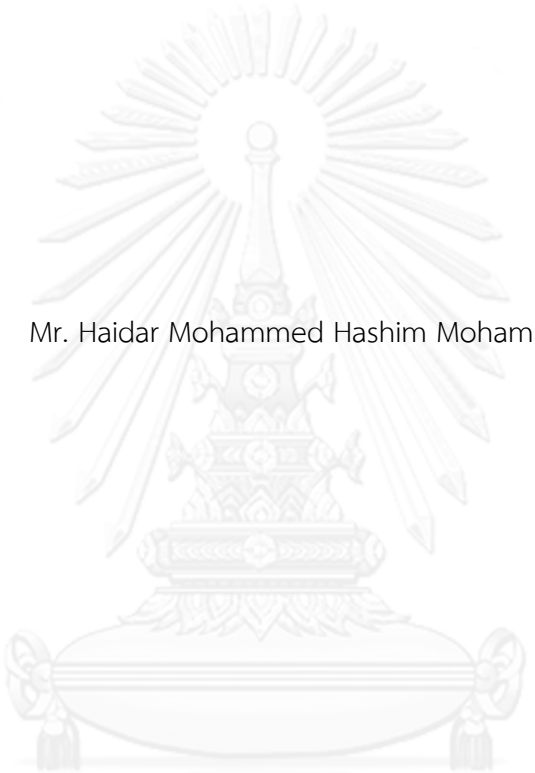
FACTORS AFFECTING FINANCIAL PROTECTION AMONG POOR HOUSEHOLDS IN SUDAN

Mr. Haidar Mohammed Hashim Mohammed



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A Thesis Submitted in Partial Fulfillment of the Requirements
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาเศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ
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By	Mr. Haidar Mohammed Hashim Mohammed
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Thesis Advisor	Kannika Damrongplasit, Ph.D.

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ไฮดาร์ โมฮัมเหม็ด ฮาชิม โมฮัมเหม็ด : ปัจจัยกำหนดการคุ้มครองทางการเงินของครัวเรือนยากจนในประเทศซูดาน. (FACTORS AFFECTING FINANCIAL PROTECTION AMONG POOR HOUSEHOLDS IN SUDAN) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร. กรรณิการ์ ดำรงค์พลาสิทธิ์, 136 หน้า.

การป้องกันความยากจนในครัวเรือนและการลดการเสี่ยงในการใช้จ่ายการรักษาเป็นจุดประสงค์สำคัญของรัฐ โดยเฉพาะประเทศที่มีรายได้ปานกลางถึงต่ำ ในประเทศซูดานมีค่าใช้จ่ายเกี่ยวกับสุขภาพสูง โดยค่าใช้จ่ายมีมากถึง64.5%ของรายจ่ายเกี่ยวกับสุขภาพในประเทศ ซึ่งปัญหานี้เป็นภาวะที่เสี่ยงให้เกิดความยากจนในครัวเรือน ระบบประกันสุขภาพให้เงินสนับสนุนต่อคนยากจนเพื่อป้องกันการเกิดปัญหาทางการเงิน วัตถุประสงค์ของงานวิจัยชิ้นนี้เพื่อที่จะหาว่าปัจจัยใดที่มีผลทำให้เกิดภาวะความยากจนในครัวเรือนและขนาดของปัจจัยเหล่านี้ที่มีผลต่อความยากจน

งานวิจัยชิ้นนี้เป็นงานวิจัยเชิงปริมาณและข้อมูลได้มาจากการสำรวจของสำนักงานสุขภาพในครัวเรือนแห่งซูดาน ได้ทำที่ภาคเหนือของประเทศเมื่อปี2554 โดยใช้กลุ่มตัวอย่าง 6986 ครัวเรือนที่ยากจน การศึกษานี้ ใช้การวิเคราะห์การถดถอยโลจิสติกแบบ2ตัวแปร

ผลการศึกษาพบว่าครอบครัวที่มีสถานะยากจนมีการเข้าถึงระบบประกันสุขภาพเป็นจำนวน16% ของครัวเรือนทั้งหมด ซึ่ง25.9%อยู่ในเขตเมือง 24.9%เป็นครอบครัวที่มีผู้ป่วยโรคเรื้อรัง ครัวเรือนที่มีประกันสุขภาพประสบกับค่าใช้จ่ายทางสุขภาพที่รุนแรงน้อยกว่าครัวเรือนที่ไม่มีประกันสุขภาพถึง2.5% ณ ค่าเกณฑ์ 40% ในขณะที่การเป็นโรคเรื้อรังคือปัจจัยสำคัญที่สุดที่ทำให้เกิดวิกฤตของค่าใช้จ่ายทางสุขภาพทั้งในกลุ่มของผู้มีและไม่มีประกันสุขภาพแต่ผลกระทบของโรคเรื้อรังนี้มีค่ามากกว่าในกลุ่มผู้ไม่มีประกัน ผู้ที่อยู่ในเมืองมีโอกาสเสี่ยงต่อค่าใช้จ่ายทางสุขภาพที่รุนแรงน้อยกว่าผู้ที่อยู่ในเขตชนบทถึง8.7%

การศึกษานี้พบว่า มีระบบหลักประกันสุขภาพในประเทศซูดานสามารถป้องกันปัญหาด้านการเงินในครัวเรือนที่ยากจนได้แม้ว่าจะไม่มากนักก็ตาม นอกจากนั้นแล้วผู้ป่วยโรคเรื้อรังคือปัญหาหลักของการทำให้เกิดค่าใช้จ่ายทางสุขภาพที่รุนแรงในครอบครัวที่ยากจน การเกิดวิกฤตในค่ารักษาพยาบาลมีน้อยกว่าในเขตเมืองเมื่อเทียบกับเขตชนบท และครอบครัวที่มีผู้หญิงเป็นผู้นำมีโอกาสประสบกับค่าใช้จ่ายทางสุขภาพที่รุนแรงได้ง่ายกว่าครอบครัวที่มีผู้ชายเป็นผู้นำ

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

ปีการศึกษา 2556

5685686529 : MAJOR HEALTH ECONOMICS AND HEALTH CARE MANAGEMENT
KEYWORDS: CATASTROPHIC HEALTH EXPENDITURE / POOR HOUSEHOLDS
FINANCIAL PROTECTION / FACTOR AFFECTING POOR HOUSEHOLDS PROTECTION

HAIDAR MOHAMMED HASHIM MOHAMMED: FACTORS AFFECTING FINANCIAL PROTECTION AMONG POOR HOUSEHOLDS IN SUDAN. ADVISOR: KANNIKA DAMRONGPLASIT, Ph.D., 136 pp.

Protection of poor households against the risk of medical expenses is one of the main objectives looked at by the governments especially in low and middle income countries. In Sudan, out of pocket health expenditure reaches 64.5% of total health expenditure. This high out of pocket expense is the challenge facing poor households. Therefore, welfare health insurance scheme, which is a subsidized scheme, has been introduced and targeted towards the poor by providing them with financial protection. The objective of this study is to examine the factors affecting poor household`s financial protection and the magnitude of their effects.

The study is quantitative and it utilizes cross-sectional data from Sudan Households Health Utilization Expenditure Survey in Northern States 2009. Samples of 6986 poor households are found eligible for this study. Binary Logit regression is employed for the analysis.

Results showed that health insurance coverage among poor was 16%, only 25.9% were urban residents, 24.9% were chronically ill. Poor insured households were less likely to incur catastrophe by 2.5% than uninsured at 40% cut off point while chronic illness was the main cause of catastrophe among insured and uninsured with higher probability among uninsured. Urban resident were less likely to incur catastrophe with probability of 8.7% less than those in the rural.

Our finding shows that NHIF coverage provided financial protection for poor households but at low rates. In addition, chronic illnesses were the main cause of catastrophe among poor households. Lower incidence of catastrophe was found among urban residents than rural ones. Female headed households were more vulnerable to catastrophe than the male headed ones.

Field of Study: Health Economics and Health Care Management Student's Signature .....

Advisor's Signature .....

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จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

CONTENTS

Page

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Page

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Page

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

LIST OF TABLES

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

LIST OF FIGURES

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

LIST OF ABRIVIATIONS

WHO	World Health Organization
NHIF	Sudan National Health Insurance Fund
MDGs	Millennium Development Goals
SDG	Sudanese Pound
CBS	Central Bureau of Statistics
FMOH	Federal Ministry of Health
SNHA	Sudan National Health Account
OOP	Out of Pocket Spending

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

CHAPTER 1
INTRODUCTION

1.1 GENERAL REVIEW:

As matter of fact Poverty is one of the most challengeable problems all over the world because it affects individual capacity for effective participation in their communities. Lack of financial protection against catastrophic health expenditure one of the many problems faces poor people in high and low and middle income countries. Many efforts were carried out and several initiatives were announced to protect vulnerable groups against consequences of high health spending as 150 million individual in 44 million households in the world face catastrophe as a result of health care payments and more than 100 million household suffer from impoverishment each year (WHO, 2008).

Designing health care system financing in a way that protect population against financial risks with ill health such as impoverishment and catastrophe become principal responsibility of health authorities in all countries in the world and international organizations (WHO, 2000) continuous rise of health costs is another challenge that limits ability of countries to provide full coverage for their population with health care services, hence many countries especially low and middle income countries directed their attention towards sharing financial risks with their people through introduction prepayment systems such as health insurance.

As a matter of fact the extent of financing health systems always confronted with limitation of inability of economy of the country to provide sufficient fund for health services to meet population needs. Pooling risk among population to spread financial risk among individuals and also to provide budgets needed for services. Many studies showed that health

insurance, can effectively solve these problems. In study of 116 countries in 89 of them catastrophic spending was reduced after introduction of health insurance(K. E. Xu, D. B . Carrin,G. Aguilar-Rivera, A. M. Musgrove,P. Evans, T., 2007).moreover, programs for targeting poor people were also introduced to increase access program in many low and middle income countries for the same purpose. Government subsidized health insurance programs for poor to overcome lack of protection against catastrophic spending Ask skin which is subsidized health insurance in Indonesia for poor and informal sector it increased their access and utilization of health services (Sparrow, 2010). Also governmental subsidies for poor Vietnamese was introduced to finance the health care for services health care fund for the poor (HCFP) was introduced and it was found to reduce the out of pocket spending for poor(Wagstaff, 2010).

Most of the poor people in Sudan which constitute 46.5% of the population live in large land area in rural areas where the severity of poverty is very high either suffer lack of services especially in very remote areas or cannot afford payment for their needed health. In addition to lots of difficulties in reaching facilities due to distances and difficulties of transportation that affects their spending. Many efforts, initiatives and programs were introduced by the government for the sake of alleviating poverty and attaining millennium development goals MDGs. Among these efforts was health insurance for poor via welfare scheme in National health insurance fund (NHIF) funded by Zakat chamber, ministry of finance and some Philanthropists.

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

1.2. GENERAL BACKGROUND:

Figure 1 Sudan political map

Source :("sudan-political-map, https://www.google.co.th/www.emapsworld.com%2Fsudan-political-map.,")

Sudan is a vast country that lies on the central east region of Africa with a surface area of 1882000 km square .It share borders with Chad and the Central African Republic on the west, Egypt and Libya on the north, Ethiopia and Eritrea on the east, and South Sudan, on the south .The total population was estimated by 35.05 million (2012) with annual growth rate 2.55%. Only 33% from the total population are living is the urban area while 56.4% are rural and the remaining are nomads (World Bank).

Because of the long standing civil war in south Sudan which ends by the separation of the South in 2011, Sudan faces many challenges that impact the national economy. In general, the loss of oil revenue and the continuous conflict in Darfur made the national economic indicators deteriorate to the worst .As a result of this Sudan ranked 53 out of 88 developing countries in terms of Human Poverty Index. About 46.5% of the population was under poverty line. Among which 57.6 % in the rural areas 26.5% urban .The severity of poverty is 7.8 and average household GDP growth rate 5.1%. (World Bank 2011).

Table 1 Main socio economic indicator of Sudan in 2011

Indicator	SUDAN	GHANA[1]	EQ-GUINEA[2]	CONGO DEMOG	VEITNAM	UZBEKISTAN
Inflation, consumer prices (Annual %)	22.11	8.73	6.95	-	18.68	45.30
GDP in billions(current US$)	63.90	39.50	16.80	15.70	135.50	1544.83
GDP per capita current US$)	1537.60	1594.03	23,473.44	245.58	1543.03	47.10
Gross national income GNI current US$)billions	61.20	38.30	10.70	14.40	129.70	99.99
Literacy rate, youth female(% of females ages 15-24)	84.55	-	98.41	-	96.65	99.89
Literacy rate, youth male(% of males ages 15-24)	89.95	-	97.71	-	97.48	-
Age dependency ratio(% of working-age pop)	81.63	73.31	72.36	92.78	42.16	-

Source: world Bank 2011

[1] Indicators of Ghana are similar to Sudan.
[2] Eq.Guinea is one of the richest African countries.

1.3 POVERTY IN SUDAN

1.3.1 DEFENITION AND BACKGROUND:

Definition: poverty is a multi- dimension. It referred to as pronounced deprivation of one or more facet of well-being of a person. In Sudan consumption was used to study poverty in which 114 SDG level of consumption used for defining those under it as poor people. (SudanCentralBureauofStatistics, 2009).

Since independence in 1956 Sudan was subtended with many conflicts especially in the south which was considered as the longest civil war in Africa, disputes in Darfur and south Kordofan still ongoing. Unequal distribution of public resources, wealth and the administration between the periphery and the center was among main factors of war. Small funds allocated for poverty reduction efforts Moreover, Drought and Desertification that stroked some parts of the country during 1980th played a role in fragility of country systems. In addition to ideology, ethnicity in many peripheral communities and socio- economic fragility contributed a lot in worsening the situation of country. Combining all these factors together the result was high poverty rate in the country.

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

More than half of the people who were above 15 years old were in active regarding their economic share (SudanCentralBureauofStatistics, 2009).

1.3.2 DISTRIBUTION OF POVERTY IN SUDAN:

Large land area of Sudan with diversity of geography and demography showed differences in poverty distribution among states.

Table 2 Poverty level in Sudan by states

Name of state	Percentage of poor population
Northern Darfur	69.4
Southern Darfur	61.2
Southern Kordofan	60.0
Northern Kordofan	57.9
Red Sea	57.7
Blue Nile	56.5
West Darfur	55.6
White Nile state	55.5
Gadarif state	50.1
Sinnar	44.1
Elgazira	37.8
Kasala	37.3
Northern state	37.2
River Nile	32.2
Khartoum	26.00

Source: (CBS, 2009)

The table (2) shows prevalence of poverty among different states where was found to be highest in Northern Darfur state and lowest in Khartoum state. This table2 also indicated that western part of Sudan had the poorest population.

As large portion of population fall under poverty line .looking at the poverty in term of gender the distribution showed that households headed by women were more susceptible to poverty than men. Moreover uneducated household head was found to be more vulnerable 60% to poverty than educated ones (CBS, 2009).

People live in urban areas were found to be better-off than those in rural as considerable wealth concentrated in urban areas and health care services available and easily accessed. This is clearly observed in variation between states and within the state.

In fact, poverty and ill health were found to be highly correlated to each other. Many indicators point out the relationship between poverty and ill health. MDGs indicators such as high under -5 mortality, malnutrition and high maternal mortality rates reflect this association.

1.3.3 ZAKAT FUND IN SUDAN:

Zakat is Islamic alms "similar to tax" paid mandatory by Muslims who can afford it "i.e when Muslim net wealth exceeds certain minimum amount before the person deserve zakat payment". Benefits from zakat distributed to eight different beneficiaries those are: the poor, those in temporary distress, the Zakat collectors, new converts to Islam, slaves (whose freedom can be bought), debtors, the mujahedeen, street children and travellers It is collected by Zakat chamber.

Zakat chamber is a governmental institution that responsible for collection of the fund from rich people and distribution to the recipients throughout its offices in different states. One of the activities of Zakat chamber is to protect poor households from health expenses as a part of social security efforts. Health insurance card for poor through welfare scheme of NHIF is one of these efforts. The chambers provides fund every year for this purpose. They choose poor who receive the insurance according to criteria specified by the Federal level chamber. However, the actual practice of Zakat fund in some states in choosing the poor to be covered by health insurance may be different from the specified criteria. This is due to the

fact that each Zakat office can choose certain cases among people in the locality to be covered in the welfare scheme. However, there is a large variation in the poverty rate among different states as shown on (table2 above).Thus it is possible that the same person living in one locality may be chosen to be in the welfare scheme, but if residing in another locality may not be covered with by the health insurance. In other words, because of the varying practices in different Zakat offices, this study may still be subject to some endogeneity problem.

1.3.4 POVERTY REDUCTION EFFORT:

Since long ago many challenges facing Sudan in poverty reduction efforts. Several strategies, many efforts have been committed by government to achieve millennium development goals MDGs these efforts include development of public services delivery, providing more employment chances, raising more pro-poor funds, promoting domestic and foreign investments. Many programs directed towards building capacities and social protection for extreme poor population has been also introduced.

Zakat fund which is Islamic charity among its concerns is to reduce and help in poverty reduction efforts through certain targeting programs among them is to provide poor people with health insurance coverage.

In public services sector many reforms have been performed aiming to improve welfare throw efficiency and effectiveness of financing of the governmental systems. among these systems is health system for poor using health insurance as one of the financing tools for poverty reduction strategies(IMF, 2013).

1.4. SUDAN HEALTH SYSTEM

1.4.1. ORGANIZATION, DELIVERY AND MANAGEMENT OF HEALTH SYSTEM:

In fact, the public health sector act as the main provider of health services since independence in 1956. Although there are different health care partners including in addition to federal and state ministries of Health, armed forces, police, universities, private sector (both for profit and philanthropic) and the civil society. But, due to the isolation performance of these partners, the managerial health system still lacks the coordination and guidance (FMOH, 2007).

The administrative organization of the health system based on three level , federal , state and local district level .The federal ministry of health(FMOH) is linked to 16 states .Within each state there are number of localities (134 in total) managed through a district health system . Moreover, FMOH takes the direct responsibility for the organization of health in the state and support of the local health system.

The district health system has been established to strengthen the health management capacity at the level of localities. The aim from this model is to overcome the problems of supervision, leadership and to support the referral system (EMRO, 2006).

The responsibilities for the three levels are to act in integrated way the summary of these responsibilities are shown as follows:

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

1. Federal level responsibilities summarized as follow:

Responsibilities in the decentralized system for federal level were limited to:

1. Designing and formulation of national health policy
2. Planning for entire country and provide strategies
3. Describe national quality standards
4. Health information and surveillance systems
5. Manage major interstate disasters and epidemics
6. Formulation of medicines policy and regulations and overall monitoring and evaluation, coordination, supervision, training and external relationships
7. Coordination with all health care provision partners (universities, military, police and other providers) to comply with the national health policy

2. Ministry of health at state level has the following responsibilities:

1. Shape the local policies, plans and strategies according to the federal guidelines
2. Provide funds needed
3. Employing and introduction of local plans and policies

3. Localities health authorities responsible of

Chulalongkorn University

1. Services delivery in the locality

2. Implementation of national and state policies at locality level

The national health indicators in Sudan reflect the problem of inequity in health care provision.

Table 3 Sudan health indicators in 2011 compared to 3 low and middle income countries and the lowest and highest per capita income in Africa.

Indicator	Sudan	Ghana	EQ. Guinea	Congo- Dem	Vietnam	Uzbekistan
Health expenditure, total (%GDP)	6.7	5.3	4.5	6.1	6.8	5.6
Health expenditure per capita (Current US$)	119	83	1051	15	93	91
Out-of-pocket H. EXP. (%of total health expend.)	66.8	29.8	43.5	34.4	45.6	46.2
Life expectancy at birth (both sex) (in years)	62	61	52	49	75	68
Total fertility rate (women)%	4.6	4	5	6.1	1.8	2.5
Under 5 mortality rate (both sex) Per 1000 live birth	76	74	104	150	23	41
Maternal mortality rate- Per 100000	730	350	240	540	59	28
Prob. of dying in male bet. 15-60 years- Per1000 pop.	279	276	374	385	191	240
Prob. of dying in female bet. 15-60 years- Per1000 pop.	216	217	331	358	87	132
Prevalence of HIV – total(% of population 15-49)		1.4	6.2	1.1	0.4	0.2
Incidence of tuberculosis	117	79	327	142	151	101

Source (World Bank 2011)

1.4.2. HEALTH FINANCING SYSTEM:

Financing health system in Sudan comes mainly from public and private sources. These include Ministry of Health financing that covers all Sudanese citizens, Social and National Health Insurance Schemes, the armed forces employment-based social insurance schemes, private insurance schemes and out-of-pocket expenditures. The contribution of each of these financing agents' sources was as follows:

1. Public financing from (ministries of health federal and state level, defense, interior, higher education, other ministries, Zakat fund, locality authorities, national health insurance fund, and Khartoum state health insurance fund and parastatal firms) collectively contributed with 32.7% of total financing.

2. Private financing (household out of pocket spending, private health insurance enterprises, not- for profit institutions and other private institutions) provide 65.4% of total expenditure.

3. Donors and world`s agents pool 1.9 % of the total financing

The following table3 explain amount in US dollars, percentage and per capita of each of financing agent in 2008.(SNHA, 2008).

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Table 4 Total Health Care Expenditures by Financing Agents, 2008

Financing Agents		Amount USD	Percent	Per Capita
Public Agents	Federal Ministry of Health	232995596.7	6.9%	15.94
	Ministry of Defense	99095238.1	2.9%	6.78
	Ministry of Interior Affairs	17525570.0	0.5%	1.20
	Ministry of Higher Education	12748052.38	0.4%	0.87
	Other Ministries	1921062.857	0.1%	0.13
	Zakat Fund	25332220.48	0.7%	1.73
	SMOH	504466557.1	14.9 %	34.51
	Locality Authorities	69063867.14	2.0%	4.72
	National Health Insurance Fund	87509980.95	2.6%	5.99
	Khartoum state health insurance	40200403.33	1.2%	2.75
	Parastatal Firms	16281870.0	0.5%	1.11
Private Agents	Private insurance enterprises	26243235.24	0.8%	1.80
	Private household out-of-pocket payments	2136224478.1	62.9 %	146.13
	Nonprofit institutions	9179367.619	0.3%	0.63
	Other private firms and corporations	51503534.76	1.5%	3.52
World agents	Donors	35531653.33	1.0%	2.43
	International NGOs	28920886.67	0.9%	1.98
Total USD		3394743573	100%	232.22
Total USD		3,394,743,573		USD 110.58

(SNHA, 2008)

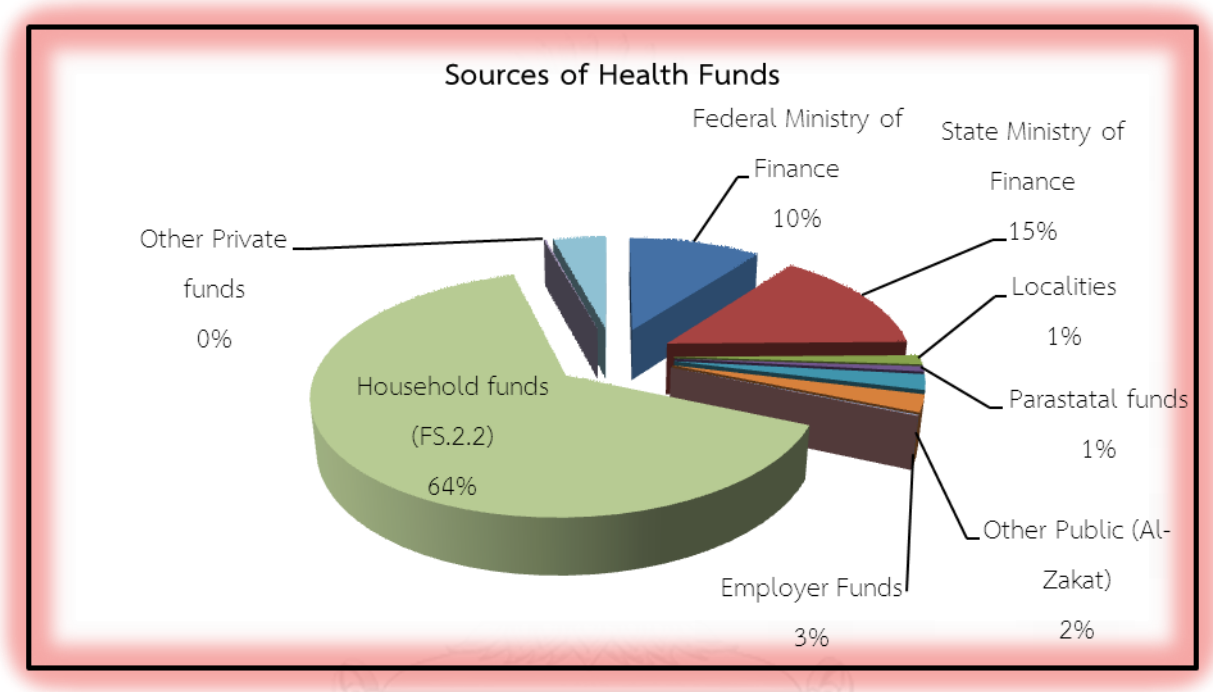
In fact, since more than two decades fluctuation in Sudan economy affect health system financing greatly which is clearly observed when looking at trending of government financing as part of GDP in 1978 and 1980 is 1.5% was allocated (Wang'ombe & Mwabu, 1987) in 1990 only 0.07% (Human Development Report. 2003) , and 3.3% in 2000 (worldbank, 2000) and 3.9% in 2005(WorldBank, 2005) and 6.9 % in 2008 (WHO, 2011) .The amount of fund raised yearly was found to be far less than required to meet population needs therefore poor people in were left un protected against high health spending because they had to pay out of pocket.

Many countries responded to initiatives for strengthening health system by user fee introduced in 1980th - 1990th in many low and middle income countries including Sudan. This is one of the solutions for the nearly collapsed health systems as financing tool to improve access and provide revenues for improving quality of services as respond to many international initiatives to strength health system such as Bamako declaration for community finance tool and world Bank for user fee .In Sudan in 1987 user fee was introduced. Combining user fee with high poverty rates and natural disasters such as drought and desertification have had bad impacts in that poor people health financing situation and they cannot access to health services neither afford payment and therefore, became more vulnerable to catastrophic spending and impoverishment. As a result that user fee did not increase access or quality of services (Lagarde, M., Palmer, N. 2011).

Out of pocket health expenditure remain the main source of funding for health system for a long time since it constitute 64% of total health spending (NHA 2008).Which was found

to be regressive, inequitable towards poor population. In presence of budget constraints in low and middle income countries, health insurance thought to be the best solution for such situations.

Figure 2 Sources of health finance



Source NHA 2008

In 2000 UN announced millennium development goals (MDGs) one them was reduction of poverty to 50% by the 2015 and improving access to health services (WHO 2000).many efforts were undertaken by the Sudan government to mobilize and allocate budget for health sector to reduce inability to pay such free care for children under 5 years old treatment and caesarian section in addition to emergencies and some special programs which funded through global agencies. Despite of all the previously mentioned efforts done there is still high

out of pocket share and shortages of funds that push very large number vulnerable people into poverty.

1.5. SUDAN NATIONAL HEALTH INSURANCE FUND

In line with many world initiatives that called for introduction of health insurance as a tool for healthcare financing National Health Insurance Fund (NHIF) in Sudan was established in 1995 as a governmental organization aiming to provide accessible health care services to meet the needs of whole population in Sudan. Using risk pooling cost containment, removing financial barriers insuring availability of services were main strategies adopted.

National health insurance fund play fundamental role in removing hardship on both people and governmental sides. Direct health services provision for insured people through its owned facilities and indirectly through contracting mainly the public providers and private ones as well.

NHIF has many objectives to be achieved summarized as following:

1. Provides Health Services for insured people

2.Contributes in Health Professionals settlement in rural areas

3. Provide equitable, transparent services to establish social solidarity, community participation values

4. Reduces poverty to help achievement of MDGs, and improve access to the health services

5. Protect susceptible groups from burden of health spending (NHIF, 2010)

NHIF in Sudan characterized by a number of features that can be summarized in:

1- The unit of insurance is the family rather than individuals

2-coverage with health insurance services is extended to include poor people (disabled, pensioners, widows and orphans) to provide protection for them against impoverishment with health spending through public social support programs for poverty reduction funded by Zakat chamber, ministry of finance and some private sector companies. Moreover Philanthropists from the community contributes in fund provision for such programs.

3- Participation of community leaders in awareness, contribution collection and enrolment processes.

- NHIF provide its services through three schemes

1. Formal sector scheme:

Cover those civil servants in the formal sector -governmental employees also cover pensioners and some other formal institutions

2. Informal sector scheme:

One of the important schemes that target people other than civil servant characterized by large proportion 80% of population is in the informal sector(NHIF, 2011) which composes of:

2.1. Informal organized sector: include people work for private companies, institutions with salaries

2.2. Informal un-organized sector: Including self-employed people, low and irregular income people. They get insured through unions and associations

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3. Welfare scheme:

This scheme directed towards protection of poor people and expansion of the social insurance coverage. Its funds come from charities such as ELzakat chamber, national ministry of finance.

Poor people in Sudan were found to be 2.3 million households grouped into 3 groups according to severity into severely poor, moderately poor and poor families who were targeted with many social initiatives to provide them with insurance(Zakatfund, 2010b). These initiatives were thought to have positive impacts on access to services in addition to financial protection from catastrophic health expenditure.

Eligibility criteria of poor for this scheme were described by Elzakat chamber report and Sudan base line poverty estimate survey 2009 which define poverty line and the severity of poverty in each state.

NHIF adopted the criteria set in both the survey 2009 and Alzakat chamber report to describe eligible households for this scheme. Certain number of poor household were introduced yearly which depends on the funds available for each year provided by funders also the percentages of distribution of poor households in each state. Then poor households defined using the following criteria:

1. A family (household) with no income and if the head of the family is unemployed or if he does have the ability to work.

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2. The head of the family income are less than 120 Sudanese pounds per month or have no income from any other source.

3. Or that the average per capita consumption in the household equal to or less than 114 SDG a month.

4. IF the head of the family forced to be unemployed as a result of disability or illness, or lack of work.

5. IF the total family income per month less than the minimum wage.

6. Family that suffers from costly endemic diseases and head of the family works with salary bases.

7. IF the head of household pensioner and suffer a chronic illness and has a family of six members or more, all in different education levels and they do not have any other source of income.

8. Head of the family who have assets such as a house or agricultural land or car and is not working and do not generate revenues. Does not have money to invest and has a family rely on him.

9. Non –skilled workers who do not produce their subsistence need such as farmers and have not any other source of income.

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10. Agricultural labors and shepherds who do not possess the animals or other source of income, and they have families consist of six members or more(CBS, 2009; Zakatfund, 2010a)

1.6. RATIONALE OF THE STUDY

In fact the complicated situation which was appeared as unstable economy, high out of pocket spending that reached up to 64.3% of total health spending in addition to high poverty rate 46.6% of the total population were classified as poor, which resulted in large proportion of the community cannot access to health services .Therefore, health insurance was introduced to solve these problems and to protect households from catastrophic health spending.

This study focuses on factors affecting poor households financial protection with more focus on the role of health insurance in protecting insured people under welfare scheme of HNIF compared to those who were uninsured.

1.7. RESEARCH QUESTION

1. Does NHIF help in protecting insured household from experiencing catastrophic health care expenditure?

2. What is the magnitude that health insurance helps to lower the probability of experiencing catastrophic health spending?

3. What are household characteristics that affect the probability of experiencing catastrophic health care spending of household?

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1.8. RESEARCH OBJECTIVES

1.8.1. GENERAL OBJECTIVES

To study the role of national health insurance (NHIF) in protecting poor insured household compared to those poor uninsured.

1.8.2. SPECIFIC OBJECTIVES:

1. To study household characteristics that affects the probability of experiencing catastrophic health care spending of household.

2. To study the magnitude that health insurance help to lower the probability of experiencing catastrophic health spending

1.9. SCOPE OF THE STUDY

This study is conducted using cross –sectional data from Sudan household health survey 2009 to determine the factor the affect poor household financial protection from catastrophic health expenditure by comparing spending of those insured under welfare scheme of NHIF and uninsured households.

1.10. HYPOTHESIS

In this study we hypothesize that NHIF help to lower the probability of experiencing catastrophic out of pocket health spending for poor households in Sudan.

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CHAPTER2

LITERATURE REVIEW

2.1 HEALTH CARE FINANCING SYSTEM:

Since more than 30 years ago WHO described among basic human rights is to get the highest level of health that could be attained. Universal health coverage was described as suitable tool to achieve the best level of health. ‘’Health for all’’ was the Alma-Ata declaration at that time which promotes attaining universal health care coverage. The main challenge facing countries and was deter achieving of net that was found to be how to finance their health systems (WHO, 2010).

The WHO report in 2000 defined the health financing mechanism as one of the most important cores of any health system.

For long time ago , the problem of how to finance the health systems take attention of policy makers , beside searching for the most effective tool that maintain the financial sustainability of the system , this tool should be affordable to the entire population and not result in reduction in utilization or progressive spending that might end with poverty of households. Many communities in the world, specially the poor ones, face several challenges in term of access to health care, financial protection of households from high health spending. It is believed that there is a relationship between the poverty and health care cost.

Financing health care systems in most of countries mainly depend in what sources are used, how these funds pooled and allocated and the type of services purchased. As a matter of fact, efficiency of fund allocations and equity in health services provision result in

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differences of source of fund, allocation and pooling depending on country context. The main source of funds comes usually come from population throughout direct and indirect taxes in addition to premium collected for health insurance. The amount of revenues allocated for health sector varied considerably between the low and middle income countries and high income countries in which sufficient revenues played a big role in determining how much to fund could be provided (Kutzin, 2001) .

Funding health care systems usually compose of three main parts revenues collection, fund pooling and purchasing and/or provision of services. Successful financing system should fulfill these specified criteria.

2.1.1. REVENUES COLLECTION

Collecting funds for financing health and its efficiency depends on who pays , how to collect and mechanism of collection which includes taxation (direct and indirect) , social insurance contributions , private insurance premium, loans and grants ,out of pocket payments. Infect , the funds derived from population who pay the largest portion in term of taxes , out of pocket and premium contributions.(Figueras J. , 2007).

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2.1.2. GOVERNMENTAL TAXATION

Although many governments start to provide free health services to their population but most of these systems stacked later by the continuous growing of health costs in the present of low or inefficient governmental budget .This is more obvious in middle and low

Countries in which the national health budget was remaining low for long time.(Scheil-Adlung, 2006).

Revenues collected from taxes considered to be the main source for health financing all over the world and especially in low and middle income countries. Moreover, these revenues were found to be highly affected by the capacity of government to raise it with income level, population and growth of the country. Most revenues came from income tax, profit tax, value added and tax, mix taxes(Mossialos E., 2002).

2.1.3. USER FEE

In 1980s, WHO stimulate different health systems to implement user charge policy .This was provided as a solution for the nearly collapsed health systems as financing tool that can improve both access to health care and provide revenues for ensuring quality of services (World bank2011).

User fees refer to a financing mechanism that characterized by paying at the time of receiving the services. This financing tool is common in many countries around the world, especially where there was marked budget constrain in Sudan 64% of total health financing arise from the pocket of households (NHA 2008). The new policy achieve its goal in maintaining regular financial flow but at the same time and due to the high cost of services , many population became unable to access to health services (Lagarde, 2008).

In many part of the world user fee still an important tool for financing health care systems specially in low and middle income countries in which people pay large proportion of

their health expenditure out of pocket and governments payments for health is limited by their budget constraints unlike high income countries where government share exceeds 50% of total budget for health. It was believed using user fee as tool of financing result in cost recovery of part of services (CREESE, 1991; CreeseA., 1991; Hardeman, 2004).

User fee was an important tool for financing health systems in many African countries. It compensated the gap in budget for health as the share of national health budget from government was limited. It facilitated revenues mobilization for health services especially primary services. Ranging from one third to two third of their revenues for primary care was collecting through user fee which enabled some countries provided cost recovery up to 15 %.This was found to bring sustainability to health services. Although sometimes found to prevent or delay access to services for poor population(Worldbank, 2011).

In fact, User fee was introduced to solve many problems in the health system such as inefficiency of health care provision, containing cost and provide more revenues to sustain services provided. This was shown obviously in many low and middle income countries where financing health system. But user fee was found to reduce health care services utilization and also there was no quality improvement, and raise the price of health services. Therefore, most of countries shifted to use health insurance and other sources of funding (Litvak, 2006).

Since World Bank adopted millennium development goals at the beginning of this century among which reduction and eradication of poverty was one of the important goals to be attained. Therefore several polices were pushed to be changed or abolished among which

user fee policy in 2001 was pushed towards elimination for its negative effects on services utilization and access to health services especially in developing and low income countries. In 2004 as '' Making Services Work for Poor People'' was adopted and user fee was no longer supported by world bank since it was believed to be financial barrier to access to services by poor population(Guo, 2012).

2.1.4 HEALTH INSURANCE

Health insurance is financing mechanism used mostly all over the world to provide funds through risk pooling in term of prepaid contributions mechanism so as to provide certain services within definite time(Worldbank, 2011).

Health insurance is considered as important coping tool that provides financial protection. Studies from several countries show that introduction of health insurance reduces incidence of catastrophic spending (F. Knaul, Wong,R., Ornelas, A., 2006)) , and other studies found that rates of catastrophic spending became lower after the universal health care scheme was introduced as in Thailand in 2001 (Limwattananon, 2007).

Financing health system by using health insurance as a mechanism is widely spread all over the world in developed and developing countries in which governments allocates certain amount of budgets to fund health system either from private sector or taxes based financing amount of funds allocated for health differ greatly from developed countries where higher percentages can be allocated as in British tax system 15% of it reserved for health to developing countries.

Using health insurance as a financing source especially social insurance found to have pros and cons. Amongst its pros it provides more funds for health through taxes , help government in financing health system , improves accessibility to health services for population , pooling risk among population providing financial protection for vulnerable groups to health financial shock and expand the health coverage .The following cons are also observed in insurance financing very poor population are included into insurance system only by using governmental subsidies , governance and accountability are difficult , leads in many countries in health cost escalation. More over preventive services are less considered in insurance systems(Gottret, 2011).

2.2. HEALTH CARE EXPENDITURE

Health is a human right which should be provided for all according to their needs. In September 2000, the millennium development goals (MDGs) was announced to adopt fairness in health care financing .The aim of this announcement is to maintain an affordable health care to all individuals and to protected households from the high health spending (WHO 2000).

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Generally, the continuous growing of the out of pocket spending in the health sector became the significant factor contributing in impoverishment of many households all over the world. This problem attracted the attention of governments and health organization.

Moreover, the global organization defined the impact on medical spending on households in terms of catastrophic health expenditure and impoverishment from medical

expenses (Li et al., 2012) . Catastrophic health expenditure was defined as the out of pocket spending that exceed certain proportion of the household or individual income with a possibility of suffering from illnesses This percentage is differed from one country to another since some define the catastrophic spending when the percentage of household spending from total income reach 5% (Berki, 1986).10% (Waters et al., 2004) and in some cases up to 40% of non-subsistence spending (K. E. Xu, D.Kawabata, K.Zeramdini, R.Klavus, J.Murray, C., 2003).

On the other hand , impoverishment from medical expenses can take place when the medical spending pull the household under the line of poverty(Bredenkamp, Mendola, & Gragnolati, 2011).

2.2.1 DETERMINANT OF HEALTH CARE EXPENDITURE

There are many factors that have association with the high OOP medical spending. In most of cases, these factors are similar among the low and middle income countries .It include socioeconomic characteristics of household such as income, age and sex and level of education. Other factors like; size of household, the extreme age members under five and elderly people over 65 and having members with chronic illness.

Determinant of catastrophic health spending and extent of their impact on household economy was a study in West Bengal in India performed by (Mondal1 S., 2010) and by using logit regression method to investigate determinant s being associated with catastrophe of household when household spent more than 40% of their capacity to pay. Prevalence of

chronic illness among household, household size and rural / urban residency were found to be associated with increased catastrophe.

As matter of fact presence of chronically ill members among the household, hospitalization among the members disability were found to have their effects on increased catastrophic health expenditure among household .in addition households with large proportion of elderly in Thailand spent big portion of their resource on health leading to catastrophe within the household(Somkotra & Lagrada, 2009).

In Burkina Faso determinants of health care expenditure especially in case catastrophic spending were economic status of the household, health care utilization , illness episodes and chronic illness in adults(Su T., 2006).

Incurring catastrophic spending, its degree and the determinants of this spending were studied in rural Ebony state in Nigeria in tuberculosis patients whom surveyed in which direct household cost and annual income used catastrophe was higher in poor household than richer ones. Effects of other factors included age over 40years it was found to be positively correlated with catastrophic spending , household with male patient incurred high degree of spending , those in formal education were found to have higher catastrophe , location of household where urban population incurred more catastrophic and HIV co-infection were found to be among the determinants of level of catastrophe(Ukwaja K., 2013).

In china , (Li et al., 2012) conducted a study using the fourth national household health survey data to study level of catastrophic health expenditure and impoverishment as well as

exploring the factors behind catastrophic health expenditure among Chinese population .The study found that , the rate of catastrophic health expenditure was high among households having members who were hospitalized, elderly, or chronically ill, as well as in households in rural or poorer regions . The study concluded that, the need for and use of health care, demographics, type of benefit package and type of provider payment method were the determinants of catastrophic health expenditure.

The study by (Akinkugbe, 2013) looked at health care financing and catastrophic payment of health in Botswana and Lesotho showed that among the determinant of catastrophic spending in these two countries people in poor quintiles were more vulnerable to catastrophe . In addition to this characteristics of head of the household such as education level where more education means less catastrophe, unemployed people associated with high catastrophe, female heads more susceptible to catastrophe than male, age, also location of household , household size and presence of children under 5 years old all these were significantly had positive correlation with catastrophic.

A third study was conducted in Kerala in India to study catastrophic spending related to coronary heart disease, socio-demographic determinants and catastrophic coping mechanisms and employment, health security coverage. Results showed that catastrophic spending was higher in rural population than urban ones, less educated incurred higher spending, have insurance reduced spending while those whose bad employment condition spent higher than those have good employment condition.(Daivadanam M., 2011).

Other evidence came from Vietnam as middle income country. In a study by (Van Minh, 2013) who directed his analysis towards examining determinants of catastrophic health spending. Results showed that Insured Households experienced lower rate catastrophe compared to uninsured. Household size was associated with lower rates. While presence of elderly people and children less than 6 years old accompanied with high rates. Rural areas population experienced high rates of catastrophe than those in urban areas .In the other hand people belongs to higher quintile had lower rates of .similar results were also obtained for impoverishment.

2.2.2. IMPACT OF HIGH OUT OF POCKET EXPENDITURE

Studying the impact of OOP spending can be assessed by looking at changes in the level of wellbeing of household. This could be obtained by estimating the extent to which household living standards is disrupted as result of purchasing medical care for ill person. The focus of many studies was on access to health care and their effect on poverty level of households and individuals.

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One point of view obtained from Whitehead et al .(2001) stated that “increased OOP costs for public and private health-care services drove many families into poverty, and are increasing the poverty of those who were already poor”.

The high out of pocket spending was regarded as a main barrier for access to health services in many developing countries. This high payment for health services can force poor households to reduce their basic needs spending such food housing so as to cope with these

expenses. A good example for this financial barrier is what (Bonu, Bhushan, Rani, & Anderson, 2009) found in their study about maternal services utilization in India . The study provides an empirical evidence of potential financial distress due to maternal expenditure, especially for the poorest women who became unable to utilize the maternal services as a result of high medical expenditure.

In fact, barriers to health care services in low and middle income countries were found to be resulted from high proportion of out of pocket spending. Poor population in these countries affected more than rich since they either delayed or cannot accessed the service as they cannot afford medical services cost, payment for transportation cost to get the services and received low quality services as they could not afford paying for good quality services was real reflection of financing health system in Cambodia which depends on user fees as main source for financing health. Therefore, these economic consequences were found to affect the poor in Cambodia. After their removal the situation seems to improve and the poor are financially protected. (Damme, 2003).

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On the other hand, positive relationship between poverty and out of pocket expenditure was observed. About 25 million households around the world were thought to be pushed into poverty as a result of out of pocket spending all over the world in 2007 (Host and Brandrup-Lukanow , 2007). This obviously shown in low and middle income countries around the world where households were forced to pay large proportions of their limited income, borrow money to, sell assets to get health services they need which in turn end up

with household being pushed into poverty or forgo the treatment, education of children in some cases.(WHO, 2004).

Poor population in Thailand found many difficulties to finance their needed health services it was found that they had to spent 21.2% of their income in health which was considered to be higher compared to rich households(PANNARUNOTHAI S., 1997) (Bredenkamp et al., 2011) investigate the variation in out-of-pocket expenditures on health and their relationship to financial catastrophe and impoverishment in Western Balkans. The study was established giving strong evidence that health expenditure contributes substantially to the impoverishment of households, increasing the incidence of poverty among the population. Moreover, the transportation expenditure accounts for a large share of total health expenditures, and contributes to impoverishment.

Absence of financial protection in health was. In which families suffer from high burden of illness as a main characteristic result of a study carried out in Mexico pointed out that health spending was the reason behind increased rates of poverty in yearly bases between the year 1992-2004.also it showed that catastrophic spending persist among poor households more than rich one(F. M. Knaul et al., 2006).

2.2.3. ROLE OF HEALTH INSURANCE IN CATASTROPHIC HEALTH EXPENDITURE

In a Mexican study by (Knaul et al. 2006) was found that the presence of catastrophic health expenditure was reduced by an increased coverage of the population with health insurance scheme , assess poverty level of household and assessing health insurance level

which is describe as that large proportion of household incur catastrophic for the fact that they have insufficient health insurance coverage (Waters, Anderson, & Mays, 2004).

On the other hand, the effect of health insurance on reducing the catastrophic expenditure may be minor. This is what found in study from rural china that carried out to measure the impact of China's New Cooperative Medical Scheme in catastrophic medical payments of rural households in Lenya County, Shandong Province, where the OOP spending found to be still have its negative impacts on poor households .The study found that the low premium of the scheme was the main cause of the failure in reducing the high OOP spending. Moreover the package of services received together with extra payment share in this problem. ((Suna, 2008), Carmichael, G. & Sleigh, A..

In fact, equity in health care access and finance was one of the main goals of health systems and was found to be a challengeable goal to be achieved (WHO2000). Financing poor population throw targeted program such as adopting subsidized health schemes found to provide protection to those targeted group. One study of financial protection for the poor in Colombia was carried out to examine the effects of a subsidized health insurance scheme that launched to expand health insurance coverage. The study in 2003 was using data from two levels national and local level to test the reduction of out of pocket spending came from implementation of subsidized system for poor population. considerable reduction of out of pocket payments was observed for poor households enrolled into this scheme 43% in local

level and 50% in national one gave an evidence for using subsidized schemes efficiently to protect poor from catastrophic health spending(Castaño, 2007).

To control high level of payment for health services many polices and strategies and rules were changed while others were introduced. One of which was introduction of prepaid health services especially health insurance. Many studies point out the importance prepayment in facing catastrophic health spending. A study on protection of household from catastrophic health spending indicated importance of prepayment strategies especially health insurance in lowering the incidence of financial catastrophe. This study also showed that social health insurance had more protection to people than other tools. To provide protection to all groups in a society mixed funding source usually used and more than one type of financing strategy(Ke Xu, 2007).

The importance of health insurance in protection household protection against catastrophic health spending was also clearly observed in low and middle income countries especially in African countries where the highest burden of disease in the world and governments finance only around 29% of health expending and 71% from out of pocket which became barrier for health services access by poor population. Due to this situation implementing social health insurance was the strategy adopted by many governments to provide protection and finance health systems and facilitate the access to services for population especially vulnerable ones(Spreeuwers, 2007).

Moreover, health insurance can protect people from high healthcare spending in upper and middle income countries as in China. A study on effect of health insurance in protecting people suffer from stroke (high financial burden disease).explained that 60% of payments fall in patient side which in turn result in either poverty or hardship of family. Health insurance was found to offer good financial protection especially for more vulnerable groups such low – income earners women in rural and urban areas. The finding showed that only 23% of families of patients with stroke fell under poverty line as a result health spending with health insurance compared to 62% without health insurance(Heeley, 2009).

2.3 FINANCIAL PROTECTION OF POOR HOUSEHOLDS METHODS FOR ANALYSIS AND EMPIRICAL STUDIES

Many models were used in determination of outcome results and findings and investigate the relationships between different variables. The relationship between catastrophe and poverty and access to health services was determined in many studies by performing more than one model of analysis. The most commonly used one is logistic regression since the non-linearity does not affect results. A study in a rural area in Senegal was carried to determine role of community based health insurance legit regression was used for estimation of results (Jütting, 2004).

In study in China was directed to identify determinants and incidence of catastrophic health spending multi-logistic regression was used as tool for analysis.(Ye Li, 2012). Third study conducted in Mexico City look at preventing impoverishment and promoting equity and protecting household from financial crisis. Data from household income and expenditure

survey were analyzed by using legit for probability of those experienced catastrophe , impoverishment and excessive spending , to bit for out of pocket spending as proportion of disposable income and OLS as tool for the findings of the study.

Protecting poor households from catastrophic health payments is a challenge faces many countries around the worlds. A lot of efforts have been made to overcome this problem amongst using health insurance as one of the tools through which reduction in the out of pocket spending of the poor could be achieved.one study by (Scheil-Adlung x., 2006) in South Africa, Senegal and Kenya using multi logistic regression method showed that being covered with health insurance lower the catastrophic payment of insured households more than uninsured.

Another study by Regional committee for the eastern Mediterranean looking at the impact of health expenditure on the household and options for alternative financing found that among the countries in region out of pocket spending is high more than 50% of the health care spending was reduced by introduction of prepayment mechanisms such as health insurance(Mediterranean, 2004).

More evidence for the financial protection for poor came from study in Vietnam by (M. Jowetta M., 2003) by using data from Vietnam survey performed in Hai Phong, Ninh Binh and Dong Thap Provinces to evaluate the voluntary health insurance . OLS and Heckman econometric models were used to estimate the coefficients and endogenous dummy variable

estimates. Comparing out of pocket expenses between the insured and uninsured it was found to drop by 200% among the insured.

Protection poor against financial hardship and catastrophe was explored in Ghana by(Nguyen H., 2011) using data from household survey performed at Nkoranza and Offinso rural districts. Probit regression method and two - parts model were used to estimate catastrophe as out of pocket evaluated as a part of capacity to pay.insured people were found to suffer high out of pocket spending but to lower extent than uninsured .the protective effect of the health insurance was clearly observed among the poorest quintile group indicated pronounced protective effect of the scheme.

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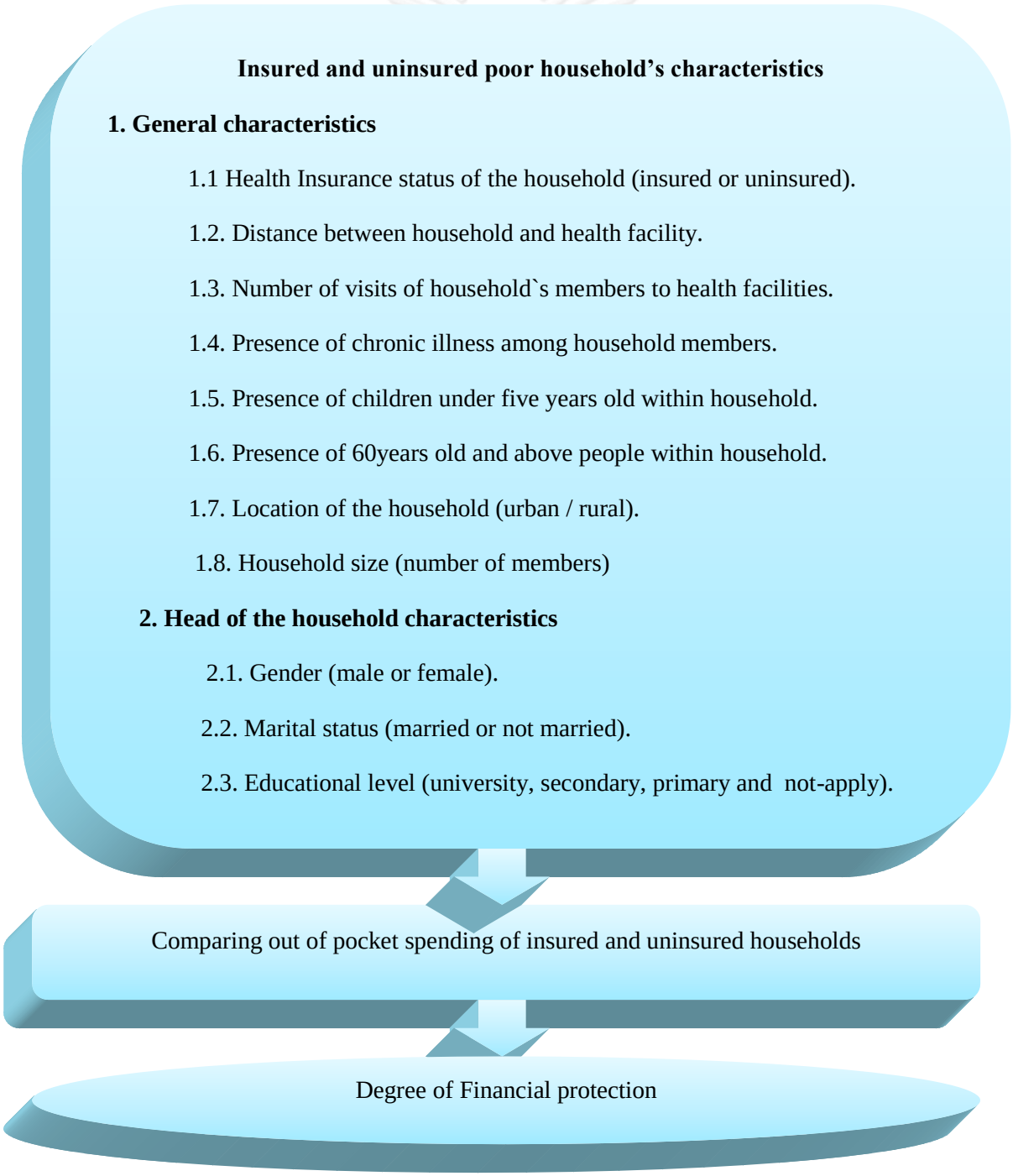
CHAPTER3

METHODOLOGY

3.1. CONCEPTUAL FRAME WORK

Shows the type of data used in this study. Two sets of data were used to perform this study including general characteristics of the households and head of the household`s characteristics the data for insured and uninsured as well.

Figure 3 Conceptual framework



The two set includes:

1. First set: include data reflects the main characteristics of whole members of the household that impacts it's out of pocket health spending of the insured and uninsured households leading to catastrophe in the household these
2. Second set: include data reflect some characteristics related to head of the household that has its direct impact on out of pocket spending of the household these are gender of the head male or female, marital status which only look at whether married one other wise considered to be not married divorced and widow

The data in general represent the demographic, socio-economic characteristic and health status in both insured household and uninsured ones as well.

The justification behind the choice these characteristics are:

1. Literature review of several studies showed that the previously mentioned characteristic had impacted out of pocket spending and therefore catastrophic level in many countries around the world

2. Sudan is a large country with wide land areas, big proportion of the population live in rural areas and the poverty level is high and many suffer difficulties and high transportation cost

3. Average household size is relatively high in Sudan

4. Effect of the health status of the household can easily be reflect the by chronic illness, extreme age members (children and 60 years and above people) in the household as they are most vulnerable group to health problems

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5. Health insurance protects considerable proportions of communities of many countries

In fact comparing out of pocket spending of insured and uninsured households can show the degree of protection provided by the welfare scheme that targeted poor population in the country.

3.2. IMPORTANT DEFINITIONS

3.2.1. HOUSEHOLD OUT OF POCKET HEALTH EXPENDITURE (OOP)

Is the sum of direct total of twelve months expenses by all household members in dental services, out patients and chronic illnesses, non - chronic illnesses, inpatient services, abroad referred cases services, preventive medical consultations and transportation costs paid by households member for seeking health care.

Out of pocket (OOP) calculation:

OOP calculated as follow

- Yearly expenses of dental visits by all members of the household was summed together to get the total expenses for dental services

3.2.2. CONSUMPTION EXPENSES

Are the total expenses of consumption of all members of households includes both those with monthly bases of consumption as well as those with yearly consumption.

3.2.3. CAPACITY TO PAY

Are the total consumption expenses less subsistence needs expenses (food expenses).

3.2.4. HEALTH INSURANCE STATUS (FOR THIS STUDY)

It's a situation of having health insurance coverage among welfare scheme`s members (NHIF Sudan). Households considered to be covered, if the head of the household or at least one member had health insurance card. This assumption based on fact that in Sudan the unit of coverage is household not individual.

3.3. STUDY DESIGN

This study is designed as quantitative study using secondary cross sectional data derived from Sudan Households Health Utilization Expenditure Survey in Northern States 2009.

3.4. SURVEY DATA, POPULATION AND SAMPLING

Sudan Households Health Utilization Expenditure Survey in Northern States 2009 has been conducted by the Central Bureau for statistics (CBS) directed toward investigating utilization and consumption of the health services in Sudan in 15 states by using sample of 12600 household (75184 individual) divided in 840 household for each state. The sampling techniques used were stratification by state location (urban/ rural) and clusters of 56 for each state were then calculated. That represents the whole country (without south Sudan) collected in three rounds during the period of March –December 2009 to cover variation in population health aspects From this survey those lived in state in period less than 6 months were excluded.

3.5. ELIGIBILITY FOR THIS STUDY

This study focuses on investigating out of pocket health expenditure for poor Sudanese households. Therefore population eligible are those household who were eligible for the

Sudan Households Health Utilization Expenditure Survey in Northern States 2009 and had the characteristic of total monthly per capita consumption level equal to or below 114SDG according to poor population classification in Sudan for those under poverty line(CBS, 2009). The reason behind the choice of household consumption level instead of income because consumption gives more useful and accurate data about living standard than income since consumption is more objective and income is quite subjective.in addition to that it is easier for household to estimate their consumption than their income (NBHS, 2009).

Furthermore, one or more of the following criteria sets by Zakat fund in describing poor population in Sudan should be fulfilled to be considered eligible for this study:

1. A family (household) with no income and if the head of the family is unemployed or if he does have the ability to work.

2. The head of the family income are less than 120 Sudanese pounds per month or have no income from any other source.

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3. Or that the average per capita consumption in the household equal to or less than 114 SDG a month.

4. If the head of the family forced to be unemployed as a result of disability or illness, or lack of work.

5. If the total family income per month less is than the minimum wage.

6. Family that suffers from costly endemic diseases and head of the family works with salary bases.

7. If the head of household pensioner and suffer a chronic illness and has a family of six members or more, all in different education levels and they do not have any other source of income.

8. Head of the family who have assets such as a house or agricultural land or car and is not working and do not generate revenues. Does not have money to invest and has a family rely on him.

9. Non –skilled workers who do not produce their subsistence need such as farmers and have not any other source of income.

10. Agricultural labors and shepherds who do not possess the animals or other source of income , and they have families consist of six members or more.(ELZAKAT, 2011)

The study sample focuses on the poor in order to control for the endogeneity problem. This is because poor people in Sudan do not choose to purchase health insurance. Zakat fund offices decide which poor households will be covered by health insurance based on the ten specified criteria above .Nevertheless, in practice there may be varying implementations across Zakat offices in different states. For example, the same household may be covered under one Zakat office but if moving to another location it may not be chosen for coverage. Thus, this vary in practices by Zakat offices may make endogeneity presence in this study.

3.6. SAMPLE SIZE FOR THIS STUDY

Out of the 12600 households of the survey the sample size for this study was figured out to be 6986 households by using the following steps:

1. Monthly consumption expenses for every items specified in the survey were added up a household monthly consumption level and then multiplied by 12 to calculate the yearly base

2. For item which consumed yearly by each individual in the household, they get added up to household level then we add this yearly expense to the 12-month consumption expenses that we calculated in the first step above

3. Then we can set a bench mark to define whether a household is poor by using per capita consumption specified for the poor (114 SDG /month /person) and multiplied by the household size to get monthly subsistence household level expenses which is further multiplied by 12 to get yearly subsistence level of consumption

4. To select poor sample, any household with yearly consumption expense (from step2) that is equal to or less than the yearly subsistence consumption expense (from step3) are kept as sample for the analysis

5. Households with health insurance other than NHIF card were further dropped

Then the number of households that fulfilled poor definition was found to be 6986(55.4% out of the total surveyed population) households to represent our sample for this study

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3.7. EXCLUSION CRITERIA

1. Households with missing consumption data were dropped. These were 18 households (0.3% of the sample size)

2. Poor households in Khartoum state (Capital of Sudan) were dropped because they receive insurance coverage other than welfare scheme of NHIF

3.8. DESCRIPTION OF THE VARIABLES FOR THIS STUDY

1. **The dependent variables (cat_40, cat_30, cat_20, cat_10).**

In this study the dependent variable represented by the ratio of total household health expenses to their capacity to pay (the total consumption expenses less subsistence needs expenses of the household) for which is referred to as catastrophic health expenditure (OOP/capacity to pay) = calculated at 4 cut of points 10%, 20 % 30% and 40 % of household capacity to pay.

These are abbreviated as cat_40, cat_30, cat_20, cat_10 which mean that out of pocket spending equal to or exceed 40%, 30%, 20%, and 10% of household capacity to pay. They are a dummy variables where:

- Cat_40 = 1 if catastrophic level (OOP/capacity to pay) equal to or exceeds 40% of capacity to pay. And cat_40 =0 otherwise
- Cat_30 = 1 if catastrophic level (OOP/capacity to pay) equal to or exceeds 30% of capacity to pay. And cat_30 =0 otherwise

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- Cat_20 = 1 if catastrophic level (OOP/capacity to pay) equal to or exceeds 20% of capacity to pay. And cat_20 =0 otherwise
- Cat_10 = 1 if catastrophic level (OOP/capacity to pay) equal to or exceeds 10% of capacity to pay. And cat_10 =0 otherwise

2. **Explanatory variables (independent)**

Explanatory variables Includes demographic, socio-economic, Health status variables and head of the household characteristics.

a. Health insurance status (dummyHI_HH)

Household considered to be insured if at least one of its members had welfare scheme health insurance card. This is because the unit of insurance is the family (household). That means if the household head had insurance all members have the right to be insured or in the case when the household head received insurance coverage as benefit from other members of the households. It is a dummy variable where:

- DummyHI_HH =1 if one member of the household had insurance indicating insurance status of household
- DummyHI_HH = 0 if none of the member in the household had insurance(uninsured family)

b. Distance to health facility (distance_km)

This variable used to indicates the hardship and additional transportation cost incurred by the household member as a result of long distance they travel in order to seek for care. It is therefore a continuous variable.

The variable distance_km measures distance between household and facilities in kilometers.

c. Number of visits to health facilities (totalhhvisits)

This variable represents the burden of frequencies of visits to health facilities including inpatient, outpatient, dental, chronic and non-chronic illness or prevention by all members of the household. This is a continuous variable.

totalhhvisits = number of visits of all household members in a year.

d. Presence of chronically ill people among poor household (dummychrill)

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This variable reflects the health status among the household members. It shows the effect of chronic illness on catastrophe among the households. It shows that at least one member of the household suffered from chronic illness. It is a dummy variable where

Dummychrill =1 if at least one member of the household confronted with chronic illness

Dummychrill =0 otherwise.

e. Presence of children under 5 years old within the household (dummychild)

This is also a dummy variable reflects presence of at least one child under 5 years old among members of the household this reflect somewhat health status among the household as children one of the vulnerable groups in term of health problems.

Dummychild =1 indicates presence of at least one member under 5 years old in the household.

Dummychild =0 otherwise.

f. Presence of elderly 60 years old or above within the household (dummyelder)

This is also a dummy variable reflects presence of at least one 60years old or above member with in the household this also somewhat reflects health status among the household as elderly also one of the vulnerable groups in term of health problems.

Dummyelder =1 indicates presence of at least one 60 years old or above member in the household.

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Dummyelder =0 otherwise

g. Location of the household (location)

This reflects the effect of urban - rural residency on the household health expenses. It is a Dummy variable where:

Location =1 if the household is in the urban areas.

Location =o if household is in the rural areas.

h. Household size (maxhhsize)

This variable indicates the effect of number of household members in experiencing catastrophic health expenditure for the household. It is a continuous variable.

i. Gender of the head of the household (gender)

This variable shows the effect of the gender of the head on the catastrophic spending level of the household. It attempts to capture the differences between households headed by male and those headed by female in terms of effect on household health expenses. It is a dummy variable:

Gender =1if the head is male, Gender =0 if the head female.

j. Marital status of the head of the household (maritalstatus)

This dummy variable reflects the effect of marital status on catastrophic health expense of households where:

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maritalstatus =1 if the head of the household is married

maritalstatus =0if the head of the household is not married (include single, divorced, widow).

k.Educational level of the head(categorical dummy variables)

This includes four categorical dummy variables – university education, secondary education , primary education , and not-apply level .These dummies try to capture the impact of education level of the head of the household on catastrophic health expense among poor households. Dummy variables are defined as follows:

- unversityedu =1 if the head had of the household university education (base category), unversityedu =0 otherwise
- secondaryedu =1 if the head had of the household secondary education, secodaryedu =0 otherwise
- primaryedu =1 if the head had of the household primary education , primaryedu =0 otherwise
- not-applyedu =1 if the head of the household is illiterate , not-applyedu =0 ottherwise

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Table 5 Summary of variables and expected signs of the associated coefficient

Variable	Symbol	Expectedsigns	Type of variable
Welfare Health insurance coverage	DummyHI_HH	-ve	dummy
Household with under 5 yrs children	dummychild	+ve	dummy
Household with over 60 years old	dummyelder	+ve	dummy
Gender of household head(male)	gender	+ve	dummy
marital status of head of household	Maritalstatus	+ve	dummy
Household size	maxhhsize	+ve	Continuous
Location of the household (urban)	Location	- ve	dummy
University Education of the head	universityedu	-ve	Categ. dummy
Secondary Education of the head	secondaryedu	-ve	Categ. dummy
Primary Education of the head	primaryedu	-ve	Categ. dummy
Not-apply education of the head	notapplyedu	+ve	Categ.dummy
Distance of household from facility	Distance_km	+ve	numeric
No. of household visits to facility	totalhhvisit	+ve	numeric
Households with chronic illness	dummychrill	+ve	dummy

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3.9. MODEL SPECIFICATION

Model used for estimation of coefficients and signs and investigate the factors that affect catastrophe among poor household. The following method used:

pr (catastrophic =1) = f (dummyHI_HH, dummyelder, dummychild, maxhhsize, gender,maritalstatus, location, primaryedu, secondaryedu, universityedu, not-applyedu, distance_km,dummychrill, totalhhvisits)

To analyze these variables binary logit regression analysis model, Binary regression used

$$\text{Pr(catastrophic =1)} = \beta_0 + \beta_1 \text{ dummyHI\_HH} + \beta_2 \text{ dummyelder} + \beta_3 \text{ dummychild} + \beta_4 \text{gender} + \beta_5 \text{ maritalstatus} + \beta_6 \text{ location} + \beta_7 \text{ universityedu} + \beta_8 \text{ secondaryedu} + \beta_9 \text{ primaryedu} + \beta_{10} \text{ not-applyedu} + \beta_{11} \text{ totalhhvisits}, \beta_{12} \text{ distance\_km} + \beta_{13} \text{ dummychrill} + \varepsilon$$

Where ε is assumed logistically distributed to get binary logit model

Maximum likelihood estimation is employed to get the coefficients. Then, the marginal effect of the impact of each variable on the probability of experiencing catastrophic health expense is computed to assess the magnitude of the impact.

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CHAPTER 4

RESULTS

4.1 DESCRIPTIVE ANALYSIS:

In this section we will show summary statistics , correlation among variables and frequencies with regard to various characteristics among the poor population in our sample .Using the cutoff points of 40%, 30%, 20%, 10% to define catastrophic expense. Head of the household characteristics will also be described.

4.1.1. OVERALL SAMPLE DESCRIPTION

In this part, overall distribution of households among all variables used in this study will be pointed out. The total poor households included in this study is 6986 distributed as follows:

First of all the number of households faced by catastrophic health spending among poor households at each cut off point can be described as follow. The total number of poor households in this study is 6986. Those confronted with catastrophe at 40 % cut off point consist of 1260 households, representing 18% of the total sample, while those faced with catastrophic expense at 30% cut off include1542 households which represent 22.1%of the total sample. Moreover, 1920 households 27.5% of the sample was suffered from catastrophic health expenditure at 20% cut off point .In addition, 2499 households 35.8% of the sample spent10% or more of their consumption expenditure (capacity to pay) on health services. More details will be discussed below.

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Among the whole sample for this study 1117 household (16%) had received insurance coverage through NHIF whereas 5869 households (84%) remained uninsured, 1807households (25.9%) were urban residents and 5179 households (74.1%) lived in rural areas, 2716 households (38.9%) were headed by male while larger part 4270(61.1%) were female headed (this does not represent the national level where the view somewhat opposite to this). Furthermore, 3711(53.1%) household heads were married and 3275 (46.9%) reported single.

Moreover 1985 (28.4%) household head had primary education, 309(4.4%) had secondary education, 76(1.1%) had university education and 4155(59.5%) did not have any education.

Out of 6986 household 1736 household (24.9%) had at least one member suffered from chronic illness, on the other hand 4368 household (62.5%) had at least one child under 5 years old. In addition, 2160 household (30.9%) had at least one member with 60years old and above.

On average the household size among poor families was 6.6, whereas average number of yearly visits to health facilities was 2.5visit per year per household. And the distance of household from the nearest health facility was found to be 1.03 km on average.

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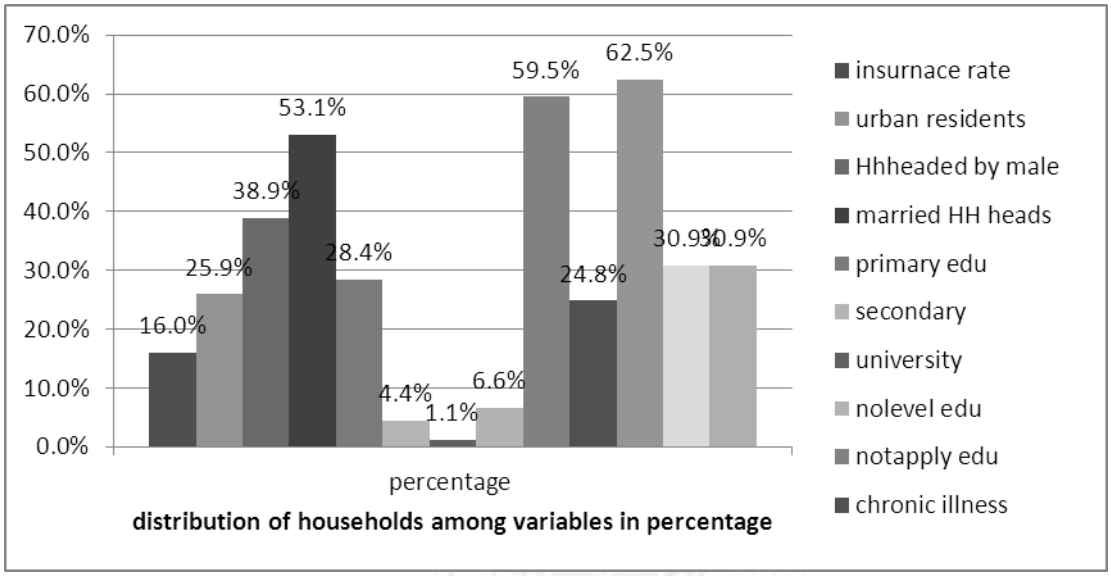
Figure 4.1 below show the distribution of households among different variables in percentages out of the whole sample for this study

Figure 4 Percentages of households among study variables



4.1.2 SUMMAZRY STATISTICS REGARDING HOUSEHOLDS CHARACTERISTICS AT 40% CUT OFF POINT

4.1.2.1 **HEALTH INSURANCE (HI)**

The results from table6 shows that majority of poor population were not covered with health insurance .Among the sample of 6986 household only 1117 households were found to be covered with insurance which indicate low coverage rate (16%) figure for this group while the 5869 (84.0%) of them were remain uncovered.

As a matter of fact 1260 households (18.0%) of the surveyed poor population were suffered from catastrophic health expenditure. Amongst 188 insured (14.9%) and 1072 was uninsured (85.1%) figure4.3.

In spite of their health insurance coverage 188 (16.8%) out of those insured 1117 were experienced catastrophe while 929 (83.2%) did not faced with catastrophe .On the other hand , 1072 non-insured households which represent (18.3%) out of total 5869 non-insured suffered from financial health expenditure catastrophe.

Table 6 Numbers and percentages of households by catastrophic spending at 40% cut off point and health insurance status

	Uninsured	insured	Total
non_cat_40	4,797	929	5,726
%	81.7% (4797/5869)	83.2% (929/1117)	82% (5726/6986)
cat_40	1,072	188	1260
%	85.1% (1072/1260)	14.9% (188/1260)	18% (1260/6986)
Total	5,869	1,117	6986
%	84% (5869/6986)	16% (1117/6986)	100%

The data in the table 6 describes health insurance status among poor and the catastrophe experienced within the group with 40% cut off point as a result of out of pocket spending in health.

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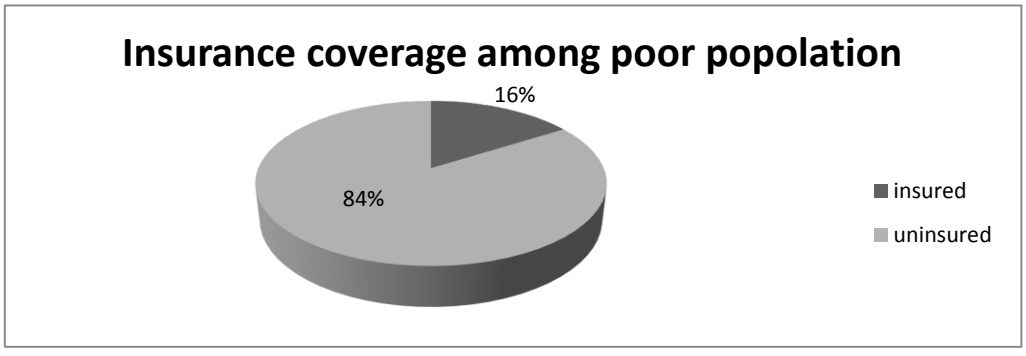
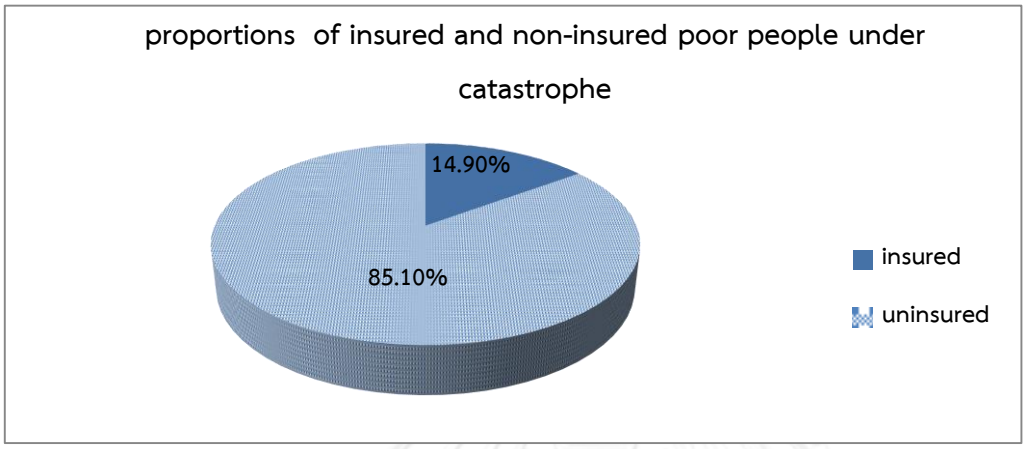
Figure 5 Rate of health insurance coverage among poor population



Figures 5 illustrate health insurance coverage among poor households in Sudan indicating that high proportion 84% remained uninsured.

Figure 6 proportions of insured and uninsured poor population under catastrophe



Figures 6 shows the percentages of insured and uninsured under catastrophe which explain that catastrophic health expenditure occur more among uninsured.

4.1.2.2 PRESENCE OF PEOPLE WITH CHRONIC ILLNESS IN HOUSEHOLD

The table7 describes the relationship between chronic illnesses and catastrophe among poor.

Table 7 Number of households by chronic illness and catastrophic health spending at 40% cut of point

	non-chronically ill	chronically ill	Total	percentage
Non-catastrophic	4,507	1,219	5,726	21.3% (1219/5726)
catastrophic	743	517	1,260	41.0% (517/1260)
Total	5,250	1,736	6986	24.8% (1733/6986)

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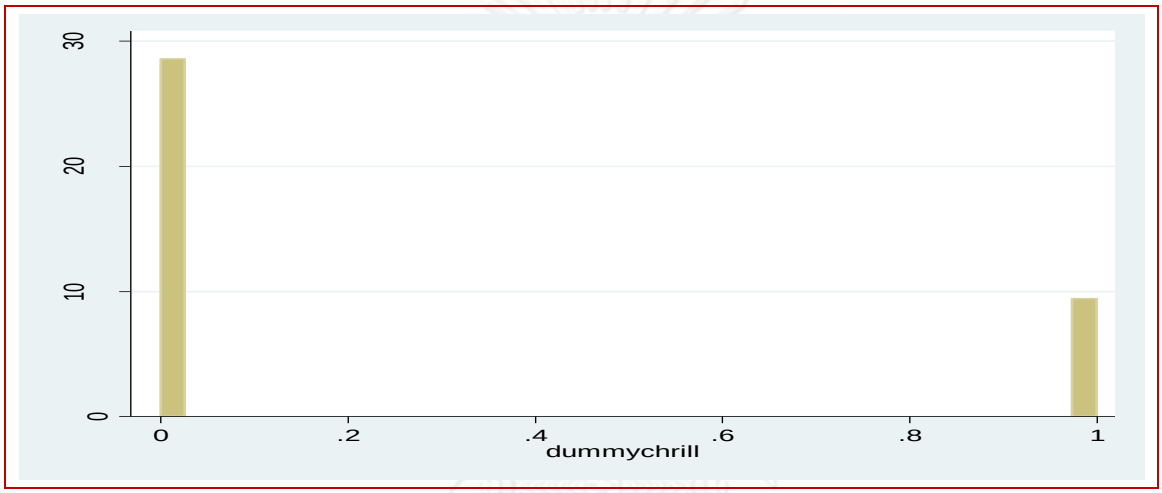
The results in the table 7 above shows that 1733 household (24.8 %) among the poor population had at least one member with chronic illness. out of which 29.8% (517/1733) were suffered from catastrophe. 41.0% of those under catastrophic had chronic illness.

Figure 7 Density of chronic illness among poor



The figure7 shows density of poor with chronic illness among the poor households

4.1.2.3 PRESENCE OF ELDER PEOPLE IN THE HOUSEHOLD (dummyelder)

The figures in the table8 below show the relationship between the proportion s of households with elder people and the whole surveyed poor people and that fall under catastrophe.

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Table 8 Elder people in the household and catastrophic spending

	non-elderly	Elderly	Total	percentages
Non-catastrophic	3,986	1,740	5,726	30.4% (1740/5726)
%				
catastrophic	840	420	1,260	33.3% (420/1260)
%				
Total	4,826	2,160	6986	30.9% (2160/6986)
%				

In table 8 only 2160 (30.9 %) household among the surveyed poor population had at least one member 60 years old or above which comply with the fact Sudan is considered a young generation country therefore most of poor were younger.

Among those under catastrophic spending 420 household 33.3% out of the total had at least one member aged 60 years old or above. This number represents 19.4 % (420/2160) of total elder population in this study. Moreover, elder people not under catastrophe were found to be 30.4% (1740/5726) of total population not under catastrophe.

Figure 8 percentages of elderly and non-elderly population under catastrophic and not-under catastrophic

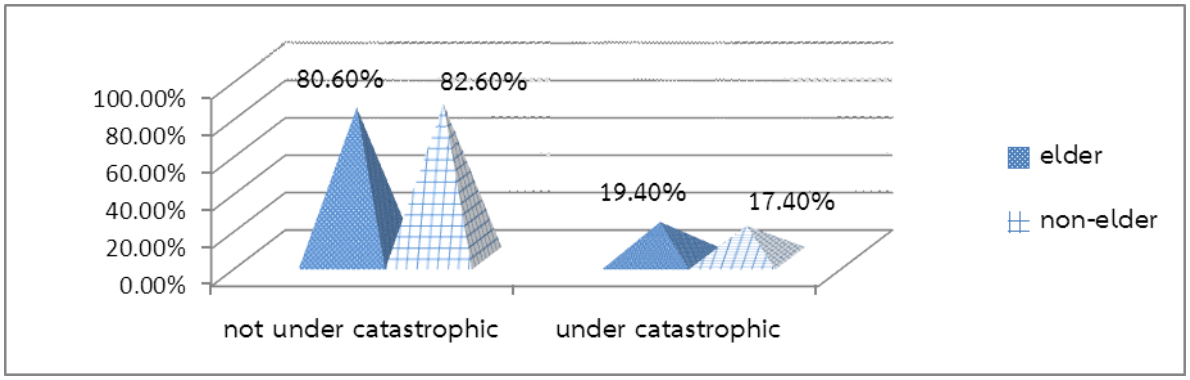

Figure 4.5 Compare the proportion of the households with or without elderly among those suffered catastrophic health expenditure and those did not fall in catastrophe.

4.1.2.4. PRESENCE OF UNDER 5 YEARS OLD CHILDREN IN THE HOUSEHOLD (dummy child)

The table 9 shows numbers and percentages of households with children under 5 years old that is experienced catastrophic health expenditure.

Table 9 Describe catastrophic and children presence or absence in poor households

	non-child	**Child**	**Total**	percentage
Non-catastrophic	**2,130**	**3,596**	5,726	62.8% (3596/5726)
%				
catastrophic	**488**	**772**	**1,260**	61.3% (772/1260)
%				
Total	**2,618**	**4,368**	6986	62.5% (4368/6986)
%				

The results in table9 shows that 4368 (62.5%) household among the poor population had at least one member under 5 years old . out of which 772household 17.7%(772/4368) were suffered catastrophe compared to 488 household 18.7% out of 2618 household did without under 5 years children.

Among the 1260 household under catastrophe (CHE) 772 households 61.3% (772/1260) households had at least one member under 5 years old. 488household 38.7% (488/1260) did not have any child but also experience catastrophe.

4.1.2.5. **LOCATION OF THE HOUSEHOLD**

The table 10 provides figures that depict the number of poor household suffered catastrophic spending and location of the household. In this table10 household resident at urban areas indicated by 1 – while zero for rural residents, at 40% catastrophic spending.

Table 10Number of household among urban/rural areas with catastrophic spending

	Rural	Urban	Total	
Non-catastrophic	**4,131**	**1,595**	5,726	27.9% (1595/5726)
%				
catastrophic	**1048**	**212**	**1,260**	16.8 % (212/1260)
%				
Total	**5,179**	**1,807**	6986	25.9 % (1807/6986)
%				

From the above table10 it is obviously observed that most of the people lived in rural areas 5179households 74.1% (5179/6986) were rural residents, while only 25.9 %(1807/6986) lived in urban areas.

Moreover , only 212 housheols11.7% (212/1807) of urban residents were reported suffered catastrophic health expenditure which also represent 16.8 % out of the poor under catastrophic .compared to 1048 household 20.2% (1048/5179) household in the rural areas which also represents 83.2%(1048/1260) out of the household under catastrophic.

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Characteristics of the head of the household and catastrophe

4.1.2.6. **MARITAL STATUS OF THE HEAD OF THE HOUSEHOLD**

The figures shown in table11 illustrates marital status of the head household and catastrophe at 40% where 1 in marital status indicate married and zero not married.

Table 11 Marital status of the head of the poor households with catastrophic health expenditure

At 40%	**Un-married**	**Married**	**Total**	percentages
Non-catastrophic	**2,669**	**3,057**	5,726	53.4 %(3057/5726)
%				
catastrophic	**606**	**654**	**1,260**	51.9 %(654/1260)
%				
Total	**3,275**	**3,711**	6986	53.1 %(3711/6986)

Among sampled population for this study no significant differences were reported for married and not married where 3711household 53.1% of household heads were married while 3275 household 46.9 %(3275/6986) were not married. Similarly no significant differences were shown among those households under catastrophic health expenditure. The proportion of households under catastrophe 654 households heads 51.9 % (654/1260) were found to be married and 606 household heads 48.1%(606/1260) were not married .this shows that marital status has no clear relationship with catastrophe among poor people.

4.1.2.7. **GENDER OF THE HOUSEHOLD HEAD**

Table 12 Gender of the head of the poor households with catastrophic health expenditure

At 40%	**Female**	**Male**	**Total**	percentage
Non-catastrophic	**3,499**	**2,227**	5,726	38.9% (2227/5726)
catastrophic	**771**	**489**	**1,260**	**38.8%(489/1260)**
Total	**4,270**	**2,716**	6986	38.9 %(2716/6986)

Among the sample of the study 6986 in the table12 it was found that a considerable number of households were found to be headed by female rather than male 4270 household61.1% (4270/6986) which attempted to be higher than male headed ones 2716 household represents 38.9% of the whole sample.

In fact the proportion of household headed by females which experienced catastrophe among the female group was found to be 771household 18.0% (771/4270) of households under catastrophe similar to male headed ones 489 household18.0% out of 2716 male headed households.

Among the 1260 households faced by catastrophic health spending only 489household 38.8% (489/1260) were male headed while large proportion in catastrophe were female headed ones 771 household 62.2%(771/1260).

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Chulalongkorn University

4.1.2.8. **EDUCATION LEVEL OF THE HEAD OF THE HOUSEHOLD**

The figures in the table13 below illustrate education level of the head of the household and catastrophic spending

Table 13 Education level of household and catastrophe

Education Level	non_catastrophic	catastrophic	Total	percentages
Not-apply	2,348	483	2,831	40.5 %(2831/6986)
Educated	3378	777	4155	59.5 % (4155/6986)
not-primary	4097	904	5,001	71.6 % (5001/6986)
Primary edu.	1629	356	1985	28.4 %(1985/6986)
not-secondary	5,470	1,207	6677	95.6% (6677/6986)
Secondary edu.	256	53	309	4.4% (309/6986)
not-university	5,657	1,253	6910	98.9% (6910/6986)
University edu.	69	7	76	1.1% (76/6986)
Total	5726	1260	6986	

The results in table13shows that large proportion of poor households population were in the not apply group consisting of 59.5% .the overall trend of education pointed out that majority of the head of poor households were remained un-educated while only 28.4 % had primary education and 4.4% received secondary education and only 1.1% had university education.

The trend of catastrophic health expenditure among poor also follow same order where 777households heads (61.7%) out of 1260 households faced catastrophe did not received any education , while 356 household 28.3% (356/1260) among those received primary,

53 household4.2% received secondary education and only 7 household 0.005 % (7/1260) among those received university education.

4.1.2.9. HOUSEHOLD SIZE AND CATASTROPHE

Table 14 Summary statistics of household size among the poor household sample at 40% cut off point

Table 14 The average number of household size among poor households.

variable	Obs	Mean	Std. Dev.	Min	Max
maxhousehold size	6986	6.621815	2.722026	1	26

In our sample for this study the following figures were obtained in table14 The average household size is 6.6 members (2.722026 std.Dev.). The minimum of the household size in this study is 1 while the maximum is 26 members.

4.1.2.10. HOUSEHOLD VISITS TO HEALTH FACILITIES

Table 15 No. of household visits to health facilities

variable	Obs	Mean	Std. Dev.	Min	Max
Total household visits	6986	2.514887	2.733418	0	42

Table 15provides the average number of visits of poor households per year to the health facilities. On average the number of visits for the poor to health facilities 2.5 visit/year. With standard deviation (std.Dev. 2.733481). While the highest number of visits were 42 visits a year. Table 15

4.1.2.11. DISTANCE FROM HEALTH FACILITES

Table 16 The mean distance from health facilities to poor households

variable	Obs	Mean	Std. Dev.	Min	Max
distance_km	6986	1.032246	18.10116	0	660

On average household distance from health facility is 1.03km with maximum distance between health facility and household is 660km will nearest locate next to the household.table16

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4.1.3. HEALTH INSURANCE

Table 17 below and figures explain the relationship between health insurance coverage and other explanatory variables:

Table 17 depicts the relationship between health insurance coverage and other variables

	Un-insured	Insured	Total	percentages
Non-Elderly	4,138	688	4,826	14.3 % (688/4826)
elderly	1731	429	2160	19.7 % (429/2160)
Non-child	2157	461	2,618	17.6 % (461/2618)
Child	3712	656	4,368	**15.09% (656/4368)**
Not-married	2751	524	3,275	16% (524/3275)
Married	3118	593	3,711	16% (593/3711)
Rural	4593	586	2,179	11.3% (586/5179)
Urban	1276	531	1,807	29.4% (531/1807)
Non-chronically ill	4520	730	5,250	13.9% (730/5250)
Chronically ill	1349	387	1,736	22.3% (387/1736)
Not-apply edu.	2194	637	2,831	22.5% (637/2831)
educated	3675	480	4,155	11.6 % (480/4155)
not-Primary edu.	4260	741	5,001	14.8% (741/5001)
Primary edu.	1609	376	1,985	18.9% (376/1985)
Not-secondary edu.	5668	1009	6,677	15.10% (1009/6677)
Secondary edu.	201	108	309	35%(108/309)
Not-university edu.	5829	1081	6,910	15.6%(1081/6910)
University edu.	40	36	76	**47.4% (36/76)**
Total	5869	1117	6986	

From table 17 the following characteristics were shown. Health insurance coverage is the most important determinants of protection from financial catastrophe among poor.

Among elder people only 429 households 19.7% were provided with health insurance coverage compared to 688 household14.3% among nonelderly group this higher rate compared to overall rate and nonelderly group.

Health insurance coverage for households with at least one member under5 years old is 15% compared to 17.6% among those without children under- 5 years old.

Similar health insurance coverage was observed among married and not married the rate of insurance coveragewas16% for both groups.

Health insurance coverage among urban poor households was found to be high 531 households 29.5% while in rural areas only 586 households (11.3%) were covered among the 5203 households.

387household 22.3% with chronic illness member/s received insurance coverage out of 1740which was found to be higher compared to other than with no chronic illness only730 household were covered (13.8%) out of 5250.

By looking at the health insurance coverage and education level of the head of the household it was found that among those with higher education had higher rates of health insurance coverage was observed. Those who had university education 36 household received insurance coverage out of 76 which represents 47.4% whereas 108 household with secondary educated members 35 % had insurance coverage out of 309household while among households with primary education 376 household 18.9% received insurance coverage.

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However the least group with insurance coverage was those with members who did not had any education 480 household among them 11.6% received insurance.

Figure 9 Percentages of health insurance coverage among poor households

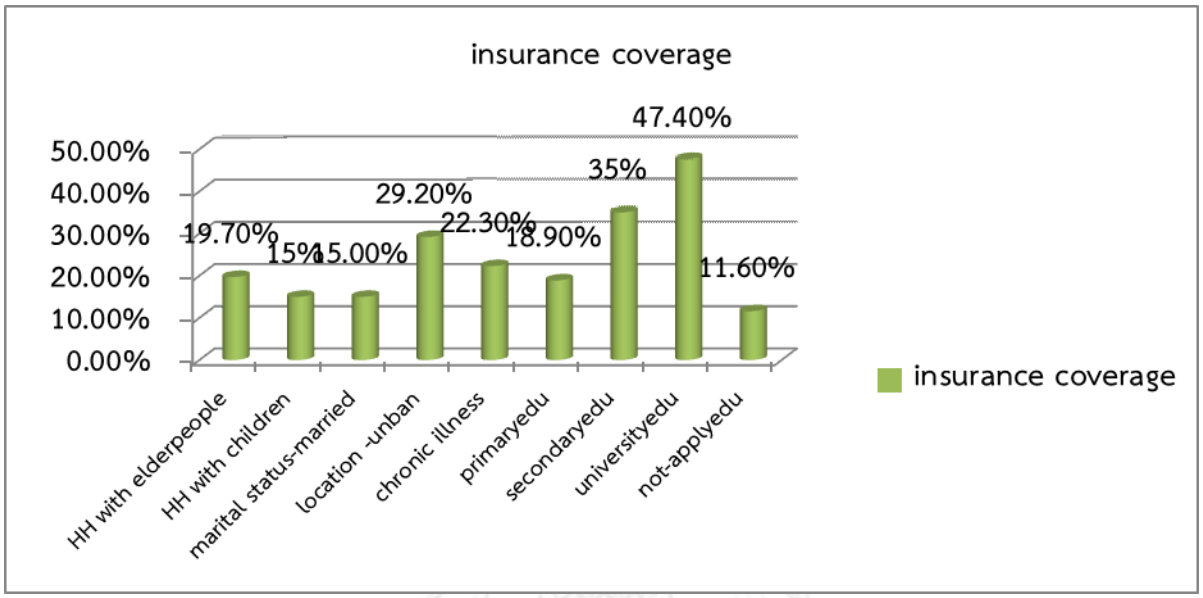

Figure 9 shows health insurance coverage among poor household across the different variables in percentages.

Table 18 Summary statistics of the mean distance, household size and number of poor households visits to health facilities.

Variable	Obs	Mean	Std. Dev.	Min	Max
distance_km	**6986**	**1.032246**	**18.10116**	**0**	**660**
maxhhsize |	**6986**	**6.621815**	**2.722026**	**1**	**26**
Total household visits	6986	2.514887	2.733418	0	42

On average poor people cross 1.03km to reach the nearest health facility (18.10116 std. Dev.) the longest distance they cross was 660km. The average household size among poor

was 6.6household and the largest household consists of 26 members while the lowest consists of one member. In addition total number of visits on average was 2.5 visits per year.table18.

4.1.7. DESCRIPTIVE ANALYSIS FOR HEALTH INSURANCE ONLY SUBSAMPLE AT 40% CUT OFF POINT

Table 19 Relationships between the different variables and catastrophe in insured only subsample

	non_catastrophic	catastrophic	Total	percentages
Health insurance	929	188	1,117	16.8 %(188/1117)
Non-elderly in HH	582	106	688	61.6 % (688/1117)
Elderly in HH	347	82	429	38.4 % (429/1117)
without children	368	93	461	41.3 % (461/1117)
Children in HH	561	95	656	58.7% (656/1117)
Gender -Female	552	123	675	60.4% (675/1117)
gender-Male	377	65	442	39.6% (442/1117)
Location-Rural	456	130	586	52.5% (586/1117)
Location-Urban	473	58	531	47.5% (531/1117)
Non-chronically ill	640	90	730	65.4% (730/1117)
Chronically ill	289	98	387	34.6% (387/1117)
Not-Married	433	91	524	46.9% (524/1117)
Married	496	97	593	53.1% (593/1117)
Not-apply edu.	929	188	1117	16.8% (188/1117)
Total	5726	1260	6986	

Table 20 Average distance, household size and visits among insured subsample

Variable	Obs	Mean	Std. Dev.	Min	Max
distance_km	**1117**	**1.23675**	**18.36721**	**0**	**542**
maxhhsize	**1117**	**7.410922**	**2.728843**	**1**	**23**
Total household visits	1117	3.145927	3.12855	0	26

Table19 shows that 16.8% of the insured households spent 40% or more of their capacity to pay in health expenses while 929 (83.2%) households did not experienced catastrophe. 429 households (38.4%) had at least one member over 60years old out of which 23.6% incurred catastrophe. Moreover 58.7% households had at least one member under five years old amongst16.9% household confronted with catastrophe.

Moreover 47.5% insured were urban residents while the 52.5% live in rural areas 22.2% of rural residents faced by catastrophe. Only 39.4% of poor insured households were headed by male while the rest were female headed ones with 14.7% of male headed ones incurred catastrophe compared to 18.2% among female headed ones this explained by better opportunity for male to have high income jobs than female since most of the members of both groups fall among un skilled workers.

53.1% of the household's heads were married whereas 46.9% not married. All of the household`s heads did not had any education meaning that all were illiterate this reflect that the sample did not have national representation in term of education.

34.6% of insured households (5.5% of the total poor) had at least one member lived with chronic illness 33.9% of these households suffered catastrophe compared to 31% uninsured under catastrophe.

On average the distance between insured households and health facility was 1.27km (std 18.38) unlike uninsured group the distance was only 0.98km (std 18.05) which means higher transportation cost could be seen among insured. Likewise average household's size found to be 7.4 members while among uninsured 6.5 membertable20.

Insured households were found to have more access to health services indicated by the higher average of number of visits 3.1 visit compared to 2.4 visits for uninsured which may reflect the fact that health insurance increase access to health service among poor insured table 20.

4.1.8. Descriptive analysis for sample without Health insurance 40% cut off point

Table 21 Catastrophe among uninsured subsample

Variable	No. of households	percentage
Households under catastrophe	**4797**	**81.73%**
Households not under catastrophe	1072	18.27

Table 21 shows the number and percentages of households catastrophic status among uninsured subsample at 40% cut off point. From this table 21it is shown that 18.3% households experienced catastrophic health expenditure at 40% cut off point.

Table 22 Explore the factor that affects health insurance only sample at 40% cut point

	non_catastrophic	catastrophic	Total	percentages
Non-elderly in HH	3404	734	4138	70.5% (734/4138)
Elderly in HH	1393	338	1,731	29.5 % (338/1731)
without children	1762	395	2157	36.8 % (21575869)
Children in HH	3,035	677	3712	63.3% (3712/5869)
Gender -Female	2947	648	3595	61.2% (3595/5869)
gender-Male	1,850	424	2274	38.8% (2274/5869)
Location-Rural	3,675	918	4593	78.3% (4593/5869)
Location-Urban	1122	154	1276	21.7% (1276/5869)
Non-chronically ill	3867	653	4520	77.1% (4520/5869)
Chronically ill	930	419	1349	22.9% (1349/5869)
Not-Married	2236	515	2751	46.9%(2751/5869)
Not-apply edu.	2561	557	3118	53.1% (3118/5869)
Not-apply edu.	2982	693	3675	62.6%(3675/5869)
Educated	1815	379	2194	37.4%(2194/5869)
Non-Primary edu.	3478	78	4260	73%(4260/5869)
Primary edu	1319	290	1609	27%(1609/5869)
Non-secondary edu.	4633	1035	5668	96.6(5668/5869)
Secondary edu.	164	37	201	3.4%(201/5869)
Non-university edu	4760	1069	5829	99.3% (5829/5869)
University edu	37	3	40	0.7% (40/5869)

Table 23 Average distance, household size and visits among uninsured:

Variable	Obs	Mean	Std. Dev.	Min	Max
distance_km	**5869**	**0.982965**	**18.04743**	**0**	**660**
maxhhsize |	**5869**	**6.471631**	**2.694908**	**1**	**26**
Total household visits	5869	2.394786	2.634788	0	42

Table 22 explores characteristics of the head of the household and other determinants associated with catastrophic spending of uninsured group of poor who spent 40% and more of their capacity to pay on health.

1731of uninsured households 29.5% had at least one member 60years old or above with 19.5% (338/1731) of the households suffered catastrophe. the proportion of elderly among uninsured do not reflect the actual percentage of over 60 years old among the whole population in Sudan which did not exceeded 5% in 2009 on the other hand 36.8% households had at least one member under 5 years old with18.3%(677/3712) of them confronted with catastrophe at 40% cut off point. 38.8% of the households were headed by male 18.6% (424/2274) were suffered catastrophe compared to 18% (648/3595) of female headed ones. Only 21.7% uninsured were urban residents 12% (154/1276) under catastrophe condition of health spending and the highest portion 78.3% of the poor were rural residents with 20%(918/4593) of them experienced catastrophe. 22.9% of those uninsured were chronically ill with 31.1% (419/1349) of them were under catastrophe. Moreover 53.1% of the uninsured sample was married with 17.9% (557/3118) catastrophe while the rest 46.9% were not married with 18.7% (515/2751) catastrophe.

Most of the poor households did not have any education level because most of members of poor households must work to get food for himself and his/her family therefore a number of members in the households forgo their opportunity for education this is clearly shown by 62.6% of household`s heads were un educated with considerable portion of these

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households 18.9% (693/3675) incurred catastrophic spending. In addition only 27% of total poor household heads had primary education amongst 18 %(290/1609) suffered catastrophe, moreover, only 3.4% had secondary education with 18.4 % (37/201) faced by catastrophic health spending whereas 0.7% households heads had university education and only 7.5%(3/40) incurred catastrophe.

On average the distance between health facility and household of 0.98km and the average household size was 6.5members and addition the average households visits to health facilities was 2.4visit table 23.

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4.2. REGRESSION ANALYSIS RESULTS

In this section results obtained by logistic regression analysis will be described in three parts. The first part shows the results of the whole sample at four different cut off point. In the second part we will show the results and interpretation of only insured household sample. In the third part the results of uninsured sample will be discussed.

Part 1-Whole sample regression results:

Table 24 Illustrates determinants of catastrophic spending on health at 40% cut off point and their marginal effects

cat_40	Coef.	Std. Err.	P>|z|	ME
dummyHI_HH	-0.206984	0.100627	0.04	-0.0251793**
dummyelder	0.052118	0.077746	0.503	0.0068102
dummychild	-0.46449	0.088439	0.000	-0.0609531***
maxhhsize	-0.096934	0.013849	0.000	-0.0128061***
maritalstatus	-0.102453	0.078148	0.190	-0.0101372
gender	-0.279036	0.073885	0.000	-0.0345022***
location	-0.741127	0.090716	0.000	-0.0871978***
primaryedu	0.355554	0.157099	0.024	0.041254**
secondaryedu	0.255452	0.219834	0.245	0.0287778
notapplyedu	0.370985	0.144206	0.010	0.0432387***
distance_km	0.02454	0.006872	0.000	0.0032088***
dummychrill	0.745607	0.074794	0.000	0.1050546***
totalhhvisits	0.296202	0.014169	0.000	0.0382315***
_cons	-1.696598	0.176	0.000	

Number of obs = 6986 LR chi2 (13) = 860.89

Log likelihood = -2866.527 Prob > chi2 = 0.0000

Pseudo R2 = 0.1306 ***: significant at 1% (P-value=<0.01)

**: significant at 5% (P-value=<0.05) *: significant at10% (P-value=<0. 1)

Table 25 Mean of capacity to pay of households across different households size

variable	hhsize1_5	hhsize6_10	hhsize11_15	hhsize16_20	hhsize21_26
mean capacity to pay	1731.17	3182.66	5086.5	5306.65	8874.6

The table 25 shows the effect of each factor on the probability that household will experience expenditure at 40% cut off point. In this table25, the determinants which had significant effects at 99% confidence interval (p-value =<0.01) are presence of children under 5years old among the household, household siz, gender of the head of the household, location of the household (urban/rural) , no-education level, distance from health facility , presence of at least one members with chronic illness within the household and number of visits to health facilities. On the other hand, health insurance coverage and having primary education are significance at 95% confidence interval (p-value =< 0.5).the results obtained will be interpret as follows (holding other variables constant).

Marginal probability analysis for out of pocket spending of poor households who spent 40% or more of the their capacity to pay on health shows that being insured under welfare scheme of NHIF reduces probability of incurring catastrophe by 2.5% .

จุฬาลงกรณ์มหาวิทยาลัย
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Notably reduction in catastrophic health expenditure prove our hypothesis for this study despite of its low reduction rate health insurance was found to protect poor financially (F. e. Knaul, 2012) The low rate of protection provided for poor can be explained by introduction of the scheme for targeting poor only few years before the year of survey with very limited financial support.

On the other hand the highest probability of incurring catastrophe was found to be associated with presence of at least one member of household suffering chronic illness this was observed from coefficient and marginal effect values and sign which stated that if one or more household member suffered chronic illness the household probability to incur catastrophe increase by10.5%. Assessing predicted probability of incurring catastrophe among poor households using marginal effect confirmed that increasing number of household visits to health facilities by one increases probability of catastrophe by 3.8% holding other variables constant.

Households living further from health facilities were significantly found more likely to incur catastrophic health expenditure. The predicted probability of catastrophe increases by 0.3% if the distance of household from the facility increases by 1kilometer. That is because of higher cost of transportation and large proportion of poor population specially live in rural .Furthermore urban residence households are less likely to face catastrophic expenditure than do rural areas residence where the probability of urban residence to experience catastrophe decreases by 8.7% compared to those living in rural areas which indicates higher living

standards in urban areas than in rural. In addition, the larger the household households size the less likely to incur catastrophe therefore grow household size with one more member that will likely to be associated with reduction in the catastrophic expenditure by 1.28% which is quite different from what hypothesized. Similar results was obtained in which increasing household size found to have protective effect against catastrophic expenses (Shi, 2011) this can be explained by larger household size the larger it is capacity to pay table25 therefore it is less likely to incur catastrophic health spending than when the household size is small.

Low rates of probability of catastrophe was found to be associated with family with under five years old with 6 % drop in predicted probability which also shows the opposite results from what was hypothesized This may be explained by the presence of a full governmental subsidized program for under 5 years in the public facilities since 2005 in the whole country. Male headed poor households were being significantly associated with lower rate of catastrophe than female headed ones where the chance of predicted probability of being in catastrophe dropped by 3.45 % if the head in the household is male rather than female.

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The education level of the head of the household hold was found to be one of the determinants of the catastrophe at 40% threshold. Households which headed by those had primary education was found to more likely to incur catastrophe with probability of 4.13% in comparison with those had university education which is the reference group .Illiteracy of the head of the household bring in more chances of incurring catastrophe in referencing to those

who had university education and even more than those had primary education with magnitude of 4.32% which is higher than that of primary education and eventually the reference group.

Secondary education of the head of the household , presence of elder 60 years old and above and marital status of the head were found not significant therefore not among the determinants of catastrophic spending at 40% threshold.

To show the robustness of obtained results at40% cut off point, three more sets of regression were performed at 30%, 20% and 10% of household capacity to pay and results obtained will be discussed below.

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Chulalongkorn University

Table 26 Determinants of catastrophic spending on health at 30% cut off point and the effects of health insurance in catastrophe.

cat_30	Coef.	Std. Err.	P>|z|	ME
dummyHI_HH	-0.2657615	0.0937075	0.0050	-0.0365742***
dummyelder	0.1065805	0.0727512	0.1430	0.0155032
dummychild	-0.4495943	0.0831267	0.0000	-0.0660860***
maxhhsize	-0.0911758	0.0129528	0.0000	-0.0128887***
maritalstatus	-0.0910924	0.0733671	0.2140	-0.0131393
gender	-0.2912544	0.0693145	0.0000	-0.0412456***
location	-0.5591842	0.0810452	0.0000	-0.0752293***
primaryedu	0.1606644	0.1393357	0.2490	0.0223653
secondaryedu	0.1258937	0.1985097	0.5260	0.0173750
notapplyedu	0.1672052	0.1265109	0.1860	0.0233133
distance_km	0.0217680	0.0067890	0.0010	0.0032629***
dummychrill	0.7352230	0.0707130	0.0000	0.1170199***
totalhhvisits	0.3417507	0.0146055	0.0000	0.0393843***
_cons	-1.4389370	0.1581347	0.0000	

Number of obs = 6986 LR chi2 (13) = 1031.25

Prob > chi 2 = 0.0000 Log likelihood = -3171.7721

Pseudo R2 = 0.1398

The table26 shows the effect of health insurance on the poor households catastrophic health expenditure and the determinants of catastrophe at 30% of household capacity to

pay and their probabilities .In this table26, the variables that have significant effects on catastrophic spending at 99% confidence interval(p-value =<0.01) are health insurance coverage (with negative sign), presence of children under 5years old among the household(with negative sign) , household size (with negative sign) , gender of the head of the household (with negative sign), location of the household (urban/rural- with negative sign) , distance from health facility(with positive sign) , presence of at least one members with chronic illness within the household (with positive sign) and number of visits to health facilities(with positive sign). The results obtained will be interpreted as follows (holding other variables constant).

Households provided with health insurance coverage under welfare scheme of NHIF were found less likely to spend more than 30% of their capacity to pay on health with reduction in probability of catastrophic spending with 3.66% .Although the percentage of reduction was low but financial protection through welfare scheme had positively impacted poor households, which shows similar result to that of 40% cut off.

On the other hand , it was found that chronic illness among the household members was the cause of catastrophic spending for poor households since the highest probability of increasing catastrophe being observed in household with chronic illness with magnitude of 11.7% .Moreover, marginal probability analysis shows that number of households` visits to health facilities positively impact catastrophic expenditure among poor households where an additional visit had increased probability of incurring catastrophe by 3.94% showing same trend as in 40% cut off point.

The distance of household from health facilities had significance of more likely to increase catastrophe for the poor. Where predicted probability of incurring catastrophe increase by 0.33% when the distance of household from the facility increase by 1kilometer.

Furthermore urban resident households are less likely to experience catastrophic expenditure than rural areas residents where the probability of urban residence to experience catastrophe decreases by 7.52 % compared to those living in rural areas. This can because of large proportion of population live in rural areas and also indicates higher living standards in urban areas than in rural. Moreover, larger the household size the less likely to incur catastrophe. Therefore households with one more member that will likely to be associated with reduction in the catastrophic expenditure by 1.29%.

Presence of children under 5 years old among the household members associated with low probability of incurring catastrophe in the household. The predicted probability for presence of children in household reduce by 6.6% among the household with children compared to those without children which may reflect the effect of subsidized health program for children under 5 years.

Male headed poor households were being significantly associated with lower rate of catastrophe than female headed household by4.12 %. This result complies with Sudan context since poor female have lower chances than male to work in high income areas or stay without work and only receive loans.

Education level of the head of the household primary, secondary and those illiterate , presence of elder 60 years old and above and marital status of the head were found not significant therefore not among the determinants of catastrophic spending at 30% threshold.

Table 27 Determinants of catastrophic spending on health at 20% cut off point and the effects of health insurance in catastrophe.

cat_20	Coef.	Std. Err.	P>|z|	ME
dummyHI_HH	-0.2868973	0.0878967	0.0010	-0.0446777***
dummyelder	0.1264242	0.0685056	0.0650	0.0209719*
dummychild	-0.4974850	0.0783946	0.0000	-0.0822033***
maxhhsize	-0.0830663	0.0122019	0.0000	-0.0158183***
maritalstatus	-0.0262954	0.0691976	0.7040	-0.0023749
gender	-0.2667362	0.0654801	0.0000	-0.0425502***
location	-0.4699040	0.0743893	0.0000	0.7509840***
primaryedu	0.1706016	0.1299861	0.1890	0.0270149
secondaryedu	0.0241500	0.1883787	0.8980	0.0037104
notapplyedu	0.1630894	0.1180169	0.1670	0.0257863
distance_km	0.0262081	0.0082596	0.0020	0.0049706***
dummychrill	0.7063366	0.0676960	0.0000	0.1247038***
totalhhvisits	0.3985861	0.0154537	0.0000	0.0809845***
_cons	-1.3260160	0.1482627	0.0000	

Number of obs = 6986 LR chi2 (13) = 1260.85

Prob > chi2 = 0.000 likelihood = -3477.4051

Pseudo R2 = 0.1535

The table27 describes the relationship between catastrophe and its determinants at 20 % of household capacity to pay. Significantly catastrophe is determined by health insurance coverage, presence of children under 5years old among the household, household size,

gender of the head of the household, location of the household (urban/rural), distance from health facility, presence of member/s with chronic illness within the household and number of visits to health facilities all significant at 99% confidence interval. Presence of elder people within the household also had significant effect on catastrophe at 90% confident interval.

Quite similar results to 30% and 40%cut off point were obtained at 20%. Health insurance coverage was found to have probability of low rate of protection but with higher probability than in 30% and 40% reaching 4.47%.On the other hand, chronic illness had the highest probability of catastrophe occurrence in the household with magnitude of 12.47%. Number of visits to health facilities by household member found to be the second cause of catastrophe at 20% with second highest probability 8.1% .unlike in 30% and 40%.

The distance of household to health facility was found more likely to increase catastrophe of poor with predicted probability of 0.49% for one additional 1kilometer. Furthermore urban residence were being at less risk of catastrophe than rural residents by 7.51% which is same results obtained at 30% indicating that moving from 30 % to 20 % cut point had same probabilities.

Moreover larger the household households size the less likely to incur catastrophe therefore household with one more member that will likely to be associated with reduction in the catastrophic expenditure by 1.58%. in addition presence of children under 5 years old among the household members associated with low probability of incurring catastrophe in the household. The predicted probability for presence of children in household reduce by8.22%

among the household with children compared to those without children. Poor male households head had less chance to experience catastrophe than if the head is female with probability of 4.26% low than female headed ones. Whereas elder people in household was only significant at90% confidence interval and at20% cut point only with predicted probability of catastrophe occurrence 2.1% higher than households without old people.

Two characteristics of household head had no rule in determining catastrophe in poor household at 20 % cut off point Educational level of the head of the household and marital status since no significant level observed.

Table 28 Determinants of catastrophic spending on health at 10% cut off point and the effects of health insurance in catastrophe

cat_10	Coef.	Std. Err.	P>|z|	ME
dummyHI_HH	-0.1102193	0.0818802	0.1780	-0.0193620
dummyelder	0.0829085	0.0656774	0.2070	0.0148033
dummychild	-0.5572350	0.0749345	0.0000	-0.0990730***
maxhhsize	-0.0574385	0.0116235	0.0000	-0.0133504***
maritalstatus	-0.0381779	0.0664208	0.5650	-0.0067884
gender	-0.3209158	0.0630655	0.0000	-0.0561342***
location	-0.3065083	0.0688159	0.0000	-0.0533022***
primaryedu	0.2679037	0.1231875	0.0300	0.0465953**
secondaryedu	0.2082697	0.1766527	0.2380	0.0359160
notapplyedu	0.2060530	0.1116304	0.0650	0.0355223*
distance_km	0.0952224	0.0243957	0.0000	0.0058031***
dummychrill	0.7922288	0.0663164	0.0000	0.1524476***
totalhhvisits	0.4862436	0.0171337	0.0000	0.0042247***
_cons	-1.3240010	0.1412785	0.0000	

Number of obs = 6986 LR chi2(13) = 1671.30

Prob > chi2 = 0.0000 Log likelihood = -3719.8652

Pseudo R2 = 0.1834

The table 28 illustrates regression results at 10% or more out of pocket expenses on health. The outcomes show some similarities and differences with those at 20%/30% and 40% cut off points. Similar results were obtained for presence of under 5 years old in household, household size, gender location, distance from facilities, visits to health facilities and presence of chronically ill member in household.

If the households had under 5 years old children, urban residents, headed by male rather than female and had large size they found to be better off or less likely to incur catastrophe whereas if households had high number of visits to health facilities, distance from facilities increase and if one or more suffered chronic illness its more likely to incur catastrophe which indicated by higher predicted probability than others.

On the other hand, health insurance was found not to have any role at low rate catastrophe in addition to presence of children under- 5 years in household because of under- five free program provided by the government whereas marital status of the head of the household also had no role in catastrophic spending.

Household head who received primary education or those illiterate had higher probability to incur catastrophe compared to those received university education while those received secondary education did affect catastrophic level of the household.

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Part 2- Subsample of insured households regression results

Table 29 Determinants of catastrophic spending on health among poor insured households at 40% cut off point.

Cat_40	Coef.	Std. Err.	P>|z|	ME
dummyelder	-0.0031480	0.1862086	0.9870	-0.0003841
dummychild	-0.6351911	0.2144098	0.0030	-0.0799551***
maxhhsize	-0.0772160	0.0336260	0.0220	-0.0093734**
maritalstatus	-0.4097427	0.2013964	0.0420	-0.0502529**
gender	-0.4057517	0.1939719	0.0360	-0.0482223**
location	-0.9163802	0.1853423	0.0000	-0.1097901***
primaryedu	0.2116084	0.3070870	0.4910	0.0248204
secondaryedu	0.1119513	0.3974031	0.7780	0.0127492
notapplyedu	0.2150932	0.2785023	0.4400	0.0252550
distance_km	0.0304782	0.0171398	0.0750	0.0036998*
dummychrill	0.6428917	0.1853551	0.0010	0.0834389***
totalhhvisits	0.1878076	0.0295919	0.0000	0.0227984***
_cons	-1.0705340	0.3690382	0.0040	

Number of obs = 1117 LR chi2 (12) = 123.38

Prob > chi2 = 0.0000 Log likelihood = -444.52778

Pseudo R2 = 0.1219

Results for the insured subsample are quantitatively similar to the entire sample except for education variables that become insignificant.

Table29 show the factors affecting catastrophe among poor insured households with three level of significance: presence of children under 5 years old , location of the household, number of household visits to facilities and presence of chronically ill people in the

household are significant at 99% confidence interval while household size ,marital status and gender of household head are significant at 95% confidence interval in addition to the distance which is significant at 90% confidence interval. On the other hand education level of the household head and presence of people above 60 years old are not significant.

As a matter of fact, catastrophe among insured poor households is found mainly determined by presence of chronically people and incidence of catastrophic spending was found to be positively correlated with high number of visits of household members to the health facilities with predicted probabilities to be increased by8.34 % and 2.28% respectively moreover distance of household from health facility also another factor that pushed households into catastrophe with probability of 0.37%.

Furthermore, poor lived in urban areas were less likely to incur catastrophe urban than those live in rural areas by 10.98%, male headed households were less likely to suffer from catastrophe, the more members in the household the less likely it suffer catastrophe, married people were found suffered less catastrophe than not married poor this can be explained by the fact that married can have higher opportunity to receive share from household members there for more protected than not married people and presence of under five years old children negatively correlated with catastrophe in the household.

Education level of household head and over 60years old people did not affect the level of catastrophe since only percentage of over 60 years old is very low 3% of total population of the country.

For robustness check three set of regression were performed at 30% cut off point and also at 20% and 10%

Table 30 Determinants of catastrophic spending on health among poor insured households at 30% cut off point.

cat_30	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.0959419	0.1732404	0.580	0.0150005
dummychild	-0.5965648	0.1998605	0.003	-0.0856181***
maxhhsize	-0.0900235	0.0314944	0.004	-0.0136501***
maritalstatus	-0.3590032	0.1867063	0.055	-0.0508430*
gender	-0.3763663	0.1786632	0.035	-0.0533092**
location	-0.6634055	0.1673782	0.000	-0.0973159***
primaryedu	0.1586051	0.2784075	0.569	0.0219218
secondaryedu	-0.0625070	0.3676906	0.865	-0.0081596
notapplyedu	0.1872555	0.2509319	0.456	0.0260687
distance_km	0.0251145	0.0158923	0.114	0.0036288
dummychrill	0.5807423	0.1719165	0.001	0.0854976***
totalhhvisits	0.2573403	0.0311066	0.000	0.0385890***
_cons	-1.0234370	0.3388430	0.003	

Number of obs = 1117 LR chi2 (12) = 152.37

Prob > chi2 = 0.0000 Log likelihood = -499.7914

Pseudo R2 = 0.1323

Table30 show the factors affecting catastrophe among poor insured households with three level of significance: presence of children under 5 years old , location of the household, number of household visits to facilities and presence of chronically ill people in the household and household size are significant at 99% confidence interval while gender of

household head is significant at 95% confidence interval in addition to the marital status of the head is significant at 90% confidence interval.

On the other hand education level of the household head, presence of people above 60 years old and distance to health facilities are not significant. In the same context as that of 40% incidence of catastrophic spending was found to be positively correlated with chronic illness in the household and high number of visits. while negative correlation between catastrophe and urban residency compared to rural ones, male headed household compared to female headed ones, higher number of household members, presence of under five children and if the head of the household married. But not affected by presence of over 60 years old, distance to health facilities and education level of the head of the household.

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Table 31 Determinants of catastrophic spending on health among poor insured households at 20% cut off point.

cat_20	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.2493300	0.1634936	0.1270	0.0446159
dummychild	-0.7767189	0.1899385	0.0000	-0.1230524
maxhhsize	-0.1106428	0.0301335	0.0000	-0.0206069
maritalstatus	-0.2598129	0.1762735	0.1410	-0.0449879
gender	-0.2957432	0.1688405	0.0800	-0.0494466
location	-0.7044694	0.1575219	0.0000	-0.1190014
primaryedu	0.1098762	0.2586462	0.6710	0.0175125
secondaryedu	-0.4838725	0.3577837	0.1760	-0.0681527
notapplyedu	0.1305455	0.2333862	0.5760	0.0208881
distance_km	0.0207290	0.0158716	0.1920	0.0033393
dummychrill	0.6411911	0.1623344	0.0000	0.1049313
totalhhvisits	0.3153928	0.0328127	0.0000	0.0572068
_cons	-0.6785572	0.3180168	0.0330	

Number of obs = 1117 LR chi2 (12) = 210.53

Prob > chi2 = 0.0000 Log likelihood = -544.64708

Pseudo R2 = 0.1620

Table31 show determinant of catastrophe among insured at 20% cut off point.

. Among determinants of catastrophe among poor insured households only five were found to be affect catastrophe namely presence of children, location, size of the households, presence of chronic illness among members of household all with significant level of 99%

confidence interval (p-value =< 0.01) whereas gender of the head of household significant at 90% confidence interval (p-value =< 0.1).

Chronic illness was found to be the main cause of catastrophe among insured people with predicted probability of 10.49% for incidence of catastrophe followed by number of visits to facilities by with probability of 5.72%.

Similar to what obtained at 30% and 40% being an urban resident probability of catastrophe reduced by 11.9%, household with at least one child under 5 years less likely to incur catastrophe than those without children with predicted probability 12.31% , male headed household less likely to suffer catastrophe and the higher the household size the less the catastrophe.

The result obtained at 20 % cut point complies with outcomes obtained at 30% and 40% cut points.

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Table 32 Determinants of catastrophic spending on health among poor insured households at 10% cut off point.

cat_10	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.2005769	0.1541385	0.1930	0.0371091
dummychild	-0.8234809	0.1774114	0.0000	-0.1515546***
maxhhsize	-0.1021759	0.0282475	0.0000	-0.0251897***
maritalstatus	-0.2257061	0.1647107	0.1710	-0.0412222
gender	-0.2838027	0.1571675	0.0710	-0.0515226*
location	-0.4371628	0.1443200	0.0020	-0.0798745***
primaryedu	0.2271218	0.2441230	0.3520	0.0408814
secondaryedu	-0.1828083	0.3200046	0.5680	-0.0312757
notapplyedu	0.3097387	0.2189429	0.1570	0.0562368
distance_km	0.0990962	0.0591587	0.0940	0.0244305*
dummychrill	0.8358827	0.1542202	0.0000	0.1610494***
totalhhvisits	0.3937612	0.0363121	0.0000	0.0970750***
_cons	-0.5971875	0.2980729	0.0450	

Number of obs = 1117 LR chi2 (12) = 284.1

Prob > chi2 = 0.0000 Log likelihood = -607.28463

Pseudo R2 = 0.1896

Table32 shows the results of logistic regression at 10% cut off point for insured poor households with marginal effects. Household size, presence of children, presence of people

suffered chronic illness within the household, household visits and location are significant at 99% confidence interval while gender is the only significant at 90%.

Similar to outcomes are obtained at 10% cut off point as the three previous cut off point where chronic illness and visits to health facilities increase the probability of catastrophe in addition to as well as further distance leads to higher catastrophe.

When the household located in an urban area that reduces the probability of incurring catastrophe comparing with rural areas with predicted probability lower by 7.99%. Presence of children also reduces catastrophe by 15.16% In addition one additional household member increases probability of catastrophe by 2.52%. Also male headed household was less likely to incur catastrophe compared to female headed ones.

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Part three: Subsample of uninsured households

Table 33 Determinants of catastrophic spending on health among poor uninsured households at 40% cut off point.

cat_40	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.0936491	0.0858820	0.2760	0.0119548
dummychild	-0.4437521	0.0978654	0.0000	-0.0575768***
maxhhsize	-0.1007215	0.0152764	0.0000	-0.0134828***
maritalstatus	-0.0301102	0.0853785	0.7240	-0.0038072
gender	-0.2578511	0.0803813	0.0010	-0.0320681***
location	-0.6765060	0.1030978	0.0000	-0.0765496***
primaryedu	0.4259925	0.1855599	0.0220	0.0483583**
secondaryedu	0.3219260	0.2657034	0.2260	0.0354405
notapplyedu	0.4433711	0.1708386	0.0090	0.0505873***
distance_km	0.0221993	0.0074619	0.0030	0.0029717***
dummychrill	0.7817147	0.0819491	0.0000	0.1113406***
totalhhvisits	0.3288465	0.0162159	0.0000	0.0440202***
_cons	-1.9287190	0.2044616	0.0000	

Number of obs = 5869 LR chi2(12) = 770.71

Prob > chi2 = 0.000 Log likelihood = -2404.7391

Pseudo R2 = 0.1381

Table33 describes the finding of regression analysis of uninsured sub sample showing their coefficients, significance and marginal effects.

Quantitatively the results obtained for uninsured subsample are very similar to the entire sample.

In the table33 Catastrophic health care expending is found to be affected by household size, presence of under five children, location of household (urban/rural), gender and education level (had primary or illiterate) of the head of the household, number of household visits to and distance from health facility and presence of chronic illness in the household. All are significant at 99% confidence interval except primary education level of the head of household which is significant at 95% confidence interval. On the other hand, catastrophe did not affected by marital status of the head of the household, presence of elder people among household members and secondary education level of the head of the household.

Presence of chronically ill people among the household was found to be the main cause of catastrophe among this group similar to that among the insured households and the entire sample with the highest marginal effect of 11.13 % (compared to 8.34% among insured), frequency of visits of household members to health facilities was the second cause catastrophe of poor the probability of incurring catastrophe increased by 4.4% for additional visit. The distance between the household and health care facilities also play considerable role in catastrophe occurrence in the household with probability of catastrophe increases by 0.30% for each additional kilometer traveled.

Results shown above also point out that poor household in the urban areas were less likely to face catastrophe compared to those in the rural areas by 7.65% whereas household

headed by male had 3.21% chance less than female headed ones. Moreover, households with children under five years old were less susceptible to catastrophe.

Educational level of the household head was also found to affect the degree of catastrophe in their households. Having primary education was found to be associated with higher probability of suffering catastrophe in reference to households whose head had university education and lower compared to illiterate headed households with predicted probabilities increase by 4.84% for primary education and 5.10 % for illiteracy however secondary education did not showed any role in affecting catastrophe .this result cannot with in Sudan context the only reason might be the low sample 3.4% among the whole sample. The same reason may explain that presence of over 60 years old did not have any rule in catastrophe among poor households .elder people in Sudan context constitute only 3% of the total population of the country.

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Robustness check for these outcomes was done by performing three more sets of regression at 30%, 20% and 10% cut off point as shown below.

Table 34 Determinants of catastrophic spending on health among poor uninsured households at 30% cut off point

cat_30	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.12949220	0.08041430	0.1070	0.0196064
dummychild	-0.43180010	0.09189140	0.0000	-0.0632599***
maxhhsize	-0.09141520	0.01426460	0.0000	-0.0143725***
maritalstatus	-0.02599060	0.08026280	0.7460	-0.0037348
gender	-0.27575830	0.07552870	0.0000	-0.0389675***
location	-0.51798000	0.09202000	0.0000	-0.0692217***
primaryedu	0.16954300	0.16228610	0.2960	0.0234419
secondaryedu	0.22367850	0.23688680	0.3450	0.0313375
notapplyedu	0.17585230	0.14746840	0.2330	0.0243518
distance_km	0.02037730	0.00757380	0.0070	0.3203700***
dummychrill	0.77827990	0.07769220	0.0000	0.1249144***
totalhhvisits	0.36763000	0.01667350	0.0000	0.0577994***
_cons	-1.59911800	0.18126790	0.0000	

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Number of obs = 5869 LR chi2 (12) = 903.26

Prob > chi2 = 0.0000 Log likelihood = -2659.4431

Pseudo R2 = 0.1452

Table 34 shows the finding of regression analysis performed for uninsured sample at 30% cut off point presenting coefficients, significance and marginal effects.

From the table34 Similar outcomes to 40% cut off point were obtained at 30% in which catastrophic expending of the household found to be affected by household size, presence of under five children, location of household (urban/rural), gender of the head of the household, number of household visits to and distance from health facility and presence of chronic illness in the household. All are significant at 99% confidence interval. While educational level of the head of household was no longer affect the level of catastrophe. Moreover marital status of the head of the household, presence of elder people among household members had no effect on catastrophe in the household.

Similar to what was obtained at 40% Presence of chronically ill people among the household was found to be the main cause of catastrophe among this group with probability of 12.41, total number of household visits to health facilities was the second cause of with probability of 5.78% in addition to that the larger the distance of household from health facilities the more likely it suffered catastrophe. .

Out comes listed above showed that if household live in urban areas their probability of facing catastrophe was found less than rural areas residents by 6.92%.another determinant of catastrophe was the household size the larger the size of the household the less likely to incur catastrophe .more over household headed by male was found to better off than those female headed ones in addition to presence of children among the household found to received benefits from free governmental subsidy provided for under five years old therefore the experienced less catastrophe.

Table 35 Determinants of catastrophic spending on health among poor uninsured households at 20% cut off point

cat_20	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.1209940	0.0759061	0.1110	0.0196064
dummychild	-0.4589016	0.0866059	0.0000	-0.0752734***
maxhhsize	-0.0780669	0.0134204	0.0000	-0.0134828***
maritalstatus	0.0330430	0.0758130	0.6630	0.0088475
gender	-0.2601510	0.0714414	0.0000	-0.0411402***
location	-0.3984247	0.0839192	0.0000	-0.0629864***
primaryedu	0.2014108	0.1517392	0.1840	0.0483583
secondaryedu	0.2675058	0.2231260	0.2310	0.0354405
notapplyedu	0.1996458	0.1378803	0.1480	0.0505873
distance_km	0.0272967	0.0095409	0.0040	0.0029717***
dummychrill	0.7323719	0.0747908	0.0000	0.1301259***
totalhhvisits	0.4250072	0.0176545	0.0000	0.0440202***
_cons	-1.5437030	0.1703902	0.0000	

Number of obs = 5869 LR chi2(12) = 1089.90

Prob > chi2 = 0.0000 Log likelihood = -2912.8382

Pseudo R2 = 0.1576

Chronic illness throughout this study observed to be the main cause that pushed many poor households into catastrophe when they pay health expenses out of pocket with probability increase by 13% table35 in presence of chronic illness as shown in the above table35. Furthermore frequency of visits of household members to health facilities was the

second cause catastrophe of poor the probability of incurring catastrophe increased by 4.4% for additional visit. The distance between the household and health care facilities also play considerable rule in catastrophe occurrence in the household with probability of 0.29% for each additional kilometer.

Outcomes obtained at this cut off point for gender, location, presence of children and household size are quite similar to results at 30% and 40% the only difference is in the magnitude of probabilities of catastrophic occurrence 4.11%, 6.30%, 7.53, 1.35 respectively. Table35.

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Table 36 Determinants of catastrophic spending on health among poor uninsured households at 10% cut off point.

cat_10	Coef.	Std. Err.	P>|z|	ME
dummyelder	0.0758851	0.0730092	0.2990	0.0122556
dummychild	-0.5147556	0.0831170	0.0000	-0.0912979***
maxhhsize	-0.0494785	0.0128324	0.0000	-0.1176817***
maritalstatus	0.0199117	0.0731776	0.7860	0.0125621
gender	-0.3236307	0.0692171	0.0000	-0.0558966***
location	-0.2703672	0.0782982	0.0010	-0.0462077***
primaryedu	0.2819172	0.1439976	0.0500	0.0482683**
secondaryedu	0.4146010	0.2130208	0.0520	0.0723294*
notapplyedu	0.2060938	0.1306805	0.1150	0.0348887
distance_km	0.0902249	0.0260377	0.0010	0.0207489***
dummychrill	0.7967493	0.0738165	0.0000	0.1521249***
totalhhvisits	0.5132835	0.0194828	0.0000	-0.0115985***
_cons	-1.5113450	0.1629491	0.0000	

Number of obs = 5869 LR chi2 (12) = 1418.41

Prob > chi2 = 0.0000 Log likelihood = -3093.0371

Pseudo R2 = 0.1865

At 10% cut off point positively correlated results obtained for chronic illness is similar to what obtained at 20%/ 30% /40% cut points with higher magnitude of marginal effect, also similar results for frequency of visits with lower marginal effect (1.16%), distance to health facilities with higher probability (2.07%).tables 36.

CHAPTER 5

DISCUSSION COLCUSION AND RECOMMENDATION

5.1. DISSCUSSION

In this part results presented in the last chapter will be discussed

Catastrophic health expenditure overview at the 40%,30%,20% and 10% cut of point will be shown at the first and then factors affecting poor households protection will be discussed.

In fact, many factors affect financial protection for the poor households in Sudan. In this section, some of these factors will be highlighted through the discussion of the following results health insured coverage, effect of chronic illness, effect the frequency of visits to health facilities, effect of the distance to health facilities, household size, extreme age people presence in the household(elder over 60 and children under five and characteristics of the head of the household on the degree of catastrophe of the households which is positively correlated with high out of pocket spending therefore it reflect their effect on financial protection of the household.

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5.1.1CATASTROPHIC HEALTH EXPENDITURE AMONG POOR HOUSEHOLDS

High health care expenses in Sudan when combined with complicated economic situation and high poverty rate pushes a lot of households into hardship, impoverishment or catastrophe especially among poor households. Even though

health expense impacts on insured and uninsured are different because of the protection provided by the insurance for insured households against catastrophic health expenses, but still both insured and uninsured incurred catastrophe but with quite different magnitude. This study show the degree of catastrophe among both insured and uninsured group and the factor affecting it is magnitude.

Catastrophic health expenses among poor insured and uninsured will be illustrated. Proportions of households that experienced catastrophe among entire sample of poor household and insured and uninsured subsamples at 40% ,30%, 20% and 10% cut off point will be discussed (figure5.1).

Among poor in the entire sample for 35.8% of the households incurred catastrophe at 10% cut off point, while at 20% cut off point 27.5% of households spent 20% or more of their capacity to pay in paying for their health expenses, moreover, at 30% the proportion was 22%, whereas 18% of the households incurred catastrophe at 40% cut off point.

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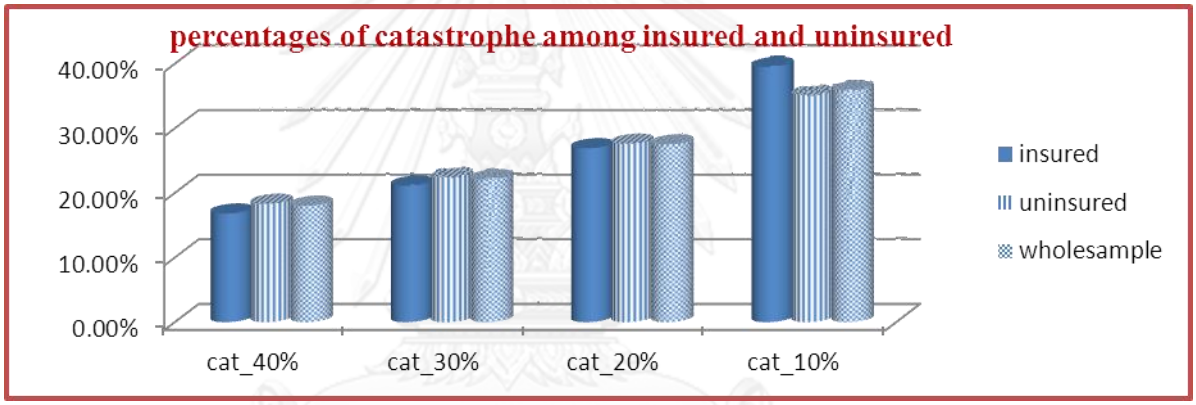
Likewise uninsured group catastrophe results quite similar to the whole sample where 35% faced catastrophe at 10% cut off point, 27.6% of the households incurred catastrophe at 20% moreover 22.3% of household faced by catastrophe at 30% cut off point in addition to 18.3% incurred catastrophe at 40% cut off point.

Among insured households 39.5% were confronted with catastrophic health expenses at 10% cut off point, 26.9% households faced catastrophe at 20% cut of point, 21.1% was the percentage of households suffered catastrophe at 30% and only 16% were under catastrophe.

Figure 10percentages of households with catastrophic health expenditure at the 4 cut off point f among insured, uninsured and households in the entire sample

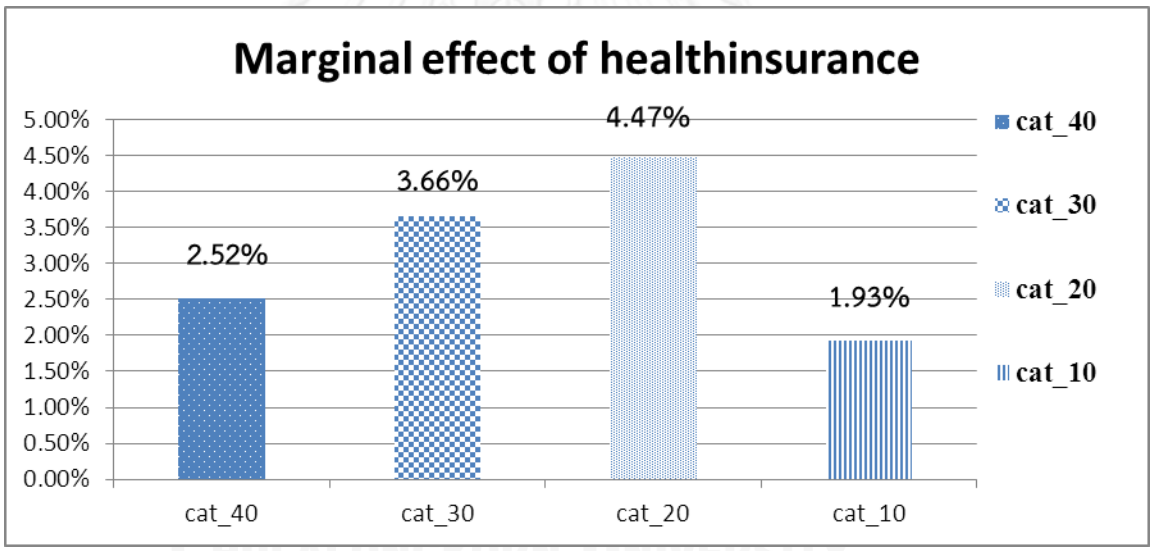


5.1.2. HEALTH INSURANCE

Evidence showed by the results obtained in last chapter was the reduction in the catastrophic spending of the poor household when health insurance coverage received. Although the level of reduction in the probability of catastrophe was small at 2.52%, 3.66%, 4.47% and 1.93%(but not significant at 10%) at the cut off points 40%, 30%, 20% and10%, respectively, this still shows the progress in financial protection for poor by using health insurance as a tool (F. e. Knaul, 2012)hence reduction in their out of pocket expenses level was found and reflect the targeting of

poor by government has impacted the vulnerable group and going in the right direction. the limited effects observed might be a result of low accessibility to health services among poor in rural areas where some times need to travel long distance to get services which put high transportation burden among poor moreover, low awareness among poor households with whole package of services can result in loss of opportunity to be protected.

Figure 11marginal effect of health insurance on the probability of experiencing catastrophic health expenses



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5.1.3 CHRONIC ILLNESS

Among poor insured and uninsured households chronic illnesses was found to be the main cause of catastrophe since the proportion of households with chronically illness found to be 24.8% of the households out of which 29.5% (7.4% out of the total) suffered catastrophe. Higher proportions of catastrophe being

observed among uninsured 31.1% compared to 25.3% insured. Likewise the marginal effect of chronic illness on probability of of catastrophe is equal to 11.13%, 12.49%, 13% and 15.2% for uninsured compared to 8.34%, 8.55%, 10.49%, 16.1% for the insured at the four cut of points 40, 30, 20, 10 % which also confirm the effect rule of health insurance in protection against catastrophe.

For overall sample, households with members suffered chronic illness were more probably incur catastrophe than those without health insurance by 10.5%, 11.7%, 12.5%, 15.2%, which considered the highest probability among all factors. Therefore, it is the main cause for catastrophe among poor household. Therefore great efforts and programs should be directed towards controlling chronic illness among poor, which is the main challenge that pushes them into catastrophe.

Figure 12Marginal effect of chronic illness on the probability of experiencing catastrophic health expenditure

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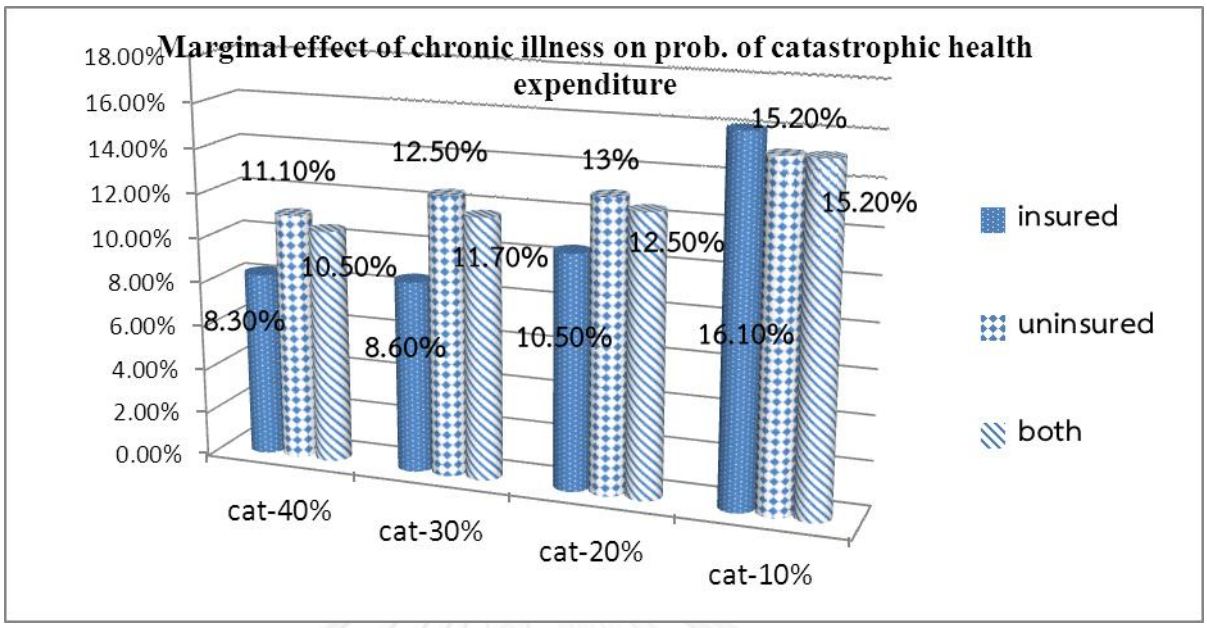

5.1.4 NUMBER OF VISITS TO FACILITIES

Table 37 Average number of households visits to health facilities and marginal effects at 40% for three samples

visits	Obs	Mean	Std. Dev.	Min	Max
Uninsured	5869	2.394786	2.634788	0	42
Insured	1117	3.145927	3.12855	0	26

Table 38marginal effects at 40% for three samples

Visits	Obs
cat_40 /no. of visits whole sample (marginal effect	3.82%

cat_40 /no. of visits insured (marginal effect	**2.28%**
cat_40 /no. of visits uninsured (marginal effect	4.40%

In general increase in number of visits to health facilities increases probability of catastrophe among poor households with magnitude of 3.82% for each additional visit for the entire sample. Although higher number of visits associated mainly with more access but it also put financial burden on the poor.

Poor insured households have more access to health service with average number of three yearly visits. This may indicate that health insurance also increase accessibility to health services (Werner, 2009) and low catastrophe among the group. Unlike uninsured households they had average of 2.4 yearly visits which indicates low accessibility compared to insured ones and high rate of catastrophe among uninsured group. Furthermore, among insured households one additional visit increases probability of incurring catastrophe by 2.28% whereas among uninsured the probability rise by 4.4% this result shows that health insurance help to better financial protection for poor since the probability of insured is lower than uninsured.table38.

In fact, Health insurance reduces financial barriers which prevent poor households from receiving health services therefore, can increase their access to the needed services. Likewise, location of the households has its impact on access to

services such as urban residents experience high level of access than rural residences who pay higher transportation cost to get services as a result of long distance they have to travel to reach health facilities a long dumpy roads than which may reduce their access to services. Moreover, lack of certain services near to poor households specially in case of secondary, tertiary and quaternary health services pushes more financial burden into households end up with reduction of access to health services. In addition to high price and bad quality of healthcare services provided near poor households also leading to more expenses paid by household to search good services with reasonable prices. Therefore, high number of visits can be a result of interaction of all mentioned factors. However insured poor households in general had better access to health services than uninsured which may show the effect of health insurance in protection of poor households from financial burden.

5.1.5. LOCATION OF THE HOUSEHOLD

Generally poor households in urban areas were more protected than those in the rural areas with better chances of protection 8.72% (at 40% cut off point) more than those in rural areas despite of the fact that 57.6% of rural residents are poor while only 26.5% of urban residents poor. Therefore special programs for targeting poor in the rural areas should be implemented.

Poor insured household in the urban areas were found better off than those in the rural areas which mean more protection for them and were less likely to

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experience catastrophe with probability of 10.98 %(at 40% cut point) less than those in rural. This indicates that poor in urban areas had more benefits from insurance than in rural areas therefore expansion of coverage with health insurance in rural areas could be one of the poverty reduction strategies because it provides more financial protection.

Likewise poor uninsured households in urban were at less risk of catastrophe than rural poor ones but to less extent than insured ones with probability 7.56% lower than rural uninsured .But in comparison with the insured, they were less protected. Therefore, more efforts should be put so as to provide insurance coverage as well as other targeting programs for poor protection especially in the rural areas.

5.1.6. DISTANCE TO HEALTH FACILITES

Distance of the household to the health facility is an important determinant of financial protection for the households because of high transportation cost associated with seeking for health care. In spite of the mean distance to health facility only 1.03km high transportation cost associated with distance because of dumpy roads especially in rural areas had its impact on catastrophe among households.

The impact of distance on catastrophe can be seen by looking at the marginal effects at 40% cut off point. Distance had higher impact among insured because the

probability of incurring catastrophe increases by 0.36% for each additional kilometer traveled likewise catastrophe probably increases by 0.30% among those uninsured ones. Moreover distance impact among the whole poor was shown by 0.32% increase in catastrophe for each additional 1km.

5.1.7. HOUSEHOLD SIZE AND EXTREME AGE PRESENCE IN THE HOUSEHOLD

Average household size among poor in Sudan is 6.6 members.With respect to the effect of household size on the financial protection for poor .the result of regression analysis showed that the higher the household size the less catastrophe in the household which gives different results from what was expected This can be explained by larger household size the larger it is capacity to pay table25 therefore it is less likely to incur catastrophic health spending than when the household size is small.

Presence of children under five years old in the household associated with low rate of catastrophe in insured as well as uninsured with higher reduction shown with those insured 8% compared to 5.76% for uninsured. The sign of the coefficient for this variable show did not comply with expected sign the reason behind that was the effect under five years free program which was implemented throughout public health facilities therefore presence of under 5years old in the household did not increase catastrophe as expected. Likewise presence of 60years old and above member s in the household also did not put household in financial burden (not

significant) this is might the result of low elderly population constitute 3-5% of total number of population of the country.

5.1.8. CHARACTERISTICS OF THE HEAD OF THE HOUSEHOLD

Generally poor households when headed by male suffered catastrophe to less extent than those headed by female the marginal effect of the gender variable obtained for the insured is 4.8% and uninsured is 3.2% as well with slightly more protection observed among insured households compared to uninsured at almost all cut off points .the result obtained could be explained by the more work opportunity available for poor male where they can get higher income compared to poor female.

Considering marital status of the head of the household had no significant effects among poor as general and uninsured household was observed only significant effect of was registered among those insured household who spent more than 30% and 40% of their consumption expenses on health among which households were less probably suffer catastrophe when the head is married .From the above results no significant difference between married and un married head of household.

Education level of the head household seems not to have any great role in affecting catastrophe among poor insured because no significance was found throughout the four cut off points unlike insured ones in uninsured households when the head received primary education the household become more likely to

experience catastrophe compared to those received university education and less than illiterate ones while secondary education was showed no significance , this outcomes observed only at the highest and lowest cut off point. The reason behind the limited effect of education come from the fact all insured household`s heads were found uneducated (the sample in term of education does not show national representation) while 62% of uninsured heads were uneducated as well. Moreover less than 1% of them had university education while about 3.5% received secondary education and about 27.5% had primary education.

5.2. CONCLUSION

In my conclusion for this study and to answer the research questions asked at the first part of my study summary of findings gained from this study will be shown. To obtain these findings data from Sudan Households Health Utilization Expenditure Survey in Northern States 2009 were used to obtain a sample of 6986 poor households out of the whole survey sample of 12468 household. In this study 1117 (16%) households were insured while the 5869were uninsured, 1736 household had at least one member suffered chronic illness, 25.8% were urban residents while 74.2% rural, 2716 (38.9%) households were headed by male while larger part 4270(61.1%) were female headed households. Binary Logistic regression used as tool for the analysis.

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One of the main findings obtained from this study is health insurance had provided financial protection for poor households shown as reduction in the probability of experiencing catastrophic out of pocket expenditure in spite of it is low rate2.5% 3.6 %, 4.5% and 1.9% at the four cut off point. Because of low rate of insurance coverage among the poor .more efforts and funds should be provided directed towards those in rural areas. Health insurance was also increased accessibility of poor to health service compared to uninsured one this confirmed that targeting poor thought NHIF welfare scheme partially attained its objective.

Second main finding was the challenge of chronic illness which was the main cause of catastrophic expenditure among poor households both insured and uninsured although insured had the lower rates. Prevalence of chronic illness among insured is higher than among uninsured group 34% while its 22% among uninsured which may question whether eligibility criteria were implemented correctly or not.in addition higher percentage of households with chronic illness located in rural areas among uninsured (17.8% rural and 5.2% urban). Unlike those among insured where higher percentage located in the urban areas (16% rural vs18% urban) These facts to protect poor from health catastrophic expenditure especial program should be launched and directed towards controlling chronic illness among poor also it suggest that future effort should be directed towards those in rural areas.

Households with male heads were better off and more protected than female headed ones with slightly higher percentage among insured compared to uninsured group. Moreover high percentage of female headed household among uninsured located in rural areas (48.7% rural 12.5% urban) while among insured(32% rural ,27% urban) These facts push the direction of greater support towards female headed ones among uninsured located in rural areas as they were the most vulnerable to catastrophe.

5.3. RECOMMENDATIONS

1. The results obtained in this study clearly support that health insurance is an effective tool at providing financial protection for poor households. Therefore if coverage with welfare scheme is expanded to enroll the poor-uninsured then their out-of-pocket expenses would be reduced leading to financial protection from catastrophic health expenditure.

2. The study shows that high proportion of vulnerable groups of poor households to catastrophic health expenditure live in rural areas therefore future protective efforts should be directed towards protection of poor households in rural areas.

3. The study findings provides strong evidence that chronic illnesses were the main cause of catastrophic health expenditure among poor households and health insurance reduces probability of incurring catastrophe. Therefore one alternative for the government to protect poor households is to use subsidized health insurance

scheme (NHIF welfare scheme) to provide financial protection for chronically ill people in poor household.

4. The study also shows that there is need to provide protective strategies to help poor female headed household. Expanding welfare health insurance coverage seem to be one solution that can be used to protect female headed households as they appeared more vulnerable to catastrophic health expenditure than male headed ones.

5.4. LIMITATION OF THE STUDY:

The limitation of this study could be summarized in the following:

1- The study used the household health utilization and expenditure survey 2009 which regarded as the latest survey in the country .Therefore, so as to analyze the impact of heavy subsidies from 2011 by Federal Ministry of Finance, future studies need to utilize updated data.
2- The secondary data contain invalid information about the income of households, so the study used the consumption expenses to reflect the financial situations of the households.
3- The survey data measured the out of pocket spending on monthly basis, so the study multiply this value with 12 to calculate the annual out of pocket spending. This may result in measurement errors that can be affect the results of this study
4- Selection bias associated with treating some cases of uninsured poor households by local Zakat offices in the sense that some households can get insured although in presence of others more vulnerable than them, may

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result in endogeneity problem which may affect the results of this study even though the effect is very limited because of rare cases

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APPENDIX

APPENDIX A Correlation test for entire sample variables

Correlation test for the entire sample variables

	dummyH~H	dummye~r	dummyc~d	maxhhs~e	marita~s	gender	location	second~u	primar~u
dummyHI_HH	1.0000								
dummyelder	0.0707	1.0000							
dummychild	-0.0342	-0.2736	1.0000						
maxhhsize	0.1265	0.0593	0.2574	1.0000					
maritalsta~s	-0.0003	0.0904	-0.3297	-0.0481	1.0000				
gender	0.0062	-0.1276	0.2729	0.0079	-0.2135	1.0000			
location	0.2159	0.0066	-0.0141	0.0877	-0.0084	0.0392	1.0000		
secondaryedu	0.1113	-0.0189	-0.0348	0.0156	0.1198	-0.0059	0.1194	1.0000	
primaryedu	0.0508	0.0153	-0.1797	-0.0027	0.3762	-0.1190	0.0678	-0.1355	1.0000
notapplyedu	-0.1467	0.0027	0.1253	-0.0462	-0.2899	0.0871	-0.1729	-0.2606	-0.7633
dummychrill	0.0989	0.1958	-0.1132	0.0744	0.0105	-0.0203	0.0423	0.0390	0.0196
totalhhvis~s	0.1007	-0.1011	0.3780	0.2674	-0.1619	0.2573	0.0509	0.0308	-0.0603
distance_km	0.0058	0.0193	-0.0566	-0.0281	0.0329	-0.0230	-0.0153	-0.0062	0.0339

	notapp~u	dummyc~l	totalh~s	distan~m
notapplyedu	1.0000			
dummychrill	-0.0388	1.0000		
totalhhvis~s	-0.0086	0.1359	1.0000	
distance_km	-0.0206	0.0991	0.0178	1.0000

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APPENDIX B regression results of determinants of catastrophic spending on health for entire sample

Table 1 regression results of determinants of catastrophic spending on health at 40% cut off point

cat_40	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyHI_HH	-.2069843	.1006271	-2.06	0.040	-.4042098	-.0097587
dummyelder	.0521175	.0777459	0.67	0.503	-.1002618	.2044967
dummychild	-.4644899	.0884385	-5.25	0.000	-.6378262	-.2911535
maxhhsize	-.0969337	.0138485	-7.00	0.000	-.1240763	-.0697911
location	-.7411271	.0907161	-8.17	0.000	-.9189274	-.5633267
maritalstatus	-.1024534	.0781478	-1.31	0.190	-.2556202	.0507134
gender	-.2790363	.0738845	-3.78	0.000	-.4238472	-.1342254
primaryedu	.3555544	.1570994	2.26	0.024	.0476453	.6634635
secondaryedu	.255452	.2198339	1.16	0.245	-.1754146	.6863185
notapplyedu	.3709852	.1442062	2.57	0.010	.0883462	.6536243
totalhhvisits	.2962023	.014169	20.90	0.000	.2684315	.3239731
dummychrill	.7456072	.0747939	9.97	0.000	.599014	.8922005
distance_km	.0245399	.0068721	3.57	0.000	.0110708	.0380089
_cons	-1.696598	.1759996	-9.64	0.000	-2.041551	-1.351645

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Table 2 regression results of determinants of catastrophic spending on health at 30% cut off point with entire sample

cat_30	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyHI_HH	-.2657615	.0937075	-2.84	0.005	-.4494247	-.0820982
dummyelder	.1065805	.0727512	1.46	0.143	-.0360093	.2491704
dummychild	-.4495943	.0831267	-5.41	0.000	-.6125196	-.286669
maxhhsize	-.0911758	.0129528	-7.04	0.000	-.1165628	-.0657887
location	-.5591842	.0810452	-6.90	0.000	-.7180299	-.4003384
maritalstatus	-.0910924	.0733671	-1.24	0.214	-.2348892	.0527043
gender	-.2912544	.0693145	-4.20	0.000	-.4271083	-.1554004
primaryedu	.1606644	.1393357	1.15	0.249	-.1124285	.4337573
secondaryedu	.1258937	.1985097	0.63	0.526	-.2631781	.5149655
notapplyedu	.1672052	.1265109	1.32	0.186	-.0807517	.415162
totalhhvisits	.3417507	.0146055	23.40	0.000	.3131245	.370377
dummychrill	.735223	.070713	10.40	0.000	.596628	.8738179
distance_km	.021768	.006789	3.21	0.001	.0084618	.0350742
_cons	-1.438937	.1581347	-9.10	0.000	-1.748875	-1.128998

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Table 3 regression results of determinants of catastrophic spending on health at 20% cut off point with entire sample

cat_20	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyHI_HH	-.2868973	.0878967	-3.26	0.001	-.4591717	-.1146229

dummyelder	.1264242	.0685056	1.85	0.065	-.0078444	.2606928
dummychild	-.497485	.0783946	-6.35	0.000	-.6511355	-.3438345
maxhhsize	-.0830663	.0122019	-6.81	0.000	-.1069815	-.0591511
location	-.469904	.0743893	-6.32	0.000	-.6157044	-.3241037
maritalstatus	-.0262954	.0691976	-0.38	0.704	-.1619202	.1093294
gender	-.2667362	.0654801	-4.07	0.000	-.3950748	-.1383977
primaryedu	.1706016	.1299861	1.31	0.189	-.0841666	.4253698
secondaryedu	.02415	.1883787	0.13	0.898	-.3450655	.3933655
notapplyedu	.1630894	.1180169	1.38	0.167	-.0682194	.3943983
totalhhvisits	.3985861	.0154537	25.79	0.000	.3682973	.4288748
dummychrill	.7063366	.067696	10.43	0.000	.5736549	.8390182
distance_km	.0262081	.0082596	3.17	0.002	.0100195	.0423966
_cons	-1.326016	.1482627	-8.94	0.000	-1.616605	-1.035426

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Table 4 regression results of determinants of catastrophic spending on health at 10% cut off point with entire sample

Cat_10	**Coef.**	**Std. Err.**	**Z**	**P>|z|**	**[95% Conf.**	**Interval]**
dummyHI_HH	-.1102193	.0818802	-1.35	0.178	-.2707015	.0502629
dummyelder	.0829085	.0656774	1.26	0.207	-.0458169	.211634
dummychild	-.557235	.0749345	-7.44	0.000	-.704104	-.410366

maxhhsize	-.0574385	.0116235	-4.94	0.000	-.0802201	-.0346568
location	-.3065083	.0688159	-4.45	0.000	-.441385	-.1716315
maritalstatus	-.0381779	.0664208	-0.57	0.565	-.1683603	.0920044
gender	-.3209158	.0630655	-5.09	0.000	-.4445219	-.1973097
primaryedu	.2679037	.1231875	2.17	0.030	.0264607	.5093467
secondaryedu	.2082697	.1766527	1.18	0.238	-.1379633	.5545027
notapplyedu	.206053	.1116304	1.85	0.065	-.0127385	.4248444
totalhhvisits	.4862436	.0171337	28.38	0.000	.452662	.5198251
dummychrill	.7922288	.0663164	11.95	0.000	.6622511	.9222066
distance_km	.0952224	.0243957	3.90	0.000	.0474078	.1430371
_cons	-1.324001	.1412785	-9.37	0.000	-1.600902	-1.0471

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APPENDIX C regression results of determinants of catastrophic spending on health for Health insurance only subsample

Table 5regression results of determinants of catastrophic spending on health at 40% cut off point with Health insurance subsample

cat_40	**Coef.**	**Std. Err.**	**Z**	**P>|z|**	**[95% Conf.**	**Interval]**
dummyelder	-.003148	.1862086	-0.02	0.987	-.3681102	.3618142
dummychild	-.6351911	.2144098	-2.96	0.003	-1.055427	-.2149556

maxhhsize	-.077216	.033626	-2.30	0.022	-.1431217	-.0113103
location	-.9163802	.1853423	-4.94	0.000	-1.279644	-.553116
maritalstatus	-.4097427	.2013964	-2.03	0.042	-.8044725	-.0150129
gender	-.4057517	.1939719	-2.09	0.036	-.7859297	-.0255737
primaryedu	.2116084	.307087	0.69	0.491	-.390271	.8134878
secondaryedu	.1119513	.3974031	0.28	0.778	-.6669446	.8908471
notapplyedu	.2150932	.2785023	0.77	0.440	-.3307612	.7609477
totalhhvisits	.1878076	.0295919	6.35	0.000	.1298086	.2458067
dummychrill	.6428917	.1853551	3.47	0.001	.2796025	1.006181
distance_km	.0304782	.0171398	1.78	0.075	-.0031152	.0640716
_cons	-1.070534	.3690382	-2.90	0.004	-1.793836	-.3472329

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Table 6 regression results of determinants of catastrophic spending on health at 30% cut off point with Health insurance subsample

cat_30	**Coef.**	**Std. Err.**	**Z**	**P>|z|**	**[95% Conf.**	**Interval]**
dummyelder	.0959419	.1732404	0.55	0.580	-.243603	.4354868
dummychild	-.5965648	.1998605	-2.98	0.003	-.9882843	-.2048454
maxhhsize	-.0900235	.0314944	-2.86	0.004	-.1517515	-.0282956
location	-.6634055	.1673782	-3.96	0.000	-.9914608	-.3353503
maritalstatus	-.3590032	.1867063	-1.92	0.055	-.7249408	.0069345
gender	-.3763663	.1786632	-2.11	0.035	-.7265397	-.0261928
primaryedu	.1586051	.2784075	0.57	0.569	-.3870636	.7042738

secondaryedu	-.062507	.3676906	-0.17	0.865	-.7831673	.6581534
notapplyedu	.1872555	.2509319	0.75	0.456	-.3045619	.6790729
totalhhvisits	.2573403	.0311066	8.27	0.000	.1963725	.3183081
dummychrill	.5807423	.1719165	3.38	0.001	.2437922	.9176924
distance_km	.0251145	.0158923	1.58	0.114	-.0060338	.0562628
_cons	-1.023437	.338843	-3.02	0.003	-1.687557	-.3593169

Table 7 regression results of determinants of catastrophic spending on health at 20% cut off point with Health insurance subsample

cat_20	**Coef.**	**Std. Err.**	**Z**	**P>|z|**	**[95% Conf.**	**Interval]**
dummyelder	.24933	.1634936	1.53	0.127	-.0711116	.5697716
dummychild	-.7767189	.1899385	-4.09	0.000	-1.148992	-.4044464
maxhhsize	-.1106428	.0301335	-3.67	0.000	-.1697034	-.0515822
location	-.7044694	.1575219	-4.47	0.000	-1.013207	-.3957321
maritalstatus	-.2598129	.1762735	-1.47	0.141	-.6053026	.0856767
gender	-.2957432	.1688405	-1.75	0.080	-.6266645	.0351781
primaryedu	.1098762	.2586462	0.42	0.671	-.3970611	.6168135
secondaryedu	-.4838725	.3577837	-1.35	0.176	-1.185116	.2173707
notapplyedu	.1305455	.2333862	0.56	0.576	-.326883	.587974
totalhhvisits	.3153928	.0328127	9.61	0.000	.251081	.3797045
dummychrill	.6411911	.1623344	3.95	0.000	.3230215	.9593606

distance_km	.020729	.0158716	1.31	0.192	-.0103789	.0518368
_cons	-.6785572	.3180168	-2.13	0.033	-1.301859	-.0552557

Table 8 regression results of determinants of catastrophic spending on health at 10% cut off point with Health insurance subsample

cat_10	**Coef.**	**Std. Err.**	**Z**	**P>|z|**	**[95% Conf.**	**Interval]**
dummyelder	.2005769	.1541385	1.30	0.193	-.1015291	.5026829
dummychild	-.8234809	.1774114	-4.64	0.000	-1.171201	-.475761
maxhhsize	-.1021759	.0282475	-3.62	0.000	-.1575401	-.0468118
location	-.4371628	.14432	-3.03	0.002	-.7200248	-.1543008
maritalstatus	-.2257061	.1647107	-1.37	0.171	-.5485331	.0971209
gender	-.2838027	.1571675	-1.81	0.071	-.5918454	.0242399
primaryedu	.2271218	.244123	0.93	0.352	-.2513505	.7055941
secondaryedu	-.1828083	.3200046	-0.57	0.568	-.8100058	.4443892
notapplyedu	.3097387	.2189429	1.41	0.157	-.1193816	.7388589
totalhhvisits	.3937612	.0363121	10.84	0.000	.3225908	.4649317
dummychrill	.8358827	.1542202	5.42	0.000	.5336166	1.138149
distance_km	.0990962	.0591587	1.68	0.094	-.0168526	.2150451
_cons	-.5971875	.2980729	-2.00	0.045	-1.1814	-.0129754

APPENDIX D regression results of determinants of catastrophic spending on health for uninsured subsample

Table 9 regression results of determinants of catastrophic spending on health at 40% cut off point with uninsured subsample

cat_40	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyelder	.0936491	.085882	1.09	0.276	-.0746766	.2619748
dummychild	-.4437521	.0978654	-4.53	0.000	-.6355648	-.2519395
maxhhsize	-.1007215	.0152764	-6.59	0.000	-.1306627	-.0707803
location	-.676506	.1030978	-6.56	0.000	-.878574	-.474438
maritalstatus	-.0301102	.0853785	-0.35	0.724	-.197449	.1372285
gender	-.2578511	.0803813	-3.21	0.001	-.4153954	-.1003067
primaryedu	.4259925	.1855599	2.30	0.022	.0623017	.7896832
secondaryedu	.321926	.2657034	1.21	0.226	-.1988431	.8426951
notapplyedu	.4433711	.1708386	2.60	0.009	.1085336	.7782085
totalhhvisits	.3288465	.0162159	20.28	0.000	.297064	.3606291
dummychrill	.7817147	.0819491	9.54	0.000	.6210975	.9423319
distance_km	.0221993	.0074619	2.98	0.003	.0075743	.0368243
_cons	-1.928719	.2044616	-9.43	0.000	-2.329456	-1.527982

Table 10 regression results of determinants of catastrophic spending on health at 30% cut off point with uninsured subsample

cat_30	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyelder	.1294922	.0804143	1.61	0.107	-.028117	.2871014
dummychild	-.4318001	.0918914	-4.70	0.000	-.611904	-.2516963
maxhhsize	-.0914152	.0142646	-6.41	0.000	-.1193733	-.0634572
location	-.51798	.09202	-5.63	0.000	-.6983359	-.3376241
maritalstatus	-.0259906	.0802628	-0.32	0.746	-.1833028	.1313216
gender	-.2757583	.0755287	-3.65	0.000	-.4237918	-.1277248
primaryedu	.169543	.1622861	1.04	0.296	-.148532	.487618
secondaryedu	.2236785	.2368868	0.94	0.345	-.2406111	.6879681
notapplyedu	.1758523	.1474684	1.19	0.233	-.1131805	.4648851
totalhhvisits	.36763	.0166735	22.05	0.000	.3349505	.4003096
dummychrill	.7782799	.0776922	10.02	0.000	.626006	.9305538
distance_km	.0203773	.0075738	2.69	0.007	.005533	.0352215
_cons	-1.599118	.1812679	-8.82	0.000	-1.954396	-1.243839

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Table 11 regression results of determinants of catastrophic spending on health at 20% cut off point with uninsured subsample

cat_20	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
dummyelder	.120994	.0759061	1.59	0.111	-.0277792	.2697672
dummychild	-.4589016	.0866059	-5.30	0.000	-.6286461	-.2891571
maxhhsize	-.0780669	.0134204	-5.82	0.000	-.1043704	-.0517635
location	-.3984247	.0839192	-4.75	0.000	-.5629034	-.2339461
maritalstatus	.033043	.075813	0.44	0.663	-.1155477	.1816338
gender	-.260151	.0714414	-3.64	0.000	-.4001735	-.1201284
primaryedu	.2014108	.1517392	1.33	0.184	-.0959925	.4988142
secondaryedu	.2675058	.223126	1.20	0.231	-.1698131	.7048247
notapplyedu	.1996458	.1378803	1.45	0.148	-.0705946	.4698862
totalhhvisits	.4250072	.0176545	24.07	0.000	.3904051	.4596093
dummychrill	.7323719	.0747908	9.79	0.000	.5857846	.8789593
distance_km	.0272967	.0095409	2.86	0.004	.0085969	.0459965
_cons	-1.543703	.1703902	-9.06	0.000	-1.877662	-1.209745

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Table 11 regression results of determinants of catastrophic spending on health at 10% cut off point with uninsured subsample

cat_10	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dummyelder	.0758851	.0730092	1.04	0.299	-.0672102	.2189805
dummychild	-.5147556	.083117	-6.19	0.000	-.6776621	-.3518492
maxhhsize	-.0494785	.0128324	-3.86	0.000	-.0746295	-.0243276
location	-.2703672	.0782982	-3.45	0.001	-.423829	-.1169055
maritalstatus	.0199117	.0731776	0.27	0.786	-.1235137	.1633371
gender	-.3236307	.0692171	-4.68	0.000	-.4592938	-.1879676
primaryedu	.2819172	.1439976	1.96	0.050	-.0003129	.5641473
secondaryedu	.414601	.2130208	1.95	0.052	-.0029122	.8321141
notapplyedu	.2060938	.1306805	1.58	0.115	-.0500352	.4622228
totalhhvisits	.5132835	.0194828	26.35	0.000	.4750979	.5514691
dummychrill	.7967493	.0738165	10.79	0.000	.6520716	.941427
distance_km	.0902249	.0260377	3.47	0.001	.0391919	.1412579
_cons	-1.511345	.1629491	-9.27	0.000	-1.83072	-1.191971

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