in 1989 relates to the attempt by the Government to introduce social health insurance system in 2004. The purpose of this system was to increase access to outpatient and inpatient health care for all Kenyans, and to reduce the OOP health care expenditure of households. After a series of policy debates and subsequent deliberations in parliament, the latter passed the NSHIF Bill in December 2004. However, the president who was expected to accent to the NSHIF Bill into law, sent it back to parliament for further amendments (Xu *et al.* 2006a). To date, the NSHIF bill has never been accented into law.

Another programme targeted at the poor was the Reproductive Health Output-Based Aid (OBA) voucher programme established in 2005. The programme was introduced in three rural districts (Kisumu, Kiambu and Kitui) and two urban slums (Korogocho and Viwandani in Nairobi). The three main target areas of the programme are safe motherhood, clinical family planning and gender violence recovery services. The objectives are to offer quality reproductive health care services for economically disadvantaged populations by means of a voucher system. Clients receive vouchers from designated voucher distributors and they go to their chosen health facility for the desired service and "pay" for the service with the vouchers. The facilities are reimbursed by the government for services provided to the voucher clients. The clients choose from 54 accredited health facilities (NCAPD, 2008).

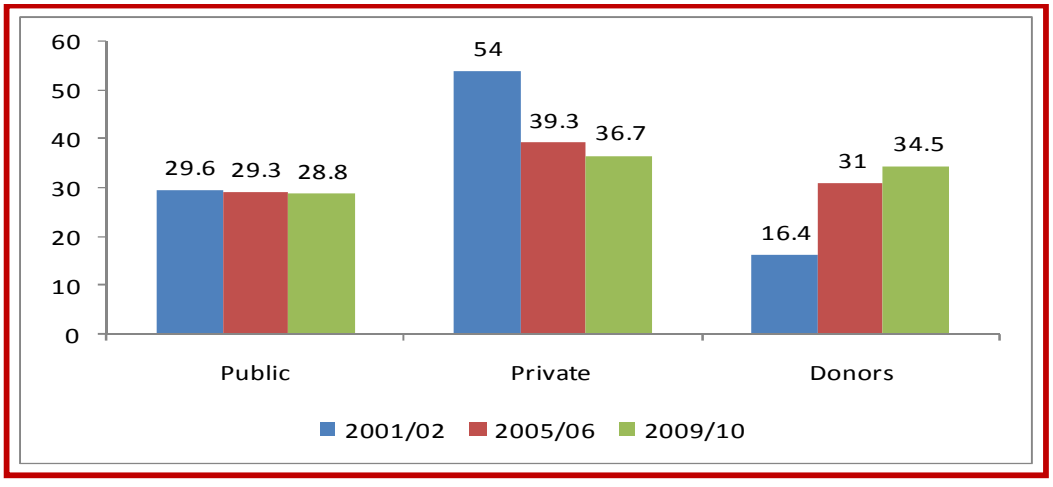
One of the most recent developments in health care financing in Kenya is the implementation of the Health Sector Services Fund (HSSF) in 2010. HSSF is a scheme established by the government to disburse funds directly to government health centres and dispensaries to enable them to improve services to the local communities. The scheme was established to give local facilities the autonomy to manage their resources, and to enable the communities to participate in health care delivery (Goodman *et al*., 2013; Waweru *et al*., 2013). Previously, insufficient resources to health facilities resulted in inadequate and poorly maintained equipment and infrastructure, unreliable drug supplies, staff shortages, poor quality health care and reduced community engagement.

A review of HSSF by Waweru *et al*. (2013) shows that there have been impressive achievements in terms of ensuring that funds reach facilities, are spent appropriately, and are overseen and used in a way that strengthens community involvement. There are also indications that HSSF has strengthened service delivery and quality of care. In addition, positive impacts have been particularly impressive in the smaller facilities (health centres and dispensaries). However, some areas that require particular attention include some aspects of financial management (such as delays in receiving funds and Authority to Incur Expenditures (AIEs)).

The Jubilee government in 2013 ushered in the most recent development in health care financing. In keeping with one of its manifestos abolished all fees for maternity services at public health facilities. It will be necessary for the Ministry and the donors of the OBA programme to work together and establish how these two programmes (OBA and abolishment of maternity fee) can be implemented, for instance, establishing a unit in the MOH to coordinate and oversee the implementation of the government policy and OBA programme.

There are three main sources of finances for health in Kenya namely public (government), private (household out-of-pocket expenditures or cost sharing) and donors. Figure 2.4 gives a breakdown of total health expenditure (THE) by the source of financing for 2001/02, 2005/06 and 2009/10.

Figure 2.4: Total Health Expenditure by Financing Source (%)



Source: Government of Kenya (2010b)

The health sector continues to be predominantly financed by private sector sources, although its share in THE has decreased from a high of 54 percent in 2001/02 to 37 percent in 2009/10. Public sector financing has remained constant over the last decade, at about 29 percent of THE, while the contribution of donors to THE has more than doubled, from 16 percent in 2001/02 to 35 percent in 2009/10 (Government of Kenya, 2010b).

Although private spending declined between 2001/2 and 2009/10, treatment costs continue to limit access to care, especially by the poor. According to Kenya Household Health Expenditure and Utilization Survey report of 2007 (Government of Kenya, 2009), 17 percent of the sick do not seek care and 49 percent of those who did not cited financial barriers as the main reason. Of those who were admitted, 14.3 percent disposed their assets or borrowed money to pay medical bills (Government of Kenya, 2009). The low level of expenditure on health by the government persists despite its commitment to prioritize health in the Vision 2030 as well as meet the Abuja targets.

A closer look at government allocations to the Ministry of Health over a period of five years reveals that the recurrent expenditures have been on the rise, except in 2008/09 when it declined by 1.5 percentage points. However, development expenditure reduced from 18.6 percent in 2007/08 to 11.1 percent in 2011/12 (Table 2.6).

Table 2.6: Total Government Allocations on Health (2007 - 2012)

Description	2007/08	2008/09	2009/10	2010/11	2011/12
Recurrent (% of total expenditure)	81.4	79.9	86.1	85.8	88.9
Development (% of total expenditure)	18.6	20.1	13.9	14.2	11.1
Total health ministries' expenditures as a percent of GOK expenditures	7.9	6.4	6	7	6.5
Total health ministries' expenditures as a percent of GDP	1.6	1.6	1.1	1.2	1.2
Per capita Government expenditure on health (US$)	13.6	13.1	15.4	14.0	14.3

Source: Government of Kenya (2012)

The expenditure by MOH as a percent of Government of Kenya (GOK) expenditure remains low at 6.5 percent in 2011/12, almost ten years after the government committed itself to

increase the allocation to 15 percent as per the Abuja Declaration. The total Health Ministryôs expenditures as a percent of GDP have oscillated between 1.1 percent and 1.6 percent over the last five years. Analyses of government's health efforts per citizen show that over the past five years, per capita government expenditure on health peaked in 2009 at US$ 15.4, but declined to US$ 14.3 in 2012 (Table 2.6). This is far below WHO recommendation of US$ 34 per capita. The allocations to the health sector are inadequate to minimize OOP expenditures.

Health insurance in Kenya has been provided by both the private and public sectors. There are three types of private health insurance providers in Kenya (Kimani, Muthaka and Manda, 2004), (a) General insurance companies that are involved in a wide range of insurance, not related to health, but who to a small extent insure people against ill health; (b) those that run medical schemes and are also health care providers operating their own clinics and hospitals where their clients seek care, although the same facilities are open to non-premium holders; and (c) those that provide health care through third party facilities, also known as health management organizations, which are widely used for employer based insurance.

Due to the high cost of premiums, membership to private health insurance comprises of the wealthiest population and is predominant in the urban areas. Moreover, private health insurance often cream skim and fail to cover people with chronic conditions like HIV/AIDS, or when they do, the premiums are unaffordable. Consequently, people suffering from long-term illnesses are excluded, even when they can afford to pay (Chuma and Okungu, 2011).

On the other hand, NHIF, which is a public health insurance, is mandatory for those in formal employment. Informal sector workers may participate and contribute voluntarily to the NHIF scheme. The scheme covers only inpatient health care costs, based on approved rates. Members pay OOP fees for diagnosis, treatment, and other medical supplies above these rates, in addition to all outpatient services. Hence, the financial protection by NHIF is still quite weak for those who seek care in private facilities (Kimani *et al.,* 2004).

It is estimated that approximately 20 percent of the population (8.4 million) are covered by NHIF (Ministry of Medical Services, 2012) while private insurance and community-based

financing schemes cover an estimated 3 percent (700,000 and 470,000 people, respectively) of the population (Ravishankar, Thakker and Lehmann, 2013)

Besides private insurance and NHIF, there is Community-Based Health Insurance (CBHI). CBHI is relatively new in Kenya, having been started in 1999, and as a result it has limited coverage (Kimani et al., 2012). According to the Kenya Community-Based Health Financing Association (KCBHFA), there exists 38 CBHI schemes with 100,510 principle members and 470, 550 insured beneficiaries. CBHI schemes in Kenya mainly operate in rural areas and are relatively small, undermining the potential for risk pooling and cross-subsidization (Chuma and Okungu, 2011).

A review of the Kenyan health system reveals that a lot remains to be done in order to bring health services to the desired level stipulated by Kenya Health Policy Framework of 2012 - 2030. The 2005/2006 Kenya National Health Accounts (KNHA) identify the top two "key challenges to achieving better health status in Kenya" as "inequitable access to health services" and "shortages of qualified health workers with appropriate skillsò (Turin, 2010). The review has shown that the health facilities are inequitably distributed amongst provinces, and the health workforce fall slightly below the WHO recommendations. At the same time, government allocations to the health sector fall below Abuja declaration and per capita government expenditure on health falls below WHO recommendations. The result of these shortfalls and inequitable distribution is health outcomes (i.e. mortality rates and life expectancy), which also fall below MDG targets.

Having established the status of the health system in Kenya, it is important to analyze how the citizens are utilizing the available health resources and the challenges they face in utilizing health services. The next chapter presents health care utilization pattern by citizens and identifies the factors that contribute to the pattern of health care utilization, including OOP expenditures.

CHAPTER 3 : OUT-OF-POCKET EXPENDITURES AND HEALTH CARE UTILIZATION

3.1 Introduction

In the conventional theory of demand, the consumer is the sole decision maker on the amount or quantity to consume. Demand is then related to willingness to pay, constrained by the tangible role played by the budget (McGuire, Henderson and Mooney, 1988). However, in the case of health care, both supply- and demand-side factors such as insurance, physician, income, distance to health care facility and the providersô service quality affect consumption (Lahiri and Xing, 2001). For example, the trained doctor not only holds the information required by the household for consumption decisions, but also supplies the needed treatment. Such considerations obviously affect the basic choices over the form and amount of health care consumed (McGuire *et al*., 1988).

Health care consumption depends on health insurance to a considerable extent. Due to unpredictability of sickness, people purchase health insurance to cushion themselves from the associated costs of treatment. In the conventional consumer theory, demand is assumed to respond to a specified and easily defined market price. In health care market, however, it is difficult to define willingness to pay and the market price for health care because the consumer may have already purchased health insurance prior to utilization of health care. The net price paid by the consumer is therefore dependent upon the gross price charged by the provider, plus the extent of insurance coverage (McGuire *et al*., 1988).

The price of health care brings us to the important role played by health care financing in utilization of health care. In many developing countries, Kenya included, health insurance coverage is not universal. Only a small proportion of the population has any form of health insurance. In addition, health care financing is characterized by very low allocations from the governmentsô budget. The bulk of health finances come from households through out-of-pocket expenditures. This form of financing health care can have profound effects on household health and economic welfare.

This chapter analyzes the partial effects of health care financing by households on health care utilization. This is an important issue for health policy because higher health care utilization

is associated with better health status. In this chapter, theoretical and empirical literature is reviewed. Theoretical and empirical models and estimation results together with conclusions and some policy implications are also presented.

3.2 Literature Review

This section reviews both theoretical and empirical literature. Section 3.2.1 review six theories that have been applied in health care demand with a view to identifying which ones are applicable to this study. Section 3.2.3 reviews empirical literature in order to identify the variables, methodologies and the gaps in the literature which this study should fill.

3.2.1 Theoretical Literature

3.2.1.1 Human capital theory

Much of the economic theory of health care demand is based on the Grossman human capital approach to health (Grossman 1972; 1999; 2004). In his model, health services are sought because they improve health status implying that demand for health care is derived from demand for health. In the Grossman model, each person inherits an initial stock of health which decreases with age, but can be increased through investments. The decision to seek medical care is an input to help counteract the natural depreciation of the health stock. Other inputs include exercise, education, nutrition, and lifestyle choices.

Grossman argues that medical care is different from other goods and services, since what an individual is actually buying is better health. In addition to increasing productivity, increased health also increases the total amount of time that can be spent on producing earnings and commodities. Therefore, health is demanded, first as a consumption commodity which directly enters the individual's utility function, and second, as an investment commodity which increases the stream of healthy days that permit market and nonmarket activities.

In typical consumer demand theory, each person has a utility function by which the various combinations of goods and services that can be purchased are ranked. The individual will choose the combination that maximizes utility function, subject to income constraint (Grossman, 1972). Human capital theory explains how individuals invest in human capital to

raise productivity, and thus produce earnings and commodities which feed back into the individual's utility function.

Grossman also incorporated a household production function of consumer behaviour to explain the difference between medical care as an input and health as an output. He distinguishes goods and services from commodities, by presenting commodities as a function of goods and services, and consumer time. The individual buys medical services and other goods to produce commodity health, which enters the utility function rather than medical care being a direct input into the utility function.

3.2.1.2 The health belief model

The health belief model (HBM) (Janz and Becker, 1984) is a conceptual framework that attempts to explain and predict health-related behaviour, particularly in regard to the uptake of health services. The model was developed in response to the failure of free tuberculosis (TB) health screening programme. The underlying concept of HBM is that health behaviour is determined by personal beliefs or perceptions of a threat posed by a health problem, and the strategies available to decrease its occurrence (Hayden, 2009). If a person does not perceive a health care behaviour as risky or threatening, then there is no stimulus to act. For example, if a smoker does not feel that he is at risk of developing lung cancer, he has no reason for behaviour change. The model postulates that health-seeking behaviour is influenced by a person's perception of a threat posed by a health problem, and the value associated with actions aimed at reducing the threat.

The HBM proposes that a person will change or adopt a health-related behaviour when the following four conditions for change exist; a) the person's susceptibility to illness or health condition - the person believes that he or she is at risk of developing a specific condition; b) the severity of a potential illness, that is the person believes that the risk of developing an illness or condition is serious and the consequences are undesirable; c) the benefits of taking a preventive action - the person believes that by undertaking a specific behaviour change the risk will be reduced; and d) the barriers to taking that action - the person believes that barriers to the behaviour change can be overcome and managed.

The model therefore consists of four main constructs; namely, perceived susceptibility, perceived severity, perceived benefits and perceived barriers. Perceived susceptibility examines the individual's opinions about how likely the behaviour they partake in is going to lead to a negative health outcome. It refers to one's subjective perception of the risk of contracting an illness, injury or death (Janz and Becker, 1984; Rutherford and Vasarhelyi, 2006). The greater the perceived risk, the greater the likelihood of engaging in behaviour that will decrease the risk. For example, people using condoms to decrease susceptibility to HIV infection, or vaccination for influenza, measles, polio among others (Hayden, 2009).

Perceived severity refers to subjective assessment of the seriousness of the health condition and its potential consequences (Glanz, Rimer and Viswanath, 2008; Janz and Becker, 1984). Though perception of seriousness is often based on information or knowledge about the condition, it may also come from a personôs beliefs on the disease itself (e.g., whether it is life-threatening or may cause disability or pain) as well as broader impacts of the disease on his/her life in general (Hayden 2009). For example, an individual may perceive flu as a relatively minor ailment, but if he/she is self-employed, having the flu might have serious financial consequences as a result of being absent from work for several days. This would influence his/her perception of the seriousness of this illness.

Health-related behaviour is also influenced by the perceived benefits of taking an action (Glanz *et al*., 2008). Perceived benefits refer to an individual's beliefs regarding the effectiveness of engaging in a health-promoting behaviour to reduce risk of disease (Janz and Becker, 1984). Thus, the individual must have the expectation that the new behaviour will be beneficial.

Perceived barriers refer to an individual's assessment of the obstacles to behaviour change. The potential negative aspects of a particular health action may act as impediments to undertaking the recommended behaviour. Even if an individual perceives a health condition as threatening and believes that a particular action will effectively reduce the risk, barriers may prevent engagement in the health-promoting behaviour. In this case, the individual weighs the action's benefits against perceived barriers such as expenses, side effects of the medical procedure, pain, inconveniences, time-consuming, and so forth (Hayden, 2009).

However, though beliefs could be important in determining whether to seek health care or not, this study does not incorporate beliefs in its modeling framework due to data limitations.

3.2.1.3 The behavioural model for health care

The behavioural model of health care (Andersen, 1995) is a conceptual model aimed at demonstrating the factors that lead to the use of health services. The model considers an individual's use of health services to be a function of three types of factors; namely, predisposing characteristics, enabling resources and need, that is those that predispose, enable, or suggest the need for individual use of health services (Rutherford and Vasarhelyi, 2006; Babitsch, Gohl and Lengerke, 2012).

The predisposing factors are the socio-cultural characteristics of individuals that exist prior to their illness (Andersen and Newman, 2005). They are based on the argument that a family's propensity to use health services can be envisaged from a set of personal characteristics such as demographic factors, social structure and health beliefs, which predate the illness (Willis, Glaser and Price, 2010). Demographic factors such as age and gender, represent biological imperatives suggesting the likelihood that people will need health services. Social structure includes education, occupation, ethnicity, social networks, social interactions, and culture (Babitsch *et al*., 2012; Andersen and Newman, 2005). They represent a broad array of factors that determine the status of a person in the community, his/her ability to cope with presenting problems and commanding resources to deal with these problems. Andersen (1995) defines health beliefs as "attitudes, values and knowledge that people have about health and health services that might influence people's subsequent perceptions of need and use of health services" (Andersen, 1995 pp 2). An individual who believes health services are useful for treatment is likely to utilize those services.

Even though individuals may be predisposed to use health services, some resources must be available for them to do so (Andersen and Newman, 2005). Both community/organizational and personal/family enabling resources must be present for use to take place. Community resources entail structures and distribution of health facilities and personnel. It also involves physician and hospital density, office hours, provider mix, quality management oversight,

and outreach and education programmes. Health policies also fall into the category of community/organizational enabling factors (Babitsch *et al*., 2012). People must have the resources and the know-how to get to these services and make use of them. Income, health insurance, a regular source of care, and travel and waiting times are some of the measures that are included in this category.

Need has also been identified as a prime determinant of use. At the individual level, Andersen and Davidson (2001) differentiate between perceived need for health services and evaluated need. Perceived need relates to how people view their own general health and how they experience symptoms of illness, pain, and worries about their health. It also incorporates whether or not they judge their problems to be of sufficient magnitude to require professional help. Evaluated need represents professional assessments and objective measurements of patients' health status and need for medical care (Andersen, 1995; Andersen and Davidson, 2001; Babitsch *et al*., 2012; Andersen and Newman, 2005). At the community level, they make a distinction between environmental need characteristics (e.g., occupational and traffic and crime-related injury and death rates) and population health indices (overall measures of community health, including epidemiological indicators of mortality, morbidity and disability).

Aspects of the behavioural model for health care have been incorporated in our modeling framework by including some predisposing characteristics such as age, enabling resources such as income, health insurance, distance and waiting time. Finally, need has also been incorporated by including chronic illness as one of the variables.

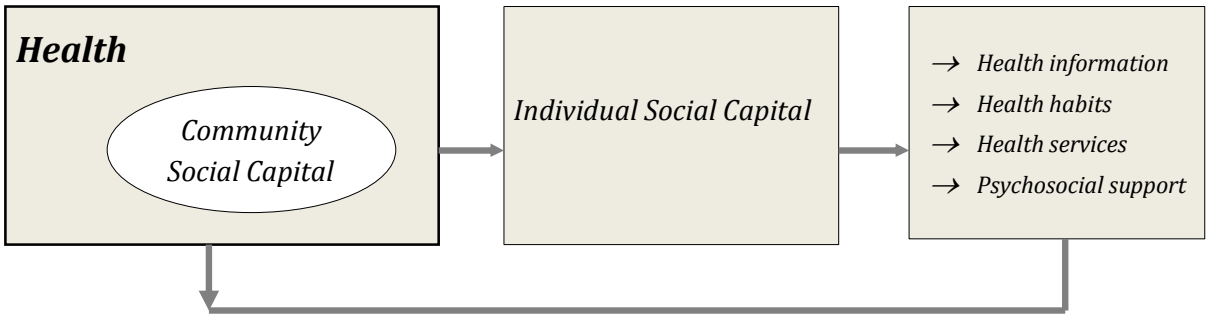
3.2.1.4 Health and social capital

Health is closely associated with social capital - "capacity of individuals to command scarce resources by virtue of their membership in networks or broader social structures" (Portes, 1998, pp 12 as quoted in Macinko and Starfield, 2001, pp 390). People form social structures that consist of friends, family, and co-workers. These social structures are often derived from organizations such as churches, recreational organizations, and political organizations. Through these networks, people exchange information, provide and receive support, and work towards achieving common goals (Rutherford and Vasarhelyi, 2006).

Social capital has been described as either a community-level or an individual-level resource. As a community resource, it is used to achieve common goals that could not be achieved by individuals operating alone; whereas at an individual level, personal social networks are used to strengthen social support, social influence, social engagement and attachment, and access to scarce resources (Nauenberg, Laporte and Shen, 2009; Macinko and Starfield, 2001; Portes, 1998). Individual social capital can be measured as the number or presence of friends, membership in a formal or informal group, trust, and sense of control over one's life (Nauenberg *et al*., 2009).

The pathway through which social capital affects health care utilization has been suggested and illustrated by Nauenberg *et al*. (2009) as shown in the figure 3.1.

Figure 3.1: Mechanisms Linking Social Capital to Health



Source: Adapted from Nauenberg *et al*. (2009)

Social capital in the form of frequent contacts with friends and relatives, participation in social events and meetings, and membership in formal and informal organizations may improve knowledge about how to cure or prevent diseases or increase awareness that treatment is needed or adoption of good health habits (Nauenberg *et al*., 2009; Rocco and Suhrcke, 2012). These links may also provide transportation that can increase access to the health system, housing services and babysitting in case of temporary illness, as well as financial and psychological support (Rocco and Suhrcke, 2012).

Kenya has had a long history of social capital as measured by membership to voluntary organizations, churches, or political parties (Nyangena and Sterner, 2008; La Ferrara, 2002). Evidence shows that social capital has played a role in health care utilization in Kenya. For

example, Ministry of Health (2004) indicates that half of those who were unable to pay for health care sought assistance from friends, family members or relatives. In 2007, 19 percent of the respondents indicated that they were given money for treatment by friends, relatives and family members (Government of Kenya, 2009). Though important for modeling health care utilization, social capital has not been captured in this thesis because the data did not capture the social factors that would allow us to measure social capital.

3.2.1.5 Game theory and health care

Game theory studies strategic actions by agents acting on self interest on othersô interests. Individuals make choices or decisions based upon their preferences, and for each decision there is a payoff they seek to maximize. The theory provides models of rational decision-making in strategic interactions. It can therefore be used to understand the role of incentives in driving health care demand, and also how policy changes affect health service management (Rutherford and Vasarhelyi, 2006).

One of the most important concepts in game theory is that of the Nash equilibrium, which was introduced by John Nash in his 1951 article *Non-Cooperative Games*. In a multi-player strategic game, the optimal action for any given player depends on the actions of other players. Nash equilibrium is based on the assumption that each player will select his/her strategy based upon his/her assessment of the action to be taken by the other players. Furthermore, it is assumed that this assessment is correct, in the sense that all players in the game make the same assessment. Equilibrium occurs when no player has anything to gain by changing his/her strategy unilaterally. Therefore, with repeated plays of the game, each of the players will continue to make the same decision (Rutherford and Vasarhelyi, 2006; American Modelling Society, 2010).

Game theory has the potential to provide a basis for understanding doctor-patient interaction and its impact on the demand for health services (Zweifel, 1981). It can be applied to the medical consultation process and used to generate predictions about how the context of a doctor-patient interaction influences cooperation and quality of care. In particular, game theory models indicate that a history of past interactions between a doctor and patient and

anticipation of future interactions make cooperation and quality care more likely (Tarrant, Stokes and Colman, 2004).

One application of game theory was by Mwabu (1997) who used game theoretic approach to model health care financing in Kenya. He conceptualized health care financing as a two-person, non-cooperative repeated game, played between nature[5], and a coalition of other players[6]. Payoffs are expressed in form of improvement in health status of the population. The strategy profile of the coalition is conceptualized as consisting of health care financing strategies such as user charges at government health facilities, tax-financed health care subsidies at private clinics, and exemptions from user charges for certain social groups. He also conceptualized the strategy profile of nature as consisting of some probability distribution of illness or health needs in the population, which is unknown by the coalition prior to the playing of the game. Natureôs response to the strategies of the coalition is another probability distribution of illnesses. Therefore, the best response strategies of the coalition at each stage of the game are not rational (in the sense of optimizing some single-valued functions under conditions of perfect knowledge) but rather a profile of strategies that is rationalizable (that is, which can be justified, rationalized, or shown to be reasonable on the basis of some criteria). As a result, there is no mechanism by which the coalition and nature can come to a binding agreement as to what illness probabilities should be in force before the play takes place.

Mwabu (1997) sought to find out how to pay for health care in a manner that does not exclude anyone from its consumption. The game theory model revealed that different agents (central government, households, and civil society) make unique contributions to its solution. He concluded that strategic interaction among economic agents influences the outcome of a given method of health care financing.

Game theory is therefore important in helping us understand the interactions between the patients and the doctors and how these interactions affect health care demand (and supply),

[5] The health care financing game is occasioned by a random occurrence of illness (poor health status) assumed to be inflicted by an 'invisible hand' of nature; thus, *nature* is the other player in the game.

[6] The coalition of other players in the game consists of the private sector, the government, the community and the civil service.

as well as health financing. In this study, we do not incorporate doctor-patient interactions but we assume that the visits that the patient makes to health facility are self initiated depending on the perceived need and benefits, but not initiated by the doctor.

3.2.2 Overview of Theoretical Literature

The analysis of the theoretical literature shows that a number of theories explaining demand for health exist. The theories that are most applicable to this study are the human capital theory and the behavioural model of health care. Applications of the other theories are beyond the scope of this study. For instance, this study does not incorporate beliefs as one of the variables explaining health care utilization, due to data limitations. It is also beyond the scope of this study to analyze strategic interactions between, say, the patient and the doctor, or the interactions between different players in health care financing. Though social capital theory is applicable in the descriptive statistics where we see different forms of social capital coming into play to help finance health care for the individuals who were affected, this is not captured in the empirical analysis.

3.2.3 Empirical Literature

This section reviews existing studies on individual demand for health care, with the aim of finding out which methodologies have been applied to model health care demand and which factors determine health care utilization.

3.2.3.1 Methodologies

An extensive literature has focused on individual health care demand decision making when faced with an illness or injury (Sahn, Younger and Genicot, 2002; Lindelow, 2003; Ssewanyana *et al.*, 2006; Ntembe, 2009 and Ichoku and Leibbrandt, 2003). These studies are based on the theory of utility maximization and focus on whether or not an individual reports illness or injury. The individual then decides whether to seek formal health care when ill, and the choice of health care provider once the decision to seek care is made. Hence, the emphasis is mainly on individuals who report an illness or injury during a specific recall period (Ssewanyana *et al.*, 2006). However, focusing only on individuals who report an illness, points to a selection bias (Akin, Guilkey and Denton, 1995; Ssewanyana *et al.*, 2006).

This is because it is assumed that people who do not report illness do not utilize health services, which is not always the case.

Previous studies have used a variety of methodologies to estimate demand for health care. These include the multinomial logit (such as Bedi *et al.*, 2004; Rivera, Xu and Carrin, 2006; Kosimbei, 2005; and Lindelow, 2003); multinomial probit (Ntembe, 2009); and the nested multinomial logit framework (Ssewanyana *et al.*, 2006; Sahn *et al.*, 2002; and Puig-Junoy, Marc and Martinez-Garcia, 1998).

The multinomial logit, however, suffers from the Independence of the Irrelevant Alternative (IIA) restriction. The IIA property assumes that all alternative sub-groups are not correlated at all, and the cross price elasticities are constant across subgroups leading to biased estimates. Subsequently, many studies have employed alternative specifications that are not restricted by the IIA property, including the multinomial probit and nested logit. However, the multinomial probit remains unpopular due to the difficulties involved in its estimation, while the nested logit requires the researcher to specify the nesting structure which is inherently ad hoc (Ssewanyana *et al.*, 2006). Furthermore, these methodologies are applicable when the dependent variable is binary or categorical variable such as health care facility choices, rather than when it is continuous.

Health care utilization is essentially assessed using patient-reported use of health services. This is based on volume, such as number of hospitalizations per year or number of visits (Andersen and Newman 2005). An evaluation of services utilization initially involves a volume analysis. In the literature, numerous studies perform services utilization analyses with multivariate regression analyses based on volume indicators such as medical visits (Biro, 2009; Andersen and Newman 2005; Creel and Farrel, 2001; Lourenço, Ferreira and Barros, 2006). Analysis of health service utilization may thus require use of count data models.

Application of linear regression model on count outcomes can result in inefficient, inconsistent, and biased estimates. Even though there are situations in which the linear regression model provides reasonable results (especially when the dataset is large), it is much

safer to use models specifically designed for count outcomes. Creel and Farrel (2001), Long and Freese (2001) and Rutherford and Vasarhelyi (2006) provide an excellent review of the recent models for count data. The most commonly used models for count data regressions include one part modeling approaches (Poisson and negative binomial regression models); two part regression models (hurdle model); zero-inflated, and latent class models.

One-part modeling approach uses a single distribution function, such as the Poisson or NB distribution, to model observed utilization of health services. They are considered as specifications based on Grossman's human capital model (Grossman, 1972, Wagstaff, 1986). In Grossman's framework, the individual is taken as the primary decision maker, fully controlling the choices regarding medical care. Examples of this approach is provided by Cameron *et al*. (1988), and Deb and Trivedi (1997, 2002).

The two-part model (TPM) accounts for the non-using individuals by envisaging health care demand within a principal-agent framework (Zweifel, 1981). This differs from Grossman's theory in that both the patient and the physician are assumed to be participants in a joint decision-making process (Rutherford and Vasarhelyi, 2006; Lourenço *et al*., 2006). The agent is the physician, who determines the frequency of a treatment after the patient has initiated the first contact. Hurdle models fall in this category and their applications can be found in Pohlmeier and Ulrich (1995); Mullahy (1986) and Deb and Trivedi (1997). One limitation of hurdle models is that they assume, at most, one illness spell during the period of observation. A patient who is a user is assumed to seek health services only once during the study. A second limitation is that a single mathematical specification of treatment model is used to describe all health care users, without considering heterogeneity between the users (Rutherford and Vasarhelyi, 2006; Lourenço *et al*., 2006).

Zero-inflated Poisson (ZIP) and zero-inflated negative binomial (ZINB) distribution models have been used as alternatives to the TPM to help correct for the excess number of individuals that do not utilize health services. In these models, instead of dividing data solely into users versus non-users, and treating everyone in each category equally, different kinds of non-users are allowed (Rutherford and Vasarhelyi, 2006). The zero-inflated model assumes that there are two latent (i.e., unobserved) groups. An individual in the Always-0 Group

(Group A) has an outcome of 0 with a probability of 1, while an individual in the Not Always-0 Group (Group B) might have a zero count, but there is a nonzero probability that he/she has a positive count (Long and Freese, 2001).

While the zero-inflated models account for different kinds of non-users in the population, they still do not account for differences among users. Latent class models were introduced to help explain unobservable heterogeneity among individuals by dividing the population into frequent and infrequent health care users based on the individual's latent long-term health status, as opposed to users and non-users as in the hurdle model (Rutherford and Vasarhelyi, 2006). Latent class models were first applied to the study of health care data by Deb and Trivedi (1997) and since then, a number of other empirical applications have appeared in the literature (Deb and Trivedi, 2002, Deb and Trivedi, 1997, Lourenço and Ferreira, 2005). Latent class models differ from two-part models in that they are not interpretable within the principal-agent framework, but tend to better describe observed utilization data (Rutherford and Vasarhelyi, 2006).

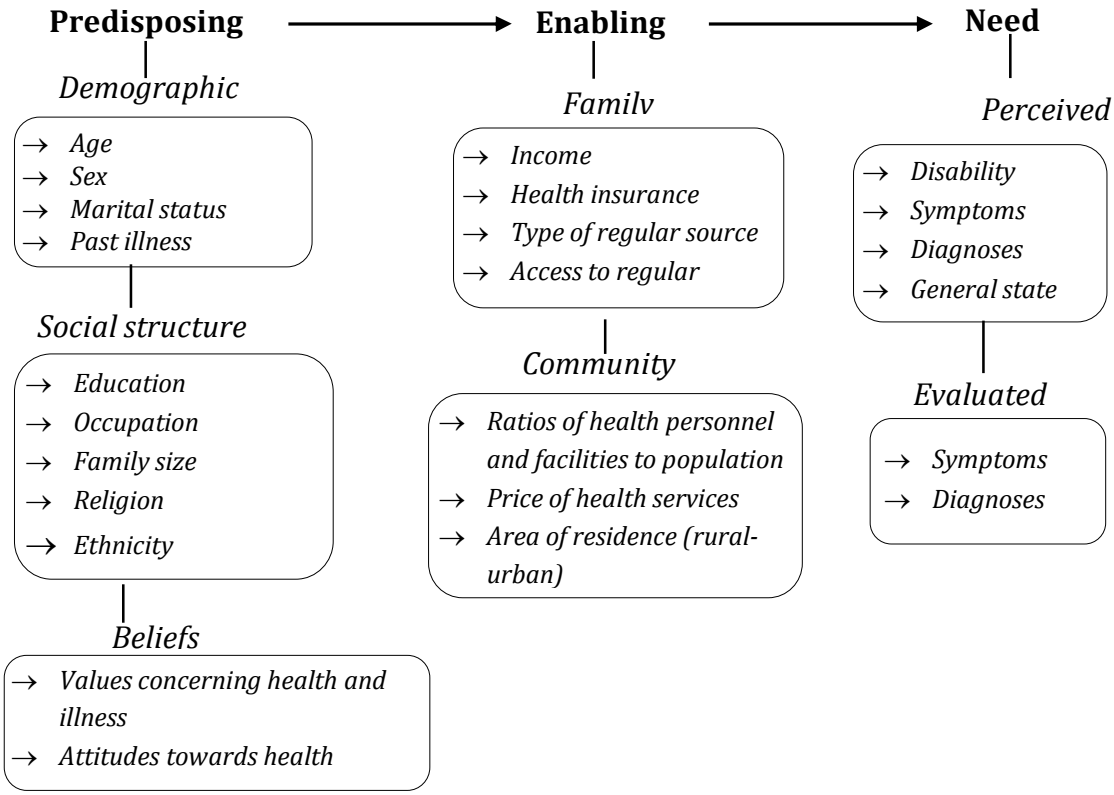
In this thesis, count data models are more applicable than categorical variable models, since the dependent variable consists of discrete numbers of visits to the health facility. We envisage health care utilization within the Grossman's framework as opposed to the principal-agentôs framework. This is based on the assumption that the household is the primary decision maker regarding health care utilization. In addition, patients in the survey on average one visit to the health facility implying that the physician had very little influence on the subsequent number of visits. Probably, this is because the recall period was only one month. Consequently, negative binomial model is the best suited compared to a Poisson regression model as discussed in 3.3.2.

3.2.3.2 Determinants of health care utilization

The purpose of this section is to review the various determinants of health care utilization. It is necessary for such an analysis to be based on a model that relates the determinants to utilization patterns in some logical fashion. Such a model would be the behavioural model of health care. The model will serve as a guide in the selection of relevant variables to include in the analysis. The underlying model assumes that use is dependent on three categories of

factors; namely, predisposing, enabling and need factors. These factors are summarized in figure 3.2.

Figure 3.2: Determinants of Health Service Utilization



Source: Andersen and Newman (2005)

Predisposing factors: Some individuals have a propensity to use services more than others, possibly due to individual characteristics that existed prior to the onset of the illness. Such characteristics however, may not directly be responsible for health service use. They include demographic, social, structural, and attitudinal-belief variables.

Age, gender and past illness are among the demographic variables. Age increases the likelihood of illness. According to the Grossman model, the stock of health depreciates with time, implying that more amount of health care is needed to sustain the same amount of health (Grossman 1972). People in different age groups have different types and amounts of illness, consequently different patterns of medical care. In developing countries, a U-shaped relationship between age and morbidity is hypothesized, implying that the health risks are

highest for infants and elderly (Heller, 1982). We would thus expect an increase in health care use among these groups.

Gender aspects in health care utilization have been studied. In Bangladesh, Kalin (2011) found that women were as much as 50 percent less likely than their male counterparts to utilize health care when sick. Lahiri and Xing (2001) found gender to be a significant determinant of Veteransô health care utilization in USA.

Past illness is included in this category because people who have experienced health problems in the past are most likely to make demands on the medical care system in the future. This could also be in existing condition such as chronic illness. Cavagnero *et al.* (2006) found that those with chronic health conditions were more likely to use health services in Argentina.

The social structure variables include education, occupation of the family head and household size. Education variable relates to the individualôs general schooling and captures the general skills that help to make the individual more productive in promoting self-health. It includes basic skills such as literacy and numerical skills, as well as knowledge of physiological processes and of institutions (administrative and legal processes) that give individuals control and confidence in utilizing information to improve their lifestyles and health status (Ensor and Cooper, 2004).

Education is a long-established determinant of the demand for health and health care. It was incorporated as a determinant of the production function of health in the early Grossman human capital model of health (Grossman, 1972 and 2004). In that model better education allows an individual to be more effective in converting health care and other health-enhancing goods into health. Other empirical studies such as Ssewanyana *et al.* (2006) and Cisse (2011) found that the higher the level of education, the higher the probability of seeking modern health care. Kosimbei (2005) found mother's level of education to be an important determinant of child health care utilization.

Studies have considered household size as an important determinant of health care seeking behaviour. Ssewanyana *et al.* (2006) analyzed the effects of household structure on health

seeking behaviour in Uganda and found that demand for health care in public facilities increases with the number of adult members in the household. In Cote d'Ivoire, Cisse (2011) found that an increase in household size leads to a reduction in the probability of seeking modern health care. Ntembe (2009) found household size to be positive and significant in determining the choice of health care provider in Cameroon.

The third subcomponent of the predisposing conditions includes attitudes or beliefs about medical care, physicians and disease. What an individual thinks about health may ultimately influence health seeking behaviour. Though health beliefs are not considered to be a direct reason for using services, they result to differences in inclination towards health services use. For example, families who strongly believe in the efficacy of treatment of their doctors might seek a physician sooner and use more services than families with less faith in the results of treatment (Andersen and Newman, 2005).

Enabling component: Enabling conditions can be measured by family resources such as income and level of health insurance coverage. Apart from family attributes, there are also certain enabling characteristics of the community in which the family lives which can also affect the use of services. These include amount of health facilities and personnel, distance to the health facilities, cost of medical services, region of the country and the rural-urban nature of the community in which the family lives. These variables might be linked to utilization because of local norms concerning how medicine should be practiced or overriding community values which influence an individualôs behavior.

Many studies have recognized income as an important consideration in the decision to seek health care, with some studies finding income not to have a significant effect on health seeking behaviour. Heller (1982) found that income only had a minor impact on whether or not the household seeks medical care. The study also indicated that unlike most other developing countries, income is not a barrier to access to medical care in Malaysia. Lindelow (2003) found that income was not an important determinant of health care choices in Mozambique. However, a number of other studies (Cisse, 2011; Ntembe, 2009; Ssewanyana *et al.,* 2006; Ichoku and Leibbrandt, 2003) have found income to be positive and a significant determinant of demand for health care.

The effect of health insurance on utilization has been analyzed in both developed and developing countries. The best known health insurance study is the Rand Health Insurance Experiment (HIE) conducted in the United States of America by Newhouse and Insurance Experiment Group (1993). They found that patients used substantially more health services when insurance coverage was complete, compared to incomplete coverage. In Vietnam, Jowett, Deolalikar and Martinsson (2004) examined the effects of voluntary health insurance on the choice of provider and type of care. They found that poorer insured persons tend to use inpatient care more compared with poorer uninsured individuals, a difference that is not found at higher income levels. Ekman (2007b) found evidence that insurance increased the intensity of utilization and reduced OOP spending in Jordan.

Cost of medical care which can be in form of user fees or OOP expenditures is an important factor in health care demand. Studies have found user fees to be a significant determinant of health care utilization (Mwabu, Ainsworth and Nyamete, 1993; Gertler, Locay and Sanderson, 1987; Ntembe, 2009; Canaviri, 2007; Ssewanyana *et al*., 2006; Mendola, Bradenkamp and Gragnolati, 2007). Mwabu *et al*. (1993) found that a 10 percent increase in user charges in government health facilities would reduce demand for medical care by 1 percent. In addition, a 10 percent increase in prices charged at mission and private clinics would reduce demand by about 15.7 percent and 19.4 percent, respectively. Lavy and Quigley (1993) show that although statistically significant, cost of medical services are less important in terms of their effect on the choice of treatment. However, in an earlier study by Heller (1982), cash price did not prove to be a factor differentiating users from non-users of medical care, whether outpatient or inpatient.

Non-monetary factors such as the distance to the health facility and the time taken to receive treatment have also been found to be important determinants of health seeking behaviour of households. Households are reluctant to consume health care if it is time consuming. The opportunity cost of that time is considered high. However, Ichoku and Leibbrandt, (2003) found waiting time an insignificant determinant of health care utilization.

The negative impact of distance on health care demand has been highlighted by Ichoku and Leibbrandt (2003); Ssewanyana *et al.* (2006) and Ntembe (2009). Distance is also a critical

factor in the uptake of obstetric, and especially delivery services. One study in Zimbabwe suggested that up to 50 percent of maternal deaths from hemorrhage could be attributed to the absence of emergency transport (Fawcus, *et al.* 1996). Distance is also cited as a reason women choose to deliver at home rather than at a health facility (Akin and Hutchinson, 1999; Amooti-Kaguna and Nuwaha, 2000; and Raghupathy, 1996). In other words, women living farther away are less likely to choose a health facility for delivery.

The impact of distance on utilization of health care is mixed. Some studies have found that people will travel long distances to obtain treatment. One study in India found that women would travel long distances to obtain private care, perceived to offer better quality than public services (Bhatia, 2001). People residing close to cities are often willing to bypass local facilities, traveling to higher level facilities in urban areas perceived to offer better quality. This was also found in a number of countries including Bangladesh (Ensor *et al.,* 2001) and Burkina Faso (Develay, Sauerborn and Diesfeld, 1996).

Need factors: Illness level represents the most immediate cause of health service use. It involves perception of illness by the individual or his family as well as a clinical evaluation. Measures of perceived illness include number of disability days that an individual experiences, those days the individual is unable to do what he usually does such as going to work, school, take care of the house, or play with other children. Other measures of perceived illness include the symptoms the individual experiences in a given time period. Evaluated illness measures are diagnoses of the actual illness and the clinically judged severity of that illness. A study in Nigeria by Ichoku and Leibbrandt (2003) argued that an increase in the number of days one is unable to perform normal duties due to sickness will naturally prompt the household to seek medical attention.

3.2.4 Overview of Empirical Literature

Different methodologies have been applied to estimate demand for health care (multinomial logit and probit, negative binomial and nested multinomial logit). Though it suffers from IIA, multinomial logit seems to be the most popular amongst the studies reviewed. The empirical literature also reveals that count data models have been applied in many countries to estimate

health care demand. However, these models are rarely used to estimate health care demand in developing countries. Health care utilization is best measured by the number of visits as opposed to whether one visited a health facility or not. The model that suits our data best is negative binomial. In this thesis, we run regressions for both public and private sub-samples in order to capture the differences in utilization of these types of facilities.

A review of the determinants of health care utilization using behavioural model of health care shows that price of medical care, religion, ethnicity, insurance, marital status, distance, area of residence, waiting time, education, age, sex, severity of illness, household size, beliefs and income are important. However, our data does not permit us to include all these variables in the modeling process. The variables included in our model are out-of pocket expenditures, insurance, distance, area of residence, waiting time, education, age, chronic illness, occupation, household size, and income.

3.3 Models of Out-of-Pocket Expenditure and Health Care Utilization

3.3.1 Theoretical Model

A health care utilization model which motivates the empirical specification of this study is based on utility maximization. Borrowing from Biro (2009) and Mwabu (2007), individuals maximize their expected future lifetime utility, which depends on consumption (C) and health (H). Since future health and survival probability are influenced by utilization of health care, the lifetime utility conditional on medical care can be written as:-

$$U = U(C,H) \tag{3.1}$$

According to Grossman (1972), health depends on "investment" in health. This "investment" is a function of medical care characteristics and other individual characteristics (like risky behaviour) that might influence the efficiency of medical services.

$$H = f(H_0, M) \tag{3.2}$$

H is the health level after utilizing medical care, H_0 is the initial health status (indicating pre-existing conditions), and M measures medical care utilization (e.g. number of visits to the doctor). Expenditure on consumption and medical services is constrained by income and

wealth. The cost of medical services depends on several factors such as type and quality of the service, and whether the individual has health insurance. Hence, the budget constraint is specified as:-

$$P_M M + P_C C = Y \quad (3.3)$$

Where P_M is the net (out-of-pocket) price of medical care and P_C is the price of other non-medical goods, when full income is expended on consumption and on medical care as well as on other health inputs needed to produce health. Y is exogenous income. Maximization of (3.1) subject to health production function (3.2) and budget constraint (3.3) can be characterized by the following Lagrangian function:-

$$\ell = U(C, f(H_0, M)) + \lambda(Y - P_H H - P_C C) \quad 3.4$$

From (3.4) the first order conditions for utility maximization after health has been produced in accordance with (3.2) can be expressed as:-

$$\begin{aligned} \frac{\partial \ell}{\partial C} &= U_C - \lambda P_C = 0 \\ \frac{\partial \ell}{\partial M} &= U_H f_M - \lambda P_M = 0 \\ \frac{\partial \ell}{\partial \lambda} &= Y - P_H H - P_C C = 0 \end{aligned} \quad 3.5$$

It is worth noting the following household's reduced-form demands for medical care (M) and consumption of non-medical goods (C).

$$M = M(P_M, P_C, Y, H_0) \quad (3.6)$$

$$C = C(P_M, P_C, Y, H_0) \quad (3.7)$$

Following Mwabu (2007), solving equations 3.2, 3.6, and 3.7 simultaneously yields a hybrid health demand function of the form:-

$$H = H(M, Y, P_M, P_C, H_0) \quad (3.8)$$

Consistent with demand theory, the entire set of prices for medical and consumption goods enters the demand function. All the arguments in 3.8 are as defined before as; H is health status after seeking medical care, Y is exogenous income, H_0 is the initial health endowment or status and P_M and P_C are the prices of medical care and consumption of non-medical goods, respectively. Following Mwabu (2007), equation 3.8 can be interpreted as a form of demand function for health where we maximize utility subject to budget constraint. The demand function is conditioned on exogenous income Y, with other covariates in the function being treated as shift factors (shifting of demand curve due to changes in these variables). However, the price P_M is endogenous since it is the amount a household will spend on health care services conditional on choice of inputs (for example choosing a private hospital as opposed to a low cost government facility). In other words P_M is not determined by the market forces of demand and supply but rather by the choices that households make. The price of H is endogenous and unobservable. It is determined household choices of health inputs and associated prices. (The endogeneity issue is discussed in greater detail in section 3.3.2.1). Since we are interpreting equation 3.8 as a demand function, H is optimal for a given number visits. Thus, assuming a one to one correspondence between visits and H, it is possible to represent the dependent variable with the number of visits to the health facility (rather than by health status); henceforth denoted by V. No analytical loss is entailed by this assumption as long as H is optimal for a given level of M. Y and all the other covariates will now be represented by X, and P_M will be represented by OOP (out-of-pocket expenditure per visit). Thus equation 3.8 can be proxied by:

$$V = V(X, OOP). \qquad (3.9)$$

In particular, X includes household size, income (captured by total household expenditure), distance to the health facility, waiting time at the health facility, area of residence (rural/urban), presence of chronic illness, working status of the head of household, education level of the household head and insurance cover. Equation 3.9 is the main equation for estimation.

3.3.2 Empirical Model

3.3.2.1 Estimation Issues

Endogeneity is said to exist if there is correlation between the error term and one or more of the covariates. Endogeneity arises owing to problems such as omitted confounder variables, simultaneity between a covariate and the outcome of interest, and errors of measurement in the covariates. The presence of endogeneity causes the estimated regression coefficients to be inconsistent or biased. Further, in the presence of endogeneity, the estimates can no longer be given a causal interpretation (Cameron and Trivedi, 2005). In our model, the price of health care is not given by the health facility or medical authority, but depends on several factors such as the health status of the patient, the type of health facility or health practitioner, the amount of care received among other factors. Hence some of the factors that affect health care utilization also affect out-of-pocket expenditures per visit (a unit value of health care). We test and address the endogeneity problem using Two-Stage Residual Inclusion (2SRI) which is discussed in section 3.3.2.2.

Ordinary least squares (OLS) regression requires the dependent variable to satisfy homoskedasticity assumption that the variance is the same for any fixed combination of the covariates. When this assumption is violated, then there is heteroskedasticity. Heteroskedasticity is the variation in the variances of the error terms for different observations. Some of the reasons why the variance of the errors may vary across the observations include skewness in the distribution of one or more regressors included in the model and the presence of outliers. However, count data is intrinsically heteroskedastic with variance increasing with the mean. Potential heteroskedasticity is controlled by using robust estimates of the standard errors.

A third assumption of least squares regression is that the observations are independent. In some cases, observations share similarities that violate the assumption of independent observations. For example, the same person might provide information at more than one point in time. There may be multiple hospitalizations or doctor visits for the same patient. Or, several members of the same family might be in the sample or use the same doctors or

hospitals, again violating independence. In these examples, it is reasonable to assume that the observations within the groups (clusters) are not independent. With clustering, the usual standard errors will be incorrect.

Another potential problem is heterogeneity. This occurs if there is a non-linear interaction between unobservable factors and the endogenous covariate which causes the effect of the endogenous covariate on the variable of interest, to differ among population subjects. In our case, heterogeneity will exist if there are some unobservable factors that interact non-linearly with the OOP expenditures variable causing the effect of this variable on health care utilization to differ amongst the households in the population. In other words, the heterogeneity arises from unobserved preferences and health endowments of individuals that influence their choice of health inputs, hence the amount of OOP expenditures incurred. There is also heterogeneity in health status arising from unobservable influences of biological processes. By using negative binomial regression model (NBRM), the problem of unobserved heterogeneity is addressed.

Basic issues in the estimation of health care demand are that the dependent variable (number of visits to health facility) is usually not continuous. It is usually observed as an event count over a period of time. In addition, there is a large number of zero observations due to many respondents reporting they did not utilize healthcare. Hence, it is desirable for efficiency reasons to estimate by maximum likelihood, which implies the use of count data models (Creel and Farrel, 2001).

This study is based on Grossman theory that utilization is driven solely by one decision making mechanism (that of the patient) as opposed to principal-agent framework (Zweifel, 1981). This, therefore, calls for one-step modeling approach using a single distribution function such as the Poisson or Negative Binomial distribution to model observed utilization of health care.

Poisson distribution may not ideally describe health care utilization due to its restrictive assumption that the mean and variance of a random variable following this distribution are equal (i.e. equidispersion). However, overdispersion, which can be caused by a large number

of zero counts in the data set, is unfortunately common in health care data, as there will be some people who never utilize services. Another assumption of Poisson distribution is that events occur independently at a constant rate. Events in health utilization data are not always independent, for example, multiple visits to a physician by the same patient are often related and the probability of event occurrence is not always constant. In this case, it seems likely that Poisson assumptions are violated in health utilization data (Rutherford and Vasarhelyi, 2006). As a result, we consider a more flexible model, the Negative Binomial (NB) distribution.

For the NB distribution, the variance generally exceeds the mean, which may better model health care utilization counts. In addition, the negative binomial is not sensitive to event dependency and variable event probabilities, so it is often considered an attractive alternative to the Poisson distribution for modeling health care utilization data (Rutherford and Vasarhelyi, 2006). The health care utilization model estimated is:-

$$E[V_i|X_i, OOP_i, \varepsilon_i] = \exp(X_i\beta_1 + \gamma_1 OOP_i + \varepsilon_i) \qquad (3.10)$$

Where index i refers to individual i. V is the number of visits to the health facility, OOP is a unit out-of-pocket expenditure, and X is a vector of variables that might influence health care utilization. ε_i is a latent heterogeneity term and it includes unobservables which influence health care utilization, but are independent from the regressors. These are basically such specific health characteristics which are not captured by the included health measures, but can also be other factors like being acquainted with a physician.

3.3.2.2 Two-Stage Residual Inclusion (2SRI)

The empirical model accounts for potential endogeneity of OOP expenditures, the large number of zero observations and heteroskedasticity. As a first step, we test for endogeneity of OOP expenditures using the two-stage residual inclusion estimation method (Terza, Basu and Rathouz, 2008) as used by Carpio, Wohlgenant and Boonsaeng, (2008) to deal with a continuous endogenous variable on a count model. They first estimated an auxiliary regression of the endogenous variable as a function of identified instruments and the remaining variables using OLS. They then used the residuals of the auxiliary regression in

the second stage as an additional explanatory variable in the negative binomial regression model.

The assumption that OOP expenditures are exogenous in the health care utilization model might be unrealistic, even if they are considered to be predetermined. Some unobserved factors might be correlated both with OOP expenditures and health care utilization. If OOP expenditures are endogenous in health care utilization model, then the consistency of the estimation is violated. The 2SRI method is applicable when there are regressors in a nonlinear model that are correlated with unobserved (latent) variables, and these unobservables also influence the outcome variable. In the context of linear models, instrumental variable (IV) methods represent the established solution to the problem of endogeneity of regressors (Geraci, Fabbri and Monfardini, 2012). For example, the conventional Two-Stage Least Squares (2SLS) method is based on the assumption that the regression relationship of the outcome variable on the treatment variable and the observable confounders is linear. Applying 2SLS method can lead to bias in estimation when used with skewed outcomes such as the present case (Terza et al., 2008; Garrido *et al*., 2012). Angrist and Pischke (2009) call it ñforbidden regressionò. They assert that forbidden regression crops up when researchers apply 2SLS reasoning directly to nonlinear models.

The 2SRI method involves two stages. The first stage is a consistent estimation of the model for the endogenous regressor. The OOP health expenditures of individual i is determined as:-

$$OOP_i = Z_i\breve{U} + \tilde{\alpha}_i \qquad (3.11)$$

The variables included in vector Z include X which is a vector of exogenous variables in the health utilization model and instrumental variable while $\tilde{\alpha}$ includes unobserved factors influencing OOP expenditures. Model 3.11 is estimated using OLS.

In the literature, age categories have been used as instruments of health expenditure. Martin, Rice and Smith (2007) used proportion of households with lone pensioners (those aged 70 years and above and living alone) as an instrument for health expenditures. This study used age categories 60 and above which we called senior. This dummy variable depicted whether the households have members in that age category or not. This age category comprises

people who are vulnerable to diseases, hence utilize more health services (Martin *et al*., 2007). Specifically, the validity of the instrument (senior) is tested that (i) it must be correlated with OOP; and (ii) it must not be correlated with health care utilization except through OOP. Also the strength of the instrument is tested through F-test. For the case of a single endogenous regressor, Staiger and Stock (1997) recommend a critical value of greater than 10 in the first-stage *F*-statistic for instruments to be strong (Cameron and Trivedi, 2005; Stock and Yogo, 2002). For a single instrument and a single endogenous regressor as is the case here, this implies that the t-value for the instrument should be bigger than 3.2 or the corresponding p-value below 0.0016 (Schmidheiny, 2012).

In addition to the requirement that instrumental variables be correlated with the endogenous regressors, the instruments must also be uncorrelated with the structural error term. If the model is overidentified, meaning that the number of additional instruments exceeds the number of endogenous regressors, then we can test whether the instruments are uncorrelated with the error term. If the model is just identified, then we cannot perform a test of overidentifying restrictions. Since this is a case of one endogenous variable and one instrument, then there is no need of identification test.

The second stage involves estimating the negative binomial model for the outcome variable, where both the residual from the first stage model and the endogenous explanatory variable are included as regressors. The rationale for including the residual from the first stage model is to serve as a control for unobservable variables that are correlated with the endogenous variable, thus allowing the endogenous variable to be treated as if it is an exogenous covariate during estimation (Mwabu, 2009). The model estimated in the second stage is:-

$$E[V_i|X_i, OOP_i, \hat{u}_i, \varepsilon_{2i}] = \exp(X_i\beta_2 + \gamma_2 OOP_i + \rho\hat{u}_i + \varepsilon_{2i}) \quad (3.12)$$

The notations follow that of equation (3.10). û is the first stage residual. If OOP is exogenous in the health care utilization model, then ρ should equal to zero. ε_2 includes unobservables which are independent from the included regressors. If OOP is exogenous, we estimate equation (3.10) using maximum likelihood estimation.

3.4 Data and Definition of Variables

3.4.1 Data

The study used data from the 2007 Household Health Expenditure and Utilization Survey (HHE&US). The survey was conducted by the Kenya National Bureau of Statistics for the Ministry of Health in September and October 2007. It was undertaken to inform the National Health Accounts (NHA) estimation and the development of the health care financing strategy. The main purpose of HHE&US was to obtain information on household health care utilization and expenditures in Kenya, and understand the health care seeking behaviour and health expenditure patterns of the Kenyan population. The survey sought information on the household's demographics, health situation, health care utilization, health expenditures and other households' expenditures, and household income and assets.

The survey covered all provinces and districts of the country. A total of 737 clusters were selected and divided into 506 rural and 231 urban clusters. Twelve households were systematically randomly selected from each cluster, yielding a sample of 8,844 households (2,772 urban and 6,072 rural) selected to ensure national representation.

The data was transformed from wide to long, yielding a sample of 38,317 individuals. Out of these, 6,514 individuals reported having been ill in the four weeks prior to the survey and 5,426 individuals utilized health services. Out of the whole data set which consisted of many variables, data on a few variables which were relevant for this study was extracted.

3.4.2 Variables

Health care utilization, the dependent variable was measured by the number of visits made to a health care provider. The explanatory variables included OOP expenditures instrumented by senior, distance to the health facility visited, area of residence, health status proxied by chronic illness, household size, waiting time at the facility between arrival and being attended by a clinician, income proxied by household expenditures, working status of household head, education level of household head, and health insurance. Table 3.1 provides a summary of definitions and measurements of the variables used in estimations.

The survey asked respondents to state whether any member of the household was sick during the four weeks preceding the survey and whether medical care was sought. If medical care was sought, the respondents were asked to state how many visits they made to the respective health care provider.

Out-of-pocket health expenditures refer to payments made by households at the point of receiving health services. Typically these include registration, consultation, drugs (including over-the counter drugs and alternative and/or traditional medicine) and vaccines, diagnosis, and medical check-up fee. Transportation cost and opportunity cost of waiting time are excluded from the OOP payments, because the data set does not have these two variables.

Table 3.1: Variable Definition, Measurement and Expected Effects

Variables	**Definitions and measurement**	**Expected Effects**
Visits	Number of visits made to the health care provider.	..
Unit out-of-pocket (OOP) expenditure	Costs of registration cards, consultation, drugs and diagnosis in Kenya Shillings (Ksh).	Negative
Distance	Distance in kilometers to the health care provider visited.	Negative
Area of residence	Represents rural or urban; it is equal to 1 if one resides in urban area; 0 otherwise	Positive
Chronic illness	Captures whether a member of the household has a chronic illness or not. Equal to 1 if one has a chronic illness; 0 otherwise	Positive
Household size	The total number of members of the household.	Positive
Waiting time	Time in hours between arrival and being attended by a clinician.	Negative
Household expenditure	Household expenditure per capita in Ksh. It proxies household income.	Positive/negative
Working status of household head	Captures working status of the head of household. It is a dummy variable equal to 1, if head of household is working; 0 otherwise	Positive/negative
Insurance cover	1 if an individual has insurance cover; 0 otherwise	Positive
Education level	1 if the head of household has secondary education and above; 0 otherwise	Positive

The respondents were asked to state whether any member of the household had any chronic illness such as hypertension, HIV/AIDS, diabetes, cardiac diseases, arthritis and gout among others. This constituted the chronic illness variable (which proxied health status) being equal to one, if a member of the household had any of the chronic illnesses, and zero otherwise.

Education captures different levels of education of the household members as opposed to years of schooling. It is measured as a dummy variable equal to one, if a household head had secondary education and above, and zero otherwise. Household expenditures included money spent on food, education, household goods and assets. Annual expenditures were converted to monthly expenditures for consistency purposes. The respondents were asked if the household members were working and for each working household member, whether they were self employed or in formal employment.

3.5 Results

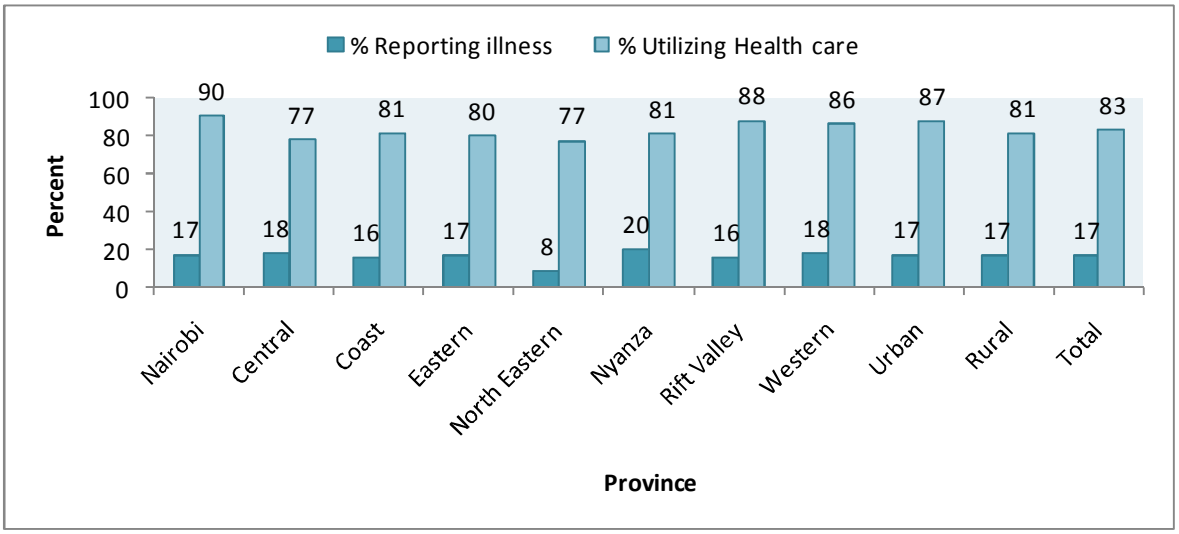
This section presents a description of the sample as well as the analytical findings on the effects of OOP expenditures on health care utilization. It provides statistics on population reporting illness, health service utilization, reasons for not seeking health care and for bypassing nearby health facilities, sources of medical funds, as well as insurance coverage. Presentation and discussion of empirical findings is also provided.

3.5.1 Health Service Utilization

About 17 percent (n = 6,514) of the respondents reported having had an illness during the recall period. Of these, 83.3 percent (n = 5,426) sought health care services. Figure 3.3 shows the population reporting illness and utilizing health care by province and area of residence.

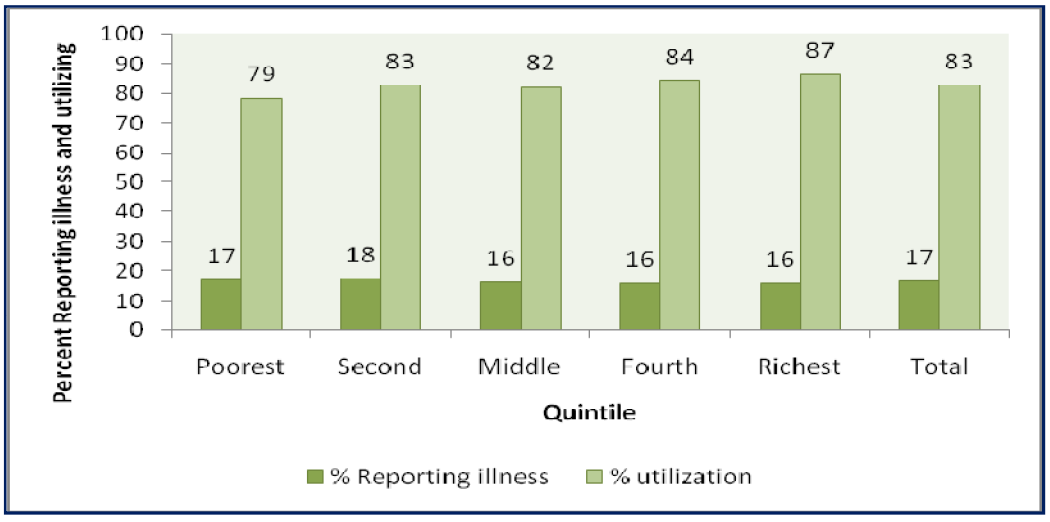
Nyanza province had the highest reports of illness (n = 1,086), while North Eastern province had the lowest (n = 231). Nairobi province had the highest rates of utilization (n = 552), with Central (n = 630) and North Eastern (n = 179) provinces reporting the lowest utilization. The other provinces do not differ considerably in terms of reporting illness and utilization. There was no difference in terms of reporting illness between rural and urban areas, but those in urban areas reported more utilization compared to rural areas

Figure 3.3: Population Reporting Illness and Utilizing Health Care by Province (%)



Though the second quintile reported the highest case of illness (n = 1,321), their level of utilization was lower at 83 percent (n = 1,100) compared to the richest quintile with a utilization rate of 87 percent (n = 1,049). The poorest quintile had the lowest utilization rate of 79 percent (n = 1,019). Figure 3.4 shows proportion of population reporting illness and utilizing health care by expenditure quintiles.

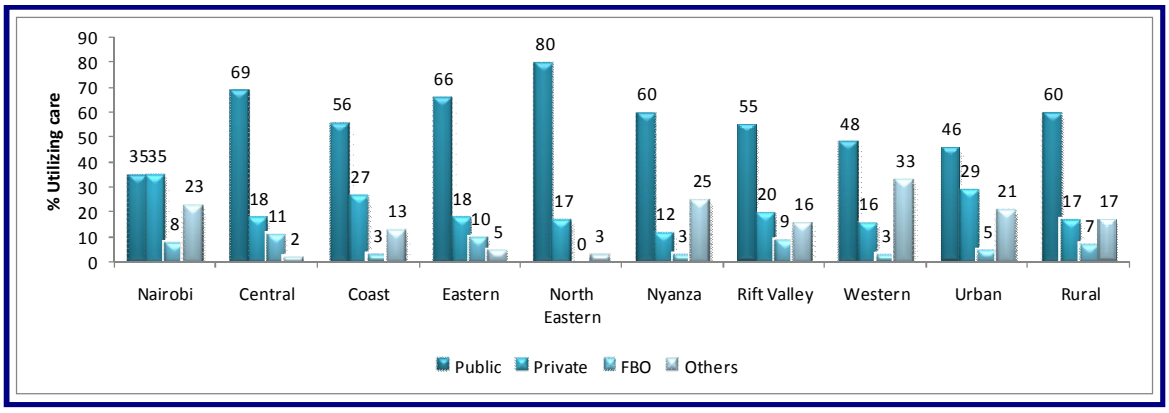
Figure 3.4: Population Reporting Illness and Utilizing Health Care by Quintile



3.5.1.1 Health service utilization by provider and province

Choice of health care providers ranged from public, private, faith based organizations (FBOs) and others[7]. In all the provinces, public health facilities were the most utilized except for Nairobi where public facilities' utilization was at par with that of private facilities. This could be due to the fact that apart from cost considerations, coverage and accessibility of government health facilities in both urban and rural areas is good. Seventeen percent of rural residents visit private health facilities compared with 29 percent of urban residents. In Nairobi, the rate of the visits to the private facilities is twice as high as in rural areas. This could be explained by the ability of the Nairobi residents to pay and availability of private health facilities in urban areas compared to rural areas (World Bank, 2008; Turin, 2010). Other than in Eastern and Central provinces, FBO facilities are the least utilized (Figure 3.5).

Figure 3.5: Health Care Utilization by Provider and Province



3.5.1.2 Reasons for not seeking health care

Eighty three percent of those reporting illness visited a medical provider. Amongst those who did not, more than two-thirds identified lack of money as the reason for not seeking care (Table 3.2). Seventeen percent said they self-medicated, which included visiting a chemist[8]. Long distance to provider was another reason which accounted for five percent. Other reasons included poor quality of health care service, religion and fear of discovering a serious illness.

[7] Others include village health worker (Traditional Birth Attendants - TBA and Community Health Workers - CHW), traditional healer, chemist/pharmacy/shop, and community pharmacy.

[8] In the others category, chemist was the most utilized representing 87.5 percent of others category

Table 3.2: Reasons for not Seeking Health Care (n = 1097)

Reason	Percent
Lack of money (n =741)	67.5
Self-medication (n =186)	17.0
Long distance to provider (n = 51)	4.6
Religious (n = 26)	2.4
Poor quality service (n = 26)	2.4
Fear of discovering serious illness (n = 8)	0.7
Other reasons (n = 59)	5.4

Source: Authorôs computations, KHHEUS,2007

3.5.1.3 Reasons for Bypassing Facility

Respondents were asked whether they visited the health facility nearest their homes, and if not, to provide the reasons as well as the provider type of the facility nearest to their homes. Sixty three percent said they visited facilities nearest their homes. Fifty two percent of government and 41 percent of privately owned facilities were bypassed. The reasons for bypassing facilities are shown in Table 3.3.

Table 3.3: Reasons for Bypassing Facility (n = 6015*)

Reason	Percent
Medicine unavailable (n = 1,223)	20.3
More expensive (n = 1,017)	17.0
Unqualified staff (n = 823)	13.7
Long waiting time (n = 639)	10.6
Was referred (n = 511)	8.5
Unfriendly staff (n = 414)	6.9
Would have paid (n = 381)	6.3
No privacy (n = 146)	2.4
Dirty facility (n = 97)	1.6
Other reasons (n= 764)	12.7

Source: Authorôs computations, KHHEUS, 2007 *The figure is higher than the number of those who sought care (5,426) because it accounts for four visits.

Lack of medicine accounted for the most important reason for bypassing health facilities. Reasons related to quality of health services (medicine, staff, waiting, cleanliness of the facility and privacy) accounted for more than half of the reasons, while those related to price of health care (ómore expensiveô and ówould have paidô) accounted for 24 percent. This shows that respondents were willing to travel long distances in search of quality and affordable health care.

3.5.2 Health Insurance Coverage

Table 3.4 presents insurance coverage by selected characteristics. Overall, only about 13.8 percent have some form of insurance cover.

Table 3.4: Proportion of Population with Health Insurance Cover, 2007 (n = 5,271)

Characteristics		**Percent**
Province	Nairobi (n = 1,517)	28.8
	Rift Valley (n = 975)	18.5
	Nyanza (n = 654)	12.4
	Central (n = 620)	11.8
	Eastern (n = 504)	9.6
	Coast (n = 462)	8.8
	Western (n = 461)	8.8
	North Eastern (n = 78)	1.5
Cluster type	Urban (n = 2,893)	54.9
	Rural (n = 2,378)	45.1
Sex	Male (n = 2,646)	50.2
	Female (n = 2,621)	49.8
Chronic illness	Chronically ill with insurance cover (n = 403)	14.8
	Chronically ill without insurance cover (n = 2,325)	85.2
Total (n = 5271)		**13.8**

Source: Authorôs computations, KHHEUS, 2007

Nairobi province has the highest insurance coverage, while North Eastern has the lowest. Also, insurance coverage is higher amongst urban residents than rural ones. This could be because a number of employer-based insurance are based in urban areas and most people who qualify for NHIF coverage (formal sector employees) are in urban areas. Coverage of males is slightly higher than that of females. Among those who have chronic illness, 15 percent have some form of insurance, and the rest have none. This coverage is very low considering the amount of health care required by those with chronic illnesses.

Table 3.5 shows the type of insurance coverage by province. Amongst the insured, NHIF has the widest coverage in all the provinces and community-based health insurance the lowest. Rift Valley province is leading with NHIF coverage, whereas Nairobi province is leading with individual, employer and community-based insurance coverage. North Eastern province has the lowest coverage for all the types of health insurance.

Table 3.5: Health Insurance Coverage by Province and Type (%), 2007 (n = 4,177)

Province	Individual insurance	Employer insurance	NHIF	Community insurance	Others*
Nairobi	81.3	49.7	15.4	41.9	10.5
Central	1.7	8.9	12.0	16.3	36.8
Coast	1.0	5.8	11.1	0.0	0.0
Eastern	4.3	11.0	10.5	0.0	0.0
North	0.6	0.2	1.1	0.0	0.0
Nyanza	5.6	6.9	14.7	16.3	10.5
Rift Valley	2.9	13.8	24.9	4.7	10.5
Western	2.7	3.7	10.4	20.9	31.6
Total	**16.7**	**11.1**	**71.0**	**1.0**	**0.5**

Source: Authorôs computations, KHHEUS, 2007 * Others include initiatives like Bamako[9].

[9] The Bamako Initiative is a joint World Health Organization/ United National Children's Fund (WHO/UNICEF) Initiative adopted by African health ministers in 1987 in Bamako, Mali, to implement strategies designed to increase the availability of essential drugs and other healthcare services for Sub-Saharan African. The initiative aimed at solving the problems in the financing of primary health care by: 1) defining and implementing self-

3.5.3 Sources of Funds for Financing Health Care

Nearly two thirds of the respondents who sought health care were able to pay for the health services. Nineteen percent of the respondents received financial support from friends and family members. This points to the importance of social capital in financing health care. Seven percent of households borrowed to finance health care, while a similar percentage sold household assets. Selling of household assets (land, domestic animals) to finance health expenditure has important implications for poverty, because this affects the household's present and future earning potential.

Table 3.6: Sources of Funds for Financing Health Care (n = 5,221)

Source	Percent
Had cash available	67.3
Was given money by friends, relatives & family members	18.8
Borrowed money	7.4
Sold household assets	6.9
NHIF	5.6
"Harambee"[10] contributions	3.5
Was given opportunity to pay later	2.8
Private health insurance	1.9
Waived/exempted	1.5
Community health insurance scheme	0.3
Reimbursed by employer	0.3

Source: Authorôs computations, KHHEUS, 2007. * Percentages do not add up to 100 because multiple responses were allowed.

The descriptive statistics have presented an overview of the number of households reporting illness, health care utilization, sources of funds for financing health care as well as insurance

financing mechanisms at district level; 2) encouraging social mobilization; and 3) ensuring a regular supply of drugs.

[10] "Harambee" is Swahili for "all pull together". It is mainly used to mobilize people or resources to achieve a common goal

coverage by province. The statistics show that though a high percentage of those who reported illness utilized health care in all provinces, 16.7 percent did not seek care due to different reasons, the main one being financial. Others who sought care had to borrow money or sell assets to meet the medical bills. This has welfare implications on the households. At the same time, some people bypassed health facilities mainly due to quality and cost reasons. Though insurance coverage could have helped households who had financial difficulties to seek medical care and cushion others from selling assets, evidence shows that insurance coverage is very low. Only 13.8 percent of the population has some form of insurance cover. Of these, 71 percent are covered by NHIF which has very limited benefits package, and only 27.8 percent have private insurance (individual and employer based insurance). Private insurance has wider and better benefits package, but the premiums are very high for the majority of Kenyans who earn low incomes.

Table 3.7 presents sample statistics of the factors affecting health care utilization.

Table 3.7: Analytic Sample Characteristics

Variable	Mean	Standard Deviation	Range	
			Minimum	Maximum
Education level (1 = secondary education and above)	0.27	0.44	0	1
Visits (No.)	1.37	0.73	0	8
Distance to the facility visited (Km)	9.26	38.62	0	800
Household expenditure (Ksh)	12,174	36,488	0	1,651,367
Chronic illness (1 = chronically ill)	0.12	0.32	0	1
Working status (1 = household head works)	0.19	0.39	0	1
Waiting time (Hours)	0.92	1.86	0.02	45
Household size (No.)	5.18	2.35	1	15
Residence (1 = urban)	0.28	0.45	0	1
Insurance status (1 = insured)	0.14	0.35	0	1
Out-of-pocket health expenditures per visit (Ksh)	319	1,405	0	40,000

Source: Authorôs computations, KHHEUS, 2007

Table 3.7 shows that, on average those who sought health care made one visit and spent an average of Ksh. 319 per visit as OOP expenditure. In addition, they had to wait for 55.2 minutes, on average, to receive care and had to travel a distance of 9.3 km, on average, to seek care. The average household size of those who sought care was 5 members, and the average monthly expenditure per household was Ksh. 12,174. Of those who sought care, 72 percent were from rural areas, 12 percent had chronic illness, and 14 percent had some form of insurance cover. Twenty seven and 19 percent of those who sought care had household heads with education above secondary level and were working, respectively.

3.5.4 Determinants of Health Care Utilization

3.5.4.1 Impact of out-of-pocket expenditure on health care utilization

Test results for validity, strength and relevance of the instrument confirm that the instrument is highly correlated with the endogenous variable with a t-value of 3.44 and P-value of 0.000, and is uncorrelated with the structural error term. Thus, *senior* is a valid and strong instrument (Appendix Table A1).

Table 3.8 shows results from four models (2SRI and Negative Binomial Models for overall, public and private facilitiesô samples). The results of the first model, 2SRI, show that OOP expenditure residual is -0.101 and not significant. This indicates that OOP expenditure is not endogenous; implying that negative binomial regression is the appropriate model.

The results show that OOP expenditures are significantly and negatively related to health care utilization in all the Negative Binomial models. This means that a 10 percent increase in the OOP expenditures decreases the difference in logs of expected counts in the number of visits by 0.86, 1.18, and 0.89 for public facilities and private facilities, respectively. Therefore OOP expenditures are a hindrance to health care utilization.

Income plays an important role in the demand for health care. Assuming that health is a normal good, demand for health is expected to increase with income. The results show that a ten percent increase in income leads to 0.23 increase in the difference in logs of expected counts in the number of visits to any health facility. Surprisingly, income is not a significant factor in seeking private health care, though it positively influences the number of visits.

Table 3.8: Results of 2SRI and NB Regressions (Dependent Variable = Visits)

Variable	2SRI model	NB model (Overall[11])	NB model (Public)	NB model (Private)
Log of OOP expenditures per visit	0.015	-0.086***	-0.118***	-0.089***
	(0.098)	(0.005)	(0.007)	(0.013)
Log of waiting time	0.058**	0.033***	0.041***	-0.079***
	(0.027)	(0.008)	(0.011)	(0.022)
Log of distance	-0.016	0.037***	0.043***	0.009
	(0.051)	(0.006)	(0.009)	(0.018)
Log of household size	0.129***	0.095***	0.069***	0.088*
	(0.035)	(0.017)	(0.024)	(0.049)
Log of household expenditure	-0.008	0.023***	0.023**	0.009
	(0.030)	(0.008)	(0.012)	(0.023)
Insurance cover	-0.043	-0.023	0.026	0.149***
	(0.028)	(0.017)	(0.028)	(0.048)
Chronic illness	0.083**	0.108***	0.088***	0.127**
	(0.034)	(0.021)	(0.031)	(0.056)
Area of residence	-0.052	0.027*	0.059***	0.105**
	(0.077)	(0.016)	(0.022)	(0.047)
Working household head	-0.036**	-0.044***	-0.012	-0.102**
	(0.017)	(0.015)	(0.021)	(0.047)
Education	0.003	0.022	0.007	0.115**
	(0.025)	(0.015)	(0.020)	(0.054)
OOP residual	**-0.101**			
	(0.098)			
Constant	0.082	0.217***	0.350***	0.691***
	(0.152)	(0.067)	(0.103)	(0.190)
Observations	8049	8123	4241	962
P-Value	0.0000	0.0000	0.0000	0.0000

*Significant at 10% ** significant at 5% ***significant at 1% Robust standard errors in parenthesis.

Waiting time, though significant in explaining health care utilization, is positively related to the number of visits in the overall and public facilities. This suggests that while a consumer may consider the time spent in obtaining treatment as important, he or she may place a higher premium on the facility for other reasons. For instance, a patient may consider the time spent waiting for treatment as secondary to the quality of drugs and the attention received when he or she eventually gets treated. The positive relationship can also be interpreted to mean that long waiting time may cause a patient to go home untreated, hence be forced to make another visit to the health facility. Lack of options, especially in rural areas where public health

[11] Overall includes all health facilities (public, private, faith based etc)

facilities are few and far apart, may force patients to wait until they get treatment. On the other hand, waiting time significantly reduces the number of visits to private facilities. This could be explained by people having other options, especially in urban areas where most private facilities are located.

A person living in an urban area is more likely to seek treatment compared to the one in rural areas. This result is not surprising, since most of the health facilities in Kenya are located in urban areas, thus households residing in urban areas have more access to care than those living in rural areas. In addition, most urban residents (apart from those living in the slums) are likely to afford health care compared to those in rural areas.

Having a chronic illness is also a major determinant of health care utilization. A ten percent increase in chronic illnesses leads to 1.1 percent increase in the number of visits to all health facilities, 0.9 percent to public facilities and 1.3 percent to private facilities. This can be explained by the fact that most chronic illnesses require routine management, thereby occasioning more frequent visits to health facilities.

The larger the household size, the more the number of visits to a health facility. In particular, a ten percent increase in household size leads to 0.95 increase in the difference in logs of expected counts in the number of visits to all health facilities, 0.69 to public and 0.88 percent to private facilities. The implication is that in large households there is higher probability of falling sick especially contagious illnesses, thus a higher likelihood of making many visits to a health facility.

Contrary to theoretical and empirical expectations, our findings show that the longer the distance to the health facility, the higher the levels of utilization, implying that people will travel long distances to obtain treatment. This is perhaps associated with expectations of higher quality of care at far away higher level facilities, especially in rural areas. Though this would apply especially to private facilities which are perceived to offer higher quality services than public facilities, distance is not a significant factor in seeking private health care.

Education level significantly increases private health care utilization. Household heads with secondary education and above are more likely to utilize private facilities than those with primary level and below. This result is not surprising since those who are more educated are likely to have better jobs, hence can afford to utilize health care at private facilities. In addition, educated people are likely to understand and appreciate the benefits of health care, hence demand it.

Working status significantly reduces health care utilization. Though not expected, the negative coefficient of this variable could be applicable in the Kenyan situation given that a majority of those working are in the informal sector. This means that any visit to a health facility, either by them or their children, implies lost earnings for that period. Hence, those who are working may choose to forego visits to health facilities unless it is extremely important to do so. This finding could also be explained by the fact that those who work, especially in formal sectors, are also more educated, invest more in their health and nutrition, and therefore, do not require to utilize health services that often since they are healthy.

The results show that health insurance cover is an important determinant for utilizing private health care, but not in public and all facilities models. According to the results, a ten percent increase in insurance coverage leads to 1.5 percent increase in the difference in logs of expected counts in the number of visits to private health facilities. This finding is not surprising since most of those who seek care from private facilities either have individual or employer based private insurance.

3.5.2.2 Discussion of Results

This chapter sought to address the first objective of this thesis; analysis of the effects of OOP expenditures on health service utilization. The results show that OOP expenditures negatively affect health care utilization in all facilities, both private and public. Distance, waiting time, chronic illness, working status and education level of the head of household, income as proxied by household expenditure, and residential area are all significant determinants of health care utilization. Insurance cover is also a significant factor in explaining private health care utilization.

The findings suggest that OOP expenditures significantly hinder health care utilization irrespective of the type of health facility. Some patients did not seek care due to financial reasons, while those who sought care resorted to borrowing and selling assets. Borrowing and selling of assets is common phenomenon in many developing countries. In Vietnam, for example, a third of poor households in debt cited payment for health care as the main reason. In Cambodia, 20 percent of patients took loans from private lenders to pay for health care, and some had to repay the loans at exorbitant interest rates of 20ï 30 percent per month. Others cut down on food to offset the cost of borrowing. In Uganda, between 20 and 40 percent of patients raised money for health-care bills not only by borrowing, but also by working for others, or selling off assets such as land or cattle (Whitehead, Dahlgren and Evans, 2001).

In addition, the poor are the most affected reporting the lowest utilization of health care. This result stresses the elastic nature of the relationship between OOP payments and the utilization of health services (Bedi, *et al*., 2004; Havemann and van der Berg, 2003). A study by Mendola *et al*. (2007) for five countries in Western Balkans found that private OOP health care payments were burdensome and seemed to discourage health care seeking behaviour, especially among the poor. This shows that OOP expenditures are a major barrier to development, since inadequate health care utilization is likely to lead to low productivity in a country. Therefore, there is need for policies to address this hindrance.

Kenya introduced the 10/20 policy in health centres and dispensaries and also abolished fees for maternal and child health services (Chuma *et al*., 2009). These policy developments notwithstanding, evidence has shown that OOP expenditures are still an issue in health care utilization. While this evidence is not new, one would expect the implementation of health reforms outlined in chapter two of this thesis to have reduced or reversed the negative effects of OOP expenditures. However, this is not the case; hence, there is need for more policies that will reduce these effects.

Concerns regarding the effects out-of pocket expenditures have led some countries like Uganda and South Africa to abolish user fees for all publicly provided health care services

(McPake *et al*., 2011; Ensor and Cooper, 2004). Other African countries like Zambia, Burundi, Niger, Senegal, Liberia, Lesotho, Ghana and Sudan have also abolished fees from public facilities, mainly for maternal and child health services (Yates, 2009; McPake *et al*., 2011). While early evidence shows that health care utilization increased as a result (Ensor and Cooper, 2004; Chuma *et al*., 2009), Gilson and McIntyre (2005) warn that quick action with no prior preparation can lead to unintended effects, including quality deterioration due to lack of funds, excessive demands on health workers and depletion of drug stocks. Indeed, Xu *et al*. (2006c) indicate that though economic theory suggests that lower cost services in the public sector would encourage a switch from private to public services (the substitution effect), this did not happen in Uganda. The use of private services increased continuously from 1997 to 2003 for both poor and non-poor. One of the reasons was that the removal of fees meant that medicines were frequently unavailable at public facilities, hence some people might have decided to seek care at private facilities. This suggests that though this study confirms the evidence that OOP expenditures are a barrier to health care utilization, any health reform being put in place to address that barrier should be clearly and well thought-out, and all pro and cons weighed before being implemented.

Addressing the negative effects of OOP expenditures alone does not solve all the barriers to health care utilization. Our findings show that facilities are being bypassed, hence the positive relationship between distance and health care utilization. The reasons given for bypassing are hinged on price of medical care and quality (Table 3.3). The introduction of Constituency Development Fund in 2003 led to proliferation of dispensaries without any due regard to infrastructure norms and standards for health facilities. As such, many facilities are not adequately equipped with drugs, staff and equipment. This is one of the main reasons for bypassing. Hence, it is not so much about availing health facilities, but the quality of the services offered in those facilities. In Kenya, for example, many rural residents bypass health centres and dispensaries to higher level and well equipped district and provincial public hospitals.

Though income does not seem to be significant in explaining private health care utilization, it is important for utilizing public health care. This finding is a bit surprising since one would

expect income to determine whether to visit private or other facilities. However, the finding could be explained by the fact that income has to rise quite significantly for one to choose private health care since they charge considerably high prices compared to public and other facilities. Another reason could be because most private facilities are located in urban areas such that even if rural incomes increased, people in rural areas would still not access them.

People residing in urban areas utilize health care more than those in rural areas since most of these facilities are located in urban areas. The World Bank Report (1993) for example, reported that households living in urban areas seek and obtain health care services more often than their counterparts in rural areas. This is very evident in Kenya since the public district, provincial and referral hospitals are all located in the main urban areas. In addition, private hospitals are also in urban areas, where they can attract more clients.

Of particular interest is the negative relationship between the health care utilization and employment status of the household head. If the reason for failure to seek health care is due to income loss (the opportunity cost of seeking care), then this finding is a relevant justification for finding ways to address the barriers to health care utilization. Indeed, the implication of a workforce failing to seek-care for serious illnesses is not something that should be ignored. Of interest also is the positive relationship between education of the household head and utilization of health services. This undoubtedly is a beneficial thing for population health status. It may be that education is acting as a proxy for lifetime income or wealth, and reflecting a positive effect of this on health care utilization.

This chapter has generated policy relevant results. Though the findings are not new, they confirm the existing evidence of the negative effects of OOP expenditures and other determinants of health care utilization. With a better understanding of why people use or do not use health services, health care organizations can seek to improve the quality of human life. Finally, the study contributes to the debate on relative importance of access versus quality of care. It will act as a guide to policy makers in Kenya as they decide whether to spend resources in increasing the density of facilities or improving quality of care in existing facilities.

This chapter has illustrated that OOP expenditures are a substantial burden as well as barrier to accessing healthcare. While some people do not utilize health services due to financial and other barriers, there are those who nevertheless utilize but end up experiencing financial catastrophe or even impoverishment. This is because sometimes OOP expenditures end up being too high relative to their incomes. They therefore end up borrowing (to pay later), selling assets or depleting their savings to meet the medical expenses which have welfare implications to the households. Incidences of catastrophic health expenditure and impoverishment in a population are valid indicators of the magnitude of OOP health expenditures problem. The next chapter illustrates further the problem of OOP expenditures by estimating the incidence of catastrophic health expenditures and impoverishment, as well as their determinants.

CHAPTER 4 : CATASTROPHIC HEALTH EXPENDITURES

4.1 Introduction

According to the 2007 Kenya Household Health Expenditure and Utilization Survey (KHHEUS), 16 percent of those who indicated need for seeking health care did not do so mainly due to lack of money. This means that each year, many Kenyans are prevented from seeking and obtaining needed care because they cannot afford to pay the charges levied for health services. This can lead to financial hardship and even impoverishment because people are too ill to work. On the other hand, many of those who do seek care may suffer financial catastrophe and impoverishment as a result of meeting these costs. The KHHEUS showed that people sold assets and other household items to meet the hospital bills which have welfare effects on the households (Government of Kenya, 2009). This occurs both to rich and poor households.

This chapter focuses on the financial burdens of paying for care through out-of-pocket (OOP) resources. It estimates the incidence of catastrophic health expenditure and impoverishment associated with OOP expenditures. Population characteristics associated with catastrophic health expenditures across provinces and quintiles are then explored, as the basis for assessing the policy options available to reduce the incidence of financial catastrophe, if it indeed exists. Finally, the study estimates the determinants of catastrophic health expenditures with the aim of coming up with policy prescriptions based on those determinants. This addresses the second and the third specific objectives of this thesis.

The rest of the chapter is organized as follows: Section 4.2 reviews literature on the different approaches and their determinants of catastrophic health expenditures and impoverishment. This will help us to determine the methodology to apply and the variables to use for estimation. Section 4.3 presents methodologies which are used for estimating the incidence of catastrophic expenditures and impoverishment as well as its determinants. Results of these methodologies are presented in section 4.4. Finally, discussion of the results is presented in section 4.5.

4.2 Literature Review

4.2.1 Catastrophic Health Expenditures

4.2.1.1 Definition and measurement of catastrophic health expenditures

Catastrophic health expenditures are defined as OOP expenditures exceeding some threshold shares of household expenditure or income (Berki, 1986; Russell, 2004; Wagstaff and van Doorslaer, 2002; Xu *et al.,* 2003). Berki (1986) defines it as expenditure for medical care that endangers the family's ability to maintain its customary standard of living. The idea behind this approach is that spending a large fraction of the household budget on health care must be at the expense of consumption of other goods and services. This opportunity cost may be incurred in the short term if health care is financed by cutting back on current consumption or in the long term, if financed through savings, sale of assets or credit.

Two methods have been used to define catastrophic expenditures (Wagstaff and van Doorslaer, 2002; OôDonnel *et al*., 2008)[12]. The first method entails defining catastrophic expenditures in relation to the health payments budget share, where total household expenditure (or income) is used as the denominator. The problem with this approach is that this budget share may be low for poor households, where most resources are absorbed by essential items such as food, leaving little to spend on health care. Households that cannot afford to meet catastrophic payments are excluded.

In the second approach, catastrophic expenditures are defined with respect to health payments as a share of expenditure net of spending on basic necessities. Wagstaff and van Doorslaer (2002) refer to óspending on basic necessities' as "nondiscretionary expenditure" and Xu (2005)[13] as "capacity to pay". The difficulty lies in the definition of expenditure that is nondiscretionary (for instance while food expenditure can be regarded as nondiscretionary, not all food purchases are necessary). However, this difficulty notwithstanding, a common approach is to use household expenditure net of food spending as an indicator of living

[12] The two papers provide detailed descriptions of the methodologies while using both total expenditure and nonfood expenditures as the denominators.

[13] Xu (2005) provide detailed description of estimating catastrophic expenditures and impoverishment using health expenditures as a share of capacity to pay.

standards (for example, van Doorslaer *et al*., 2005; Chuma and Maina, 2012; Brinda, Andres and Enemark, 2014; Su *et al*., 2006). The crux is that nonfood expenditure may better distinguish between the rich and the poor than does total expenditure (O'Donnel *et al.*, 2008).

If health care expenditure by a household is 10 percent of total expenditure, that might be considered catastrophic, but 10 percent of nonfood expenditure probably would not (O'Donnel *et al.,* 2008). Hence 10 percent is commonly used as the threshold when defining catastrophic expenditure using health expenditure as a share of total expenditure. However, when using health expenditure as a share of nonfood expenditure, the common threshold is 40 percent (O'Donnel *et al.,* 2008; Wagstaff and van Doorslaer, 2002; Chuma and Maina, 2012). The rationale is that health expenditure beyond those thresholds would force households to sacrifice consumption of other basic needs, sell assets, borrow, or become impoverished (Russell, 2004). Xu *et al.* (2003) used 40 percent of household's ñcapacity to payò.

Wagstaff and Van Doorslaer (2002) and OõDonnel *et al*. (2008) provide detailed descriptions of estimating catastrophic health expenditures, with health expenditures as a share of total expenditures and nonfood expenditures. The second method of estimating catastrophic health expenditures as a share of capacity to pay is discussed in details by Xu (2005). They define household's capacity to pay as remaining income after basic subsistence needs have been met.

The two methods, however, do not consider household's external resources. For instance, if a household is able to borrow to finance OOP health expenditure, then the impact of health expenditure on present consumption will be lower than a situation where a household cannot borrow. Flores *et al.* (2008) developed measures of catastrophic expenditures and impoverishment by taking into account financial coping strategies. They showed that if the method of financing is not considered, then catastrophic OOP health expenditure might be under- or over-estimated.

These weaknesses notwithstanding (including the arbitrariness in setting the different thresholds), Wagstaff and Van Doorslaer (2002), OõDonnel *et al*. (2008) and Xu (2005)

provide important measures of catastrophic OOP health expenditure. Moreover, these measures are also useful in making comparisons across societies or countries.

4.2.1.2 Incidence of catastrophic health expenditure

Many studies have used Wagstaff and Van Doorslaer (2002), OôDonnel *et al*. (2008) and Xu (2005) methods to measure the incidence and extent of catastrophic OOP health expenditures (Cavagnero *et al*., 2006; Lee, 2011; Su *et al*., 2006; Mendola *et al*., 2007; OôDonnel *et al*., 2005; Saksena, Xu and Carrin, 2006; van Doorslaer *et al*., 2007; Wagstaff and van Doorslaer, 2002; Xu *et al*., 2003, 2006a, 2006b, and 2007; Chuma and Maina, 2012; Gakidou *et al*., 2006; Galarraga *et al*., 2010; Knaul *et al*., 2006a; Lamiraud *et al*., 2005; Limwattananon *et al*., 2007; Wagstaff 2007; Ekman, 2007a). These studies show that OOP expenditures lead to catastrophic spending and are major causes of impoverishment.

Table 4.1 provides incidence of catastrophic health expenditures and impoverishment for selected countries. Literature reveals that most of the studies on catastrophic health expenditures have been done in Asia and Latin America and a few in Africa. Catastrophic health expenditures have been estimated for developed countries by Xu *et al*. (2003) who found that the proportion of households facing catastrophic payments from OOP health expenses varied between these countries, from less than 0·01 percent in Czech Republic and Slovakia to 2.71 percent in Portugal. Among these countries, only Portugal, Greece, Switzerland, and the USA had more than 0·5 percent of households facing catastrophic health spending. Most developed countries have advanced social institutions such as social insurance or tax-funded health systems that protect households from catastrophic spending (Xu *et al*., 2003).

Table 4.1: Catastrophic Health Expenditures and Impoverishment for Selected Countries

Country	Data	Year	Incidence of catastrophic health expenditures %			Impoverishment rate %	Source
			10% of total expenditure	40% of non-food expenditure	40% of capacity-to-pay		
Kenya	Kenya Household Health Expenditure and Utilization Survey (KHHEUS) (n = 8,414)	2007	15.5	11.4		2.7	Chuma and Maina (2012)
Kenya	Kenya Household Health Expenditure and Utilization Survey (KHHEUS) (n = 8,407)	2003			4	1.5	Xu *et al*. (2006a)
Kenya	Kenya Household Health Expenditure and Utilization Survey (KHHEUS) (n = 8,407)	2003			3.4	-	Saksena *et al.* (2006)
Uganda	National Household Surveys	1997 2000 2003			4.82 3.15 2.92	-	Xu *et al*. (2006c)
Tanzania	Tanzania National Panel Survey (n = 8,297)	2008/09	-	18	-	-	Brinda *et al*. (2014)
Nigeria	Four Local Government Areas in southeast Nigeria (n = 4,873)	Not provided	-	27	-	-	Onwujekwe, Hanson and Uzocukwu (2012)
Burkina Faso	Nouna Health District Household Survey (NHDHS) (n = 800)	2000/01		10.8		-	Su *et al*. (2006)
Zambia	Living Conditions Monitoring Survey (n = 10,921)	1996			2.29	-	Xu *et al*. (2003)
Botswana	Household Income and Expenditure Survey (HIES) (n = 6,053)	2002/03			7.43	-	Akinkugbe, Chama-Hiliba and Tlotlego (2011)
Lesotho	Household Budget Survey (HBS) (n = 6,882)	2002/03			1.25	-	
South Africa	World Health Survey	2002			10.5	7.1	Lamiraud, Booysen and Scheil-Adlung (2005)
South Africa	South Africa Income Expenditure Survey (n = 29,594)	1995			0.03	-	Xu *et al*. (2003)
Senegal	Enquête Sénégalaise auprès des ménages	1994			0.55	-	
Ghana	Ghana Living Standards Survey (n = 5,998)	1998/99			1.30	-	
Namibia	Household Income and Expenditure Survey (n = 4,384)	1994			0.11	-	
Argentina	National Survey on Household Expenditure (NSHE) (n = 27,102)	1996/97			5.5	1.7	Cavagnero *et al.* (2006)
Mexico	Mexican Household Income and Expenditure Surveys (n = 14,042, 10,952 and 22,595 in 1996, 1998 and 2004, respectively.	1996 1998 2004			3.4 4.2 2.6	3.4 1.7	Knaul *et al*., (2006b)

Country	Data	Year	Incidence of catastrophic health expenditures %			Impoverishment rate %	Source
			10% of total expenditure	40% of non-food expenditure	40% of capacity-to-pay		
Thailand	Health and Welfare Surveys (n = 70,000)	2000 2002 2004 2006	5.4 3.3 2.8 2.0	-	-	-	Limwattananon *et al*. (2011)
Georgia	Health Utilization and Expenditure Survey (HUES) (n = 2,859)	2007			11.7	-	Gotsadze, Zoidze and Rukhadze (2009)
Mexico	Mexican Household Income and Expenditure Surveys (n = 14,042, 10,952 and 22,595 in 1996, 1998 and 2004, respectively.	1996 1998 2004			3.4 4.2 2.6	3.4 1.7	Knaul *et al*., (2006b)
Argentina	National Survey on Household Expenditure (NSHE) (n = 27,102)	1996/97			5.5	1.7	Cavagnero *et al.* (2006)
Bolivia	Bolivia Living Conditions Survey (n = 5,000)	1999 2002			4.8 3.7	1.7 1.2	Rivera *et al*. (2006)
Korea Rep	Household Expenditure Survey (n = 62,638)	1996 2001 2005	11.80 10.17 11.81	-	-	-	Lee (2011)
Bangladesh	Household Income Expenditure Survey (n= 7940)	1999/00	15.57	7.13	-	3.77	Van Doorslaer *et al*. (2006)
India	National Sample Survey, 55th round (n = 120,039)	1999/00	10.84	3.44	-	3.70	
Indonesia	Socio-Economic Survey (SUSENAS) (n = 218,568)	2001	4.43	1.95	-	0.68	
Vietnam	Living Standards Survey (n = 5,999)	1998	15.11	5.97	-	1.20	
Malaysia	Household Expenditure Survey (n = 9,198	1998/99	2.01	0.21	-	0.05	
Albania	Living Standards Measurement Survey (n = 15,434)	2005	20.79			2.80	Bredenkamp, Mendola and Gragnolati (2011)
Bosnia and Herzegovina	Living in Bosnia and Herzegovina Household Survey (n = 2,325)	2004	3.10			1.73	
Montenegro	Institute for Strategic Studies and Prognoses (ISSP) Household Survey (n = 8,205)	2004	1.14			0.40	
Serbia	Living Standards Measurement Survey (n = 7871)	2003	12.22			1.24	
Kosovo	Living Standards Measurement Survey (n = 16,013)	2000	26.32			6.26	
Cambodia	Cambodia Socioeconomic Survey (n = 6,000)	1999			5.02	-	Xu *et al*. (2003)
Colombia	National Quality of Life Survey (n = 9,042)	1997			6.26	-	

There are three Kenyan studies which used two nationally representative data sets for 2003 and 2007. There are other Kenyan studies, however, such as Perkins *et al*. (2009) and Barasa *et al*. (2012) which are plagued by problems such as unrepresentative samples, OOP costs associated with hospital admissions only and/or maternity care. Hence, they do not give a true picture of catastrophic health expenditures and impoverishment in Kenya.

Chuma and Maina (2012) applied the OôDonnel *et al*. (2008) method to estimate catastrophic health expenditures and impoverishment while Xu *et al*. (2006a) and Saksena *et al*. (2006) used Xu (2005) method. Saksena *et al.* (2006) measures both actual and potential incidence of catastrophic health expenditures by taking into account households which would have faced catastrophic health expenditures had they sought health care when they needed it. Chuma and Maina (2012) and Xu *et al*., (2006a) are based on households that actually sought health care.

Xu *et al*. (2006a) found that the proportion of households with catastrophic expenditure was four percent among all households and 10 percent among those whose member had used health services. According to Saksena *et al*. (2006) there is a significant difference between the total number of households potentially facing catastrophic expenditure and those that actually faced catastrophic expenditure. They found the incidence of catastrophic health expenditures was 3.4 percent among those who actually utilized, and 8.1 percent among potential users of health services. Thus, they concluded that including only those who utilized health services grossly understates the true burden of catastrophic health expenditure.

The Ugandan study by Xu *et al*. (2006c) illustrated the impact of eliminating user fees in public health facilities in 2001. Their findings show that the incidence of catastrophic health expenditures reduced from 4.82 in 1997 to 2.92 in 2003. Knaul *et al*. (2006a) also demonstrated that incidence of catastrophic health expenditures reduced after the introduction of Popular Health Insurance Scheme (PHIS) in Mexico in 2001. The incidence reduced from 3.4 in 1996 to 2.6 in 2004. These two studies illustrate that the reforms in these countries were effective in reducing the burden of OOP expenditures.

However, Lee (2011) showed that despite universal health insurance in Korea, the burden of catastrophic health expenditures still lingers. The author demonstrated this using nationally representative data sets from 1996 to 2005. The incidence of catastrophic health expenditures was 11.8 percent in 1996, went down to 10.2 percent in 2001 and increased to 11.8 percent in 2005 depicting a U-shape incidence of catastrophic health expenditures. The author notes that the National Health Insurance (NHI) system which achieved universal coverage in 1989, has never been comprehensive in terms of service coverage despite its universality in terms of population coverage. The insurer pays 70 percent of the expenditures on those services and items covered under NHI and the patients pay OOP for the remaining 30 percent and other services not covered by NHI. Thus, the high co-payments and other payments for services not covered by NHI could be attributed to the persistent high burden of catastrophic health expenditures. The same is reported in Argentina where insurance does not shield households from the burden of catastrophic expenditures (Cavagnero *et al*., 2006). Therefore, while having universal health insurance coverage is important, what matters more is the comprehensiveness of the coverage in terms of services and benefits.

Most studies reviewed showed that the poor were largely affected by catastrophic health expenditures. However, this is not the case in Thailand. Limwattananon *et al*. (2011) showed that between 2000 and 2006, the incidence of catastrophic health expenditures reduced from 4 percent to one percent amongst the poor, and from 5.6 percent to 3.3 percent among the richest quintile. The poorest quintile had the highest rate of reduction, 77.5 percent while the richest quintile had a 41 percent reduction over the six year period. They concluded that the low incidence of catastrophic health expenditures reflected the effectiveness of the universal coverage (UC) policy (introduced in 2001) in protecting households from medical care costs. They attributed this performance to design factors of the system, which included a comprehensive benefits package covering almost all interventions, services which are free at point of use and accessible and well-functioning service providers at the primary care level.

This section has revealed that irrespective of the method used to analyze catastrophic health expenditures, the figures that emerge are all positive implying that some level of catastrophic health expenditures were experienced. It has also provided evidence of countries which

implemented health reforms that were relatively successful in reducing the burden of catastrophic health expenditures. Hence, there are important lessons to learn from Thailand and Mexico on implementing successful reforms as well as from Korea on how to avoid some pitfalls.

4.2.1.3 Determinants of catastrophic health expenditures

Though many studies (described above) have examined the incidence of catastrophic health expenditures, only a few of them analyzed their determinants (Xu *et al*., 2006a; Xu *et al*., 2006c; Knaul *et al*., 2006b; Akinkugbe *et al*., 2011; Cavagnero *et al*., 2006; Rivera *et al*., 2006; Gotsadze *et al*. 2009; Su *et al*., 2006; Lamiraud *et al*., 2005 and Brinda *et al*., 2014). All these studies used logistic regression analysis to estimate determinants of catastrophic health expenditures.

A review of the literature identifies some important determinants of catastrophic expenditures as poverty, aging, chronic illnesses, low levels of insurance coverage, financing system, rural/urban differences, socio-economic status, types of illness, demographic composition of the household, and the characteristics of household head such as age, sex, education (Kawabata, Xu and Carrin, 2002; Xu *et al.,* 2003; and Galarraga *et al*., 2010).

There are a number of studies which have explored how health financing systems impact on the incidence of catastrophic health expenditures. Xu *et al.* (2003; 2007) found that rates of catastrophic spending are higher in poorer countries and those with limited prepayment systems. Xu *et al.* (2007) found that operating a tax-financed system or a social health insurance system makes no difference to the incidence of catastrophic expenditures. Van Doorslaer *et al.* (2007) argue that the low incidence of catastrophic spending in Sri Lanka, Malaysia and Thailand reflects the low reliance on OOP expenditures in financing health care and the limited use of user fees in the public sector. By contrast, the high rate of incidence in Korea reflects the high co-payments in the country's social insurance system and the partial coverage of inpatient care (Lee, 2011).

Health insurance reduces the risk of catastrophic health spending (Gakidou *et al.*, 2006; Galarraga *et al.*, 2010; Knaul *et al.*, 2006a; Lamiraud *et al.*, 2005; Limwattananon, Tangcharoensathien and Prakongsai, 2007; Xu *et al.*, 2006b). Gakidou *et al.* (2006) and Knaul *et al.* (2006a) found that the introduction of the Popular Health Insurance Scheme (PHIS) in Mexico from 2001 led to a reduction in the incidence of catastrophic health expenditures. Limwattananon *et al.* (2007) found that rates of catastrophic spending in Thailand were lower after the universal health care scheme was introduced in 2001. Lamiraud *et al.* (2005) found that in South Africa, social health protection can help to reduce incidence of catastrophic health expenditures. Xu *et al.* (2006b) found that those insured had a low financial burden than the uninsured.

Other studies which have examined the effect of health insurance on incidence of catastrophic health expenditures show the limitation of insurance in reducing and eliminating catastrophic health expenditures. Wagstaff (2007) found that even with the introduction of social health insurance scheme in Vietnam in 1993 and the subsequent extension of the scheme to the poor, poor households were still spending a high proportion of their income on health care and at considerable risk of catastrophic spending. Xu, *et al.* (2006b) found that with the introduction of health insurance in Vietnam, the rates of catastrophic expenditure for the non-poor declined between 2000 and 2003, while it surprisingly remained at the same level for the poor. They argue that this could be due to the frequent unavailability of drugs at government facilities after the removal of user fees, forcing patients to purchase drugs from the private sector. In Kenya, health insurance was not significant in explaining catastrophic health expenditures (Xu *et al*., 2006a). The authors argued that this could be due to limited insurance coverage both in terms of population and benefit package.

There are a few other studies which, surprisingly, have found a positive relationship between insurance and incidence of catastrophic health expenditures. In Zambia, health insurance did not provide financial protection against the risk of catastrophic expenditures, rather it increased the risk (Ekman, 2007a). Cavagnero, *et al.* (2006) found no evidence that households with social health insurance coverage are protected against catastrophic health

expenditures. They concluded that the issue is not so much the presence of health insurance coverage but the depth of the coverage in terms of benefits package.

Apart from health insurance, area of residence has also been confirmed as a significant determinant of catastrophic health expenditures. For example in Botswana, Akinkugbe *et al*. (2011) found that households in the rural areas were more likely to face catastrophic health expenditures compared to their urban-residing counterparts. Living in an urban area was protective against financial catastrophe in Kenya (Xu *et al*., 2006a), whereas in Uganda it was protective for the non-poor and not the poor (Xu *et al*., 2006c). However, in Georgia, the odds of facing catastrophic health spending were almost two times higher for the capital city residents compared to those households that received care in East and West Georgia (Gotsadze *et al*., 2009). They attributed this finding to the fact that there were higher costs of more complex health care services available in the capital, and relatively easy access to facilities in the capital city.

Characteristics of the household head (gender, education and working status) are also key in explaining catastrophic health expenditures. Being employed and having a higher level of education could be translated into more opportunities to cope with the financial burden such as borrowing money or selling assets. In Mexico, for example, Knaul *et al*. (2006b) found that education of the household head is associated with a lower probability of catastrophic health expenditures. Similarly in Uganda, having a household head with low education increased the odds of catastrophic health expenditures (Xu *et al*., 2006c). Female headed households and those with an educated household head were found to be less likely to face catastrophic health expenditures in Botswana (Akinkugbe *et al*., 2011). On the contrary, female-headed households are more likely to encounter financial catastrophe than households headed by males in Argentina (Cavagnero *et al*., 2006). However, the sex of the household head did not influence the probability of catastrophic expenditures among the poor in Uganda, but female-headed households were more likely to encounter financial catastrophe than those headed by males among the non-poor (Xu *et al*., 2006c). In Kenya and Argentina, Xu *et al*. (2006a) and Cavagnero *et al*. (2006) found that household head with high education and working, decreased the odds of catastrophic expenditure.

Su *et al*. (2006) found that economic status was a key determinant of catastrophic health expenditures in Burkina Faso. In Georgia, Gotsadze *et al*. (2009) found that households in the richest quintile were four times less likely to face catastrophic expenditure when compared with the poorest quintile. Catastrophic health expenditures were positively associated with the change in poverty in Mexico, implying that households had more income to spend on health as poverty declined (Knaul *et al*., 2006b). In Tanzania, low socioeconomic status of the household increased the probability for catastrophic expenses (Brinda *et al*., 2014).

Household characteristics such as size and composition have also been established as key determinants of catastrophic health expenditures. Household size signifies a combination of wealth and the number of people using health services. The young and the aging members of the households generally need more health services than others. In Lesotho and Burkina Faso, household size was positively associated with catastrophic health expenditures, whereas in Mexico, the opposite was true. The presence of a senior member and/or children in the household increases the risk of catastrophe in all the three countries (Xu *et al*., 2006c; Akinkugbe *et al*., 2011; Knaul *et al*., 2006b). In Kenya, having children aged below five years decreased the odds of catastrophic health expenditures (Xu *et al*., 2006a). However, this is explained by existence of special government policies targeted for this age group. In Argentina, households that have at least one senior member ï aged 65 or more ï are more likely to face catastrophic payments than younger people, and having children less than five years old is not a risk factor for facing catastrophic payments (Cavagnero *et al*., 2006).

Chronic disease is an important determinant of catastrophic health expenditure (Brinda *et al*., 2014). Household members with chronic illnesses are more likely to use health services, and therefore, have a higher probability of facing catastrophic expenditure. In Georgia for example, the odds of facing catastrophic expenditure were 4.4. and 27 times higher among households that have incurred expenditure for treating chronically ill persons and those with a case of hospitalization.

In Kenya, Xu *et al*. (2006a) found that use of outpatient services is associated with a small risk of incurring a catastrophic expenditure compared to use of inpatient services. In Uganda, using inpatient services was the most important risk factor for catastrophic expenditure among the non-poor, whereas for the poor, using private outpatient facilities was strongly associated with catastrophic expenditures (Xu *et al*., 2006c). Similarly for Argentina, the use of inpatient services is the most important risk factor for a financial catastrophe (Cavagnero *et al*., 2006). In Tanzania, utilizing traditional healer services significantly increased the likelihood of experiencing catastrophic health expenditures (Brinda *et al*., 2014).

4.2.1.4 Catastrophic expenditure and Impoverishment

Impoverishment in this context captures the extent to which catastrophic expenditure pushes people below the poverty line or further down the line (Wagstaff, 2008). Impoverishment due to health care payments are normally calculated as the difference between poverty estimates derived from household resources before paying for health care (gross of OOP payments) and after payments (net of OOP expenditure) (Wagstaff and Van Doorslaer, 2003; O'Donnel *et al*., 2008). Such a comparison is indicative of the scale of the impoverishing effect of health payments. According to Xu (2005), a non-poor household is impoverished by health expenditures when it becomes poor after paying for health services. This happens when household expenditure is equal to or higher than subsistence spending, but lower than subsistence net of OOP health expenditures.

Based on these two measurements of impoverishment, several studies have documented levels of impoverishment as shown in Table 4.1. Among the African studies, only the Kenyan studies by Chuma and Maina (2012) and Xu *et al*. (2006a) estimated impoverishment effect of OOP expenditure. They found that impoverishment due to health care payments was 1.5 percent in 2003 and 2.7 percent in 2007. Chuma and Maina (2012) indicated that about 1.48 million Kenyans are pushed below the national poverty line due to health care payments. Other studies estimating impoverishment are from Latin America and Asia, with impoverishment rates ranging from 0.05 percent in Malaysia to 6.26 percent in Kosovo. We did not find documented evidence of impoverishment in developed countries.

Wagstaff and van Doorslaer (2002) examined health care payments and poverty in Vietnam in 1993 and 1998 and found that the difference between the pre-payment and post-payment poverty headcount was around 3.5 percentage points, while the difference between the pre-payment and post-payment poverty gaps was around one percentage point.

Van Doorslaer, *et al.* (2006) used data from 11 Asian countries to compare pre-payment and post-payment poverty headcounts and poverty gaps using the World Bank's dollar-a-day poverty line. They found that the dollar-a-day poverty headcount is, on average, 2.7 percentage points higher after deducting OOP spending from household consumption. In Bangladesh, the difference is 3.8 percentage points, 3.7 percentage points in India and 2.6 percentage points in China. In Malaysia and Sri Lanka, by contrast, the difference is just 0.1 and 0.3 percentage points, respectively.

Limwattananon, *et al.* (2007) compared the incidence and the profile of catastrophic health expenditures and impoverishment due to household OOP expenditures in Thailand, for the periods before and after the introduction of universal health care coverage (UC). They found that UC policy had a major impact on reducing the overall incidence of catastrophic expenditure and impoverishment, and in minimizing the poverty gap. However, despite the free UC scheme, some households still faced catastrophic health expenditures and impoverishment due to lack of proper referral system. This resulted in the use of inpatient services in private and public hospitals outside the users' home provinces, where some of the services were not covered in the benefits package. Knaul, *et al.* (2006a) reported that the difference between the pre-payment and post-payment poverty gap narrowed following the introduction of the Popular Health Insurance scheme in Mexico.

4.2.3 Overview of Literature

Literature shows that there is empirical evidence that OOP expenditures lead households to experience financial catastrophe and impoverishment. In summary, the review of the literature shows the incidence and depth of catastrophic health expenditures and impoverishment for different countries. A few studies estimated the determinants of catastrophic health expenditures. The review has clearly shown that estimates of

impoverishment are lacking in Africa, yet there is documented evidence of high incidence of catastrophic health expenditures in African countries. In addition, all the studies reviewed have used either of the approaches discussed in the literature review for estimating catastrophic expenditures and impoverishment. None has used both methods in the same study. This thesis adds to the existing literature by applying both methods to estimate catastrophic health expenditures and impoverishment. By so doing, one is able to compare findings with other studies that used either of the methodologies. After estimating the incidence of catastrophic health expenditures and impoverishment, many studies have not estimated their determinants. Yet, identification of household level factors that explain variation in the incidence of catastrophic payments makes it possible to draw policy recommendations. .

4.3 Models for Analyzing Poverty Effects of Catastrophic Expenditures

This section briefly discusses the two methodologies used for analyzing the association between catastrophic health expenditures and impoverishment. For detailed descriptions of the methodologies see Wagstaff and van Doorslaer (2002); O'Donnel *et al*. (2008) and Xu (2005). In these methodologies, the incidence of catastrophic payments is defined as OOP expenditures exceeding a threshold budget share. The two commonly used thresholds are 10 percent of total income or 40 percent of non-food income. Xu uses 40 percent of capacity to pay. We begin by discussing Wagstaff and van Doorslaer (2002) methodology followed by Xu (2005) methodology.

4.3.1 Wagstaff and van Doorslaer Methodology

To calculate catastrophic expenditure headcount ratio which is the percentage of households incurring catastrophic expenditures, T_i is defined as OOP health expenditures for household i, x_i total expenditure for household i, and $f(x)$ food expenditure. A household is said to have incurred catastrophic payments if T_i/x_i, or $T_i/[x_i-f(x)]$ exceeds a specified threshold, z. The headcount is then given by:-

$$H = \frac{1}{N}\sum_{i=1}^{N} E_i \qquad (4.1)$$

where N is the sample size and E_i, equals 1 if *Ti/xi (*or $T_i/[x_i\text{-}f(x)]) > z$ and zero otherwise.

The headcount ratio does not reflect the amount by which households exceed the threshold. Catastrophic expenditure overshoot, which captures the average degree by which health expenditures (as a proportion of total expenditure or non-food expenditure) exceed the threshold *z* is therefore used. The overall overshoot O is given by:

$$O = \frac{1}{N}\sum_{i=1}^{N} O_i \qquad \text{where } O_i = E_i\,((T_i/x_i)\ \bar{\imath}\ z) \qquad (4.2)$$

The incidence and the intensity of catastrophic expenditures are related through the mean positive overshoot (MPO), which captures the intensity of occurrence of catastrophic expenditures defined as:

$$MPO = \frac{O}{H} \qquad \rightarrow \qquad O = H \text{ x } MPO \qquad (4.3)$$

Standard methods of measuring poverty do not take into account OOP payments for health care. If extreme, OOP expenditures could lead to poverty. Wagstaff and van Doorslaer (2002) describe methods to adjust poverty measures on the basis of household expenditure net of OOP spending on health care. The three measures of poverty include; a) Poverty headcount, which is the proportion of households living below the poverty line; b) Poverty gap, referring to the aggregate of all shortfalls from the poverty line; and c) Normalized poverty gap obtained by dividing the poverty gap by the poverty line. Calculating the three measures requires setting a poverty line and assessing the extent to which health care payments push households below it. The official national poverty line for Kenya is Ksh. 1,257 per person per month and this was used in this study to estimate poverty levels before

and after health care payments[14]. The difference between the relevant poverty measures before and after paying for healthcare is the poverty impacts of OOP payments. These are given as:-

$$PI^{H} = H_{pov}^{post} - H_{pov}^{pre} \tag{4.4}$$

Equation (4.4) represents the difference between poverty headcount after and before paying for health care, which is the poverty impact (impoverishment) due to OOP expenditures or impoverishment headcount. It represents the proportion of households that were impoverished as a result of paying for health care.

$$PI^{G} = G_{pov}^{post} - G_{pov}^{pre} \tag{4.5}$$

Equation (4.5) represents the difference between poverty gaps before and after health payments which is the impoverishment gap. It shows the average deficit in Kenya shillings to reach the poverty line.

$$PI^{NG} = NG_{pov}^{post} - NG_{pov}^{pre} \tag{4.6}$$

Equation (4.6) is the difference between normalized poverty gaps before and after health payments which is the normalized impoverishment useful for international comparisons.

4.3.2 The Xu Methodology

Xu (2005) estimates catastrophic health expenditures based on capacity to pay. The methodology requires data on OOP health expenditure, household consumption expenditure (exp), food expenditure (food), poverty line (pl), household subsistence spending (se) and the householdôs capacity to pay for health care (ctp).

[14] For a detailed discussion on poverty concepts and measurements, refer to chapter five on out-of-pocket expenditures and poverty.

Out-of-pocket health expenditures refer to payments made by households at the time of receiving health services. They include doctorsô consultation fees, purchases of medication and hospital bills. In addition, insurance reimbursements are deducted from OOP expenditures.

Household consumption expenditure comprises both monetary and in-kind payment on all goods and services (excluding health care services), and the money value of the consumption of home-made products. Household food expenditure is the amount spent on all foodstuffs by the households, plus the value of familyôs own food production consumed within the household. However, it excludes expenditure on alcoholic beverages, tobacco, and food consumption outside the home (e.g. hotel and restaurants).

The methodology uses adult equivalent household size rather than actual household size. The reason for equivalizing is to put them on a comparable basis, considering that a lone adult does not require the same food expenditure as a family of four. However, importantly but less obvious, economies of scale mean that the family of four does not require four times the level of food expenditure. This means that achieving comparability is not simply a case of dividing household expenditure by the number of people in the household. Rather, an agreed scale is used to adjust the expenditures to reflect the household composition and size, thus put them on a like-for-like basis. This process is known as 'equivalization'. The equivalence scale used in this study is 0.56[15], which implies that food consumption increases with additional household members, but the increase in consumption is less than proportional to the increase in household size (Xu *et al.,* 2003).

To minimize the measurement error considering that the poorer the household the higher the share of total income or consumption devoted to food (Xu *et al.*, 2003), calculations of subsistence expenditures and poverty line are based on the average food expenditure of households whose food expenditure share of total expenditures is in the 45-55 percentile

[15]The value of the parameter *β* has been estimated from previous studies based on 59 countries' household survey data, and it equals 0.56 (see Xu *et al.*, 2003). Due to the wide coverage of the study of more than 80 percent of world population, the equivalence scale has been applied in many other countries, including Kenya (Xu *et al*. 2006a)

range. This is the subsistence expenditure per (equivalent) capita, which is also the poverty line (*pl*):-

$$pl = \frac{\Sigma w_h * eqfood_h}{\Sigma w_h} \quad (4.7)$$

Where w_h is the equivalized household size in the 45th to 55th percentile range and $eqfood_h$ is the equivalized food expenditure. The subsistence expenditure for each household (se_h) is derived by:-

$$se_h = pl*eqsize_h \quad (4.8)$$

A household is regarded as poor ($poor_h$) when its total household expenditure is smaller than its subsistence spending.

$Poor_h = 1$ if $exp_h < se_h$ and $Poor_h = 0$ if $exp_h \geq se_h$ (4.9)

Household capacity to pay is then defined as a household non-subsistence spending. Food expenditure may be lower than subsistence spending for some households, implying that the householdôs food expenditure is under the estimated poverty line. This could be as a result of the fact that reported food expenditure in the survey does not consider food subsidies, self-production and other non-cash means of food consumption. In that case, the non-food expenditure is used as non-subsistence spending.

$$ctp_h = \exp_h - se_h \quad if\ se_h \leq food_h$$
$$ctp_h = \exp_h - food_h \quad if\ se_h > food_h \quad (4.10)$$

The burden of health expenditures is defined as the OOP expenditures as a percentage of a householdôs capacity to pay.

$$oopctp_h = \frac{oop_h}{ctp_h} \quad (4.11)$$

Catastrophic heath expenditure occurs when a householdôs total OOP health expenditures are equal to or exceed 40 percent of householdôs capacity to pay or non-subsistence spending.

Catastrophic health expenditure is constructed as a dummy variable with value 1 indicating a household with catastrophic expenditure, and 0 without catastrophic expenditure.

$$cata_h = 1 \quad if \ {oop_h}/{ctp_h} \geq 40\%$$

$$cata_h = 0 \quad if \ {oop_h}/{ctp_h} < 40\% \qquad (4.12)$$

A non-poor household is impoverished by health expenditures when it becomes poor after paying for health services. The variable generated to reflect impoverishment ($impoor_h$) is a dummy variable taking the value of 1 when household expenditure is equal to or higher than subsistence spending, but is lower than subsistence spending net of OOP health expenditures, and 0 otherwise.

$impoor_h$ = 1 if $exp_h \geq se_h$ and $exp_h - oop_h < se_h$, otherwise, (4.13)

$impoor_h$ = 0

4.3.3 A Logit Model of Catastrophic Expenditure Incidence

Following other studies in the literature (Xu *et al*., 2006a; Xu *et al*., 2006c; Knaul *et al*., 2006b; Akinkugbe *et al*., 2011; Cavagnero *et al*., 2006; Rivera *et al*., 2006; Gotsadze *et al*. 2009; Su *et al*., 2006; Lamiraud *et al*., 2005 and Brinda *et al*., 2014), the logistic regression model is applied to the analysis of determinants of catastrophic health expenditure. The unit of analysis is the household. The dependent variable is occurrence of catastrophic expenditure (cata) defined as 1 when the household faces catastrophic health payments, and 0 otherwise.

Based on the logistic distribution function, the probability of a household facing catastrophic expenditure is:

$$\Pr(cata = 1|X) = F(X\hat{\delta}\hat{b}) = e^{X\hat{\delta}\hat{b}} / (1 + e^{-X\hat{\delta}\hat{b}}) \qquad (4.14)$$

The associated odds ratios can be written as follows:

$$OR = \frac{P}{1-P} = \frac{\Pr(cata = 1 \mid X)}{\Pr(visit = 0 \mid X)} = e^{x'\beta} \qquad (4.15)$$

The odds ratios formulation is relevant if the only data available for estimation are at the group rather than individual level. In the event of individual level data, the probability of experiencing catastrophic health expenditures is determined by an underlying latent variable, y*, with a dichotomous realization on the dependent variable. The dependent variable, cata, is measured as follows:

$$y_i = \begin{cases} 1 & if \ y_i^* > 0 \\ 0 & if \ y_i^* \le 0 \end{cases} \qquad (4.16)$$

y* is defined by the following regression relationship.

$$y^* = \sum X'\beta + \varepsilon \qquad (4.17)$$

Ůis a random error term assumed to follow a logistic distribution. X is a set of independent variables which, in our case, include insurance cover, inpatient and outpatient health care utilization, area of residence, log of expenditure, household size, household headôs characteristics (such as education level, working status and gender), chronic illness, having household members aged 65 years and above (senior), and children below five years. The model is estimated by maximum likelihood.

4.3.3.1 Variables

Table 4.2 shows a summary of the variables used in estimating determinants of catastrophic health expenditures.

Table 4.2: Definition of Variables and Measurement

Variable name	Measurement	Expected effect
Catastrophic health expenditure	1 if a household experiences a catastrophic health expenditure; 0 otherwise	é
Insurance cover	1 if a household has some form of insurance cover (either private or NHIF); 0 otherwise	Negative
Inpatient	1 if a member of household was an inpatient within one year prior to survey; 0 otherwise	Positive
Outpatient	1 if a household member visited a health facility or doctor one month prior to the survey; 0 otherwise	Positive
Area of residence	1 if the household is located in an urban area; 0 otherwise	Negative
Log of expenditure	The natural log of household monthly expenditure	Negative
Household size	Number of members in the household	Positive
Male headed household	1 if the head of household is a male; 0 otherwise	Negative
Household head education level	1 if the head of household has secondary school level of education and above; 0 otherwise	Negative
Chronic illness	1 if a member of household has a chronic illness; 0 otherwise	Positive
Senior	1 if a household has a member aged 65 years and above; 0 otherwise	Positive
Child	1 if a household has a child aged five years and below; 0 otherwise	Positive
Household head working status	1 if the head of household is working; 0 otherwise	Negative

4.4 Results

4.4.1 Catastrophic Health Expenditures

The results for incidence and intensity of catastrophic health expenditures are presented in Table 4.3. They are defined for health expenditures as a share of total household expenditure, nonfood expenditure and capacity to pay using various threshold budget shares. Incidence of catastrophic expenditures decreases as the thresholds increase. As the threshold is raised from 10 percent to 25 percent of total expenditure, the estimate of the incidence of catastrophic payments falls from 14.35 percent to 7.06 percent, and the average overshoot drops from 3.04 percent of expenditure to only 1.61 percent.

However, the mean positive overshoot (MPO) does not decline as the threshold is raised. At 40 percent of nonfood expenditures threshold, the incidence is 9.84 percent compared to the incidence of 11.17 percent at threshold of 40 percent of capacity to pay.

Table 4.3: Incidence and Intensity of Catastrophic Health Expenditures

Catastrophic payment measures	**Threshold budget share z**			
OOP as share of total expenditure	**10%**	**15%**	**25%**	**40%**
Headcount (%)	14.35	10.78	7.06	
Overshoot (%)	3.04	2.43	1.61	
Mean Positive Overshoot (%)	21.18	22.54	22.80	
OOP as share of nonfood expenditure				
Headcount (%)		20.77	14.53	9.84
Overshoot (%)		5.52	3.93	2.33
Mean Positive Overshoot (%)		26.58	27.05	23.68
OOP as share of capacity to pay				
Headcount (%)			14.84	11.17

Source: Authorôs Computation

Table 4.4 shows incidence of catastrophic health expenditures by province. When threshold is set at 10 percent of total expenditure, Eastern province has the highest incidence of catastrophic expenditures and North Eastern the lowest incidence. However, at thresholds of 40 percent of nonfood expenditure and capacity to pay, Rift Valley has the highest number of households experiencing catastrophic expenditure, probably because it also had the highest utilization after Nairobi province (Figure 3.1). North Eastern had the lowest incidence of catastrophic expenditure when thresholds were set at 10 percent of total expenditure, and 40 percent of capacity to pay possibly due to the fact that it also had the lowest utilization (Figure 3.1).

Table 4.4: Incidence of Catastrophic Health Expenditures by Province

	Wagstaff and van Doorslaer Methodology						Xu Methodology
	OOP as share of total expenditure			OOP as share of nonfood expenditure			OOP as share of capacity to pay
Province	**10%**	**15%**	**25%**	**15%**	**25%**	**40%**	**40%**
Nairobi	14.23	11.17	8.10	16.90	12.35	8.99	8.79
Central	12.95	9.43	6.52	17.92	12.01	8.83	10.29
Coast	11.70	7.77	4.31	18.41	12.75	7.19	8.44
Eastern	17.68	13.07	8.71	24.83	17.42	11.67	13.94
North Eastern	8.41	5.87	3.13	18.79	12.52	7.24	6.85
Nyanza	14.32	10.40	5.71	20.97	12.79	7.33	9.97
Rift Valley	16.06	13.01	9.03	23.67	18.19	13.65	16.20
Western	15.71	12.29	8.46	22.56	16.11	11.48	10.80
Total	**14.35**	**10.78**	**7.06**	**20.77**	**14.53**	**9.84**	**11.17**

Source: Authorôs Computations

Table 4.5 shows incidence of catastrophic health expenditures by quintiles. For all the thresholds, the poorest had the highest number of households experiencing catastrophic health expenditures.

Table 4.5: Incidence of Catastrophic Health Expenditures by Quintiles

	Wagstaff and van Doorslaer Methodology						Xu Methodology
	OOP expenditure as share of total expenditure			OOP expenditure as share of nonfood expenditure			OOP as share of capacity to pay
Quintile	**10%**	**15%**	**25%**	**15%**	**25%**	**40%**	**40%**
Poorest	17.74	13.71	9.44	28.55	21.72	16.56	19.7
Second	13.59	9.2	5.7	23.09	14.78	9.26	12.11
Middle	**12.17**	**8.91**	**5.58**	18.76	12.05	7.36	9.09
Fourth	12.95	10.21	6.41	17.04	12.53	8.02	8.37
Richest	13.72	10.21	6.47	**14.96**	**9.98**	**6.35**	**6.53**

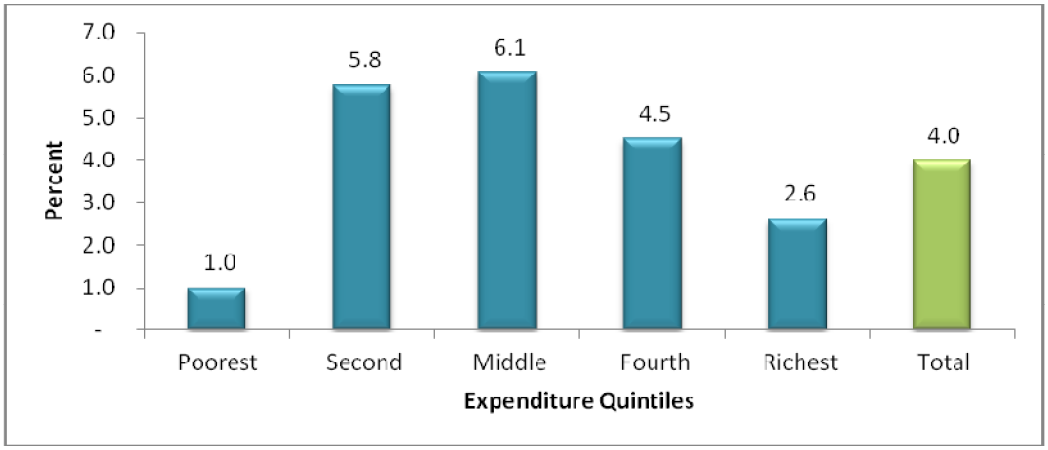
Source: Authorôs Computation

When the threshold is set at 10 percent of total expenditure, the middle quintile had the lowest incidence but at 40 percent of nonfood expenditure and of capacity to pay, while the richest quintile had the lowest incidence of catastrophic health expenditures. This confirms O'Donnel *et al*. (2008) assertion that nonfood expenditure threshold may better detect catastrophic payments among the poor.

4.4.2 Household Impoverishment

Out-of-pocket expenditures led to financial difficulties for some households, and pushed others into poverty. Figure 4.1 presents results of estimates of impoverishment using Xu methodology.

Figure 4.1: Household Impoverishment by Expenditure Quintiles

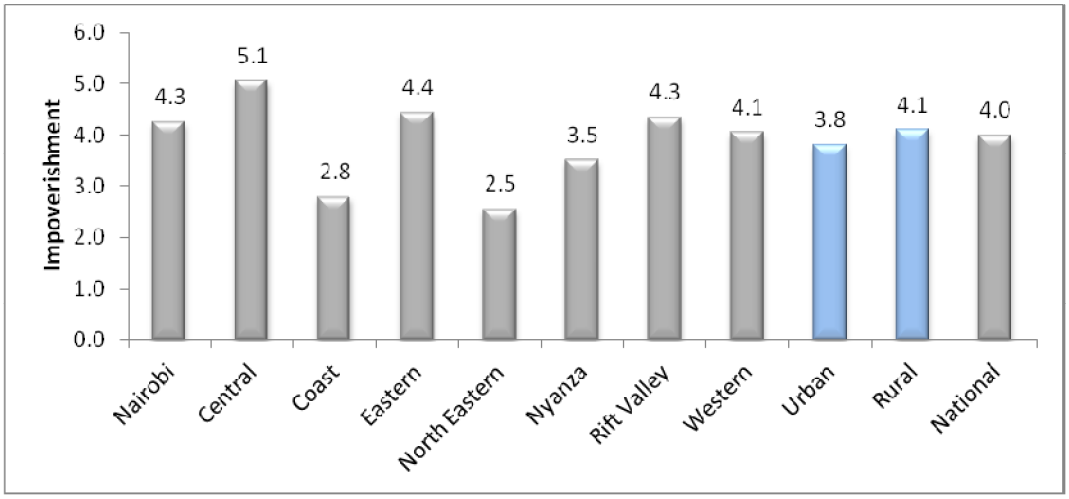


The results show that four percent of the households who used health services were impoverished and that the highest impoverishment of 6.1 percent occurred in the middle quintile, and the lowest impoverishment in the poorest quintile. This is because they were already under the poverty line before health payments, an implication that it is households with higher total expenditure that are more likely to spend a large fraction of those resources on health care. This reflects the inability of the poorest of the poor to divert resources from basic needs.

Figure 4.2 presents impoverishment by province. Central province experienced the highest impoverishment and North Eastern province the lowest. This could be explained by the fact that majority of those who were impoverished were from the middle quintile and Central has

the majority of her population (25%) being from this quintile. Nairobi province has majority of her residents from the richest quintile, while in Rift Valley province, the majority are from the poorest quintile. This also could explain the fact that though Rift Valley province had the highest incidence of catastrophic health expenditures, it was not the most impoverished because the poorest quintile, which makes up the majority in Rift Valley, had the least impoverishment.

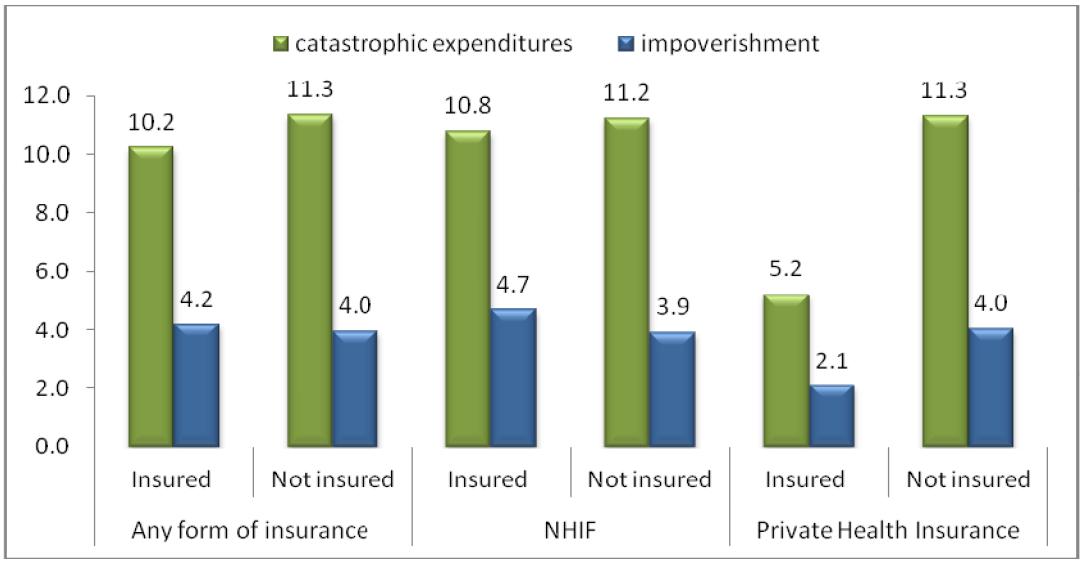
Figure 4.2: Impoverishment by Province



4.4.2.1 Catastrophic health expenditures and impoverishment by insurance coverage

Figure 4.3 shows that those who did not have any form of insurance experienced higher incidence of catastrophic health expenditures than those who had. However, having NHIF insurance does not seem to shield people from impoverishment. Indeed, those with NHIF cover experienced higher impoverishment than those who did not have. This could be explained by the limited benefit package which accompanies NHIF compared to private health insurance. On the other hand, private health insurance seems to effectively shield people from both incidences of catastrophic health expenditures and impoverishment. Only five percent and two percent of those who had private insurance experienced catastrophic health expenditures and impoverishment, respectively.

Figure 4.3: Catastrophic Health Expenditures and Impoverishment by Insurance



Household impoverishment was also estimated by calculating poverty levels using consumption expenditure before making health care payments and after paying for health care (Wagstaff and van Doorslaer methodology). Both the headcount (the proportion of households living below the poverty line) and the poverty gap (the aggregate of all shortfalls from the poverty line which is the poverty headcount multiplied by the average deficit of the poor from the poverty line) were calculated. The national poverty line of Ksh. 1,257 per person per month was used to estimate poverty levels before and after health care payments. Table 4.6 shows poverty headcount and gap before and after paying for health care.

Table 4.6: Poverty Headcount and Gap before and After OOP payments

	Gross of health payment (1)	Net of health payments (2)	Difference	
			Absolute (3) = (2) - 1)	Relative [(3)/(1)*100]
Kshs 1257 per month poverty line				
Poverty headcount (%)	49.18	52.28	3.1	6.3
Poverty Gap	4930	5374	444	9%

Source: Authorôs Computations

The results show that 49.18 percent of individuals were living below poverty line before paying for health care. After paying for health care, the headcount increased by 3.1 percent.

This represents an increase of 6.3 percent of population or 2.5 million individuals falling into poverty as a result of paying for health care. The average shortfall from the poverty line (the poverty gap) was Ksh 4,930 before accounting for health care payments and Ksh 5,374 after accounting for health care payments. This represents an increase in poverty gap of nine percent.

Table 4.7 shows some sample characteristics of variables used in estimations.

Table 4.7: Description of the Analytic Sample (N = 8,453)

Variable	Mean	Std. Dev.	Range	
Catastrophic Expenditure	0.112	0.315	0	1
Insurance Cover	0.148	0.355	0	1
Child	0.432	0.495	0	1
Senior	0.130	0.336	0	1
Chronic	0.244	0.429	0	1
Inpatient	0.095	0.293	0	1
Outpatient	0.476	0.499	0	1
Male headed household	0.711	0.453	0	1
Educated household head	0.323	0.468	0	1
Area of residence	0.313	0.464	0	1
Income	12,769	36,803	17	1,651,367
Household size	4.540	2.372	1	15
Working Head of Household	0.770	0.421	0	1
Health care utilization	0.512	0.500	0	1

Source: Authorôs Computation, KHHEUS 2007.

The statistics show that out of those who sought health care, 11.17 percent experienced catastrophic health expenditures and 14.8 had some form of insurance cover. Ten percent and 47.6 percent of the respondents utilized inpatient and outpatient care respectively. On average, a household spent Ksh 12,769 per month as household expenditure. Among the household characteristics, 30.7 percent were poor, 71 percent were male-headed households,

32 percent had an educated household head and the average household size was five members. With regard to household composition, 24 percent of the households had at least one member with a chronic illness, 13 percent with a senior member aged 65 years and above, and 43 percent had a child below five years.

4.4.3 Correlates of Catastrophic Health Expenditure

Table 4.8 presents logit results for determinants of catastrophic health expenditures.

Table 4.8: Logit Results: Dependent Variable is Catastrophic Expenditure Dummy

Variable	Odds Ratio	dy/dx	Coef.	Std. Err.	P>IzI
Insurance cover	1.072	0.006	0.069	0.121	0.539
Child	0.892	-0.010	-0.114	0.066	0.123
Senior	0.929	-0.007	-0.074	0.103	0.506
Chronic	0.956	-0.004	-0.045	0.081	0.599
Male headed household	0.900	-0.010	-0.105	0.071	0.184
Educated household head	0.959	-0.004	-0.042	0.086	0.640
Working household head	1.061	0.005	0.059	0.092	0.496
Residence	1.150	0.013	0.139	0.100	0.108
Log of income	0.603	-0.046	-0.506	0.023	0.000
Log of household size	1.776	0.052	0.574	0.143	0.000
Inpatient	1.261	0.023	0.232	0.144	0.042
Outpatient	1.197	0.016	0.180	0.087	0.013
Constant	3.522		1.259	1.127	0.000
No. of observations = 8422				Prob>chi2 = 0.000	
LR chi2 (12) = 241.93				Pseudo R2 = 0411	

The coefficients on outpatient and inpatient care utilization are positive and statistically significant at 5 percent. This means that utilizing either outpatient or inpatient health services is positively associated with the risk of incurring a catastrophic health expenditure. Being an outpatient increases the probability of incurring catastrophic health expenditures by 0.016.

On the other hand, inpatients have a .023 higher probability of incurring a catastrophic health expenditure.

Income is a significant determinant of catastrophic health expenditures. The results show that increasing income by one percent reduces the probability of incurring catastrophic health expenditures by 3.5 percent. The findings suggest that households with higher incomes are less likely to incur catastrophic health expenditures than poorer households.

An increase in household size by one unit will increase the probability of incurring catastrophic health expenditures by 4.4 percent. Larger household size means higher probability of someone being ill. Moreover, if the disease is contagious, then it is more likely that more persons will be sick in a larger household. As a result, we would expect that expenditure on health care to be higher in larger households. Since larger health expenditure is more likely to result in catastrophic health expenditure, then household size is also expected to increase the probability of catastrophic health expenditure.

Health insurance cover, area of residence, gender, working status and education level of household head, having a household member with chronic illness, being over 65 years and/or below five years, are all not significant in explaining catastrophic health expenditures in Kenya.

4.5 Discussion of Results

This chapter has provided very intuitive results. First, the estimation of catastrophic health expenditures and impoverishment using Xu (2005) methodology shows that 11 percent of household who utilized health care incurred catastrophic health expenditures and 4 percent were impoverished. Xu *et al.* (2006a) found that 10 percent of those who used health services experienced catastrophic health expenditures, and 3.5 percent were impoverished by health payments. This means that the incidence of catastrophic health expenditures increased by one percentage point in the four year period. The two studies are comparable since they both used the same Xu (2005) methodology and data collected by the same agency which ensured, as much as possible, that the same households that were interviewed in 2003 were interviewed in 2007 (Government of Kenya, 2009).

Using Wagstaff and van Doorslaer (2002) methodology, the incidence of catastrophic expenditure was found to be 14.35 percent when the threshold was set at 10 percent of total expenditure and 10 percent when the threshold was set at 40 percent of nonfood expenditure. O'Donnel *et al.* (2008) suggest that if health spending is income elastic, nonfood expenditure may be preferred for the denominator of the budget share to better detect catastrophic payments among the poor. The result of catastrophic incidence of 10 percent when threshold is 40 percent of nonfood expenditure, is close to the result of catastrophic incidence using Xu (2005) methodology. A recent study by Chuma and Maina (2012) used the same 2007 Household Expenditure and Utilization Survey data and found that at 10 percent of total expenditure threshold, the incidence of catastrophic expenditures was 15.5 percent, and at 40 percent of nonfood expenditure threshold, the incidence was 11 percent. These findings suggest that some Kenyans bear a big burden of OOP expenditures.

The incidence of catastrophic expenditures is lower when OOP expenditures are expressed as a percent of total expenditure than of nonfood expenditure and capacity to pay. This implies that food expenditure forms a high proportion of total expenditure, and this is typical of low income countries (Chuma and Maina, 2012).

Further analysis of our findings shows that the poor are the most affected by catastrophic health expenditures. High incidence among the poor shows that OOP expenditures are regressive and there is lack of protection of the poor against such high spending. Regression results reveal that increasing income by one percent reduces probability of incurring catastrophic expenditures by 3.5 percent, and an increase in poverty by ten percent increases the probability of incurring catastrophic expenditures by 30 percent. The implication here is that failure to establish avenues and mechanisms for increasing incomes and reducing poverty will continue to push more people into poverty due to high costs of illness.

The difference between poverty estimates derived from household expenditures gross and net of OOP payments for health care correspond to the number of individuals that are driven into poverty by OOP payments. Our findings show that about 2.5 million Kenyans were pushed below the national poverty line due to OOP expenditures. The poverty gap also increased by Ksh 440, probably due to non-poor individuals falling below the poverty line and poor

individuals falling further below the poverty line. The study by Xu *et al.* (2006a) found the poverty gap increased by Ksh 336 shillings per year in 2003 due to paying for health services. Hence, OOP expenditures are a major barrier of development. However, this finding should be interpreted with caution. It does not provide an estimate of how poverty would change if some form of pre-payment replaced OOP financing of health care. Identification of such an effect would require tracing the impact of such a reform on households' utilization of health care, work effort, consumption and savings. Nonetheless, the figure is informative of the magnitude of the impoverishing effect of payments for health care that is not currently reflected in poverty estimates. It tells us how many individuals are not counted as poor despite the fact that the value of their consumption of all goods and services, other than health care, is less than the national poverty line of Ksh 1,257 per person per month.

A study by van Doorslaer *et al.* (2006) found that after estimating poverty gross and net of OOP expenditures in 11 Asian countries, Indonesia had the lowest incidence of households being pushed into poverty due to health care payments. The authors contended that one possible explanation for Indonesia's apparent success in shielding poor families from high payments for health care was its policy of targeted exemptions, implemented through a health card.

From the logit regression results, health insurance coverage does not appear to be a significant determinant of catastrophic expenditures in Kenya. This could be due to the limited number of Kenyans with any form of health insurance. In addition, majority of those with any form of insurance are covered by NHIF, which only covers bed costs related to inpatient stays. Therefore, a substantial part of inpatient costs as well as outpatient services is paid through OOP. The descriptive analysis shows that those with private insurance incurred less impoverishment compared to those with NHIF coverage. However, private insurance is afforded mostly by higher income earners due to the high premiums involved. Thus, it is not surprising that the current insurance has no effect on protecting households from catastrophic expenditure, although it plays a certain role in reducing some households' financial burden.

The findings on insignificance of insurance as a determinant of catastrophic health expenditures are supported by findings in Hong Kong, where private health insurance cover was not associated with the risk of catastrophic payments (O'Donnell *et al.*, 2005). However in Thailand, the same authors found that those without cover were 40 percent more likely than those with universal coverage insurance cover to incur catastrophic payments. Therefore, significance of insurance coverage to catastrophic health expenditures differs from country to country depending on factors such as the depth of the coverage.

As expected, use of inpatient care contributes more to catastrophic expenditures than outpatient care. However, people utilize outpatient care more than inpatient care. For example, our analysis shows that 48 percent of the households utilized outpatient care compared to 10 percent who utilized inpatient care. Thus, overall, outpatient care is expensive, hence there is need to include outpatient benefit packages in the NHIF scheme.

While this chapter contributes to a better understanding of the impact of OOP expenditures on catastrophic expenditures and impoverishment, it does have some limitations. First, the analysis does not capture all potentially catastrophic effects of illness or disability such as lost earnings, and all households that postpone their health care for lack of financial resources. Secondly, because of inconsistencies in the categorization of OOP payments, the study does not attempt to identify the catastrophic and poverty impacts of specific categories of payments. Some respondents reported total OOP without categorizing into drugs, consultation fees, registration among others. This would not only have helped us to know which category of payment contributed most to catastrophic expenditures and impoverishment, but also the most important area of policy to be considered in order to address the catastrophic and impoverishment impacts of OOP expenditures.

Though there are two Kenyan studies (Xu *et al*., 2006a; Chuma and Maina, 2012) which estimated catastrophic health expenditures and impoverishment for Kenya, this study differs from them in a few aspects. First, Xu *et al*. (2006a) used 2003 data set and used Xu (2005) methodology. This study uses the 2007 data set. Secondly, Chuma and Mainaôs (2012) study uses Wagstaff and van Doorslaer (2002) and does not estimate the determinants of CHE.

None of the studies applies both methodologies as is the case with this study. By using both methodologies, one is able to compare findings from either of the studies.

This chapter has estimated catastrophic health expenditures and impoverishment effects of OOP expenditures. However, though it has established that poverty headcount increased by 3.1 percent due to health care payments, one cannot tell precisely whether the increase was due to OOP expenditures or other factors. This can only be established by linking OOP expenditures to poverty empirically, while controlling for confounding factors. This empirical investigation is carried out in the chapter five.

CHAPTER 5 : OUT-OF-POCKET EXPENDITURE AND POVERTY

5.1 Introduction

Kenya's development efforts since independence have emphasized poverty reduction through economic growth, employment creation and the provision of basic social services (Kimalu *et al*. 2002). Although the commitment to fight poverty has remained strong, these efforts have not yielded the expected results, with almost half of the countryós population living in poverty (Kristjanson *et al.*, 2010).

With positive economic growth, a peaceful political transition, a new constitution and a rapidly growing and educated labour force, Kenya has growing potential to tackle poverty (World Bank, 2013). In 2005, 47 percent of the population was estimated to be living in poverty (World Bank, 2008). It is not known with certainty how poverty has changed, as there has not been another nationally representative household budget survey since 2005. However, World Bank projections using national accounts data and based on strong assumptions suggests that Kenya's poverty rate is in the range of 34 and 42 percent (World Bank, 2013).

A large number of studies on poverty in Kenya, its measurement and determinants exist (Greer and Thorbecke, 1986; Mukui, 1994; Government of Kenya, 2000; Mwabu *et al*., 2000; Oyugi, 2000; Manda, Kimenyi and Mwabu, 2001; Geda *et al*.; 2001; Kabubo-Mariara *et al*., 2006, Mberu *et al*., 2011). They identify age, size of household, place of residence, level of schooling, livestock holding, sanitation, gender and marital status of household head, and employment as key determinants of poverty (Mwabu *et al*., 2000; Oyugi, 2000; Kabubo-Mariara *et al.*, 2006; Mberu *et al*., 2011). Though qualitative studies have identified health shocks and health payments as important determinants of poverty, they have not been included in modeling poverty determinants in Kenya. Including these variables will provide firm empirical evidence of their effects on poverty.

Sicknesses and accidents drain the wealth of individuals and can impoverish their households. Besides treatment costs, households bear the cost of productive time lost from work, as well as opportunity costs due to days spent taking care of ill family members. The

combined costs and loss of income for a serious illness or injury can force individuals and households to cut nonmedical consumption. These costs perpetuate poverty for the poor and push those above the poverty line into poverty.

Qualitative studies have also suggested a large impoverishing effect of health care payments. The World Bank *Voices of the Poor* study found that after illiteracy and unemployment, health costs were reported as the most important precursor to poverty among the poor (Narayan, 2000). A retrospective study in 35 villages in Rajasthan, India, found that health and health expenses were one of three main causes behind 85 percent of all cases of impoverishment (Krishna, 2004). One-half to two-thirds of all households falling into poverty mentioned ill-health and health expenses as a contributory cause.

While such qualitative evidence on impoverishing effects of health shocks and health payments exist, firm empirical studies on health related determinants of poverty in Kenya are lacking. This thesis builds on the existing studies on determinants of poverty to analyze the health related determinants of poverty, specifically health care utilization, chronic illness and catastrophic health expenditures.

After estimating incidence of catastrophic expenditures and impoverishment, many studies (Chuma and Maina, 2012; Lee, 2011; Wagstaff and van Doorsaer, 2002; Mendola *et al*., 2007; van Doorslaer *et al*., 2007) fail to assess the impact of out-of-pocket expenditures on poverty, while controlling for confounding factors. Hence, we cannot tell whether the impoverishment was due to OOP expenditures or other confounding factors. This thesis investigates the impact of OOP expenditures on household poverty in Kenya, by assessing how OOP expenditures affect healthcare utilization, catastrophic expenditures and chronic illness, and how these, in turn, affect household poverty. This chapter addresses the fourth objective of this thesis; to assess the impact of OOP expenditures on household poverty through their impact on health care utilization and catastrophic expenditures.

5.2 Literature Review

5.2.1. Definitions and Concepts of Poverty

There are many definitions of poverty and a consensus is yet to emerge on what it entails to be poor (Ng'ethe and Omosa, 2009). There are several conceptualizations of poverty, the main ones being: income-based concept, consumption-based, the basic needs approach, the asset based approach, and the human capability approach (Ng'ethe and Omosa, 2009; Sarshar, 2010; World Bank, 2000; UNDP, 1997; Ocampo, 2005).

Earlier definitions of poverty focused on income as its defining characteristic (Ng'ethe and Omosa, 2009). The logic and rationale behind this approach is that, in principle, an individual above the monetary poverty line is thought to possess the potential purchasing power to access the goods and services needed to function at a sufficiently comfortable level of well-being (Ocampo, 2005). Today's most widely used measure of poverty is the number of people living on less than US$ 1.25 a day-the extreme poor. The Millennium Development Goals adopted this measure for its target of reducing by half the rate of poverty between 1990 and 2015, and the World Bank recently endorsed the goal of reducing the percentage of extreme poor to 3 percent by 2030 (World Bank, 2013). Expressed in Kenyan shillings, the US$ 1.25 poverty line in 2005 was approximately Ksh 1,246 per day. Using this benchmark, Kenya's US$ 1.25 a day poverty rate in 2005 was 43.3 percent overall (World Bank, 2013).

An important distinction is between absolute and relative poverty. Absolute poverty measures all those falling below the established poverty line, while relative poverty measures the income "gap" or "economic distance" between the poor and the non-poor. Instead of measuring poverty according to an absolute standard (the poverty line), the situation of the poor is compared to that of more affluent groups. Even when the poor move up income-wise, they remain poor if left "too far behind" by the richer groups (Ocampo, 2005). Two indices of absolute poverty are the head-count (the total number of people below the poverty line) and poverty incidence or the proportion of the poor to the total population. Relative poverty is measured by the "income gap" or "poverty gap", that is "the average income shortfall of all

the poor as a proportion of the poverty line," or "the additional income needed by the poor to rise above the poverty line" (Chuma and Maina, 2012; Ocampo, 2005).

However, it is widely recognized that when it comes to thinking of ways to tackle poverty, a focus on income is not always helpful because some (non-monetary) public goods cannot be purchased as their markets do not exist (Ng'ethe and Omosa, 2009). Furthermore, for attributes that can be purchased, markets, especially in developing countries, operate imperfectly. Therefore, income as a sole indicator of poverty is limited, as it does not (or cannot) incorporate and reflect such key dimensions of poverty as life expectancy (longevity), literacy, the provision of public goods, and even at the limit, freedom and security.

Consumption-based definition of poverty focuses on individuals and/or households' consumption expenditure. Individuals and households are considered poor, if consumption falls below some recommended food energy intake, plus a minimum allowance for non-food consumption. Kenya's own measure of poverty is based on the cost of purchasing a basket of food items which provides just enough calories (2,250 kilocalories) to meet daily requirements and an allowance for basic non-food amenities (World Bank, 2013). In 2005, the cost of basic food and non-food needs per month for one adult was established at Ksh 1,562 for rural areas and Ksh 2,913 for urban areas (World Bank, 2013). The consumption approach is closely related to the income approach even though it offers a broader conception of poverty (Ng'ethe and Omosa, 2009). However, Sen (1981) contends that although it is easy to solve the problem of óminimum nutritional requirement' which is not a very high cost basket of essential food requirements, the difficultly lies in the people's food habits and that the minimum requirements of non food items are not easy to determine. However, he emphasizes that though malnutrition captures only one of the aspects of poverty, it is a very important aspect which must have a central place in determining the conception of poverty.

The basic needs approach defines poverty as the deprivation of values, mainly material, for meeting basic human needs. The basic human needs include not only food, clothing and dwelling, but also health and education (Sarshar, 2010). However, this concept has its share of limitations since needs change over time (Ocampo, 2005).

Shifting from the traditional base of basic needs and income/consumption, poverty has also been defined in respect of lack of opportunities, and not merely lack of adequate income or inability to meet basic human needs (Sarshar, 2010). The capability approach reconciles the notions of absolute and relative poverty, since relative deprivation in incomes and commodities can lead to an absolute deprivation of minimum capabilities (UNDP, 1997). For example, the disproportionate division of income within the family cannot be adequately dealt with by the income approach to poverty. There is an inherent gender bias in the resource allocation which results in neglecting of female members. The approach, therefore, encompasses a wide range of features relating to poverty such as hunger, poor education, discrimination, vulnerability and social exclusion (Ng'ethe and Omosa, 2009).

Another departure from income poverty is viewing poverty as the absence of assets. Poor households are seen as those with low asset bases and productivity. World Bank (2000), identifies five types of assets namely: a) human assets (capacity for basic labour, skills, and good health); b) natural assets (land); c) physical assets (access to infrastructure); d) financial (savings and access to credit); and e) social assets (networks of contacts and reciprocal obligations that can be called on in time of need and political influence over resources). The returns to these assets depend not only on access to markets, but also on the institutions of state and society, prevailing patterns of gender, ethnic, racial or social discrimination, and public policy and state interventions (World Bank, 2000).

From the foregoing, poverty may be explained in terms of various kinds of factors including economic, social, political and natural factors. Some of these may be categorized as institutional factors, geographic, technological, and cultural dimension variables. The multi-dimensionality of poverty suggests that these various factors often work together to "cause" or "determine" poverty or affluence.

While most of the studies on poverty in Kenya are based on income and consumption definitions of poverty (Kabubo-Mariara *et al*, 2006; Mwabu *et al*., 2000; Oyugi, 2000; Geda *et al*., 2001;), a few others (Mberu *et al*., 2011; Kristjanson *et al*., 2010) have used asset-based approaches to examine poverty determinants in Kenya.

5.2.2 Determinants of Poverty

World Bank (2005) classifies determinants of poverty as regional, community, household and individual level characteristics which include demographic, economic and social characteristics of households and individuals.

At the regional level, poverty is high in areas characterized by geographical isolation, a low resource base, low rainfall, and other hostile climatic conditions. Other important regional and national characteristics that affect poverty include good governance; a sound environmental policy; economic, political and market stability; mass participation; global and regional security; intellectual expression; and a fair, functional, and effective judiciary (World Bank, 2005). The relationship of these characteristics with poverty is country-specific. Kabubo-Mariara *et al*. (2006) used number of constituencies per capita as a proxy for good governance. However, the variable turned out not to be a significant determinant of household welfare. They explained that this could be due to the fact that parliamentary representation may only help to enhance provision of public goods if at all, and this may not have any direct short term impact on household welfare. However, the variable did not have the unexpected sign for poverty implying parliamentary representation may not be an important determinant of poverty. Muyanga, Ayieko and Bundi (2006) also included agro-ecological dummy variables to account for geographical heterogeneity of the environment. They found that the high potential cash crop growing central and western highlands have relatively low poverty compared to the dry coastal and eastern low lands, which are characterized by frequent crop failures.

At the community level, infrastructure and social capital are major determinants of poverty (World Bank, 2005). Indicators of infrastructure development include proximity to paved roads, whether or not the community has electricity, proximity to large markets, availability of schools and medical clinics in the area, and distance to local administrative centers. Other indicators of community level characteristics include average human resource development, access to employment, social mobility and representation, and land distribution. Okwi *et al*. (2006) included some community level variables in their spatial estimation of poverty determinants such as distance to the nearest town, land use, soil type, elevation above sea

level and agro-climatic factors (rainfall and range lands). These variables were found to be significant in explaining spatial patterns of poverty in Kenya. Kabubo-Mariara *et al*. (2006) also estimated institutional determinants of poverty. Their study included, among other variables, number of active cooperatives, ratio of public to private secondary school teachers, health facilities, government land and infrastructure as explanatory variables.

Household and individual level characteristics are further divided into demographic, economic and social characteristics. Demographic characteristics include household size and structure, dependency ratio, age and gender of the household head. Indicators of household size and structure are important in that they show a possible correlation between the level of poverty and household composition. Mwabu *et al*. (2000) found that polygamous families were more prone to poverty than other family structures. Household composition, in terms of size of the household and characteristics of its members (such as age), is often quite different for poor and non-poor households. Geda *et al*. (2001) found that poverty status is strongly associated with household size. Household size was top five determinant of poverty in Oyugi (2000).

The dependency ratio is calculated as the ratio of the number of family members not in the labour force (whether young or old) to those in the labour force in the household. This ratio allows one to measure the burden weighing on members of the labour force within the household. A high dependency ratio is associated with greater poverty (World Bank, 2005). In a participatory methodology applied by Kristjanson *et al*. (2010) to analyze reasons for households' descent into poverty, having numerous dependants was found to strain households' limited resources, and was associated with 41 percent of all observed descents.

Gender of the household head significantly influences household poverty, and specifically, households headed by women are poorer than those headed by men. In studies by Mwabu *et al.* (2000), Muyanga *et al*. (2006), and Kabubo-Mariara *et al*. (2006), disparities in poverty between female- and male-headed households were detected. Female-headed households experienced higher poverty than male-headed households.

Apart from income and/or consumption which are typically used to define whether a household is poor, there are a number of other economic characteristics that correlate with poverty, most notably household employment, property and other assets owned by the household. The use of these variables as independent variables is justified even if they were used in derivation of poverty estimates (Okwi *et al*., 2006). Household property includes land, cultivated areas, livestock, agricultural equipment, machinery, buildings, household appliances and other durable goods and its financial assets. These indicators represent the household's inventory of wealth, therefore affecting its income flow. Furthermore, certain households, especially in rural areas, can be poor in terms of income, but wealthy when their property is taken into consideration (World Bank, 2005). Muyanga *et al*. (2006) used average value of physical assets and acreage under crop and found them to have a negative impact on poverty.

The most widely used social indicators of poverty are measures of health, education and shelter. Four types of indicators are normally used to characterize health in analyzing a household's living standards; a) nutritional status, for example anthropometric indicators such as weight for age, height for age, and weight for height (Mwabu, 2007; Strauss and Thomas, 1998 and World Bank, 2005); b) disease status or the type of disease (chronic or acute) for example, infant mortality and morbidity rates, diabetes among others (Mwabu, 2007; World Bank, 2005); c) the availability of health care services such as primary health-care centers, maternity facilities, hospitals and pharmacies, basic health care workers, nurses, midwives, doctors and traditional healers, and medical service such as vaccinations, access to medicines and medical information (Kabubo-Mariara *et al*., 2006; World Bank, 2005) ; and d) self reported status where individuals in a survey are asked to indicate whether their health status is excellent, good, fair or poor. The responses are then averaged to determine the proportions of the populations that correspond to each of the categories (Mwabu, 2007).

The indicators used to characterize education in an analysis of poverty include the level of education achieved by household members (basic literacy, years of education completed); the availability of educational services, such as proximity to primary and secondary schools (Kabubo-Mariara *et al.*, 2006; Muyanga *et al*., 2006); and the use of these services by the

members of poor and non-poor households. The commonly used measures to capture use by poor and non-poor households include children's registration in school, the dropout rate of children by age and gender and reasons for dropping out, the percentage of children older than the normal age for their level of education, and average spending on education per child registered (World Bank, 2005).

Shelter encompasses housing, service and environmental indicators. The housing indicators include the type of building (size and type of materials), whether one rents or owns a house, and household equipment. The service indicators focus on the availability and the use of drinking water, communication services, electricity, and other energy sources (Oyugi, 2000).

Finally, the environmental indicators include the level of sanitation, the degree of isolation (availability of roads and paths which are usable at all times, length of time and availability of transportation to get to work) and the degree of personal safety (World Bank, 2005).

5.2.3 Poverty and Health

Most of the empirical work linking individual and household welfare to health covers the impact of health on productivity and earnings, consumption and poverty. For example, Gertler and Gruber (2002) examined the impact of health shocks on household consumption patterns in Indonesia. They found evidence that illness reduced labour supply and household income. Wagstaff (2005) also found that health shocks were associated with a reduction in consumption in Vietnam. Godlonton and Keswell (2005) examined the impact of health status on poverty status and found that households that contain more unhealthy individuals were more likely to be income poor than those with fewer unhealthy individuals. Mendola *et al*. (2007) found that in Albania and Bosnia, the probability of poverty was higher among those who had experienced a chronic illness. O'Hara (2004) estimated the impact of demographic characteristics, insurance status, and medical usage of the family on poverty and found that older heads of the family, at least one family member in poor health, or some adults without health insurance were the most at risk of poverty.

Studies on health expenditures and poverty focus on the main effects through which OOP expenditures perpetuate poverty. According to Whitehead, Dahlgren and Evans (2001), the

main channels through which health expenditures affect poverty fall into three categories. First, untreated morbidity, where the most severe effects are felt by those who are denied services because they cannot afford them. Such people are at risk of further suffering and deterioration in health. In Kenya, for example, 39.4 percent and 37.7 percent of people who reported illness in 2003 and 2007 respectively, indicated they did not seek care because of lack of funds for treatment (Government of Kenya, 2009). In the Kyrgyz Republic, more than half of the patients referred to hospital were not admitted because they could not afford hospital fees, and in some Indian rural areas, 17 percent of people who reported illness did not seek care, with more than a quarter citing financial reasons (Whitehead *et al.*, 2001)

The second category is reduced access to care. Studies have shown that high OOP expenditures cause an indiscriminate reduction in access to care (Mbugua, Bloom and Segall, 1995; Ministry of Health, 2004; Government of Kenya, 2009). Asingwire (2000) found that introduction of user-fees on health care services in Uganda were making it exceedingly difficult for HIV/AIDS affected households to access medical care. Non-affected households were also affected by the high cost of health care, only that their medical needs were not as severe as affected families. Available evidence shows that poor people delay seeking care until an emergency situation arises, because of financial constraints (Tipping, 2000; Segall, Tipping and Lucas, 2000). This delay often forces them eventually to seek care at a more expensive level, typically at a hospital rather than a health centre. The negative effects of OOP expenditures are therefore two-fold: poorer health and increased medical expenditure (Whitehead *et al.*, 2001).

The third category is catastrophic expenditures and long term impoverishment. People buy health care even if it costs them their long-term livelihood, because medical expenses are often forced payments. The challenge is not in allocation of scarce resources, but whether or not they can find money for urgent treatment such as surgery. The negative social effects of direct user fees for health care are also greater than most of the other fees because these expenses are unexpected and the total cost is often unknown until after treatment.

Ill health has become a leading cause of household impoverishment in many countries. Poor households reporting illness in a rural area in northern Vietnam spent an average 22 percent

of their household budget on health-care, whereas rich households spent eight percent (Whitehead *et al.*, 2001). Loans and debt are common consequences of medical expenses (Ministry of Health, 2004; Government of Kenya, 2009). In addition, withdrawal of children from school is another common coping strategy-to save on school fees and for children to help out on farm activities while parents seek temporary jobs to pay off loans for hospital bills. For example in Uganda, children from some HIV/AIDS affected families dropped out of school to work and contribute towards the family income. On the other hand, daughters were retained at home to assist in household and garden work, while others were married off early (Asingwire, 2000).

The result of reduced access to health care and untreated morbidity is poorer health. This leads to health-poverty trap which is a state of being trapped into low productive capacity and income deprivation due to ill health conditions and related health costs. Such poverty makes households unable to invest in health and nutrition. This further causes more ill health and malnutrition, which calls for medical attention, hence more health expenditures. Some of those forced to sell assets and deplete household savings in order to meet health care expenses are sometimes driven into poverty or deeper into poverty, if they were already poor. The result is health-poverty trap which is as a result of health care expenses.

5.2.4 Modeling the Determinants of Poverty

There are two main approaches in modeling determinants of poverty. The first approach is the use of consumption expenditure per adult equivalent approach (Geda *et al.*, 2001, Kabubo-Mariara *et al*., 2006; Fissuh and Harris, 2004; Audet, Boccanfuso and Makdissi, 2006). The second approach is to directly model poverty by employing a discrete choice model. This approach proceeds by employing binary logit or probit model to estimate the probability of a household being poor conditional on certain characteristics. Ordered logit and probit models have also been employed to identify the factors which affect the probability of a household being poor conditional upon a set of characteristics. Discrete choice models in the analysis of determinants of poverty have been applied in a number of studies in Kenya (Kabubo-Mariara *et al*., 2006; Oyugi, 2000; Geda *et al.,* 2001; Mberu *et al*.,

2011). Geda *et al*. (2001) used both logit and ordered logit models to estimate determinants for poverty in Kenya.

The discrete choice model has a number of attractive features in comparison to the expenditure approach. The consumption expenditure approach, unlike the discrete choice models, does not give probabilistic estimates for the classification of the sample into different poverty categories. In a sense, we cannot make probability statements about the effect of the variables in the poverty status of our economic agents (Fissuh and Harris, 2004; Geda *et al*., 2001). Second, the major assumption of the consumption approach is that consumption expenditures are negatively associated with absolute poverty at all expenditure levels; hence factors that increase consumption expenditure reduce poverty. However, this is not always the case, for instance increasing consumption expenditure for individuals above the poverty line will not affect the headcount poverty (Geda *et al*., 2001).

The discrete choice approach of modeling poverty has been criticized because of the arbitrariness of the poverty line, and unnecessary loss of information in transforming household expenditure into a binary variable that indicates whether a household is poor or not (Kabubo-Mariara *et al*., 2006; Audet *et al*., 2006). Secondly, the fact that all those who are above the poverty line are intentionally considered to be homogenous or identical may not be tolerable (Fissuh and Harris, 2004). These weaknesses notwithstanding, the discrete approach is more preferable compared to the consumption expenditure approach and has been widely applied in many poverty studies (Fissuh and Harris, 2004; Kabubo-Mariara *et al*., 2006; Geda *et al*., 2001; Oyugi, 2000; Mberu *et al*., 2011).

Studies which have deviated from the above two approaches include Okwi *et al*. (2006) who used spatial regression analytical techniques to estimate spatial determinants of poverty in rural Kenya. Muyanga *et al*. (2006) used censored quantile regression technique for transient poverty determinants in Kenya. Kristjanson *et al*. (2010) applied an asset-based approach to examine reasons for household poverty movements across Kenya over the long-run, and how they differ depending on major livelihood opportunities available. They employed a participatory methodology that combined quantitative and qualitative approaches at household and community scale.

The nature of the data used in this study does not permit the use of spatial and/or quantile regression techniques. The choice is therefore between consumption expenditure and discrete choice approaches. Appleton (2001) presents an empirical comparison of the expenditure and discrete choice methods and concludes that for Uganda, there was no substantial difference between these approaches. Mwabu *et al*. (2000) justified their choice of expenditure approach on the premises that the two approaches (discrete and consumption expenditure) yield similar results. It is on these similar grounds that this study uses the discrete model.

5.2.5 Overview of Literature

The review of literature has shown that poverty has been defined based on different concepts and the studies reviewed have applied these concepts in modeling determinants of poverty. The review has also shown that there are diverse determinants of poverty classified according to region, community, individual/household and social characteristics. Of all these determinants of poverty, health variables, especially health expenditure variables such as OOP and catastrophic health expenditures have not been examined. Many studies that have included health variables have used health status (Godlonton and Keswell, 2005; Mendola *et al*., 2007; O'Hara, 2004) and health care utilization (Mendola *et al*, 2007; O'Hara, 2004).

Studies which have linked OOP expenditures to poverty are mainly qualitative studies (Whitehead *et al*., 2001; Mbugua *et al.*, 1995; Asingwire, 2000) and have concentrated on identifying channels through which the expenditures affect poverty. An empirical investigation of these channels by modeling poverty and health expenditure variables while controlling for confounding factors, will provide firm empirical support for their arguments. This is basically lacking in these studies.

Out-of-pocket expenditures deplete both health and physical capital by reducing utilization of health service and increasing incidences of catastrophic expenditure, thereby impoverishing households. When catastrophic expenditure increases, there is a decrease in wealth because people sell assets to finance catastrophic health expenditures, making it difficult to finance consumption. With unaffordable OOP expenditures, utilization reduces thereby affecting health, hence productivity. These are some of the channels through which health variables

affect poverty. However, these variables have not been included in previous studies on poverty. This study therefore includes health related variables (chronic illness, catastrophic health expenditures and healthcare utilization) as additional determinants of poverty.

5.3 Methodology

5.3.1 Theoretical Model

Following Geda *et al*. (2001) and Cameron and Trivedi (2005), this study assumes that the probability of being in a particular poverty category (being poor or non-poor) is determined by an underlying response variable y* that captures the true economic status of an individual. y* is defined by the following regression relationship:

$$y_i^* = \sum X_i'\beta + \varepsilon_i \text{ where } \beta = \beta_1, \beta_2, ...\beta_k \text{ and } X_i' = 1, X_{i2}, X_{i3}, ...X_{ik} \qquad (5.1)$$

i indicates the observation and Ůis a random error. X is a set of independent variables. In equation (5.1), y* is a latent variable, hence not observable. What is observable is an event represented by a dummy variable *y* defined by:

$$y_i = \begin{cases} 1 & if\ y_i^* > 0 \\ 0 & if\ y_i^* \le 0 \end{cases} \qquad (5.2)$$

Equation (5.2) implies that cases with positive values of y* are observed as y =1, while those with negative or zero values of y* are observed as y = 0. From equations (5.1) and (5.2), the following expression is derived.

$$\Pr(y_i = 1 \mid X) = \Pr(y_i^* > 0 \mid X) \qquad \text{or equivalently}$$

$$\Pr(y_i = 1 \mid X) = \Pr(X_i'\beta + \varepsilon > 0 \mid X) \qquad (5.3)$$

Substituting the structural model and rearranging terms yields,

$$\Pr(y = 1 \mid X) = \Pr(\varepsilon > -X_i'\beta \mid X) \text{ or } \Pr(-\varepsilon < X_i'\beta \mid X) = F(X_i'\beta) \qquad (5.4)$$

where F is the cumulative distribution function (cdf) for Ů Equation (5.4) implies that the probability depends on the distribution of the error Ů Assuming that Ůis distributed normally

with Var (Ůj) = 1 and a mean of 0, this leads to the binary probit model. The probit model specifies the conditional probability as:-

$$\Phi(X_i'\beta) = \int_{-\infty}^{X_i'\beta_i'} \Phi(z)dz \qquad (5.5)$$

where ū (.) is the standard normal cdf with derivative ū (z) = (1/2´)exp(-z^2/2), which is the standard normal density function. Cameron and Trivedi (2005) contend that empirically, either logit and probit can be used since there is, often, little difference between the predicted probabilities from probit and logit models. In addition, often, the fitted log-likelihoods are very similar for the two models, again suggesting little additional gain for using one rather than the other model. The likelihood function is written as:-

$$L(\beta) = \sum_{i=1}^{N} F(X_i'\beta)^{yi}(1 - F(X_i\,\beta)^{1-yi} \qquad (5.6)$$

This study specifies a probit model by assuming a normal cumulative distribution of Ůin F. As before, X_i are the characteristics of the households/individuals, and ƃ$_i$ the coefficients for the respective variables in the probit regression. Equation (5.6) is estimated with maximum likelihood (ML) technique and equation (5.5) basically presents the probability of being poor or non-poor. Specifically, to estimate determinants of poverty, a binary model of poverty is specified as:-

$$P_i = X_i\text{ƃ} + \mathring{U}_j \qquad (5.7)$$

where P_i is poverty status of the individual taking on the value of 1 if an individual is above poverty line, and zero otherwise. The Kenyan poverty line of Ksh 1,257 per individual per month is used. ƃ is a vector of parameters to be estimated and Ůj is a random error term. X_i specifically includes household characteristics such as age and household size, regional characteristics (rural/urban) and health related variables, for example health care utilization, chronic illness and catastrophic health expenditures.

5.3.2 Estimation Issues

Measurement of effects of health (and health related expenditures) on poverty is complicated by the endogeneity of both health and poverty in the estimated equations (Mwabu, 2007). If the observed and unobserved household and individual attributes influence both health and poverty, then the estimates of the impact of health on poverty are biased and inconsistent (Godlonton and Keswell, 2005). This study measures health status by presence of chronic illness in a household and includes health care utilization through which OOP expenditures are expected to affect poverty. Both variables have been shown in the literature to be endogenous in the measurement of welfare (Mwabu, 2007). Another health related variable included in this study is catastrophic health expenditures.

There are two possible causes of endogeneity of the chronic illness and health care utilization variables. First, most variables that influence health care utilization and chronic illness also determine poverty. Secondly, it is possible to have feedback effects between health care utilization and poverty, and between chronic illness and poverty. To address endogeneity of both of these variables, 2SRI technique is employed. However, the method requires appropriate instruments. Medical care instruments that have been used in literature include user fees at local clinics, distances and travel time to clinics, prices of staple foods, alcohol and cigarettes, distances to market centers and to social infrastructure such as roads, schools and clinics (Mwabu, 2007). These factors are assumed to influence the demand for medical care, while exerting no independent effect on poverty. For health care utilization and chronic illness, the instruments used are log of waiting time and interaction of log of waiting time and log of distance, respectively.

Another potential problem is heterogeneity. This occurs if there is a non-linear interaction between unobservable factors and the endogenous covariate which causes the effect of the endogenous covariate on the variable of interest to differ among population subjects. In our case, heterogeneity will exist if there are some unobservable factors that interact non-linearly with the health utilization and chronic illness, causing the effect of these variables on poverty to differ amongst the households in the population. The Control Function Approach (Florens *et al.* 2008; Mwabu, 2009; Wooldridge, 2010) is adopted to control for heterogeneity. In

addition, possible heteroskedasticity is controlled for by using robust estimates of the standard errors.

Cameron and Trivedi (2005) contend that for such complications as above, it is easier to work with the linear probability model (LPM). Standard linear model methods can then be applied provided standard errors adjust for heteroskedasticity. Even if logit and probit models are ultimately used, a linear model can be useful for exploratory analysis. Hence, to take care of the above estimation issues 2SRI and CFA methods are employed and robust standard errors are used to take care of heteroskedasticity. Simple correlations are also carried out to test for multicollinearity. Data are analyzed using STATA (Version SE12) and the unit of analysis is individual.

5.3.4 Methods

To implement the 2SRI and CFA, the study borrows from Mwabu (2007, 2009) and Kabubo-Mariara *et al*. (2009). With necessary modifications, the relationship between poverty and health variables and other control variables is summarized as follows:-

$$P = \breve{U}_0 + \breve{U}_1 H + \breve{U}_2 CHR + \breve{U} X + e_1 \quad (5.8)$$

$$H = \beta_0 + \beta_1 X + \beta_3 M_1 + e_2 \quad (5.9)$$

$$CHR = \breve{u}_0 + \breve{u}_1 X + \breve{u}_3 M_2 + e_3 \quad (5.10)$$

where (5.8) is the poverty equation, P; (5.9) is a demand function for health care, H; and (5.10) is chronic illness function, CHR. X is a vector of exogenous explanatory variables, while M_1 and M_2 are sets of instrumental variables for health care demand and chronic illness, respectively. M_1 is the log of waiting time and M_2 is the interaction of log of distance and log of waiting time.

In the absence of endogeneity and heterogeneity, a probit model of equation (5.8) would be estimated using Maximum Likelihood technique. However, to account for endogeneity, two stage residual inclusion (2SRI) is used where the residuals of the endogenous variables, H and CHR are included. This involves, as a first stage, estimating equations (5.9) and (5.10),

predicting their fitted residuals and including the fitted residuals in equation (5.8) as a second stage. Hence, equation (5.8) becomes

$$P = \breve{U}_0 + \breve{U}_1 H + \breve{U}_2 CHR + X\breve{U} + \breve{u}_1 V_H + \breve{u}_2 V_{CHR} + e_4 \quad (5.11)$$

which is our 2RSI model. If the coefficients of the residuals are significantly different from zero, then it is an indication that the variable is endogenous. Therefore, implementation of 2SRI first tests for endogeneity, and also addresses the endogeneity problem. H, CHR and X are as previously defined, V_H and V_{CHE} are residuals of visits and CHR, respectively.

Control Function Approach is employed to address heterogeneity. This involves interacting the endogenous variable with its fitted residuals. The procedure is therefore as the one in 2SRI, plus the interaction of the endogenous variable with its fitted residuals. The equation to estimate is as follows:-

$$P = \breve{U}_0 + \breve{U}_1 H + \breve{U}_2 CHR + X\breve{U} + \breve{u}_1 V_H + \breve{u}_2 V_{CHR} + \breve{u}_3 V^*H + \breve{u}_4 V^*CHR + e_6 \quad (5.12)$$

Where V*H and V*CHR are interaction terms of the endogenous variables with their residuals.

5.3.5 Definition and Measurement of Variables

Table 5.1 provides definition, measurement and apriori expectations of variables which have been used in the implementation of the models described above.

Table 5.1: Definition and Measurement of Variables

Variables	Definitions and measurement	Expected effect
Poverty status of individual	1 if an individual is below the poverty line; 0 otherwise.	é
Chronic illness[16]	Defines whether an individual has a member of their households with chronic illness. (1 = presence of chronic illness).	Positive
Medical care	The number of visits made to the health care provider.	Positive
Catastrophic expenditure	1 if a household experienced catastrophic expenditure; 0 otherwise.	Positive
Area of residence	1 if an individual resides in an urban area; 0 otherwise.	Negative
Household size	The total number of members of the household.	Positive
Gender	Gender of the household head (1 = male; 0 otherwise).	Negative
Working status of household head	1 if a household head is working; 0 otherwise.	Negative
Education level of household head	1 if a household head is educated up to secondary school level and above; 0 otherwise.	Negative
Insurance status	1 if an individual has any form of insurance cover; 0 otherwise.	Negative
Waiting time	Time taken in hours between arrival and being seen by a clinician.	(instrument) -
Log Distance*log waiting time	Interaction of log of OOP with the log of waiting time.	(instrument) -

5.4 Results

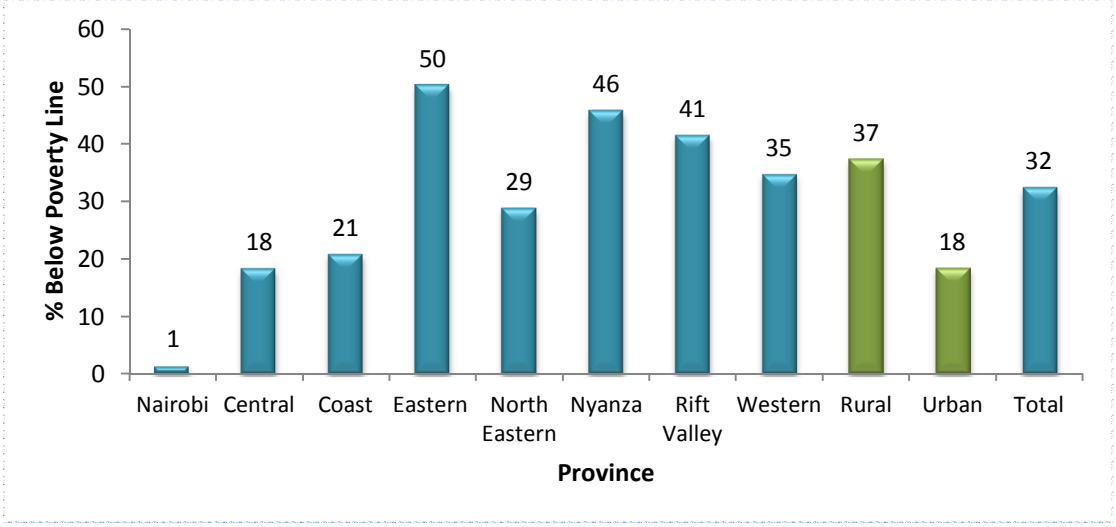
This section presents a description of the sample as well as the analytical findings of the determinants of poverty. A discussion of the findings is presented together with conclusions in section 5.4.4.

[16] Chronic illnesses include hypertension, diabetes, cardiac disorders, arthritis, HIV/AIDS, ulcers and gout.

5.4.1 Poverty by Province

Results show that, nationally, 32 percent of households were below the poverty line in 2007. Four out of eight provinces had poverty levels above the national average, with Eastern and Nyanza provinces having the highest levels. Nairobi and Central provinces have the lowest proportions of their population living below the poverty line. The percentage of rural residents below the poverty line was twice as high as those in urban areas. Figure 5.1 shows the overall incidence of poverty by province and residence.

Figure 5.1: Poverty by Province and Area of Residence



5.4.2 Sample Characteristics

Table 5.2 presents a description of the sample. On average, 32.4 percent of individuals were living below poverty line in 2007. In addition, people made an average of roughly 1.3 visits to a health care provider though some respondents had to make as many as eight visits. seven percent of household members had chronic illnesses, with 11.1 percent experiencing catastrophic health expenditures. On average, 74.8 percent of the households were male-headed. Thirty one and 72.8 percent of respondents had household heads with education above secondary level and were working, respectively. Fourteen percent of the respondents had some form of insurance, whether NHIF, employer-based or private insurance. The average household size was six members with the largest being 15 members. Majority of the respondents were from the rural areas with only 26.5 percent residing in urban areas.

Table 5.2: Sample Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Poverty status (1=non-poor)	38004	0.324	0.468	0	1
Chronic illness (1 = Chronic)	37524	0.073	0.260	0	1
Catastrophic health expenditures (1=CHE)	38004	0.111	0.315	0	1
Area of residence (1 = urban)	38123	0.265	0.441	0	1
Gender of the household head (1 = male)	38121	0.748	0.434	0	1
Working status of the household head (1 = working)	38124	0.728	0.445	0	1
Education status of the household head	38123	0.309	0.462	0	1
Medical insurance cover (1 = covered)	38123	0.138	0.345	0	1
Household size (No)	38108	5.771	2.412	1	15
Medical care (No. of visits)	38121	1.300	0.807	0	8

5.4.3 Determinants of Poverty

Table 5.3 presents results for five models. The first is 2SRI model based on equation 5.11, where we test for and address endogeneity. The second model is CFA based on equation 5.12 where we test for and address heterogeneity. The third (2SRI (2)) is the main model for our discussion after establishing that there is no heterogeneity. It is a full sample model. We also ran both rural and urban samples to account for the differences in those regions. These are shown in models four and five.

The results of the tests for validity, strength and relevance of the instruments are shown in Appendix Table A2. The first-stage F-statistics are sufficiently large (12.72 and 10.83), which is evidence that the instruments are strong. In addition, the results show that the instruments are highly correlated with the endogenous variables at one percent significance level, and they are not correlated with the outcome variable. Hence conclude that the instruments for this study are strong, valid and relevant.

In Table 5.3, the results of 2SRI model (Model 1) show that the chronic illness residual is significant at 1 percent level, implying presence of endogeneity. The log of visits residual is not significant, therefore health care utilization is in fact exogenous. To rule out heterogeneity, CFA model is used. Heterogeneity is tested for through the interaction of the endogenous variable with its residual. If the interaction variable is significant, it implies presence of heterogeneity. The results of CFA model (Model 2) show that the interaction variable is not significant, hence heterogeneity is not present. Therefore, the right model to use is 2SRI (Model 3) which includes the residual of the chronic illness variable. 2SRI models for both rural and urban samples are also included.

Model 3 results show that chronic illness has significant impacts on poverty. Results show that when we account for endogeneity, chronic illness increases the probability of being poor. For the rural sample, the effect is even stronger. This could be explained by the fact that with chronic illness, there is more utilization of health service hence higher OOP expenditures. It may also involve inpatient services which are more expensive. This drains household savings and assets. A further explanation is that those chronically ill are less productive, hence low or no income which leads to poverty.

Health care utilization is associated with increasing poverty in all samples. A one percent increase in health care utilization is associated with approximately 0.07 percent probability of being poor in all the three samples (full, urban and rural). This can be explained by high OOP expenditures which may force people to sell assets, borrow or deplete their savings. Thus, even if health care utilization leads to improved health, and people are more productive, the sale of assets, borrowing and depletion of savings, will still render them poor. In the event that the sick household member dies after incurring the high OOP, selling of assets and dissaving, the household is left even worse-off, especially if the deceased was the bread winner. The positive relationship between poverty and health care utilization, however, does not imply that people should reduce health care utilization. On the contrary, we should aim at increasing it because it has long term benefits. What needs to be tackled is the high OOP expenditure on health by households which may lead to poverty.

Table 5.3: Determinants of Poverty

Variable	1 2SRI(1)	2 CFA	3 2SRI (2) Full Sample	4 Urban Sample	5 Rural Sample
Chronic illness (1 = chronic	1.022*** (0.346)	1.183** 0.486	0.915*** 0.412	0.475*** (0.182)	1.050*** 0.442
Log of visits (No.)	-1.051 (0.736)	0.080*** 0.016	0.080*** 0.016	0.063** (0.023)	0.074*** 0.025
Log of visits residual	**1.021** **(0.735)**				
Chronic residual	**-1.429*** **(0.346)**	**-0.925**** **0.425**	**-0.997**** **0.420**	**3.476*** **(1.180)**	**-1.068*** **0.382**
Chronic*chronic residual		**-0.170** **0.552**			
Catastrophic health expenditures (1 = CHE)	0.238*** (0.023)	0.239*** 0.023	0.239*** 0.023	0.213*** (0.041)	0.251*** 0.025
Area of residence (1 = urban)	-0.169*** (0.015)	-0.172*** 0.015	-0.172*** 0.015		
Gender of household head (1 = male)	0.027 (0.027)	0.050 0.048	0.020 0.018	0.029 (0.028)	-0.014 0.022
Working status of household head (1 = working)	-0.075*** (0.018)	-0.080*** 0.018	-0.080*** 0.018	-0.119*** (0.029)	-0.067*** 0.020
Education status of household head (1 = secondary and above	-0.021 (0.030)	-0.049** 0.021	-0.049** 0.021	-0.140*** (0.028)	-0.018 0.026
Medical insurance cover (1 = covered)	-0.015 (0.028)	0.013 0.020	0.013 0.020	-0.066*** (0.023)	0.014 0.031
Log of household size (No)	0.152*** (0.015)	0.025*** 0.012	0.024*** 0.011	0.206** (0.096)	0.130*** 0.031
Constant	0.845** (0.369)	0.435** 0.223	0.435** 0.223	1.036*** (0.301)	0.346 0.251
Observations	4398	4398	4398	1392	3298
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.0838	0.0835	0.0834	0.0690	0.0398

*Significant at 10 percent **Significant at 5 percent ***Significant at 1 percent Robust standard errors in parenthesis

Catastrophic expenditure dummy is positive and statistically significant at one percent level for full and urban samples, but not rural sample. A one unit increase in catastrophic health expenditures raises the probability of being poor by 0.24 for both full and urban samples and 0.21 for the rural sample. This effect is explained by the OOP expenditures incurred in seeking treatment, which cause households and individuals to experience catastrophic health expenditures and consequently, impoverishment.

Being an urban resident is negatively and significantly associated with poverty. Urban residents (except those in the slums) have a higher ability to pay compared to their rural counterparts because of high incomes. This explains the negative relationship between residence and poverty.

Working status of the head of household is negatively and significantly associated with poverty at one percent level in all the samples. It seems to have stronger effects in the urban areas than in the full and rural samples. Consistent with theory and previous findings, education status of the household head is negatively associated with poverty in the full and urban sample models.

Medical insurance is a significant determinant of urban poverty, but not for full and rural samples. This could be explained by the fact that majority of those who have health insurance from rural areas are covered by NHIF, which has very limited benefits package. However, the bulk of those with private and employer-based health insurance are from urban areas, hence it is significant in explaining urban poverty.

The larger the household size, the higher the likelihood of poverty. An increase in household size by one percent is associated with 0.02, 0.2 and 0.13 percent increase in poverty in full, urban and rural samples, respectively. The reason for this could be because the higher the household size, the more the utilization of health care (especially from contagious illnesses), the higher the probability of incurring catastrophic expenditures and the higher the probability of falling into poverty.

5.4.4 Discussion of Results

This chapter sought to establish the effects of OOP expenditures on poverty. This was accomplished by including health related variables in the poverty equation, which have a bearing on OOP expenditures. These variables are health status as proxied by chronic illness, health care utilization measured by the number of visits to a health service provider, and catastrophic expenditures which was a binary variable taking on the value of 1 if an individual was from a household which had experienced catastrophic expenditures, and zero otherwise. To ensure reliable results, necessary diagnostic tests were carried out.

A key finding is that OOP expenditures through their impact on health care utilization, catastrophic expenditures and chronic illness have implications on poverty. They all have positive effects on poverty, implying that OOP expenditures increase poverty. Though many studies have not linked OOP expenditures as has been done in this study, the few that have found health care utilization (Mendola *et al*., 2007; O'Hara, 2004) and health status (Godlonton and Keswell, 2005; Mendola *et al*., 2007) to be significant determinants of poverty. This points to the importance for policies that will reduce OOP expenditures, which constitute a significant share of health care financing in Kenya.

The determinants for rural and urban poverty are the same except for insurance and education status of household head which are not significant in explaining rural poverty. Most educated residents migrate to urban areas in search for green pastures and white collar jobs leaving rural areas with less educated people who engage in manual work. It is therefore not surprising that education status of household head is not significant in explaining rural poverty.

Education is an important determinant of household poverty. Results show that poverty is a decreasing function of education attainment. This finding is consistent with earlier findings for Kenya (Geda *et al*., 2001, Mwabu *et al*, 2000, Oyugi, 2000; Kabubo-Mariara *et al*., 2006; Mberu *et al*., 2011). It is especially significant in explaining urban poverty, where employability, especially in the formal sector, depends on the level of education unlike in rural areas.

Consistent with previous findings in Kenya, household size has been found to be positively associated with poverty (Geda *et al*., 2001; Oyugi, 2000; Mwabu *et al*., 2000; Muyanga *et al*., 2006; Kabubo-Mariara *et al*., 2006; Mberu *et al*., 2011).

CHAPTER 6 : CONCLUSION

6.1 Summary

Direct out-of-pocket expenditures are identified as the single biggest barrier to health care access. While user fees have been promoted as a way to reduce the overuse of services, this is not what happens. User fees have adverse effects on the poor. They are inefficient in terms of achieving their objectives, encourage people to delay seeking care until a condition is advanced, and more difficult and expensive to treat. And when people pay OOP for care, financial ruin is usually the result.

This thesis sought to investigate the effects of OOP expenditures on health care utilization, catastrophic health expenditures and household poverty using Kenya Household Health Expenditure and Utilization Survey (KHHEUS) of 2007. This was accomplished by estimating a binomial model for health care utilization, a logit model for catastrophic health expenditures and a 2SRI model for poverty. In all the models, estimation issues such as endogeneity, sample selection bias, heterogeneity and heteroskedasticity were all tested and addressed where necessary. In addition, the incidence and intensity of catastrophic expenditures and impoverishment were also estimated.

The results demonstrate that OOP expenditures are a deterrent to health care utilization, impoverish households and are a significant determinant of household poverty through their effects on health care utilization and catastrophic health expenditures. The thesis also established that households that sought health care experienced catastrophic expenditure and others were impoverished by health care payments. In addition, descriptive statistics show that the incidence of catastrophic expenditure is higher among the poor, and that those in the medium quintile are more likely to fall into poverty after an incident of catastrophic expenditure. In absolute terms, the findings suggest that approximately 2.5 million people were pushed into poverty as a result of paying for health care. While this finding does not indicate how poverty will change if OOP expenditures are replaced by some form of prepayment scheme, it is quite intuitive on the magnitude of impoverishment due to OOP expenditures.

One of the most noteworthy results, which is substantiated in all the technical chapters, both by descriptive and regression analysis, is the inadequacy of the current insurance coverage to protect households from impoverishing effects of OOP expenditures. There is therefore need for a policy to address this inadequacy.

A novel line of research in this thesis is relating poverty to health service utilization, catastrophic health expenditures and chronic illnesses. This is a clear deviation from the traditional way of modeling poverty. These variables proved to be significant determinants of poverty, therefore suggesting that policies targeted at addressing poverty should not ignore these health variables.

Measurement of catastrophic health expenditures and impoverishment are based on cross-sectional data which is limited in terms of measuring the causal relation between household health spending and household poverty. However, they do assist the policy-makers in quantifying the number of affected households, identifying groups most at risk, and approximating the amount of money that households allocate to finance healthcare.

6.2 Discussion

This study has used both descriptive and econometric methods to establish the direct and indirect impacts of OOP expenditures on health care utilization, catastrophic expenditures and household poverty. Specifically, the thesis sought to answer the following questions: a) What are the effects of OOP expenditures on health service utilization? b) What is the incidence and intensity of catastrophic expenditures and impoverishment? c) What are the determinants of catastrophic health expenditures in Kenya? d) What are the impacts of health service utilization and catastrophic expenditures on household poverty? e) What policy implications can we draw from the findings of this study? This discussion is centred on the first four questions with the policy recommendations addressing the last.

6.2.1 What are the Effects of Out-of-Pocket Expenditures on Health Service Utilization?

The effects of out of pocket expenditures on health service utilization are investigated in chapter three of this thesis. The findings confirm the existing evidence that OOP

expenditures are a significant deterrent to health care utilization in all the facilities. What emerges clearly from this thesis is that OOP expenditures are not an appropriate financing mechanism for health services in Kenya, and reliance on them needs to be reduced. However, the main question is; what should replace them? Gilson and McIntyre (2005) argue that the removal of fees should not be thought of as a simple exercise that can be implemented at the stroke of a pen.

Removal or reducing users fees requires alternative funding mechanisms to be in place. These include tax-based financing, social health insurance, subsidized community-based health insurance, private insurance, vouchers, conditional cash transfers, and equity funds. However, the decisions on the choice of one or mixture of mechanisms to implement needs to be evidence-based and should be aimed at reducing reliance on OOP funding for health services. Each of these alternative funding mechanisms have their own challenges and should be evaluated one at a time.

While the government has over the years spurred health system reforms and innovative health financing mechanisms such as 10/20 policy, waiver and exemption policies for the poor, women and children, social protection for the elderly, HSSF among others, it remains to be seen how these policies have helped to reduce the financial burden of the households. However, it is worth noting that this study is based on 2007 data, yet a number of these reforms have been implemented after 2007. Therefore, the results may not be a reflection of the impact of these reforms. A more recent data (KHHEUS 2013 which is yet to be released) would provide a more informative analysis of the effects of these reforms.

One of the major limitations of the data we have used in this thesis is that the survey did not collect information of the indirect costs of health care such as travel costs and lost earnings (productive time lost due to illness of other family members). Hence, the financial consequences of OOP expenditures are underestimated. Probably the effect of OOP on health care utilization would even be higher if these indirect costs were included in the analysis. In fact, Gertler and Gruber (2002) find earnings losses to have a more disrupting effect on household living standards than medical spending following a health shock in Indonesia.

Removing financial barrier to health care utilization is not the only solution. This thesis shows that there are other significant determinants of health care utilization such as distance, waiting time, household size, income, chronic illness, area of residence, and working status of the household head. For private health care utilization, having an insurance cover and an educated household head are also significant determinants. Therefore, reforms implemented should address both financial and non-financial barriers to health care utilization. Bypassing of facilities implies that access is not only about the proximity of health facilities, but also the quality of health services.

6.2.2 What is the Incidence and Intensity of Catastrophic Health Expenditures and Impoverishment?

This study employed the two methodologies available in the literature to estimate catastrophic health expenditures and impoverishment (Wagstaff and van Doorslaer, 2002 and Xu, 2005). Descriptive statistics show that the poorest quintile experienced the highest incidence of catastrophic health expenditures. There is therefore need to give more weight to excess payments incurred by poorer households. Large expenditures on health care that are incurred by better-off households may be judged quite differently from payments made by poor households that are forced to cut back on consumption of basic necessities.

Incidence of catastrophic expenditures demonstrates the significant role of health insurance. Private health insurance seems to have more effect in shielding households from catastrophic health expenditures and impoverishment compared to NHIF. Only 2.1 percent of those with private insurance were impoverished by health care payments compared to 4.7 percent with NHIF insurance. At the same time, 5.2 percent of households with private insurance experienced catastrophic health expenditures compared to 10.8 percent with NHIF insurance coverage. This implies that while having an insurance cover is necessary, the depth of the cover in terms of benefit package counts more. A good example is Korea with universal insurance coverage, yet more than 10 percent of her population has been experiencing catastrophic health expenditures due to high copayments and lack of comprehensiveness in its benefit coverage.

Taking the difference between poverty estimates derived from household resources gross and net of OOP payments for health, the results show that about 2.5 million Kenyans were pushed below the national poverty line due to OOP expenditures. However, this comparison of poverty estimates cannot be interpreted as the change in poverty that would arise from any policy reform that eliminated OOP health expenditures. Nonetheless, our comparison is indicative of the scale of the impoverishing effect of health payments, and has shown the extent to which poverty is currently underestimated (or hidden) by ignoring the amount of household resources that are exhausted by payments for health care.

6.2.3 What are the Determinants of Catastrophic Health Expenditures in Kenya?

After estimating the incidence and intensity of catastrophic health expenditures and impoverishment, the study estimated the determinants of catastrophic health expenditures. An empirical identification of determinants of catastrophic health expenditures is important for aiding policy makers to know the areas to target to reduce the effects of catastrophic health expenditures on Kenyan households. To accomplish this, a logit model was estimated with catastrophic health expenditures constructed as a dummy taking on the value of one if a household experienced catastrophic health expenditures, and zero otherwise.

Our results suggest that area of residence, income, household size, poverty status of the household, and utilization of both inpatient and outpatient health care are significant drivers of catastrophic health expenditures. While we would expect having an insurance cover to shield households from catastrophic health expenditures, this is not the case in Kenya. This could be explained by the fact that majority of those who have insurance cover are under NHIF which is very limited in its benefits package.

6.2.4 What are the Effects of Health Service Utilization and Catastrophic Expenditures on Household Poverty?

2SRI model was applied to investigate the effects of health service utilization and catastrophic expenditures on household poverty. The departure from the traditional modeling of poverty using a probit/logit model was necessitated by the potential endogeneity and heterogeneity of the health variables included in the model.

One key finding from the study is that both health care utilization and catastrophic health expenditures are significant in explaining poverty. Utilization of health care implies experiencing OOP, and in some cases, catastrophic expenditures which lead to poverty. When OOP expenditure is met through dissaving, borrowing and sale of assets, even if the sick member recovers, the household is still likely to experience poverty since they are already in debt, with no assets and no employment at hand. The household is left in an even worse poverty situation if the sick member dies after incurring the OOP (especially if s/he was a bread-winner). However, this does not suggest the need to reduce health care utilization. On the contrary, this should be strengthened by addressing the barriers to utilization.

Government policies and efforts to fight poverty need to take into account the impact of OOP expenditures on poverty. This calls for alternative health financing mechanisms that offer financial risk protection to the population, especially the poor who are most affected by catastrophic health expenditures. Other important determinants of poverty were found to be chronic illness, area of residence, household size, gender, education and working status of the household head.

Finally, the estimation results have demonstrated the need to take into account the econometric problems such as endogeneity, heterogeneity, multicollinearity and heteroskedasticity. Failure to address these problems will produce biased results and lead to misleading policy prescriptions.

6.3 Policy Implications

The review of the health sector has also shown that OOP expenditures are the principle means of financing health with little room for risk pooling. While this thesis strongly recommends a reduced reliance on direct payments, it does not call for an immediate end to user fees. However, expanding the current health insurance coverage and move towards universal health insurance coverage is seen as the most effective way to shield the population from the impoverishing effects of OOP expenditures.

Findings in this thesis have indicated that health insurance (especially private health insurance) has a major impact on shielding households from both catastrophic health expenditures and impoverishment. Further is a significant determinant of urban poverty. The government therefore needs to expand the current health insurance coverage and move towards universal health insurance coverage. However, the benefit coverage needs to be deepened so as to meaningfully shield households from impoverishing effects of OOP expenditures.

Kenya is fairly well equipped with administrative structures under NHIF to expand coverage and enable the poor and elderly to be covered. We would thus expect a continuous progress in population coverage of NHIF, with the aim of eventually reaching universal coverage. However, in the transitional period, other social protection programs such as private health insurance and community-based health insurance may need to be considered. These should be well regulated and fit in the overall health financing strategy of the country, namely, moving from a system based on OOP payments to one based on prepayment and pooling of resources.

Our findings show that poverty estimates, which do not account for OOP expenditures, are usually grossly underestimated. It would therefore be important for future national poverty estimates to take into account health care payments by households as has been done in this study. This will give the nation an indication of the magnitude of household impoverishment due to OOP expenditures.

While this study has found distance to be positively related to health care utilization, this has been explained by the fact that people bypass facilities mainly due to quality and price reasons. This suggests that there is need to equip the already existing facilities with drugs, qualified staff and hospital equipment. However, considering the financial implications of undertaking such a task, this could be done gradually by targeting a few health facilities every year in every county.

Impoverishment due to OOP payments is a serious risk in Kenya. Finding ways to reduce OOP burden for the poor and near-poor is an important policy task. The removal of user fees

at primary health care level, the 10/20 policy, HSSF, social protection for the elderly, abolition of maternity fees in public health facilities and waivers and exemptions for children are commendable and are steps in the right direction. However, the government still has some means at its disposal to reduce the burden of OOP and other barriers to health care utilization. Some of these include introducing catastrophic risk coverage for poor population, and introducing drug benefits for chronically ill patients, especially those from lower income families.

6.4 Contribution to Knowledge

Our findings lend support to qualitative studies suggesting that health-care payments cause impoverishment. This thesis provides firm empirical evidence of impoverishing effects of health care payments.

The work contained in this thesis is the first attempt to link health variables (catastrophic health expenditures, health care utilization and chronic illness) to poverty. While many studies estimate the incidence of catastrophic health expenditures, they do not link them empirically to poverty. Many studies modeling poverty estimates ignore the role the health variables (especially those related to OOP expenditures) could play in explaining poverty.

We have also demonstrated empirically the importance of national poverty estimates to take into account OOP expenditures in order to arrive at realistic estimates and avoid underestimations of the poverty estimates.

This thesis has departed from the traditional way of modeling health care demand in developing countries using probit/logit and multinomial logit/probit and has used negative binomial model to capture healthcare utilization as a count variable.

Further, by employing both Xu (2005) and Wagstaff and van Doorslaer (2002) methodologies in estimating the incidence and intensity of catastrophic health expenditures and impoverishment, we provide a wide range of estimates for sensitivity analysis, unlike when only one methodology is used. It also gives more room for comparison of results where either of the methodologies was employed.

6.4 Areas for Further Research

The analysis of catastrophic health expenditures in this study only took into account expenditures of those households that used health services. This represents only households with observed catastrophic health expenditures. Undoubtedly, there are many households who are too poor to afford the OOP expenditures for health care, hence are not able to use health services. By not including these households into the calculation of catastrophic of health expenditure, its true burden across the population is not estimated, especially its burden to poorer households. There is therefore need for a study that will estimate the total potential burden from catastrophic health expenditure by taking into account households which would have faced catastrophic health expenditure had they chosen to seek health care when they needed it (using self-reported need for health care as a proxy for need).

After estimating the incidence of catastrophic health expenditures, this study did not go further to examine short term changes in consumption patterns on food, education, housing and other goods, due to high OOP expenditures. This study therefore suggests, as an area for further research, an examination of mechanisms for coping with large OOP expenditures.

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APPENDICES

Table A1: Testing the Validity of Instrument for Out-of-Pocket Health Expenditure

Variable	Log of OOP expenditures model		Visits model	
	Coefficient	**t**	**Coefficient**	**z**
Log of OOP expenditures			-0.086***	-18.84
Log of waiting time	-0.254***	-9.31	0.033***	3.83
Log of distance	0.516***	28.18	0.036***	5.64
Log of household size	-0.294***	-6.35	0.100***	5.88
Log of expenditure	0.299***	13.09	0.022***	2.86
Insurance cover	0.227***	4.58	-0.020	-1.14
Chronic illness	0.245***	4.29	0.107***	4.95
Area of residence	0.775***	18.15	0.026*	1.67
Working household head	-0.076*	-1.87	-0.043***	-2.87
Education	0.204***	5.21	0.023	1.53
Senior	**0.344*** **	**3.44**	**0.035**	**1.02**
Constant	1.292***	6.55	0.212***	3.14
Observations	8049		8049	
P-Value	0.0000		0.0000	
R-Squared	0.2424			
F-statistic (10, 8038)	203.92			
Wald chi2(11)			548.53	

*Significant at 10 percent **Significant at 5 percent ***Significant at 1 percent

Table A2: Testing the Validity of Instruments for Endogenous Variables H and CHR

Variable	Model I	Model II	Model III	Model IV
Log of visits		0.003 (0.019)		
Chronic Illness				-0.039*** (0.012)
CHE	0.027** (0.012)	0.230*** (0.020)	0.004 (0.006)	0.224*** (0.011)
Area of residence	0.010 (0.009)	-0.167*** (0.014)	0.003 (0.005)	-0.168*** (0.008)
Gender of household head	0.008 (0.009)	0.007 (0.015)	-0.009* (0.005)	0.019** (0.008)
Working status of household head	-0.009 (0.009)	-0.066*** (0.015)	-0.006 (0.005)	-0.074*** (0.008)
Education status of household head	-0.008 (0.009)	-0.042*** (0.015)	-0.015*** (0.005)	-0.028*** (0.008)
Medical insurance cover	-0.022** (0.011)	0.009 (0.018)	0.008 (0.006)	0.013 (0.010)
Log of household size	0.048*** (0.009)	0.047*** (0.016)	-0.080*** (0.007)	0.051*** (0.010)
Log of waiting time	**0.016*** **(0.005)**	**-0.008** **(0.009)**		
Log of distance*log of waiting time			**0.005*** **(0.002)**	**-0.003** **(0.002)**
Constant	0.746*** (0.018)	0.307*** (0.035)	0.246*** (0.015)	0.306*** (0.020)
Observations	5111	5111	18594	18594
Prob>F	0.000	0.000	0.000	0.000
F-test Statistic	**12.72**		**10.83**	

*Significant at 10 percent **Significant at 5 percent ***Significant at 1 percent

Models I: Testing for relevance and strength of log of waiting time as an instrument for health utilization (log of visits is the dependent variable)

Model II: Testing for relevance and strength of log of waiting time as an instrument for health utilization (poverty is the dependent variable)

Models III: Testing for relevance and strength of the interaction of log of waiting time*log of distance as an instrument for chronic illness (Chronic illness is the dependent variable)

Model IV: Testing for relevance and strength of the interaction of log of waiting time*log of distance as an instrument for chronic illness (Poverty is the dependent variable)