POTENTIAL DETERMINANTS OF THE DESIRE TO ENROLL IN THE NATIONAL HEALTH INSURANCE FUND AMONG FAMILIES IN THE INFORMAL SECTOR IN THE NORTHERN STATE OF SUDAN

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ปัจจัยที่สัมพันธ์กับความต้องการที่จะสมัครเข้ากองทุนประกันสุขภาพแห่งชาติของครัวเรือนที่อยู่ในภาคนอกระบบในรัฐนอร์เทิร์น ประเทศซูดาน

นายโมฮัมเหม็ด โมฮัมเหม็ด อาห์เหม็ด เอลฮาสซาน ซาอีด

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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Thesis Title	POTENTIAL DETERMINANTS OF THE DESIRE TO ENROLL IN THE NATIONAL HEALTH INSURANCE FUND AMONG FAMILIES IN THE INFORMAL SECTOR IN THE NORTHERN STATE OF SUDAN
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โมฮัมเหม็ด โมฮัมเหม็ด อาห์เหม็ด เอลฮาสซาน ซาอีด: (ปัจจัยที่สัมพันธ์กับความต้องการที่จะสมัครเข้ากองทุนประกันสุขภาพแห่งชาติของครัวเรือนที่อยู่ในภาคนอกระบบในรัฐทางตอนเหนือ ประเทศซูดาน (POTENTIAL DETERMINANTS OF THE DESIRE TO ENROLL IN THE NATIONAL HEALTH INSURANCE FUND AMONG FAMILIES IN THE INFORMAL SECTOR IN THE NORTHERN STATE OF SUDAN) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : อ. ดร. ชันทาล แฮร์เบอร์โฮลส์, อ. ที่ปรึกษาวิทยานิพนธ์ร่วม : อ.ดร.นพ. กฤษณ์ พงศ์พิรุฬห์, 100 หน้า.

การศึกษานี้เป็นการศึกษาแบบภาคตัดขวางที่มีวัตถุประสงค์เพื่อการสำรวจปัจจัยที่เป็นไปได้ของความต้องการของการเข้าร่วมในระบบหลักกองทุนประกันสุขภาพแห่งชาติ (NHIF) ในกลุ่มครอบครัวที่ไม่ได้รับสิทธิ์ซึ่งอาศัยอยู่ทางตอนเหนือของซูดาน รวมไปถึงความคาดหวังสำหรับประกันสุขภาพ ข้อมูลปฐมภูมิถูกเก็บรวบรวมจาก (717), ครอบครัวในกลุ่มที่ไม่ได้รับสิทธิ์ ในรัฐทางตอนเหนือของซูดาน ระหว่างเดือนกุมภาพันธ์ ถึงมีนาคม 2013 โดยการใช้การออกแบบการสุ่มตัวอย่างแบบหลายขั้นตอน.

ผลการวิจัยจาการประมาณการโดยใช้แบบจำลอง binary choice แสดงให้เห็นว่า อาศัยอยู่ในเขตเมือง สุขภาพของหัวหน้าครอบครัวการ สุขภาพของชาย ความถี่ของการได้รับคำแนะนำทางการแพทย์ และการตระหนักถึงประกันสุขภาพอย่างสมบูรณ์และเฉลี่ย มีนัยสำคัญ และมีความสัมพันธ์เชิงบวกกับความต้องการในการเข้าร่วมใน NHIF ในขณะที่ตัวแปรดัมมี่ ที่ชี้ให้เห็นว่า สถานะของอาชีพของการค้าขายมีนัยสำคัญและเป็นเชิงลบ ผลการวิจัยนี้เป็นการยืนยันอย่างกว้างๆ โดยการประมาณการโดยใช้แบบจำลองการตอบสนองคำสั่ง แต่การเพิ่มเติมความหนาแน่นของความต้องการเข้าร่วมแสดงให้เห็นการลดลงของนัยสำคัญ กับ อายุ และ รายได้ของครอบครัว.

การศึกษาแนะนำให้ปฏิรูปการให้ความร่วมมือของภาครัฐ โดยการพิจารณาความคาดหวังของผู้คนของประกันสุขภาพ ซึ่งสิ่งนั้นช่วยในการตระหนักถึงความเป็นไปได้ของการบรรลุประกันสุขภาพถ้วนหน้าของ NHIF ในรัฐทางตอนเหนือของซูดาน.

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MOHAMED MOHAMMED AHMED ELHASSAN SAEED: POTENTIAL DETERMINANTS OF THE DESIRE TO ENROLL IN THE NATIONAL HEALTH INSURANCE FUND AMONG FAMILIES IN THE INFORMAL SECTOR IN THE NORTHERN STATE OF SUDAN. ADVISOR: CHANTAL HERBERHOLZ, Ph.D., CO-ADVISOR: KRIT PONGPIRUL, MD, MPH, Ph.D., 100 pp.

This is a cross-sectional study aimed at exploring the potential determinants of the desire to enroll in the NHIF, among families in the informal sector in the Northern State of Sudan as well as their expectation of health insurance. Primary data were collected from 717, families in the informal sector, in the Northern State of Sudan between February and March 2013, using a multi-stage sampling design.

The results from estimating a binary choice model reveal that, urban residency health of the head of the family, health of male dependents, medical advice seeking frequency, and perfect and average health insurance awareness, are significantly and positively related with the desire to enroll in NHIF,, while the dummy variable which indicates the occupational status of a merchant is significant and negative.

These results are broadly confirmed by estimating an ordered response logit model, but in addition the intensity of the desire to enroll is found to significantly decrease with age, education and family income.

The study recommends some reforming interventions that consider people's expectations of health insurance, and support the goal of achieving universal health insurance coverage of in the Northern State of Sudan.

Field of Study: Health Economics and Health Care Management
Academic Year: 2012

Student's Signature……
Advisor's Signature……...
Co-advisor's Signature……..

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LIST OF ABBREVIATIONS

CRF	Chronic renal failure
DM	Diabetes Mellitus
EMRO	Eastern Mediterranean Regional office
FMOH	Federal Ministry Of Health
FMF	Federal Ministry of Finance
HTN	Hypertension
GNI	Gross National Income
OOP	Out-Of pocket
SMOH	State Ministry of Health
VHI	Voluntary Health Insurance
NHIF	National Health Insurance Fund
SHI	Social Health Insurance
UNDP	United Nation Development Program
WB	World Bank
WHO	World Health Organization

CHAPTER I
INTRODUCTION

1.1. Introduction

Providing of health care services over the past few decades, especially for the developing countries, has been widely depend on out-of –pocket payments even in the public hospitals. That is because most of these countries suffering from many financial constraints and low Gross National Income (GNI) per capita, US$ 1,025 or less, the World Bank, 2009, this resulting in growing up of the private sectors to provide health care in most of these countries (WB, 2009)

The impact of this has resulted in healthcare being provided on the basis of ability-to-pay, which has disadvantages on the poor and low income groups and increased inequities in access to affordable healthcare. This in turn has been placed a substantial and sustained pressure exerted by national and international organizations on governments to reform the healthcare and health care financing systems and to provide health and social security to the whole population. However, to find a solution and to escape out of this problem, the implementation of social health insurance (SHI) is one model for health financing, to achieve something of the goals in some of these countries, and many are thinking about doing so the health insurance scheme in Sudan which known as National Health Insurance Fund considered as national body and has its executive directorate at the level of each State, to regulate its system,(Abualbishr, 2009)

On the other hand, those countries that have already (SHI) schemes in place are redoubling their efforts to expand their insurance coverage, especially to the informal sector and the poor people. How to increase coverage expansion among the informal sector becomes the real challenge facing the welfare of most developing countries, including Sudan.

Expansion of coverage to the informal sector is one of the challenges and difficulties facing the government in Sudan, specially the Northern State where the coverage still 3.5% of this sector

To answer the question of whether and how other countries succeed in achieving these targeted goals, a literature review is conducted, aiming to identify current and previous research on this subject, and to explore the experiences of developing countries. The review of the literature complements the analysis of

primary data, which are collected through a survey, to study the factors that affect the desire of participation of the informal sector in National Health Insurance Fund (NHIF) in the Northern State of Sudan and the expectations of the informal sector towards the NHIF in terms of for example enrollment process and premium collection from the informal sector, while the formal sector already contribute through deduction of 10%from workers' salary, 6% from employees and 4% from the employers (Abualbishr, 2009).

Generally most of the reviews reveal that there are different well-documented factors affecting this issue including, socioeconomic, demographic, managerial and administrative factors such enrollment mechanism, premium collection specially for the informal sector and access to health facilities as well as the health status of the people, and represent the main constraints that make the achievement of SHI coverage expansion a complex task, these issues are discussed in more details in the literature review in Chapter 3.

Therefore, in this study, the findings of the literature review looking at developing countries in general, together with the information gained from the data collected on health insurance in Sudan specifically the Northern State, are used to explore the stated key questions, aims and objectives of this study in an attempt to bring to light the feasibility of coverage expansion via, NHIF, in the Northern State - Sudan.

1.2. General Background of SHI in Sudan

The Social Health Insurance was introduced in 1994 after the enacting of the National Insurance Corporation Act in response to the impact of the financial reform policies and the introduction of the user fees in public facilities.(NHIF, 2006) The main objectives of the NHIF which known in Sudan as National Health Insurance Fund NHIF, were to secure and improve the quality and the accessibility of health services, to gradually expand the coverage for all population to achieve WHO "health for all" initiative and equitable access and to raise revenues for health services in the Sudan. The observatory adds that all public employees and those who are working in the formal sector are entitled compulsory to insurance with adoption of voluntary enrollment policy for the informal sector.(. WHO, 1981)

Since its implementations in the 1994 the NHIF is increasingly playing a major role in raising revenues for the health sector and improving the accessibility to

the healthcare through the expansion of the population and health services coverage. (NHIF, 2006).

However There are many eligibility and exclusion criteria, through which NHIF, regulates the enrollment and participation to avoid adverse selection and dropping out, Enrollment is family-based with specific criteria for whom the benefits of NHIF can be provided through participation of the head of the family, included family members are known as legal dependents, including the mother and father of the head of the family, the sons up to 18 years old and daughters until their marriage.

Hence the following eligibility criteria exist, (1) there is no individual enrollment, (2). The head of the family has no right sponsor male dependents after reaching 18 years old, upon which they considered as separate family, (but for those who continue their study in the universities can sponsored by National Student Support Fund), and (3). Daughters also not considered as legal dependent after getting married, in addition women who registered as head of the families cannot sponsor their husband unless they proved their disability. There is no exclusion for pre-existing health conditions.(NHIF, 2006).

1.3. Interventions and efforts towards universal coverage in the Sudan

The population coverage started by 3% in 1995 and progressively increasing to approach 35%of total population of Sudan, in 2008, most of which in the formal sector, by this approach and as the insurance is family based, the dependents of the client can be enrolled spontaneously, the dependents are father, mother, wife and sons up to 18 years old and daughters till get marriage (Abualbishr, 2009). On the other hand regarding the health insurance in Northern State of Sudan where the total number of population nearly, 700,000, the coverage remain low in the Northern State, which is 45% for both (formal and informal sector), where the proportion of the informal sector is very low from this percentage which is only 3.5%(NHIF., 2008). Tremendous efforts are now directed towards the coverage of the other sectors in the society and strategic plan has been set targeting universal coverage and aiming to enroll 80% of the population by the year 2027 with 5% annual coverage stated in the annual plans. A variety of approaches and institutions have been involved to expand the coverage of the social health insurance, NHIF to include other dimensions of SHI, in addition to the compulsory formal sector. These include the initiatives for the coverage of pensioners through the Federal Ministry of Finance (FMF) and the Social

Security Fund (there was deduction from their salaries during their working in the government), the poor and the martyr families, sponsored through the Zakat[1] Chamber, the university students through the National Student Fund and the coverage of the informal sector including the farmers and the nomads through councils, unions and local committees through voluntary enrollment (NHIF, 2006)

1.4. Rationales for conducting this study

The urgent need to conduct this study developed from many point of views, one of which there are few of scientific studies and critical analyses of the SHI experience and its coverage expansion in Sudan, specially the Northern State. On the other hand, the obviously large and growing informal sector in most low income countries compared to the public sector, (formal sector) all over the world, (Giedon & Bitra, 2003)

In Sudan farmers represents almost 74% of the population, most of which are farmers and nomads. One of the serious problems is that the vast majority of the population (almost 70%) is not covered by health insurance in the Sudan (NHIF., 2008)

The poor outcome of some methods such as enrollment through (farmers unions and five family groups) and other methods that concern with group enrollment, to cover the informal sector is apparent in the low coverage of these groups within the last 10 years In addition to all mentioned efforts ineffective variable methods of premium collection from the insured informal sector, presence of health services established by NHIF in rural areas which poor people are unable to afford so Zakat chamber which considered as one of the most important governmental institution concerning with collecting money from rich and spend it to the poor, and ill people 1,500,000 in 2007, (Chamber, 2008), and access, and finally the existence of successful international experiences in achieving universal coverage and enrolling the informal sector and poor people all motivate this study.(Mohamed, 2007).

These findings in the literature suggest some of the factors which need to be critically analyzed to identify the constraints, drivers and opportunities for coverage

[1] (Zakat: definition is amount of money that every adult, mentally stable, free and financially able, Muslim male and female, is to pay to benefit the Poor, New converts to Islam, those in bondage or debt in services of Allah and those who administer and collect it.) . However Zakat Chamber, responsible for administration, collecting and distribution of this money. So many of the Poor people sponsored through this chamber and get health insurance card(Chamber, 2008)

expansion in the Northern State- Sudan, then all over Sudan, thereby highlighting possible directions for imminent research about the universal coverage of SHI in Sudan. The reviewed literature on developing countries highlight areas in which the few published papers on the experience of the Sudan on SHI lack the scientific and in-depth analysis especially in the area of the feasibility of universal coverage via SHI scheme in the country. Hence, an analysis of SHI in the Sudan needs to be conducted and combined with some abstracted lessons from the experiences of the developing countries in order to provide and share knowledge which can then be applied in order to expand the coverage to the poor and the disadvantaged populations. It is hoped that this could thereby enhance the equitable access to healthcare, within the Sudan.

1.5. Problem and significance

The main problems are those represent the current situation of the informal sector health insurance status in the Northern State, which can be summarized as the existence of the large number of the informal sector 74%, (non-mandated) compared with the already covered public sector (formal or mandated). There is a large gap between insured and noninsured individuals among the informal sector, and the coverage still is only (3.5%) in the informal sector. The poor outcome of most of the previous attempts, occurred in Sudan in general which has been done in many states (Gadarif, Gzeera, Kordofan and Red Sea states) during the last 10 years ago, and the last one in the Northern State in 2009, The premium for the family was 20 S D G = ($4USD), this premium for all the members of the family per month (the head of the family and his/her dependents) (NHIF, 2010b).

The outcome of this experience was very poor when evaluated after one year, although the coverage initially dramatically increased from about 38% to 71% in both sectors. But unfortunately after one year of evaluation there was a large number dropped out 30%, which represent the those families who were covered through an charity organization (Banged organization) in Marrawi locality, which enrolled about 32,000 families in NHIF, and also large number of adverse selection was noticed. So this problem really needs to be investigated to know, why poor out come and no desire for continued enrolment? And the coverage outcome of the attempts to enroll the informal sector is only 3.5% for this sector. It should be mentioned that it is about 41.5% for the formal sector, means that it is 45% of all population of the state, the formal sector which is mandated sector it is covered 100%. Also to reduce OOP,

because Health insurance is one of the important sources of health care finance, then more equity and accesses to health care facilities and finally Sharing the cost, pooling the risk and burden of the expensive health care services, across, rich\poor and well\ill, through large group participation (NHIF, 2010b).

1.6. Research Questions

This study will be conducted to know, what are the potential determinants of the desire to enroll, in the National Health Insurance Fund, among families in the informal sector in the Northern State of Sudan?

1.7. Research Objectives

1.7.1. General objectives

The objective of this research is to identify the potential determinants of the desire to enroll in the National Health Insurance Fund (NHIF), among the families in the informal sector in the Northern State of Sudan, aiming to increase health insurance coverage expansion.

1.7.2. Specifics objectives

The specific objectives of this study are:

- To draw lessons from the experiences made in other developing countries for informal sector enrollment in health insurance in order to achieve coverage expansion or universal coverage.
- To synthesize the previous attempts in Sudan to increase enrollment in NHIF.
- To identify association between potential explanatory variables and the desire to enroll in the NHIF in the Northern State of Sudan.
- To explore the expectations of the head of the families in the informal sector in the Northern State of Sudan towards the NHIF.

1.8. Hypotheses

The Hypotheses are as follows:

1. Families with access to health services are likely have more desire to enroll than those without access.

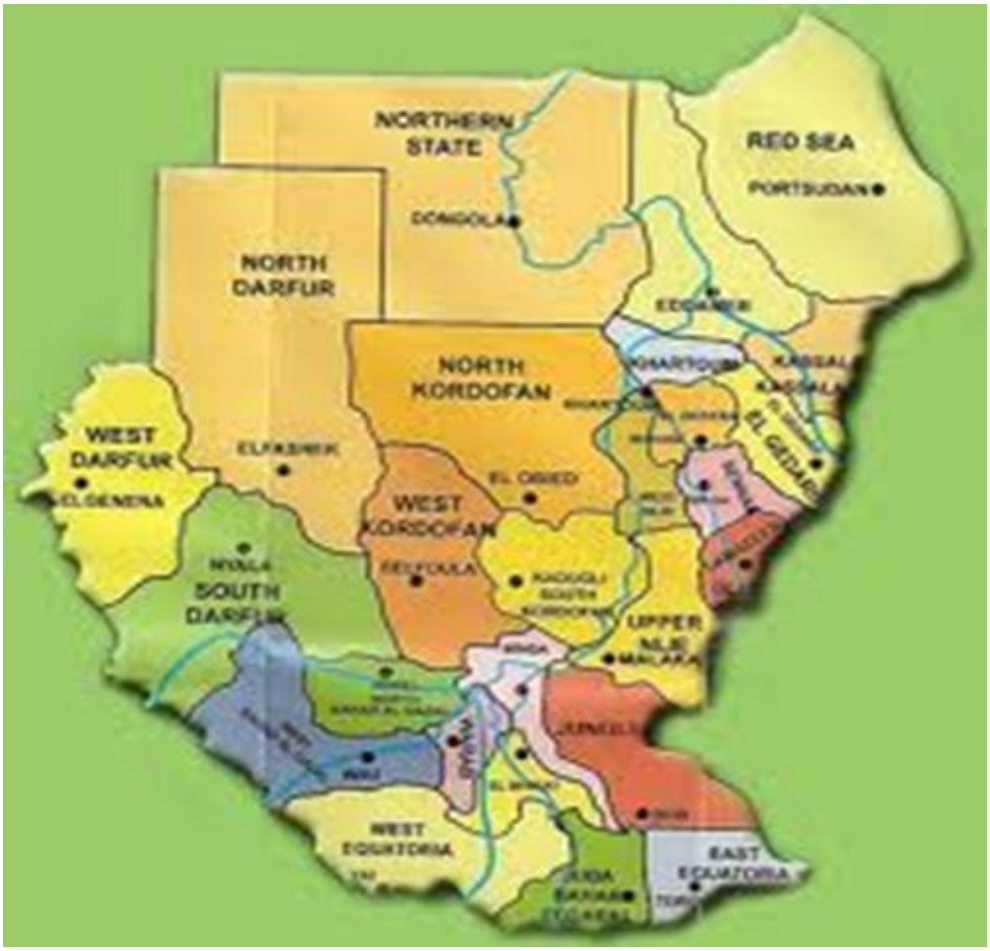
2. Head of the families who are more educated are likely have more desire to enroll than those less educated.

3. Families who have received health insurance awareness and education are likely have more desire to enroll than those have received none.

1.9. Scope

This study conducted to identify the potential determinants of the desire to enroll in the NHIF among families in the informal sector in the Northern State of Sudan by interviewing the head of the families who represents these families. Primary data were collected from 717 families in February and March 2013 from the 7 localities of the State which are Dongola, Alborgage, Dalgo, Halfa, Algoled, Aldaba and Marawee, as shown in Figure 1-1, which subdivide in to 21 subunits known as, Administrative Units, using a multistage sampling design.

Figure 1. 1 Sudan map before secession in 2010



Source: WWW. Worldmapfinder. Com/Map_Earth.php

CHAPTER II
BACKGROUND

2.1. Background

Sudan is one the developing countries in eastern Africa, its boundaries, from the North, Egypt and Libya, from the West, Chad, South Sudan from the South and the Red Sea and Ethiopia from the East. Its population nearly 31 million people 33.2% lives in urban while 8% are nomads, 59.8% rural area, the average household about 5 persons. The prolonged civil war is one the main causes that lead to poverty and diseases in the country, and affect wildly the health where the fund for chemotherapy , radiotherapy and renal dialysis account about 22% of total federal expenditure (EMRO, 2006).

The government exerts a great effort to counteract these shortages especially in health and education; one of the most important tools was health insurance implementation for the employees of the government in 1995. The idea for this program depend on deduction of small part from their salaries about 4% and then subsidies the premium with 6% to be 10% of the employee's salary to be paid as participation fee for health insurance(NHIF, 2010a).

The idea improve the health access and improve the health system but, not too much because it is only restricted to the formal sector, and the majority of population are in the informal sector (non-employee), so the enrolment of the informal sector become one of the urgent issues for the government. So many attempts are made to involve this sector, but the challenges were also too much. One of these challenges is that most of the informal sector is poor and the government is poorer to subsidies them(NHIF, 2010b).

2.2. Sudan Health Profile

There is a rapid change in Sudan health system that is because of change in demographics and disease pattern as well as the clear rising in health care costs. So to improve the health systems performance and outcome the WHO regional health system observatory for the Eastern Mediterranean (EM), to achieve better health and equal finance specially for this region, in Sudan during the civil war the revenues come from wounded tax used to treat the wounded soldiers and improve military infrastructures health facilities (EMRO, 2006). Unfortunately there are many challenges and constraints regarding the data availability, so that efforts have been

exerted to use the available data especially those from national source such as Ministries of, Health, Finance, Labor, and National Statistics reports.

In Sudan there is wide spread of poverty and there is a significant variation in it between the States, although Sudan is a very rich country regarding natural and human resources but socio-economic development and health indicators is still below expectations as shown in tables, 2.1 and 2.2.

Overall, health indicators comparable with those of Sub-Saharan Africa average, because of the prolonged conflicts between South Sudan, Darfur and North Sudan there is a significant urban and rural disparities, displacement and spreading of communicable as well as non-communicable diseases (EMRO, 2006).

Table 2. 1 Socio-cultural indicators

Indicator	1990	1995	2000	2004
Human Development Index:	N.A	0.379	0.453	0.505*
Literacy Total:	-	-	50%	-
Female Literacy:	-	-	49.2%	-
Women % of Workforce	-	-	-	-
Primary School enrollment	-	-	-	-
% Female Primary school pupils	-	-	-	-
%Urban Population	-	-	62%	54.3%

*Estimated from data for northern states (Source: Ministry of Finance)

Table 2. 2 Indicators of Health status

Indicator	1990	1995	2000	2004
Life Expectancy at Birth	54	55	55.5	55.5
HALE	-	-	-	
Infant Mortality Rate	69.9	-	68	-
Probability of dying before 5th birthday/1000	123.4	-	104	-
Maternal Mortality Rate	537	-	509	-
Percent Normal birth weight babies	85	-	69	-
Prevalence of stunting/wasting	33	-	-	-

(Source: Annual Statistical Report 2004, FMoH)

In 2003 health infrastructures about 6233 health facilities, but there is smaller primary health care network has been observed. Indicators shows, high rate of maternal and children mortality especially in the area where poor or no health facilities available, i.e. in rural areas. The main cause for mortality and morbidity among children were malnutrition, malaria, diarrhea and respiratory tract infection. On the other hand the main causes of maternal morbidity and mortality were malaria, malnutrition and pregnancy complications, and malaria is main cause of deaths among both adult and children, as shown in Table 2.3 and Table 2.4,(Mohamed, 2007)

Table 2. 3 Indicators of Health Status by Gender and Location

Indicator	Urban	Rural	Male	Female
Life Expectancy at Birth:	-	-	52.5	55.5
HALE:	-	-	47.2	49.9
Infant Mortality Rate:	67	68	73	62
Probability of dying before 5th birthday/1000:	101	105	108	99
Maternal Mortality Rate:	496	514	-	-
Percent Normal birth weight babies:	76	66	-	-
Prevalence of stunting/wasting:	-	-	-	-

Table 2. 4 Causes of Mortality/Morbidity

Rank	Mortality	Morbidity
1	Malaria	Malaria
2	Pneumonia	Acute upper respiratory tract infections
3	Septicemia	Diarrhea and gastroenteritis
4	Circulatory system	Dysentery
5	Malnutrition	Acute bronchitis
6	Diarrhea	Malnutrition
7	Dehydration	ANC
8	Anemia	pneumonia
9	Acute Renal Failure	Tonsillitis
10	Other heart diseases	Injuries and wounds

(Source: Annual Statistical Report 2004, FMoH)

2.3. . Health Delivery System

In Sudan there are three levels for providing health services which are primary health care, referral care from rural hospitals and tertiary teaching hospitals. On the other hand the military and police forces also provide health care for their employees as well as for civilian especially in emergency cases. In addition health insurance and AL Zakat chamber also play an important role in health services provision. Also the private sector which largely developed due to deterioration of the public sector plays an important rule and became one of the important providers in Sudan. So for these variation in providing health services there was deterioration on health services and large cost burden on both Federal Ministry of Health (FMOH) and the patients (FMOH, 2008).

This deterioration became more complicated due to weak capacity of health planners and policy makers. So there is an urgent need to reform and put it in place. Therefore the government exert efforts to provide the health services through the main public hospital at the all levels and through continuous training for the workers on all health facilities, soothe (FMOH) and (SMOH) states ministries of health after decentralization policy currently leading the financial and provision of health services aiming to continue facing these challenges of health services provision and financing (FMOH, 2008).

2.4. Health Insurance in Sudan's Northern State:

The Northern State is one of the big States in the country, the health insurance introduced since 1997. The executive directorate exists in the capital of the State, (Dongola).The state is subdivided into 7 localities, where the health insurance have directorate at each of these levels, (sectors directorates).The main job for most of its population is the agriculture and all of them live in groups along the River Nile in its both banks,(Table 2.5 below shows the distribution of population in the localities) .This State is one of the relatively better than the other state regarding the factors that can make the idea of implementation relatively possible, where no geographical barriers, security and politically stable and all people are residence and lives in groups. The health services provided through different providers such as Ministry of Health, NHIF, police and military forces. There are nearly 80 facilities through which the health services can be provided, which include all the level of facilities such as

health centers, rural hospitals, teaching hospitals, private hospitals and police and military hospitals (NHIF., 2011).

Table 2. 5 Distribution of the Population in the Northern State

Locality	Number of population
Dongola	150161
Marawe	157729
Halfa	23631
Aldaba	148545
Dalgo	42133
Alborgage	87319
Algled	79547
Total	699065

Source (NHIF, Northern State2009)

Health insurance (NHIF) in the State also consider as one of the main providers where provide the health services through its direct health centers of which there are 15. Also provide services through the public hospitals and health centers by purchasing services for its clients. There are no tertiary health care facilities in the Northern State, hence there are only four to five secondary level in which the number of specialist doctors range between three to seven, general practitioners between five to ten, while in the rural hospital there are only about two or three specialists doctor and maximum four general practitioners and only one to three general practitioners in each health center.

These are the main health facilities in the state in addition to small number of public health services where health services is provided at the level of medical assistant, which is about 10 health centers.

Table 2.6 shows the facilities through which NHIF in the Northern State provides health services to its clients

Table 2. 6 Health facilities in Sudan's Northern State

Locality	Public hospitals	Public health centers	NHIF health centers	total
Dongola	5	4	5	14
Maeawe	5	4	7	16
Aldaba	5	0	2	7
Halfa	2	1	0	3
Dalgo	3	0	0	3
Alborgage	3	2	0	5
Algoled	3	5	0	8
Total	26	16	14	56

Source: annual statistic report (NHIF), Northern State (2009).

Regarding coverage expansion started in 2009, when the NHIF, start to enroll whole informal sector in health insurance, so the first experience started in this state, and a higher committee had been lunched for this issue. All people of the state were informed and survey was done in two month for the entire informal sector. All families were registered and entered into the computers-system in each locality to facilitate the mechanism for enrollment through group participation as well as to be used for statistical record and report to follow up this sector. The response for registration was very good but regarding the participation and purchasing insurance card was very poor, where the majority of those people waiting to be sponsored through Zakat chamber or other charity organizations and majority of those who participates seem to be adverse selection[2],(NHIF., 2011).

[2] The is no evidence or study for the adverse selection in the Northern State.

CHAPTER III
LITERATURE REVIEW

The main aims of the literature review to explain the concepts of the health insurance, challenges and constraints, experiences of countries, similar studies and the factors affecting informal sector's participation. This chapter also provides basic information about SHI and universal coverage and underlines the policies and the approaches of universal coverage in developing countries.

3.1. Concept of Health Insurance

Health insurance is a system by which distribution of financial burden and risk pooling of health expenditures costs over time through pre-payment. It is also a risk pooling and financial protection system against unexpected, high costs illness. There for, health insurance concepts are those benefits of health services for insured individuals or groups, which can be provided by the government or companies on behalf of those individuals. So the main precondition for Voluntary Health Insurance, (VHI), which concerns with the informal sector, the targeted population should be large enough to obtain enough finance for that (Ron, 1990).

To achieve these concepts and goals especially the benefits of risk pooling some characteristic should be considered which are:

Including the government employees whom known as formal sector with, compulsory contribution to the risk pool (to include the rich and healthy), the scheme should be contain large number of people because the idea is depends on, more large number of people more risk pooling and financial sustainability for the scheme. (WHO, 2010).and there should be large number of people in the scheme also can be defined as the way realizing social justices that is because it based on co-operation between the rich and the poor, the well and the ill and the employers and employees (Ron, 1990).

3.2. Definitions

3.2.1. Social insurance

Seubert (2003) said that :(According to the World Health Organization, social health insurance (SHI) "is a form of financing and managing health care based on risk pooling. SHI pools both the health risks of the people on one hand, and the contributions of individuals, households, enterprises, and the government on the other." A more succinct definition is offered by Seubert in, (eHow, 2003), Economic,

Environmental and Social Statistics, which states that social insurance is a "scheme is one where the policy-holder is obliged or encouraged to insure by the intervention of a third party."), so health insurance considered as non for profit government agency (Seubert, 2003).

Carrin and James (2004); clarify that there are essentially two main health financing systems for achieving universal coverage. The first is the tax financed system, which draws its income from taxes and non-tax government revenues, and operates directly-managed healthcare facilities.

The second is the SHI scheme which is also called National Health Insurance SHI is an earmarked fund set up by the government with targeted explicit benefits especially to the poor, which are defined as, “anyone who cannot afford a daily consumption of US$ 1” in return for payments In principle it involves compulsory membership among population, so can achieve adequate health access with reasonable prices.(G. Carrin & James, 2004).

The funds are usually managed independently of the government, for example by Para states or regional boards, which work within a tight framework of regulations, Carrin et al, 2008 add that, typically, SHI is provided through a system of payroll contributions calculated as a percentage of income and normally split between employer and employee In addition, flat-rate contributions are commonly used for the unemployed, poor, and informal sector workers, defined as, “the workers with low and non-regular, no taxed incomes, insecure employment and self-employment without social security” (Carrin. G., 2008).

3.2.2. Universal coverage

Universal coverage is defined by, WHO as “access to preventive, curative and rehabilitative health interventions for all at an affordable cost, thereby achieving equity in access”. Carrin and James (2004) clarify that universal coverage is a crucial concept in SHI one which incorporates two different coverage dimensions: healthcare coverage and population coverage.(G. Carrin, and James,C, 2004)

3.2.3. The rationales for the universal coverage

Giedion and Bitran (2003) defined that the random nature of diseases and its unexpected consequences, the high costs of the advanced, new healthcare that is based on out-of pocket and the restriction of individual financial resources have all

contributed to the desire for universal coverage (Giedon & Bitra, 2003). Carrin et al (2008); add that the acute nature of the problems of poverty and inequity in access to and poor quality of healthcare in developing countries gives the priority of the urgent need for universal health insurance coverage.

Also, Carrin et al (2008) added, that universal coverage through SHI spreads the responsibility of healthcare financing among households and the private sector, through society-based sharing and risk pooling, rather than through an dependency on the government finance. In addition he report, low health service expenditure in developing countries, with 29 countries in Africa spending less than the US$34 per capita, the standard stated by the WHO, in 2005. This has resulted in the relatively high proportion of total expenditure on healthcare which is currently paid through out-of pocket payment such as 50% in Kenya, 47% in the United Republic of Tanzania and 45% in Ghana (Carrin. G., 2008)

The arrangements made for the expansion of coverage beyond the formal sector vary considerably among developing countries, contend that many countries start by creating a SHI for the formal sector and then expand the coverage at a later time, either through gradual enrollment within the single SHI scheme or through the adoption of multi-insurance schemes for different groups. In most of the cases, the introduction of a universal SHI scheme necessitates extra funding from sources rather than contributions, especially during the initial phase (Adam Wagstaff, 2009).

These sources may include a variable tax financed share or funds from the government or external donors to subsidize insurance program for the poor and low income groups (McIntyre, 2008) The informal sector in the Philippines, Colombia and Vietnam, contribute to the formal-sector SHI schemes with tax revenues, used to enroll those with insufficient means; in Thailand, civil servants join one scheme, formal sector workers join another, and the rest are covered by the taxpayer; China and Mexico have separate voluntary contributory schemes catering to the coverage of the rural population (Wagstaff, Lindelow, Jun, Ling, & Juncheng, 2009).

Additionally, in 2005, the Philippines launched the KaSAPI program, a Philippines health insurance initiative, which aims to provide universal coverage for informal sector workers, through microfinance agencies such as cooperatives, microfinance institutions, and rural banks ILO ASRO, 2006. Furthermore, Carrin et al (2008) affirm that Lesotho rapidly implemented SHI for the formally employed, with

a gradual extension to the rest of the population, of which 50% is exempted from having to pay, and that tax revenues are combined with the formal sector contributions to supplement the SHI funding (Carrin. G., 2008). The authors add that aiming at universal health coverage for its population; Rwanda has spearheaded the development of a number of schemes, such as the Medical Military Insurance and community based health insurance that together constitute its SHI system.

3.3. Challenges and constraints

The implementation of health insurance idea in the informal sector is one of the most important challenges all over the world in these days. All governments and decision makers are looking for the tools by which they can achieve this goal. The challenge of moving away from out-of –pocket (OOP) payment at the time of receiving health care services become very hard specially for the poor and low income uninsured people, so several countries of low and middle income implement some form of health insurance for informal sector people to improve accessibility to health services and prevent them from financial crises of diseases, in China 2003 health insurance was lunched to enroll the poor and other low income groups, the schemes increase the access to inpatient, outpatient but do not reduce out of pocket payment (Wagstaff et al., 2009)

Financial constraint is of the major barriers of access to health care for marginalized sections of society in many countries, Wagstaff (2009); Also it has been estimated that about 1,3 billion of the poor in the world which considers as a very high proportion have no access to health services that is simply because they cannot afford to pay at time when they need the health services , and most of those who use it they suffer financial hardship because they have to pay (A. Wagstaff, 2009).

The spend on health services also considered as a large proportion of the household income as mentioned that about 5% of Latin American household spend more than 40%of their non-subsistence income on medical care yearly. On the other hand in India those who pay for hospitalization costs around 4% fall into poverty due to the high costs of medical care. Many Low and Middle Income Countries, (LMICs) over these past decades, found that it is difficult maintain sufficient financing for health spending specially for low income and poor, so the policy makers have been recommending a range of suitable measures, including cash transfers, cost sharing arrangements and a Varity of health insurance schemes (WHO, 2012).

3.4. Countries experiences with increasing insurance coverage

Experience from countries with the similar health insurance can be used to see how they identify the factors which influence the household participation in order to increase the health insurance coverage.

One of the most important studies in Thailand in (1994-1995) by Supakankunti, in (Khon Kaen) province where the project of health insurance was a pilot project aiming to provide health insurance to un- insured in order to implement universal coverage. The targeted were the households in the rural areas, in which they grouped in to four categories: (card non purchasers 1993 to 1995, new card purchasers, continued card purchasers and those who had not purchased or dropout). There were also four types of questionnaires used in this survey which are :(one for the leaders in the villages and districts, targeted households, about attitude toward the program and cost data from health facilities). Also secondary data used which concerned with statistics records. The data collected include information about households' demographic and socio-economic status and other important information, using both qualitative and quantitative methods. There was 1005 households' response to the survey among those 495 household were non card purchase 9not purchase health card in the period between 1993 to 1995) and 510 were card purchase. The data analyzed to investigate the factors affecting the health cards purchasing, dropout and attitude of card users(Supakankunti, 2001a).

A logistic regression model used to identify the significant predictors of health cards purchasers, non-purchasers and continues purchasers. Because there were many changes in the program such as changes in the criteria of health card usage, type of the card, changes in price and the ways by which the program financially managed. So there were different in the characteristics between the new car purchase and health card non-purchase group, where those who were new card purchase, the result showed that old people, large family size, higher presence of illness, those, who have economic problems, lower income and lower education affect the health insurance card purchasing and only two of these are significant, namely, education level and the presence of illness. Then when the logistic model used there were five factors influence the card purchasing which were demographic and socioeconomic factors (education background, numbers of employed member on in the family, income of the

household per year, presence of illness and access to the health facilities),(Supakankunti, 2001b).

Another study, done by, Joses. M., et al (2005), when he mentioned that studies conducted in developed countries show that individual- and household- level characteristics' variables are important determinants of health insurance ownership, when use economic models for analysis. There is a dearth of such studies in sub-Saharan Africa which was aiming to examine the relationship between health insurance participation and the demographic, economic and educational characteristics of South African women. The analysis was based on the data collected from women, aged between 16 and 64 years in a cross-sectional national household sample derived from the South African Health Inequalities Survey (SANHIS). The study subjects consisted of 3,489. The outcome measure was the probability of a respondent's participation in health insurance and a logit model was used. The result of the study showed that coefficients of the covariates for area of residence, income, education, environment rating, age; smoking and marital statuses were positive, and all statistically significant at $p \leq 0.05$. Women who had more education, those who have high incomes and lived in urban area in the provinces and lives in permanent accommodations, had a higher desire to be insured rather than those who have the opposite characteristics (Kirigia et al., 2005).

In Philippines there is a good example for this experience, in which the national health insurance program, (NHIP) aims to find solution to health access specially among those who in the informal sector .the insurance coverage is about 79% of hall population, (formal sector and informal sector), most of those who already covered by this insurance belong to the formal sector, but the coverage among the informal sector remains low.

PhilHealth introduced in 2005 KaSAPI (KalusugangSigurado at Abot-Kaya PhilHealth insurance) this program was done to encourage the informal sector to participate in health insurance. This program (KaSAPI) created to correct the problems that occurred with the previous one, (Individually Paying Program (IPP)), in which the way to enroll this sector through organized group has achieved limited success, where only 19% of the 15.5 million of people in this sector were covered (GTZ factsheet). Also there was a high adverse selection due to the voluntary nature

of the program. So (KaSAPI) solves this problem by determining the minimum number of the people in the group in exchange for a discounted premium.

In 2007 the program working with 14 organizations with net result of 4.000 families enrolled in this program KaSAPI The important aim of this program that to achieve three goals, “triple- win:

The win for the members or Clients who can get health insurance card very easy and with no complication on payment mechanism, all the procedures through their organization or their company where they work, the win for the partner organizations when they achieves their social mission of pooling of unexpected illness risk and obtaining financial protection among their member and ensure a continuous working and proper productivity where there will be no absence of working, and the third win is for the program when it reach its mission of achieving increase in insurance coverage through group participation and sustainable financing for the program, through large continuous group participation among the informal workers (PhilHealth, 2006).

So to achieve these goals and to ensure a proper method to make it a successful experience, there were important steps used by philHealth to implement (KaSAPI). Firstly the selection of the partner’s intermediaries according to the nature of the partners’ interest and needs and know the acceptable level of the health status and the risk profile of the partners in these intermediaries. Also the promotion and advertising for any program is very important so the enrollment and participation among the client depend on how is the fitness of the relationship between the intermediary and the clients and also depend on the coverage package of the program that will be provided, where it should be clear and realizable to convince the clients to trust on the idea. On the other hand, the adequate knowledge, education and information among the targeted people about the project objectives and how can they benefits from its services are very important for its implementation because they need it to utilize the health insurance services appropriately and wisely so that the program can avoid many problems such as moral hazards and adverse selection (PhilHealth, 2006).

Also it seem that it is very important to make a good and easy system for enrolment and benefit provision for clients without complicated steps that by adapting the program system with clients system and to find solution to improve the facility to

make it easy for the members at anytime and anywhere, as well as easy mobile communication should be applied to ensure more connection and communication. However, it is important for all the clients to know that the enrollment is merely of all component of the package of the health program, the more complete benefit packages the more clients attraction, so the department of health system was involved in assuring that, and one of the important to extend the health insurance coverage in the informal sector it need devise an organizational and institutional mechanism to assist and manage these issues in a viable, effective and suitable ways to the informal sector economy conditions, KaSAPI, turned out to be successful and was replaced by I Group (PhilHealth, 2006).

Rebecca, Thornton, (2009) the premium of contribution and its collection is the one of the main problem for informal sector enrolment. In2007 Nicaragua the policymaker fined a way by which they can encourage the informal sector to enroll and to ensure their continuation also, this through a voluntary mechanism known as (Seguro Faculativo de Salud). Although it was for the informal sector but the cost and Coverage is similar to those in the formal sector. In this program the subscribers can pay a flat monthly fee for all the services without copayment at the time of receiving the services but for the first tow month of participation of the clients the premium for enrollment is relatively high and then decreased monthly in specific ratio for the subsequent months, this experience is very convenient for subscribers and can ensure their continuation (Thornton, 2010).

As the same as other developing countries access to health services is a challenge for most people in Senegal, specially the poor people who are more affected regarding their inability to counteract the high costs of health services. The policymakers and the researchers attention was attracted as it seemed that the community-based health insurance schemes target the poor more efficiently. An example of these schemes in rural Senegal explaining factors affecting the participation in these schemes, so using outcome of a household survey done for members and non-members, in which there were many factors interfering and affecting participation in health insurance scheme, the most important are of these factors were, socio-economic and demographic factors of the households . In that study Johannes Jutting (2003) mentioned that the study was aiming to collect information about households mainly in five aspects, which are: Socio-economic and

demographic information, impact of mutual, (Mutual health insurance organization) and where people participating or not?, health status and health care seeking behaviors, income, expenditure and consumption and evaluation of living condition.

So to conduct the survey there was two stages: stage (1) stratified sampling procedure where they selects, 4 villages out of 16 and stage (2) randomly select the interviewers' household and leaders of the villages.

After collecting the data the approach applied by Wenberger and Jutting (2001) was used to estimate the determinant of enrollment. In that approach the participation in local organization depend on rational choice of an individual weighting costs and benefits of the member ship. It assumes that the participation depends on the financial condition of the household where the higher income of the household the more participating in health insurance. On the other hand the characteristics of the household head that person who can make the decision to participate or not also were very important, these characteristics include, age, sex, education and health status of the household head, so they hypnotized that the younger households' heads are more participating than the older households. Also In those household head that are better educated were more participating than those less educated. addition to that the households characteristics' also influences the enrollment which are ethnic group, religion, health status as well as income, however those with bad health status were more participating in Mutual health organization (Jutting, 2003)

A study done in Gujarat by Gumber and Kulkarni in 2000 in India, there were many objectives to conduct the study which includes, reviewing of the existing health insurance schemes in India and some of developing countries regarding the efficacy and equity of these schemes also aiming to examine the households' heath seeking behavior, pattern of the morbidity and expectation for health insurance schemes especially for those covered by various types of schemes. One issue is that to estimate health insurance demand as well as to suggest easy and affordable health insurance plans especially for those in the informal sector.

The primary data was collected in 1999 for both rural and urban household, a random sample of 1200 households, involving 4 groups according to their insurance status, where they insured in three different schemes and the fourth group those who have no insurance they depend on out-of-pocket in receiving health services, which

used as control group for the study. The result of this study shows, regarding morbidity pattern in this current study the annual incidence around two episodes per capita and the morbidity of female was higher than that of the male and reaching the facilities and doctors is poor in rural than urban household. Regarding the expenditure on health services and treatment which includes the direct cost as in medical services and indirect cost such as transportation and losing income when absence from work as in case of during being co-patients, so the health expenditure and burden of health care was higher for those of the rural area than urban. On the other hand satisfaction among those who insured in different type of schemes it seem to be vary according to availability, quality and waiting time for receiving its services (Gumber, 2002b).

Regarding the demand for health insurance shows that desire to participate is greater among those of low income where they wish to be insured in each one of these schemes and some of non- insured in the urban area are willing to enroll in tow type of health insurance schemes which are called, (Jan Arogya and SEWA), that is because its low premium, they also expressed that their knowledge is limited about other scheme so the health insurance education is one of the important factors affecting the enrollment. When consider the expectation of the rural household from the new insurance schemes that increase the coverage package and the price was the most important for the urban households to increase the desire for enrollment. Willingness to pay for new schemes was greater among rural respondent in case if it increase the coverage package such as life coverage and accident coverage where they show than can pay annual premium of amount that higher 16% for additional services and the same expectation for those of the urban, So that the coverage package represent one of the most important factors that can affect the enrollment (Gumber, 2002a).

3.5. Effect of Socio-economic and demographic factors on desirability

The effects of these factors on people to get health insurance are clearly as in case that those of higher income more participating than those of lowers income (Hongviatana and Ssuphachit, 1999). That is because most of them have no ability to buy insurance. On the other hand the educational level and health education, influence because the people well know about the hazards and disadvantage when they have no health insurance card as well as their demand to high quality health services which becomes very expansive these days due to advance health services,

also the family size or the number of dependent on the head of the households make them more eager to get insurance. Farther more the age and gender also determine whether the people have a desire to get insurance or not that is why, because elderly and the young one believe that they less risk for illness (Hongvivatana, 1999).

Cohen et al (2005) review the demand factors in the experiences of Kenya, Tanzania and Uganda, and report that the respondents were, in principle, interested in health insurance coverage, and willing to raise and pay considerable contribution rates(Cohen, 2005). Similarly, when conducting and reviewing a variety of studies examining the desirability and willingness to participate in health insurance schemes of populations in India, Sodani (2001) concludes that there is a high willingness to join health insurance initiatives if these schemes are well designed and carefully managed to facilitate the enrollment procedure for the informal sector (Sodani, 2001). In addition Wagstaff (2009) assert that the desirability of the people to join the insurance scheme largely depends on the benefit packages and the quality of services provided where schemes that have a large package of benefits and more services with high quality are more expected to have large number of clients (Wagstaff et al., 2009).

3.6. The difficulties of collecting the insurance contributions

Wagstaff (2009) argues that SHI mechanisms for collecting the contributions from the poor and the informal sector are ineffective. He states that coverage of the poor provided by paying their contributions through general revenues has proved easier than enrolling them through government subsidies or collecting the contributions from the informal sector.

This finding is supported by Towse et al (2004), who state that Thailand, which is known as being strongly committed to universal health coverage, have enrolled most of the population through taxation and relies on SHI payroll contributions for only 12% of its population. The authors add that this explains why China appears to be on the verge of using tax revenues to finance a universal package of basic health services, and thorough taxation which seem to be a hidden and spontaneous tool to collect the premium from people without facing any difficulty regarding the payment mechanisms or timing of payment rather than completely relying on expanding the coverage via the rural SHI schemes (Wagstaff et al., 2009).

3.7. The presence of successful insurance experiences in the World

There are many successful international and regional health insurance experiences, Carrin and James (2004) emphasize that around 50% of the Industrialized Countries and 27 Developing Countries have succeeded in achieving total coverage expansion and equitable access to health services through definitive SHI mechanisms. The authors also state that other developing countries can benefit from such experiences to achieve universal population coverage, bearing in mind the variations in cultural and socio-economic contexts. Moreover, many low and middle income countries such as Costa Rica and the Republic of Korea have succeeded in covering their whole population in a shorter transition period, that is the time between the first law regarding SHI and the final law for implementing universal coverage being passed: the time being 20 and 26 years respectively, compared to western countries which took an average of 70 years to achieve universal coverage(G. Carrin & James, 2004).

3.8. Factors influence desire to enroll and dropout

3.8.1. Factors influence the desire to enroll in Health Insurance Scheme

There are many factors that can influence the desire of the people to get health insurance card as we see in the literature review above, most of these factors can be summarized in that, those people who have a health problem, large family dependents, high level of education, a good access to health services, high income were most likely to get health insurance than those of the opposite characteristics.

3.8.2. Factors cause Health Insurance clients to drop out

Dropping out is one of the problems of health insurance schemes, that is because some people participate as adverse selection which usually leads to high costs burdened by the insurance schemes more than the paid premium. Sometimes they stopped continuation due to dissatisfaction with health insurance services quality. In one study in Nigeria by Lammers in 2010 showed that there is strong evidence suggest that adverse selection and dropping out in health insurance schemes more commonly in those concerning with the informal sector which known as voluntary schemes. Most people buy health insurance just when they need health services and after become well they stop continuing participation, also mentioned that most people

drop out due to the rational that their health condition is well so no need to get insurance card (Lammers, 2010).

3.9. Expectations towards health insurance scheme

The judgment on health insurance schemes depend on the achievement of its goals and sustainability as well as its matching with the individuals and the community as whole, because it is very difficult to match a new schemes with the current characteristics of the community pattern, poverty and wealth, and the community cultures and religions. So it is very important to address these factors to ensure at maximum achievement of the objectives, corruption prevention, ensure equity and accessibility for health services

On the other hand Yemenis were interviewed (GTZ, EC opinion survey 2005) to see their expectation about health insurance, where some of them expressed that must do awareness about its benefits and packages, some mentioned that health insurance should deal with (food insurance) as they called it, that is to prevent poverty and malnutrition related diseases such as diarrheas, Tuberculosis, anemia and other type of disease related to poor nutrition, and about 54% addressed that health insurance should be mandatory (Schwefel, 2005).

Regarding the administration of the health insurance schemes some of the interviews expressed that it should be administered by the government not by unknown authorities to ensure the trust and credibility. Other individuals in the union workers mentioned that they should not pay premium contribution and the have to get benefits free also mentioned that they can accept only 2% deduction of their salaries and the employers must pay from 5-6% of the premium. The expectation among the medical professionals where understanding of health insurance is better, they need to rational the choice of providing health insurance services according to the standard of quality and efficiency and not based on the decisions makers and economists only (Schwefel, 2005).

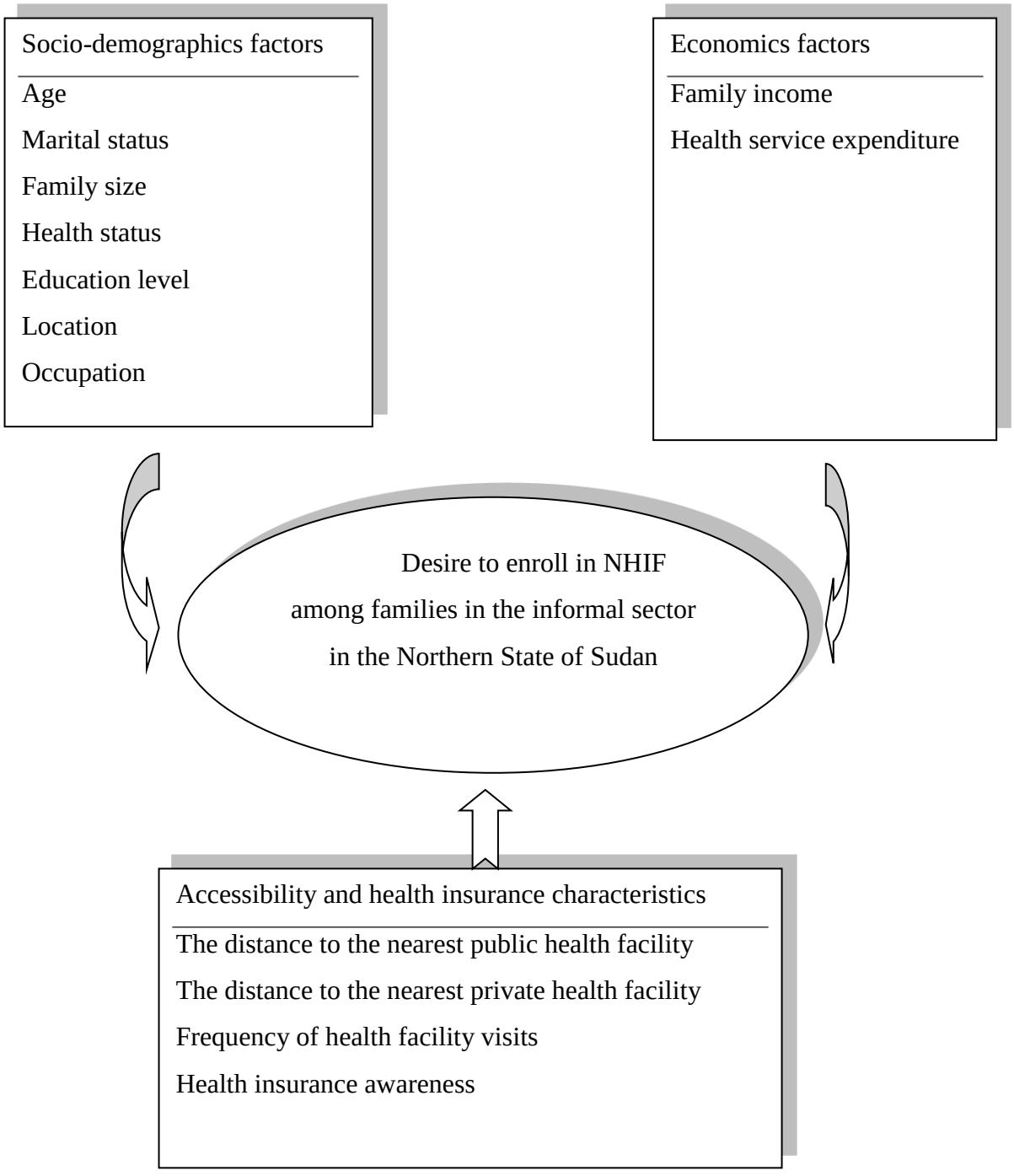
CHAPTER IV
CONCEPTUAL FRAMEWORK

In this study the main aim is to analysis the potential factors that can affect the desire of the head of the families among the informal sector to enroll in health insurance in the Northern State of Sudan, therefore affect the coverage expansion in this State as it explained in Figure 4.1 below. The head of the families in this sector were interviewed by using specific questionnaires prepared for this issue. The interviewers will be well trained team, of workers in the NHIF in the State. The target individuals are the head of the families in the State that is because the participation in NHIF by the head of the family and the benefits of health insurance card, for him and his dependents. The dependents according to the Act of the NHIF in Sudan are; the head of the family's wife or (wives), because Islam religion allows for the husband marriage up to four wives, the father and the mother of the head of the family, the sons till 18 years old and the daughters till get marriage. So that the average range of the families is five persons, as it calculated by the Statistic directorate of NHIF and becomes as the standard family size for the insurance families

The conceptual framework shows the relation between the dependent variable which is the desire of the informal sector to enroll in the NHIF in the Northern State of Sudan and demographic and socioeconomic characteristics' of the head of the families and dependents as well as the relation with the health insurance characteristics. On the other hand some of the variables that were used in the literature review, were not used here in the conceptual framework, such as gender of the head of the families, because most of the respondents are male and married, as well as social network effects (although this was investigated in appendix D). Also, family income per year is used instead of head of the family income per year, while family expenditure per month was not used because its mean was lower than the corresponding amount for family income.

Some questions regarding the head of the families' expectation not included in the model so the model include the variables which are explained in this Figure 4.1.

Figure 4. 1 Conceptual Framework



CHAPTER V
RESEARCH METHODOLOGY

This study is aiming to identify the potential determinants of the desire among the families of the informal sector for enrollment and participation in NHIF in the Northern State, Sudan.

This state is the one of the most suitable for this study because of the following reasons:

- Governmental and political support.
- One of the most stable states (politically and security).
- The low population number in the state in compare with the other state which helps in using it as a pilot for any program, about 699,065, Central Bureau of Statistics (CBS. 2008).
- The informal sector represents 74% of whole population.
- Low health insurance coverage, where the coverage is only, 4.5% in the informal sector. But the coverage is 100% in the formal sector which represent 41.0% of the total coverage of all population in the Northern State. So that the coverage is 45.5% in both (formal and informal sectors), and is for whole population in the Northern State of Sudan this data according to NHIF, 2012, but recently in 2013 new calculated data were released which leads to some mild changes in the coverage percentage for both formal and informal sectors , that is because, in the past the coverage calculated out of 80%, not 100% of whole population, and that is because 20% used to be for military and police force employees and their families

Now the new data are explained in details under the heading study population.

This study focuses on:

- The people live in groups along the River Nile (easy to reach), as shown in figure 5.1, where the red area represent the Northern State.
- There almost, the entire area is linked with paved roads and are no difficult geographical barriers.
- The existence and availability of reasonable health infrastructure facilities.

Figure 5. 1 Northern State in Sudan Map

Source: WWW. Worldmapfinder. Com/Map Earth. Php

There are 7 localities in this State which is divided in to 21 sub- units called executive units which are sub divided into small villages and areas.

Then using a multi-stage sampling method this sample will be distributed according to the weight of the non-insured families in the informal sector in each locality, as well as will be distributed to the lower units of the localities, (the administrate units and villages).(NHIF, 2012).

5.1. The Study Design

This is a cross-sectional study, using primary data from the informal sector of the Northern State of Sudan. The regression analysis of the data was conducted to investigate the factors that can affect the desire of the informal sector to enroll in the health insurance. The binary logistic regression model used to identify the significant predictors of desire to enroll in national health insurance.

$$ERD = f(AGE,,ED1,LO,FIN,OC1,OC2,MS1,FS,HFHS,FDHS,MDHS,MASF\ DSKM1,DSKM2,HSEX,AWR1,AWR2)$$

The following model is used:

ERD_i = 1 if $ERD^*_i > 0$ (if there is desire to enroll in NHIF)

0 if $ERD^*_i \leq 0$ (if no desire to enroll in NHIF)

And $ERD^*_i = x_i' \beta + \varepsilon_i$, where ERD^*_i is a latent variable

Then, the equation for the binary logistic model i:

$$ln\left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 AGE_i + \beta_2 ED1_i + \beta_3 FIN_i + \beta_4 OC1_i + \beta_5 OC2_i + \beta_6 MS1_i + \beta_7 FS_i + \beta_8 HFHS_i + \beta_9 FDHS_i + \beta_{10} MDHS_i + \beta_{11} MASF_i + \beta_{12} DSKM1_i + \beta_{13} DSKM2_i + \beta_{14} HSEX + \beta_{15} AWR1_i + \beta_{16} AWR2_i + \beta_{17} LO_i + \mathcal{E}_i$$

β_0 = constant term

$\beta_1 - \beta_{17}$ are the coefficients of the explanatory variables

Where;

Where P_i denotes the probability of having desire to enroll

The independent variables[3] are:

1. AGE: Age of the family head; years.

2. ED: Highest education completed of the head of the family; Dummy variable = 1 if secondary or university education completed and = 0 otherwise.

3. LO: Location (living area); Dummy variable = 1 if urban and = 0 if rural.

[3] the following characteristics are regarding the head of the family except the health status where the dependents are also included

4. FIN: family income; Amount per year in SDG.

5. OC: Occupation of the family head; where
OC1 Dummy variable = 1 if merchant, and = 0 otherwise.
OC2 Dummy variable = 1 if farmer, and = 0 (otherwise).

6. MS1: Marital status of the head of the family. Dummy variable = 1 if married, and = 0 otherwise.

7. FS: Family size; Numbers of the legal dependents.

8. HFHS: head of the family health status. (having any type of chronic illness, such as DM, HTN, CRF, Cancer, Psychotic disease or having a serious disease during the last three months); Dummy variable = 1 if well and = 0 otherwise.

9. FDHS: Female dependents' (mother, wife or daughters) health status (having any type of chronic illness, such as DM, HTN, CRF, Cancer, Psychotic disease or having a serious disease during the last three months);Dummy variable = 1 if well and = 0 otherwise.

10. MDHS: Male dependents' (father or sons), health status (having any type of chronic illness, such as DM, HTN, CRF, Cancer, Psychotic disease or having a serious disease during the last three months);Dummy variable = 1 if well and = 0 otherwise

11. MASF: Average number of medical advice seeking frequency during the last three month.

12. DSKm1: Distance from the head of the family's house to the private health facility in Km.

13. DSKm2: the distance from the head of the family's house to the public health facility in Km.

14. HSEX: Average family health services expenditure per month during the last three months, amount SDG.

15. AWR: Health insurance awareness of the head of the family, (does s/he know what are available packages, benefits, enrollment mechanisms and the monthly premium of the NHIF. Three conditions for the level of awareness are distinguished based on three themes, namely (1) (NHIF) package and benefits, (2) Insurance premium and (3) Enrollment mechanism: 1. If s/he knows and answers the above three items, then awareness is perfect; 2. 1f s/he knows one or two, awareness is average and 3. If s/he knows nothing, then awareness is poor. The following dummy variables are thus created

AWR 1, Dummy variable = 1 if perfect and = 0 otherwise.

AWR2, Dummy variable = 1 if average and = 0 otherwise.

Also expectation toward NHIF in the Northern State, regarding the preferable time for those want to participate, where some of them may prefer monthly payment because of their financial situation and some may see the best time for them each 6 month, specially the farmers where there is two agriculture seasons, considering that in the previous years the payment was only per year. On the other hand the enrollment mechanism was through groups where the minimum number of the group is 5 families with specific characteristics which include one or more of the following; (the families should be lives at the same area, work at same place or have family relation regarding emerging from one family roots). Also the impact of the satisfaction the insured people in the formal or informal sectors on those noninsured, regarding the benefits and availability of the services, if they encourage them to enroll or not, were elicited

Questions about willingness to pay, health and adverse selection were also asked. In addition, several additional questions were asked about families' financial status.

Alternatively, an ordered response logit model is estimated, where the dependent variable is the intensity of the desire of the head of the family in the informal sector to enroll in NHIF, (denoted by the intensity range from 1 to 5, where 1 indicates very weak desire and 5 very strong desire.

The latent model is $y_i^* = x_i' \beta + \varepsilon_i$ and

$y_i = 1$ if $y_i^* \leq 0$

$= 2$ if $0 < y_i^* \leq \gamma_2$

…

$= 5$ if $\gamma_4 \leq y_i^*$

The ordered response logit model uses the same explanatory variables as the binary choice model

The variable definitions are summarized in Table V-1.

Table 5. 1 Variables characteristics and indicators measurement

Variable	Indicator measurement
Age of the head of the family	Years
Occupation of the head of the family	Type of the job
Income of the family	Sudanese Pound(SDG)
Marital status of the head of the family	Married/single/others
Family size (head and his dependents)	Number of people
Health status (head and his dependents)	Well/ill
Location of the family	Urban/rural
Education level of the head of the family	Secondary/university or lower
Health insurance awareness	Perfect, average or poor
Accessibility to health facilities	Distance in Km
Health services expenditure/ month	Sudanese pound(SDG)

5.2. The study population

The study population is the informal sector of people in the Northern State-Sudan and the following are some data about this sector.

Total number of families = 175,770, so the total number of the formal sector (mandated): As families= 67,711, and covered (100 %.)

Total number of the targeted informal sector (voluntary): As families= 108,059, and covered 3, 4%. So the target here is the non-insured families of the informal sector (108,059), which will be considered as the (study population). The

table below: shows the number of the families in the informal sector in the 7 Localities and explain the coverage % in each out of the total No. of the families:

Table 5. 2 Coverage distribution per localities

Locality	Total No. of families	Covered families	informal sector families	Covered families in informal sector	Coverage % in informal sector
Dongola	37832	23872	14702	742	5.00%
Marawee	39238	15982	24741	1485	6.00%
Halfa	8621	5087	3534	0	0
Aldaba	37424	8786	28796	158	0.50%
Dalgo	10615	4148	6467	0	0
Alborgage	21999	7978	15261	1240	8.10%
Algoled	20041	5483	14558	0	0
Total	175770	71336	108059	3625	3.40%

Source: the annual statistic report NHIF Northern State 2012.

It is clear that there is variation in the number of people in the locality, actually this variation includes also the size of the locality and distribution of health facilities as well as its availability.

The table below shows the proportion of formal and informal sector families out of the whole State families, where its obviously the informal sector represents the large proportion, while the health insurance coverage is very low in this sector.

As mentioned the majority of people in the informal sector are farmers and they scatter in groups along the River Nile in small villages

Table 5. 3 Proportion of the informal sector out of whole population

Sector	Total families	Covered families	The %out of the total families of the State
Formal sector	67711	67711	38%
Informal sector	108059	3625	62%
Total N families	175770	71291	100%

Source: the annual statistic report (NHIF) Northern State 2012.

The majority of those people live in the rural areas where they practice their main jop as farmers, while some of them as merchants,

Table 5. 4 Percentages of Rural and Urban per Localities

Locality	Families total	Urban%	Rural%
Dongola	14702	35	65
Marawee	24741	18	82
Halfa	3534	52	48
Aldaba	28796	14	86
Dalgo	6467	3	97
Alborgage	15261	8	92
Algoled	14558	6	94
Total	108059		

Source: the annual Northern State 2012.

5.3. The study sample:

The study sample will be taken firstly the sample will be taken from the population of the informal sector which are 108,059 families then selected of 40 village out of 442 villages of the State then distribute the sample and the 40 villages[1] according to the weight of the informal sector families in each locality (the seven localities), secondly, distribute the sample according to the weight of each locality using stratified multistage method , after using this law for sample size estimation:

$$n = \frac{Nz^2\,Pq}{Nd^2 + z^2pq}$$

If we assume Z=2 (1.96 for the 95% level of reliability), then

$$n = \frac{N}{1 + Nd^2}$$

Where n=sample size

N=population size =108059

d=precision 0.05

z = reliability coefficient

p = proportion of the population that has a particular attribute

q = 1- p

So when calculated the sample size is:

$$\mathrm{n} = \frac{108059}{1+108059(0.0025)} = 399$$

As required by Technical and Ethical Review in the Northern State, n is then multiply as follows, (399×1.5×1.2)

Where 1.5 = Deff. (Design effect)

1.2 = non-response

N	Sample size
108059	717

Permission to conduct the survey obtained from the, (Technical & Ethical Review Committee), in Sudan is restricted to not more than 30 to 40 villages. The documentation can be found in the appendix

Table 5-5 shows the coverage % of the informal sector out of the total coverage of the State and the coverage % of the families in the informal sector out of the whole families in the informal sector:

Table 5. 5 The Coverage percent of the Informal Sector

covered families in the State	covered families in the informal sector	%of coverage informal sector out of total coverage	Total informal sector families	Coverage %of the informal sector out of the total of informal
71291	3625	5%	108059	3.40%

Source: annual statistic report NHIF Northern State 2012

Table 5-6 shows the No. of the targeted village in each locality according to the weight of the informal sector in each locality:

N.B: the weight in each locality calculated by dividing the number of the informal sector in each locality by the total number of the informal sector all over the State%.

Table 5. 6 No. of the targeted villages / localities

Locality	Total No. of the informal sector	The %of the weight in each locality	No. of the villages according to weight
Dongola	14702	14	.14*40=5.6=6
Marawee	24741	23	.23*40=9.2=9
Halfa	3534	3	.03*40=1.2=1
Aldaba	28796	27	.27*40=10.8=11
Dalgo	6467	6	.06*40=2.4=2
Alborgage	15261	14	.14*40=5.6=6
Algoled	14558	13	.13*40=5.2=5
Total	108059	100	40

The total No. of villages in each locality, the targeted No. of villages according to the weight, the interval of the selection (total No. of villages in the locality divided by the targeted No. of villages) and the selected figures which corresponding to specific villages name in the list of the villages in each locality,

where the first No mean the selected figure out of the interval then the rest of the villages chosen according to this figure plus the interval.

Table below shows systematic selection of village, from the list obtained from the Statistics Directorate of the Northern State, 2013.

Table 5. 7 Systematic Selection of The villages

Locality	Total No. of villages	Targeted number	Interval	Selected villages (No.)out of the list
Dongola	74	6	12	8,20,32,44,56,68
Marawee	123	9	13	10,23,36,49,62,75,88,101,114
Halfa	44	1	44	17
Aldaba	71	11	6	5,11,17,23,29,35,41,47,53,59,65
Dalgo	49	2	25	13,38
Alborgage	45	6	8	4,12,20,28,36,44
Algoled	36	5	7	4,11,18,25,32
Total	442	40		

The targeted number in the above table = the number of the villages in each locality which calculated according to the weight of the informal sector in each locality.

The interval = the total number of the villages divided by the targeted number of the villages, out of which the first number of the villages will be selected randomly then the rest of the villages follows the selected number +the interval.

Teams of 24 people who work for NHIF in these localities were selected carefully according to their good knowledge with all families in these area (some families in some tribes use an specific language, not Arabic language which called (Rutana), and living area near to the targeted villages.

That team had received well training about the main issue for this research as well as how they should do the interview for the respondents.

Then selection of the families out of each village will be as follow:

1. Starting with the house No. three in the informal sector of those who have no health insurance in each village.
2. Add the interval to the house No. three in each village and select the next targeted house of the families of the informal sector.

3. The house that where there is no available head of the family can be replaced by the next one.
4. The interview should be only with the head of the family.

The table below shows, the number of the targeted villages in each locality, the targeted number of families in each locality according to the weight and the distribution of the families equally in each village in the locality.

Table 5. 8 Target Sample in the localities

Locality	Targeted villages per locality	Targeted families per locality	Targeted families/village
Dongola	6	98	16
Marawee	9	164	18
Halfa	1	23	23
Aldaba	11	191	17
Dalgo	2	43	12
Alborgage	6	101	16
Algoled	5	97	19
Total	40	717	

5.4. The expected signs of the independent variables

The expected signs, are shown in Table V-9. Those have (+) signs expected to increase the desire to enrollment, those with (-) signs expected to reduce the desire for enrollment and those with mixed signs may affect the desire or may not

Table 5. 9 The expected signs of the coefficients

AGE	LO	ED1	HSEX	MASF
+	+	+	+	+
FIN	FS	OC1	OC2	MS1
+	+/-	+	−	+
HFHS	FDHS	MDHS	AWR1	AWR2
-	-	-	+	+
		DSKM1	DSKM2	

		+	–	

5.5. Possible benefits

The possible benefits from this study include, identifying the factors affecting the people desire to participate in (NHIF) in the Northern State of Sudan, so intervention can occur to manage those have negative effects on the families and restricting their participation as well as identifying the best mechanism for enrollment and premium collection for those families in the informal sector in this State and the other rest of the States in Sudan, and also can help policymakers and decision makers in proper decisions regarding coverage expansion in the informal sector.

CHAPTER VI
RESULT AND DISCUSSION

The result of the research, which will be mentioned in details on this chapter, is based on the objective and the methodology outlined in the previous chapters, in which the targeted population were the families of the informal sector of the Northern State of Sudan were interviewed using a sample of 717 families to represent the whole families in that sector.

The questionnaires that had been used to conduct this study was including many question about demographics and socioeconomics characteristics of these families in the informal sector in that State as well as some characteristics related to the NHIF in the Northern State of Sudan, to see the potential determinants of the desire to enroll in the NHIF among families in the informal sector.

The sample was distributed according to the weight of the informal sector families in the State, which composed of 7 locality (Dongola, Marawee, Hlfa, Dalgo, Alborgage, Algoled and Aldaba), and each locality composed of sub units called administrative units, the total number of these sub units is 21, which sub divided in to small villages and areas, the total of these villages is 442 villages.

A team of 24 person work at NHIF in the Northern State was included in this research; they were fully oriented and well trained about the interview of the families as well as the main issue for this study. The starting point time for the data collection was in 18th February when the permission for data collection was given and finished on 15th of March 2013 then the ethical consent issued in 28 of March 2013, when the data had been revised by the committee.

So this chapter will show the result of this survey as well as discussing some issues regarding the result using SPSS and Eview software programs.

6.1. Descriptive analysis

In this part the result shows some characteristics about the head of the families as well as the relation between these characteristics and the desire to enroll in (NHIF) in the Northern State.

Gender of the head of the families

The table below shows that the majority of the head of the families are male which represent 594, (82.8%) and the female are only 123, (17. 2%) out of the total number of the respondents. That is because the male responsible for the families even

if they were not working, that is for many reasons one of which cultures and traditions, those families with females head usually considered as special condition as either divorced or with dead husband.

Table 6. 1 Gender of the head of the families

Head of the families	Frequency	Percent
MALE	594	82.2
FEMALE	123	17.2
Total	717	100.0

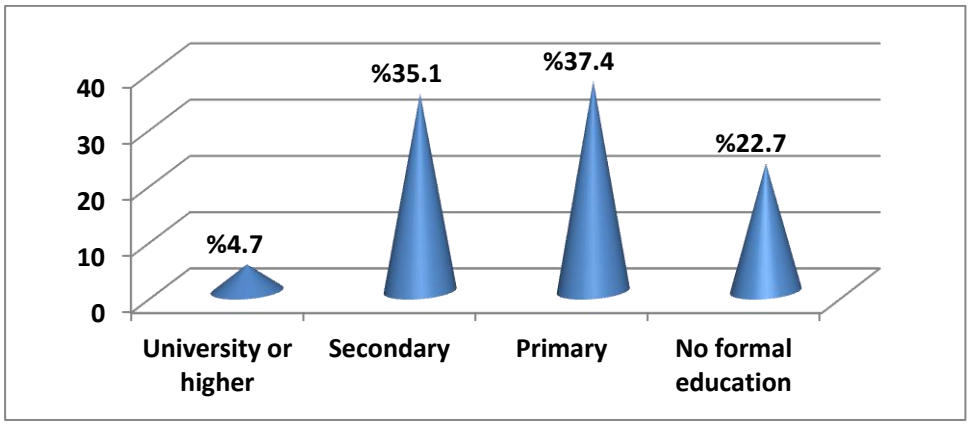
Head of the family's highest education level

The figure below shows and describes the education level of the respondents in this survey where it is obviously clear that most of the head of the families are primary school level which represent about 268 (37.4%) out of the total number, followed by those of secondary school level 35.1%.

Those who do not received any formal education 22.7% and lastly those who has university or higher represent the minimum respondent, only 4.7%, that is because the majority of this sector are merchants and farmers and those group usually didn't complete their education, and those who complete their education absolutely will be included in the public sector whom already have health insurance with the formal sector.

Those who have university or higher education in the informal sector, usually doesn't included in the public work, they have their own business

Figure 6. 1 Head of the families' highest education level



Location (living area of the families

The table shows the distribution of the families in the Northern State, it is clear that the majority of the people lives in the rural areas (83%), in groups in a narrow panel just, barreled to the River Nile in its both bank, because the rest of the State is a desert area in a distance of approximately (800Km) long. The urban people (17%), lives in the seven cities which represents the capital of the seven localities which it is small cities. This fact is one of the main characteristics that can describes not only the people in the Northern State , but can be generalized to all people in Sudan, already mentioned in the previous chapters.

Table 6. 2 Head of the families' location areas

	Frequency	Percent
rural	594	82.8
urban	123	17.2
Total	717	100.0

So the families in the rural areas represent 83% while the urban represent only 17% that means the majority of people in the Northern State lives in the rural area where they practice their main job which is the agriculture.

Head of the families' occupation

As it is clear in the table, below the majority of the head of the families practice the agriculture which describes as the main job for people 208 out of 717, about 29%, and it should be considered that those who practice other job also have farmers beside their other work. The merchants about 19.1% while others job which also include farmers plus another work represents 51.9%.

Table 6. 3 Head of the families occupations

	Frequency	Percent
Merchant	137	19.1
Farmer	208	29.0
Others	372	51.9
Total	717	100.0

Marital status of head of the families

The above table shows the situation of the marital status among the head of the families, where it is obviously that most of them are married 551out of the total respondents (76.8%), while only 78 (10.9%), were single and the rest distributed for those who can be divorced or ladies with a dead husbands, that because the age of married in the Northern State ranges between 18 to 30 years old.

Table 6. 4 Head of the families' marital status

	Frequency	Percent
Married	551	76.8
Single	78	10.9
Others	88	12.3
Total	717	100.0

Head of the family's' desire to enroll in the NHIF

Regarding the desire of the head of the families to enroll in (NHIF), the majority of the people explained that they have desire to get health insurance card, which it is very clear, 580 out of 717 have desire (80.9%) , while only 137 (19.1%) have no desire, that is because the majority of people are poor in this State and they suffers from high cost of health services even if the (NHIF) services quality were not good enough, they need at least to get insurance to help them even for the cost of simple diseases, while those of high income, who explained that have no desire , they prefer to visit the private health facilities as well as they explained they can offer to pay for private, because of its good quality services.

Table 6. 5 Head of the families desire to enroll

	Frequency	Percent
Have desire to enroll	580	80.9
Dose not have desire to enroll	137	19.1
Total	717	100.0

Some of those who have no desire to enroll also explained that there is no health facilities near to their living areas, so the spend a large amount of money if they want to get health insurance services which is equal to that can be paid for the private one.

This variation in the desire reflects some facts, the most important one is that the head of the families those who have high income prefer to use the private sector facilities, which known as (Private Clinics), for some reasons:

- They afford to pay for the private services.
- They preferred private because of its perceived good quality services.
- They don't need to wait in a long queue as in NHIF.
- Those families who are poor and have no desire, that is because there is no NHIF, health facilities nearby, so the same costs of transportation for them to these facilities can treat them in the private clinics.

Desire to enroll if the head of the families and/ or dependents were not sick

This table shows the desire of the head of the families to enroll in NHIF even if they were not ill or no one of their dependents were ill. So, it is obviously that the majority of the head of the families want to get health insurance card to protect their health in the future or to be able to get medical services if they become ill.

Table 6. 6 Desire to enroll if the head and/or dependents were not sick

	Frequency	Percent
YES	490	68.3
NO	227	31.7
Total	717	100.0

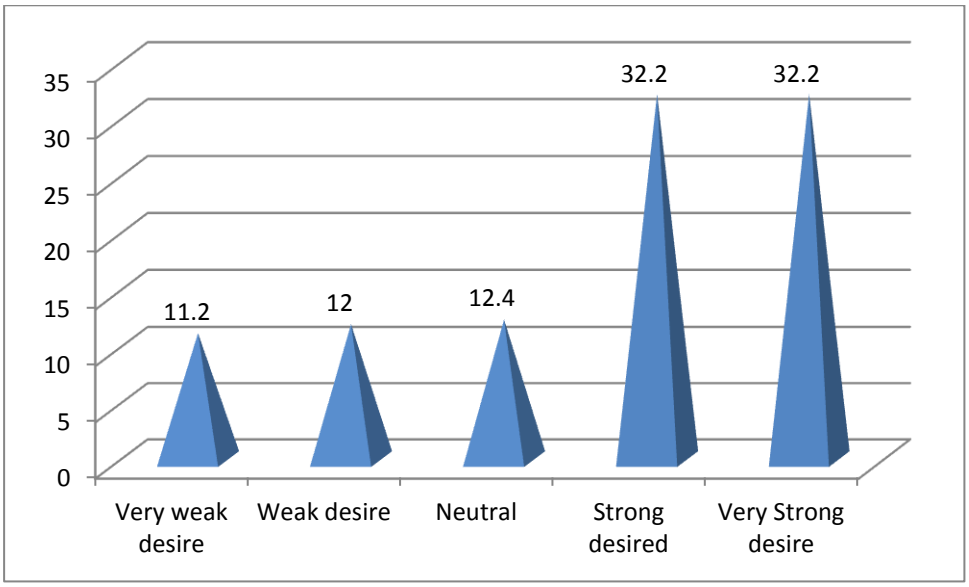
This question was asked to study the behavior of the families toward health insurance, to see if they only have desire when they are ill or if some of their dependent were ill or not? Also it has another dimension that to see the existence of adverse selection among these families. The result was 490 (68.3), out of 717 explained that they still have desire to enroll and that also may be due to their background about the advantages of the insurance

Intensity of desire of the head of the families

The intensity of the desire to enroll in the (NHIF), vary between very weak desire to very strong desire, most of the families have a very strong desire and strong desire to enroll where it represent 231 and 231 (32.2%), that mean the majority want to get insurance card. Only 89 of them have neutral desire which represent 12.4%. On

the other hand the rest of the families ranges between 80 to 86 (11.2 to 12.2%) have very weak and weak desire to enroll.

Figure 6. 2 Head of the families' intensity of desire to enroll



These variations in the desire may be related also to socioeconomics and demographics factors as well as some of the health insurance schemes characteristics, which will be discussed later in details in this chapter

The relation between the intensity and these factors will be analyzed by ordered choice model and will see how each of these factors can affect the desire.

Head of the family health status

Regarding head of the families health status it is obvious that those who are well represent 71.5% of the respondents and only 28.5%, said they have any type of chronic illness, such as (DM, HTN, CRF, Cancer, Psychotic disease) or having a serious disease during the last three months.

Table 6. 7 Head of the families' health status

	Frequency	Percent
Well	513	71.5
Ill	204	28.5
Total	717	100.0

But few of those interviewed families may not say the truth because they thought that if they talk about illness in their families they may lose the chance to get health insurance that is because they know that NHIF refuse to give health insurance for those need it only during illness and that is because of avoiding adverse selection.

On the other hand some families deny to say have illness in their families for social or cultural reasons.

The female dependents health status

The above table shows the health status of the females dependents in the families (mothers, wives and un married daughters), as well as the male dependents health status (fathers, and sons less than 18 years old), whom considered as dependents on the head of the families according to the (NHIF), law, which called (Insurance Family), where they can benefit by the head of the family participation

Table 6. 8 Female dependents health status

	Frequency	Percent
Well	501	69.9
Ill	216	30.1
Total	717	100.0

The male dependents health status

Health status among males 76.4% well, is better than those of the female 69.9%well, that is because the male dependents only to the age 18 years old, then can be considered as a new family while the female can take longer time till they get marriage, so they may be more exposed to illness during that time of prolonged dependency as well as may be due to other reasons such as Gender imbalances, and may need farther investigations.

Table 6. 9 Male dependents health status

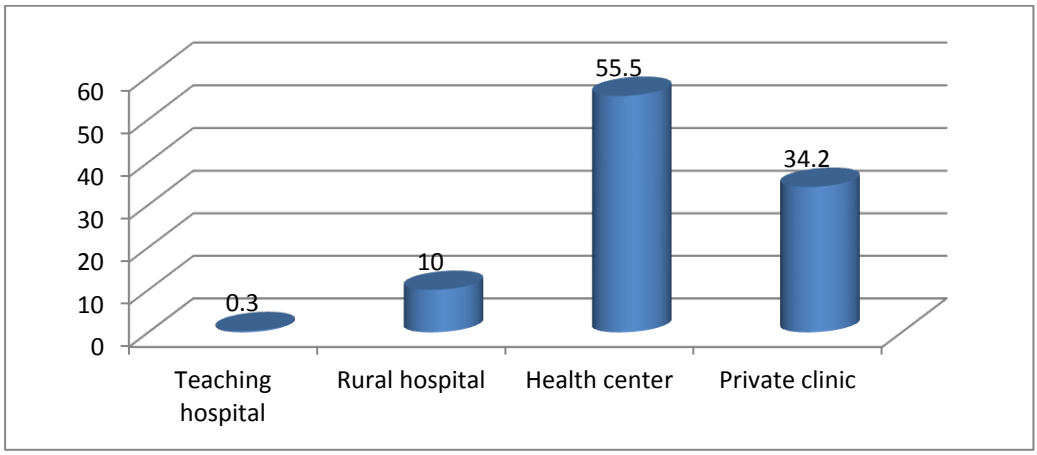
	Frequency	Percent
Well	548	76.4
Ill	169	23.6
Total	717	100.0

Types of the health facilities

The figures, shows it is clear that the majority of families seek medical services in the health centers, (55.5%), and that is clearly explains the distribution of

the families is more in the rural areas where the majority of health facilities are health centers, than the urban areas where the other type of health facilities in which the head of the family and his dependents used to visit during the last three months are more available.

Figure 6. 3 Types of health facilities



. The percentage of teaching hospital is very small that is because there are on mainly less than five teaching hospital all over the State, and they found only in two big cities, (Dongola) the capital of the State and (Marawee), the second city in the State, while the rest of the health facilities varies from health centers to rural hospital, as well as availability of the private clinics where it is distributed in the capital cities of the locality.

On the other hand visiting of health centers explains the less severity of the diseases among these families because as the much the disease was sever the patient enforced to visit a teaching or at least rural hospital where he can be admitted and receive more health care, because even most of the private clinics has no wards for admission it just works as outpatient and not for long stay and most of those medical personnel who works in these private clinics are mainly works in the public hospitals.

Although some people explained that they have no high income, but they use to visit the private clinics (34.2%), which it costly for them but they have no choice. The reason they explained is that the majority of the specialist doctors are not available in the hospital even during the day time, where they have to be in the hospital and they want to receive the best consultation which can be achieved only

from the consultants as well as they lives far away from the cities and they don't want to waste their time, so they prefers visit private clinics rather than teaching or rural hospitals.

Table 6. 10 willingness to pay the premium

	Frequency	Percent
YES	57	7.9
NO	660	92.1
Total	717	100.0

Head of the families Health Insurance Awareness

Regarding health insurance awareness which considered as one of the most important factors that can lead people to buy health insurance card, that because, through this awareness they can know the health insurance packages and benefits which can be provided by the insurance schemes as well as can teach them how can they enroll and where they receives the health insurance services.

Table 6. 11 Head of the families' awareness level

	Frequency	Percent
perfect	128	17.9
average	258	36.0
poor	331	46.2
Total	717	100.0

So the question for this awareness was very important to know for how much the people in the Northern State aware about the NHIF in this State as well as to know is the lack of this awareness contributing and causing their staying away and limiting their participation or not. Questions were asked about their knowledge about health insurance benefits, packages, the premium and the mechanism of enrollment.

Three conditions for the level of awareness are distinguished: 1. If the respondent knows and answers the above three items, then awareness is perfect; 2. 1f the respondent knows one or two out of three, awareness is average and 3. If the respondent knows nothing, then awareness is poor. So in the result it is clear that the majority of the respondents, 331 out of 717, which represent 46.2% exhibit poor

awareness about the NHIF, 258 (36%), are average and those who have perfect knowledge only128(17.9).

This result absolutely shows how much the desire to enroll in NHIF have been affected by the level of awareness the importance of health insurance awareness among the people, where the perfect level can increase the desire to enroll and increase coverage expansion. Additional questions were asked about expectations towards health insurance, willingness to pay for health insurance, health and adverse selection and families' financial status.

Head of the families' willingness to pay the premium

Although some families spend more than the premium of the NHIF ,in the health services but they don't have willingness to pay the low premium, which equal to 30 SDG, where about (92.1%), where some of them explained that they cannot afford it while others see that it is too much for the current health insurance coverage as they heard from those who have health insurance whom says, there are many of the services out of the packages as well as no available health insurance facilities nearby to them, some of them said that because they are waiting to be covered by Zakat chamber.

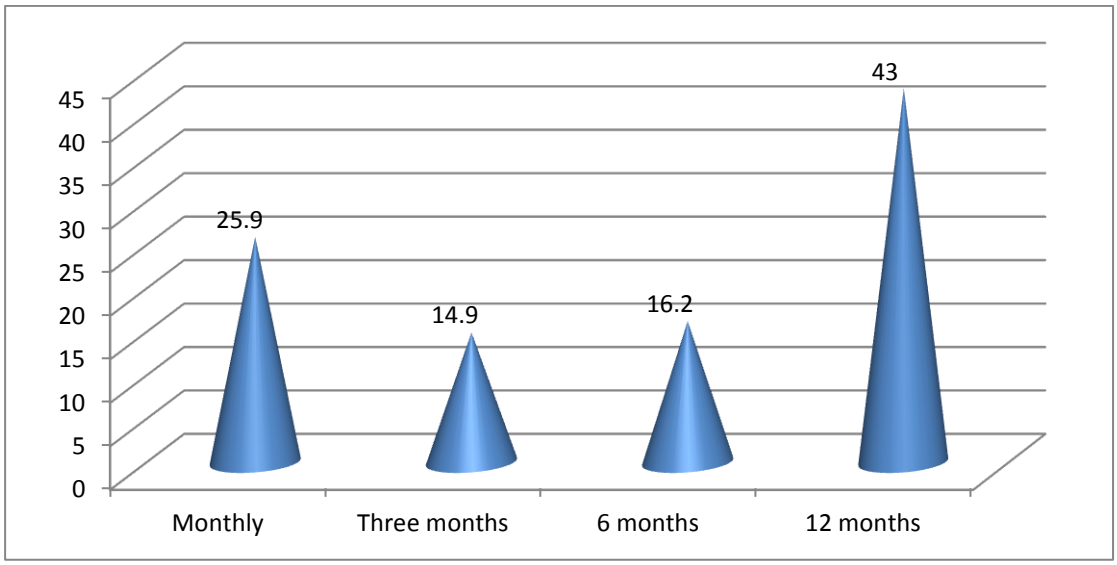
Table 6. 12 Willingness to pay the premium

	Frequency	Percent
YES	57	7.9
NO	660	92.1
Total	717	100.0

The preferable time for premium payment

Figure 6.4 shows the preferable time for the head of the families for premium payment and that is according to their financial situation which linked with many factors. As known the majority of the head of the families in the State works as farmers, where their income is depend on the yearly product of their agricultural seasons especially the season of the date trees where the Northern State is the famous State in the Sudan regarding this product

Figure 6. 4 Preferable time for premium payment



So the majority of the head of the families prefers to pay the premium once per year which is very suitable to their annually income. They explained that by the high numbers of the respondent that represent 43% (308 respondents), out of the total number of the respondents 717, while those who prefer to pay monthly, it can be justified by those who work in the free sectors or free work as merchant or other jobs and they explained that it is better for them to pay monthly and they represent about 25.9%. while those who prefer to pay every 6 months also can be due to the existence of two seasons in the agriculture and it is better for them to pay each 6 month according to these seasons which known as summer and winter seasons and they represent 16.2% and lastly those who see it is better for them to pay each three month may be due to their income which can be restrict them for doing so and they are about 14.9%.

So these variation in the preference for the period of the premium payment should be considered because each sector of those different sectors has its special financial situation limiting them to pay the fixed time approved by NHIF which is the annually contribution collection .

The preferable enrollment mechanism

Regarding the enrollment mechanism in the NHUF it is also considered as one of the main barrier for families to participate in the scheme, that because the law of

the NHIF not allows for the individually enrollment and that is because it mainly depend on the group and large numbers participation which can includes ill and well and rich and poor to achieve the objectives of risk pooling and to avoid the adverse selection which against the main idea of the health insurance schemes anywhere.

Table 6. 13 Preferable enrollment mechanism

	Frequency	Percent
Individually	335	46.7
Groups	382	53.3
Total	717	100.0

The current mechanism for enrollment in the NHIF depend on the enrollment through group participation for all families of the informal sector through their union (farmers, merchants and others), or micro organization and villages or even by the community committees in the villages or cities.

Lastly to make it more easy the NHIF approved enrollment through the lower numbers of five families , those who have a relation each other's such as working in the same place or living in the same area or have a family relationship (from the same family roots).

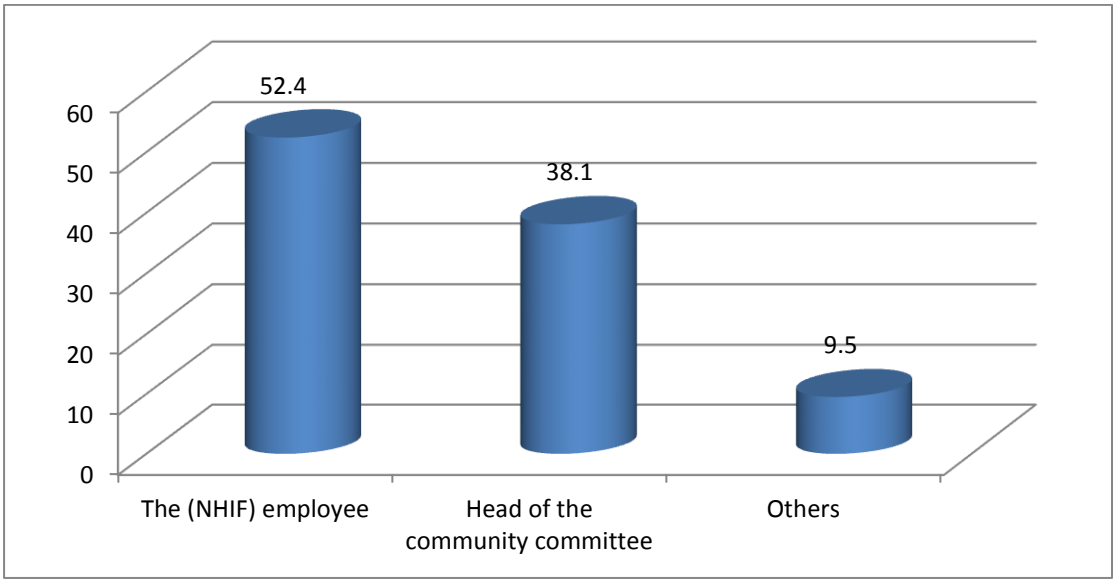
But also all these attempts to make the enrollment easier doesn't not achieved the targeted issue to enroll those sectors, rather than increase the adverse selection.

The result showed mild different regarding their preference for group or individually enrollment where there were 53% prefer the enrollment through groups and 47% said individual. It should be mentioned that individual enrollment was approved in this month (March 2013 by the Higher Committee of the NHIF in Sudan, aiming to facilitate the enrollment individually but with some restriction and rules.

The preferable person for premium collection

It is very important to get the suitable person to work as intermediary between the NHIF and the families, that is because, the communication between the government agencies and organization seem to be difficult for some people specially those who have special customs and traditions or languages which is obviously clear in the Northern State and Sudan generally.

Figure 6. 5 The preferable person for premium collection



So some families prefer enrollment through the known persons in the villages who known as Omda or Shakh, and some prefer the leaders in their community rather than the organization employees, but the result shows that the majority prefer the NHIF employees (52.4%), that is because the majority of those employees from the same villages where these families lives, so no problem for them to enroll and pay their contribution for those employees, and some of them prefer the head of the community committee in their villages (38.1%), because they think that they can trust more on them and they can be available for them at any time, while few of them prefer other people such as the doctors in the hospital where they use to visit while others prefer the contribution through the head of their unions.

The impact of words of mouth of insured on non-insured families

One of the most important things that can affect the desire of enrollment among the families in the informal sector is the reported satisfaction with health insurance of those people in the formal sector who have already health insurance card (mandated sector), through the advertising for health insurance services either positive or negative advertising, which can affect strongly the desire for enrollment.

That because if the insured families are not satisfied from the NHIF services, they will discourage those who have no health insurance and restrict their desire for participation and the opposite when they are satisfied by the packages and benefits of the health insurance and absolutely they will encourage them to enroll.

The result shows that they are well satisfied and 481(67%), out of 717 explained that they had been encouraged to enroll in NHIF.

Table 6. 14 The impact of insured on none-insured head of the families

	Frequency	Percent
Encouraged	481	67.1
Discouraged	236	32.9
Total	717	100.0

Head of the family's' desire to enroll and type of health facilities they used to visit

The relation between the head of the families desire to enroll in NHIF the type of the health facilities they use to visit and seek medical advice especially if it provide health insurance services is very important, because some health facilities even it is nearby to the living areas of the families doesn't provide NHIF services, so it have no value for those who have insurance cards.

Table 6. 15 Head of the families desire * Type of health facility visited

		Teaching hospital	Rural hospital	Health center	Private clinic	Total
Dose not have desire to enroll	Count	2	6	80	49	137
	%	1.5%	4.4%	58.4%	35.8%	100.0 %
Has desire to enroll	Count	0	66	318	196	580
	%	.0%	11.4%	54.8%	33.8%	100.0 %
Total	Count	2	72	398	245	717
	% within Head of the family's' desire to enroll in the NHIF	.3%	10.0%	55.5%	34.2%	100.0 %

Chi-Square Tests

		Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square		4.280(b)	1	.039

On the other hand the type of health facility also is very important that is because of the type of the services, level of the services and the quality as well as the availability of the medical personnel who works in each level of these health facilities.

Usually at the health centers level the services provided mainly at the level of primary health care and dealing with less complicated cases, the medical personnel who provide the health services is either medical assistant or general practitioner. The majority of health facilities in the Northern State are health centers, that is because people lives in small groups in the villages which spreads along the River Nile in a narrow band, so it is difficult for the government to cover and provide all these villages with hospitals.

So the result shows that the number of those who have desire to enroll and they used to visit health centers 318, (54.8%) out of 580 whom have desire to enroll , while those who have no desire to enroll and use to visit health centers are 80 respondents, (58.4%), out of 137 those whom have no desire to enroll. On the other hand the number of both families who have desire to enroll and those who have no desire to enroll, who used to visit health centers is 398 out of 717 with percentage of 55.5%, there for those who need to get health insurance, because the level of health services in the majority of these health centers is limited and some of them cannot afforded the costs of medical services, while the health insurance can achieve for them all their requirements, that is because the services is free , the patients pay only 25% of the medicine fee.

The private sector in the State is not real private sector as it known in the health sector, that is because there is no large number of private hospitals or specialized centers, it is just small clinics work at the level of outpatient and then the patients are referred if there is need, to admit the patients, they send him to the nearest public hospital for farther follow up where the consultant actually works.

Although the private clinics services usually known more expensive than the public sectors, but people prefer to visit it because of perceived good quality and serving of time and the specialist doctors usually are not available in the hospital even during duty time, it should be mentioned that the government know that they works during the day time but they give permission for them because the majority of patient come from outside the cities and the transportation mainly during the day time as well as to encourage them to work in these rural States, to support them financially, as well

as the patients use it just for the starting of treatment and then they continue their medication if they had been admitted in the public hospital, so they pay only fee for visit fee.

The number of those have desire to enroll and use to visit the private clinics is 196, (33.8%) out of 580 while those who have no desire only 49, (35.8) out of 137 respondents and the total number of those who use the private clinics is 245, (34.2%), out of the total number of the 717 respondents. So the majority have may desire to enroll because the visit is free in NHIF and this services is available for those who have insurance cards.

On the other hand the availability of rural hospital only on these areas where people lives in a large group especially in the cities and big villages. Most of the medical services in these hospitals provided by general practitioners as single doctor in the hospital, while in some of these hospital, one or two specialist doctors can be available, usually those for obstetrics and gynecology and internal medicine departments.

So it seem to be the third choice for the majority of people who visit these hospital, where 66, (11.4%), respondents out of 580, those who have desire and visit these hospital and only 6, (4.4%), respondent use to visit it and use to pay out of pocket for all health services there for they are eager to get health insurance because the majority of them are of low socio-economic status, as explained most of them. The total number of those who use to visit these hospital including those who have desire and those who have no desire only 72, (10%), out of the total respondents, (717). Also it should be mentioned that some of them explained they can go to a different hospital rather than to get services even the hospital they choice is more far than the nearest one for them because they trust in the doctor of that hospital.

Teaching hospital are very few, it is about 5 hospital all over the State, and mainly used by those people who lives near to them or those who referred for farther management, because the majority of people lives in rural areas, so only 2, (1.5%), of those who have no desire used to visit it while no one of those who have desire used to visit it, that is may be the availability of private clinics in these cities and most of these clinics near to these hospital , so even the people of these cities prefer to visit the private clinics for the same reasons mentioned before.

Head of the family's' desire to enroll in the NHIF * Health insurance awareness

Health insurance awareness is one of the more important potential determinants of the desire to enroll in health insurance, that is because as much as these families has a good knowledge and awareness as much as their desire to enroll and participation increase. So the result shows that respondents who have desire to enroll , (580), are more than those who have no desire , (137), although the majority of those want to enroll have poor awareness, where they represents about 232, (40%), respondents out of 580, while 225 are average knowledge and only 123 are perfect.

Those who have no desire to enroll 5 respondent have perfect awareness and only 33 of them have average awareness level while 99 respondents have poor level of awareness, this explains that although the majority have no perfect or average awareness but they have desire to get health insurance card and want to enroll in NHIF. It is clear from the result that the awareness among both families , those who have desire and those who have no desire to enroll is very poor, that is because only 128, (17.9 %) of out of the total respondents have perfect level of awareness, and only 258, (36.0%) , have average level while the majority are poor level, 331 (46.%)

Table 6. 16 Head of the families desire * insurance awareness

		Health insurance awareness			
		perfect	average	poor	Total
Dose not have desire to enroll	Count	5	33	99	137
	%	3.6%	24.1%	72.3%	100.0%
Has desire to enroll	Count	123	225	232	580
	%	21.2%	38.8%	40.0%	100.0%
Total	Count	128	258	331	717
	%	17.9%	36.0%	46.2%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	50.784(a)	2	.000

Head of the family's' desire to enroll in the NHIF * Head of the family health status

The relation between the health status and the desire to enroll in the health insurance is one of the more problems facing the insurance schemes, because the

majority of people ask for insurance only when they get illness, and this is one of the major crises which leads to high costs for the schemes, which known as adverse selection.

Table 6. 17 Head of the families desire to enroll* their health status

		Ill	Well	Total
Dose not have desire to enroll	Count	63	74	137
	% from row	46.0%	54.0%	100.0%
Has desire to enroll	Count	141	439	580
	% from row	24.3%	75.7%	100.0%
Total	Count	204	513	717
	% from row	28.5%	71.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.576(b)	1	.000

The result shows that the number of those who have no desire to enroll although they are ill, 63 respondents out of 137, which is 46.0% of this number, while those who have no desire and have no illness were 74,(54.0%), which may be explained by their ability to pay for private clinics, or they have no health facilities provide health insurance nearby to them, that is according to the justification of some of them.

On the other hand those who have desire to enroll and they complains of many health problems, want to get insurance because of the high medical services costs, where around 141 respondents were ill and 439 respondents were in a good health and they want to get insurance card that is because 128 of them have perfect awareness and 258 have average while those who have poor awareness 331, so the majority were aware and they know the health insurance benefits and just want to have insurance to prevent themselves as some of them explained. But generally the head of the family want to get health insurance to be insured against un expected illness, this is the main objective of the majority.

Head of the family's' desire to enroll in the NHIF * Female dependents health status

Regarding the female dependents health status, it is clear that the majority of the head of the families have desire to enroll because the responsibility of those dependents and the costs of their illness will affect his income , so he had to insure all the members of his family those who included as family dependents according to the

(NHIF)law. In the result the percentage of ill female as groups or gender, can be measured according to the percentage of the head of the families those who explained the existence of their illness in his family, but not including the number of ill females there for it is difficult to estimate the number of them per head, because they may include all female in the family or may be one or two of them.

Table 6. 18 Head of the families desire * Female health status

		Ill	Well	Total
Dose not have desire to enroll	Count	51	86	137
	%	37.2%	62.8%	100.0%
Has desire to enroll	Count	165	415	580
	%	28.4%	71.6%	100.0%
Total	Count	216	501	717
	%	30.1%	69.9%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.057(b)	1	.044

But generally 165 of the respondents have ill females in their families and 415 have no illness, out of 580 respondents and they explained their desire to get health insurance and want to enroll in NHIF on the other side those who have no desire to enroll 51 of them explained that they have ill female and 86, have no illness, out of 137 , respondent, which may indicate the less care of the head of the families for female dependents in this State.

Head of the family's' desire to enroll in the NHIF * Male dependents health status

The male dependents' health status also important for the head of the families and also affect their desire to enroll. Those who have desire to enroll in NHIF although their male dependents' health status was well represent the majority of the respondents, where 462 have desire and have no ill male dependent, which reflect their desire to enroll even they have no ill dependent, and may be they have perfect or average health insurance awareness.

Table 6. 19 Head of the families desire * Male health status

		Ill	Well	Total
Does not have desire to enroll	Count	51	86	137
	%	37.2%	62.8%	100.0%
Has desire to enroll	Count	118	462	580
	%	20.3%	79.7%	100.0%
Total	Count	169	548	717
	%	23.6%	76.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.532(b)	1	.000

Head of the family's' desire to enroll in the NHIF * Preferable time for premium payment

Regarding the preferable time for the head of the families to pay the premium and the relation of that with their desire to enroll, it is clear that the majority of those people prefer premium collection each 12 month and that is may be due to many reasons according to their explanation during the interview, where 308, (43.0%), out of both groups,(who have no desire (65), and those who have desire were (243), said it is better for them, because the majority are farmers and they use to count everything regarding their income annually, while those who prefer to pay the premium monthly come as the second choice for the majority, whom belong to merchants group and it is

better for them, so 186 respondents (25.9%), out of the total number, 41 out of them have no desire but they said that they prefer to pay monthly if they want to enroll, while 145 who have desire prefer to pay monthly.

Table 6. 20 Head of the families desire to enroll* Premium collection timing

		Monthly	Three months	6 months	12 months	Total
Dose not have desire to enroll	Count	41	14	17	65	137
	%	29.9%	10.2%	12.4%	47.4%	100.0%
Has desire to enroll	Count	145	93	99	243	580
	%	25.0%	16.0%	17.1%	41.9%	100.0%
Total	Count	186	107	116	308	717
	%	25.9%	14.9%	16.2%	43.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.831	3	.120

On the other hand some of those who have no desire also explained they prefer each 3month (10%), and 6 month,(12%), in case if they have desire to enroll, as well as the same explanation from those who have desire, they prefer each 3 month, (16%), or 6 month (17%), that is because there is also tow agricultural season per year in this State.

Head of the family's' desire to enroll in the NHIF * Preferable enrollment mechanism

The enrollment mechanism and the ways through which the clients can join the insurance schemes are very important that is because many of those who may have desire to enroll, especially in the informal sector, describe it as its main problem which restrict their participation, that is because the characteristics for these mechanism very difficult for the majority of those people.

In Sudan the enrollment is wither through deduction from salaries and that is only for the formal sector or through groups or micro organization and unions , that is

for the informal sector, and also through five families groups which have specific criteria

Table 6. 21 Head of the families desire to enroll* Enrollment mechanism

		Groups	Individually	Total
Dose not have desire to enroll	Count	81	56	137
	%	59.1%	40.9%	100.0%
Has desire to enroll	Count	301	279	580
	%	51.9%	48.1%	100.0%
Total	Count	382	335	717
	%	53.3%	46.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.326(b)	1	.127

The result shows that no large variation among families regarding participation mechanism, more over the majority of them prefer groups participation, but explained that it should be easy in terms of its rules, not be complicated for them, so 382 out of the total respondents number prefer groups enrollment while 335 prefer individually enrollment. Those who have no desire were, 81 respondent but they explained if they have to enroll they prefer it through groups, while 301 of those who have desire to enroll said the same idea.

Regarding those who prefers the individually enrollment, they represent about 46.7% among whom 56 respondent have no desire to enroll and 279, have desire to enroll. The majority explained that they have some type of health problems and they need the insurance as fast as possible so they prefer individually enrollment which is shorter time to get insurance card, but also they have no idea about the main issue for health insurance that is because they think they should have health insurance because they are ill and, and they are not oriented about the health insurance objectives or the problems of adverse selection.

Head of the family's' desire to enroll * Insured individuals' satisfaction

The table shows the relation between the number of respondent who explains that, the insured individual those who have already join the health insurance and the

desire to enroll, this relation also indirectly can measures the satisfaction of these insured families and their impact which can be positive or negative on the informal sector through their encouragement or discouragement for those in the informal sector.

Table 6. 22 Head of the families desire to enroll* Insured impact

		Discouraged	Encouraged	Total
Dose not have desire to enroll	Count	98	39	137
	%	71.5%	28.5%	100.0%
Has desire to enroll	Count	138	442	580
	%	23.8%	76.2%	100.0%
Total	Count	236	481	717
	%	32.9%	67.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	114.385(b)	1	.000

The total number for those who were encouraged to enroll in health insurance was 481 respondent, (67.1%), about 442, (76.2%), of those respondent they have desire to enroll while the rest 39 respondent have no desire to enroll in spite they have been encouraged to enroll and they explained that, if they enroll they will not find health insurance facilities near to them as well as the cost to seek for these services can be equal to that for out-of pocket.

While 236, (32.9%) respondents out of 717 were discouraged to enroll and in spite of that 138 have desire to enroll which represent (23.8%), of these families.

Table 6. 23 Abbreviations explanations

abbreviation	Original sentence
FEX	Family expenditure
HFD	Head of the family debt at present
HIN	Head of the family income per year
SP	Suggested premium for NHIF current services
SSC	Snuffing or smoking cost per month

Table 6. 24 Descriptions of the continuous variables

	AGE	DSKM1	DSKM2	FEX	FIN	FS
Mean	45.61549	19.42254	7.660282	654.2408	8057.31	4.761972
Median	45	15	3	500	7000	4
Maximum	90	81	505	9000	30500	12
Minimum	19	1	0	0	0	0
Std. Dev.	12.22936	17.30484	21.03298	627.2349	5482.389	11.33406
Observations	710	710	710	710	710	710

The table shows that in the mean age of people is 45 years old. The average distance from home to the nearest private health facility is 19.42 Kilometers (Km) and to the nearest public health facility is 7.66 Km. whereas the mean family expenditure per month was SDG 645.240, while the mean of the family income per year was SDG 8057. The difference between family income which calculated as the total income of the family per year and family expenditure which counted as the expenditure of the family per month, that family expenditure not includes some hidden items which the families used to get it from their own resources, such as milk, vegetables, and others , that is because the majority are farmers.

On the other hand the mean of the family size was 5 persons, the mean of the head of the family debt was SDG 591.5, while, it was about SDG 7198 for head of the family income. The mean of health services expenditure per month during the last three months was SDG 150.5, so the mean of medical advice seeking frequency per month during these last three months was 3 times.

The head of the family expenditure on smoking and snuffing was SDG 31.5 as on average although those families suggest only about SDG 19 per month, which is

equivalents to $4.29 USD as the mean of suggested premium, which represent $\frac{2}{3}$ of the current premium, when $ 1USD equivalents to 4.42 SDG.

Table 6. 25 Description of the continuous variables (continued)

	HFD	HIN	HSEX	MASF	SP	SSC
Mean	591.5634	7198.803	150.4169	2.98169	18.4493	31.55493
Median	0	6000	100	3	20	0
Maximum	15000	30500	1800	20	50	450
Minimum	0	0	0	0	0	0
Std. Dev.	1357.882	4866.184	182.8977	2.122072	9.966494	54.52613
Observations	710	710	710	710	710	710

Head of the family's desire to enroll* Family income per year

The table below shows the percentages of the families income and describes the relation with those who have no desire to enroll in NHIF and those who have desire, where it obviously that as family income increase the desire of the respondents decrease to enroll in NHIF, so the income was categorized into 5 categories according to the result of the mean and medium of the families incomes as it is clear in the above figure, where the maximum was SDG 20,000 ($4524.8USD) or more while the minimum was SDG 4999 ($1130.9 USD) or less per year..

Table 6. 26 Families' income per year

	[0 - 4999] Percent %	[5000 - 9999] Percent %	[10000 – 14999 Percent %]	[15000 - 19999] Percent %	≥ 20000 Percent %
No desire	35.77	35.04	16.79	8.76	3.65
Desire	32.35	36.7	17.22	9.22	4.52

There for those who have no desire to enroll and have high income represent 3.6%, while those who have the lowest income were 35.7%. On the other hand those who have desire to enroll and have the highest income were only 4.5% while those who have the middle and lowest income represent the majority, 32.3% and 36.7%.

Head of the family's desire to enroll*Distance to nearest private health facility

The table below shows the distance from the head of the families', home to the nearest private health facilities also commonly is very important for their desire to enroll which was grouped into 5 categories, according to the mean of the result where the nearest distance was 1 to 14.5 Km while the farthest was 60 Km or more, so for those families who have no desire to enroll the nearest distance was represented for 52.9%, while 0.7% was the farthest. So when the distance increase the desire to enroll increase as it was expected.

On the other hand the nearest distance for those who have desire was 43.5%, while 6.7% for those who live far from the facilities.

Table 6. 27 Distance in Km from home to the nearest private health facility

	[1 -14.5] Percent %	[15 - 29.5] Percent %	[30 - 44.5] Percent %	[45 - 59.5] Percent %	≥60 Percent %
No desire	52.9	27.54	13.77	5.07	0.72
desire	43.52	32.64	14.68	2.42	6.74

Head of the family's desire to enroll*Distance to nearest public health facility

The table below shows the distance from homes to the nearest public facility, where the distance also categorized into 5 according to the mean of the study's result, so, the distance was different from that of private facilities because of there were many public facilities compared with private facilities. So the nearest distance was between 0 to 4.5 Km, while the farthest was 35 Km or more.

Regarding those who have no desire and lives in the nearest areas were 59.4% while only 5% for those in the farthest areas. On the other hand those who have desire and lives in the nearest areas were 63.9%, while 2.5% lives in the farthest areas

So as the distance becomes far from the public facilities the families tend to be not insured while those who live near to the public facilities, the desire was increased.

Table 6. 28 Distance from home to the nearest public health facility

	[0 - 4.5] Percent %	[5 - 9.5] Percent %	[10 - 24.5] Percent %	[25 - 35.5] Percent %	≥35 Percent %
No desire	59.42	27.54	5.07	2.9	5.07
Desire	63.9	20.9	8.82	3.8	2.59

Cross tabulation desire to enroll and intensity of the desire to enroll

The table below shows the relation between desire to enroll which either = 1 if there is desire to enroll or zero if there is no desire and the intensity of the desire to which ranges between 1 if there is very weak desire and 5 if there was very strong desire to enroll in NHIF, among the family of the head of the family in the informal sector. So those who have no desire to enroll were 137 respondents while those who have desire were 580 respondents.

Table 6. 29 Desire to enroll and intensity of the desire to enroll in NHIF

	Erd=0		Erd=1	
INTEORD	Frequency	Percent %	Frequency	Percent %
1	61	44.53	15	2.59
2	52	37.96	35	6.03
3	4	2.92	86	14.83
4	6	4.38	228	39.31
5	14	10.22	216	37.24
Total	137	100	580	100

Cross tabulation the desire to enroll and willingness to pay the premium

This table shows the relation between those head of the families who have desire to enroll in NHIF, and willingness to pay the premium if it is SDG30 for the current NHIF packages and services, where it is clear that, those who have no desire and said they have no willingness to pay that premium were 132, (96.35%), out of 137 respondents.

On the other hand those who have desire to enroll and have no willingness to pay the premium were 528,(91.03%), out of 580 respondents, which mean that the majority of the respondents have no willingness to pay the premium for the current packages , and as mentioned above they suggested a maximum premium SDG 50 and minimum zero, with mean of SDG 18.44.

Table 6. 30 Desire to enroll and willingness to pay the premium

	Erd=0		Erd=1	
p30	Frequency	Percent %	Frequency	Percent %
0	132	96.35	528	91.03
1	5	3.65	52	8.97
Total	137	100	580	100

6.2. Regression analysis

After describing these data and explaining the relation, frequencies and comparing the variables, then regression analysis is used to see the relation between the desire to enroll among these families and the effects of the potential determinants which can influence the desire of the informal to enroll in NHIF.

6.2.1. Result of the binary logit model

The regression results using the head of the family's desire to enroll (ERD) as the dependent variable are shown in Table VI-21. The results reveal that urban residency, being merchant, health status of the head of the family, health status of male dependents, frequency of health facility visits, and perfect and average awareness. were significant and influenced the head of the families desire for enrollment.

Table 6. 31 Result of ERD, (Binary logit model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.660422	0.598123	-1.104156	0.2695
AGE	-0.004176	0.009410	-0.443737	0.6572
ED1	-0.342418	0.237261	-1.443212	0.1490
LO	0.986391	0.351937	2.802746	0.0051
FIN	-1.94E-05	2.07E-05	-0.938669	0.3479
FS	-0.009319	0.017721	-0.525886	0.5990
OC1	-1.159864	0.276818	-4.189992	0.0000
OC2	0.102456	0.277068	0.369784	0.7115
MS1	0.394802	0.260836	1.513603	0.1301
HFHS	0.492841	0.263936	1.867276	0.0619
FDHS	0.045838	0.281719	0.162710	0.8707
MDHS	0.631199	0.295339	2.137204	0.0326
MASF	0.330131	0.080590	4.096419	0.0000
DSKM1	0.009739	0.007468	1.304182	0.1922
DSKM2	-0.001017	0.005698	-0.178542	0.8583
HSEX	0.000154	0.000602	0.255297	0.7985
AWR1	2.764641	0.552458	5.004258	0.0000
AWR2	0.957798	0.244850	3.911778	0.0001

So the result is as following, the age of the head of the families, (AGE) has a negative coefficient sign. The p-value is insignificant, P =0.6572, that means the age does not play an important role in desire to enroll.

The education level of the head of the family, ED1, the secondary/ university and higher is not significant and has negative sign, not as expected, that is because the majority of the respondents who have university/secondary level of education, explained that the services quality not encouraged them to enroll. Which mean that the more the head of the family education level is high the desire is decrease not as the same when compared with that in the literature review, where it showed those who have high education level have more participation

Regarding the location of the head of the families, their living area, (urban and rural), it is significant, (p = 0.0051) and with positive coefficient sign, (0.986391), as expected because those who live in the urban areas has tendency to get health insurance and more desire to enroll than those of the rural areas, that because of the availability of health facilities.

The result also shows FIN, is insignificant (p = 0.3672), and it has negative sign, (-1.94E-05), not as expected, and it also not as in the literature reviewed, where those who have high income were found to be more participating and more desire to have insurance card, that is may be due to their impression about NHIF services, or the mouth word impact of those who have insurance cards and not satisfied, while those who have low family income have more desire to enroll than those have high income, because they cannot afford the cost of the private services.

Family size FS, also is insignificant, (p = 0.5990), and with negative coefficient sign (-0.009319), it means that when the family member increase by one member the probability to have desire decrease with, 1.159864, although the payment for the premium is per family, whatever the number of its dependents, which against the expected, which can be explained due to, when family members are more they work and increase the income of the family so they can afford and share the private services costs, also it should be mentioned that there is no strong correlation between family size and family income.

The occupation OC1, is highly significant, (p = 0.0000), with negative coefficient sign, (-1.159864), which not as expected but it support the idea that high income decrease the desire of enrollment, where the occupation OC1, is merchant

whom known have high income than other occupation, so it mean that they can tolerate the high price of out of pocket as well as they seek for good services which may be available in the private sector rather than public and NHIF, as the majority of them explained that. On the other hand there is no strong correlation between OC1 and FIN.

Regarding the occupation OC2, which means farmers, is positive, (0.102456), but insignificant, (p = 0.4090).

MS1, means that the head of the family is married and it is positive, (0.394802), but insignificant, (p = 0.1301). That explains those head of the families who get married have desire to enroll rather than others status, which is same as expected.

Regarding the head of the family health status, HFHS, it is positive, (0.492841), and significant, (p = 0.0619), that mean when the health status of the head of the family is well he tend to get health insurance which not as the expected, but that may be due to the fact that know health insurance usually avoid the participation of ill individuals, so they may not tell the truth as well as many of people deny to talk about real health status specially if they were ill or maybe they need to be protected against unexpected illness crises.

On the other hand, the female dependents health status, FDHS is positive, and insignificant.

On the other hand, male dependent health status MDHS, is positive, (0.631199), and significant, (p = 0.0326), which means that when MDHS, increase (not ill), the probability of the desire increase the majority of people don't like to talk about their family health status, and deny existence of illness in their families, the same as in head of the family health status,

Also, MASF,(medical advice seeking frequency), one of the most important factors that play important role regarding the desire to enroll in health insurance schemes , as the result shows, the frequency for seeking medical services per month for the head of the family and his dependents, so as it was expected that as much as the number of time that they seek medical services increase, absolutely the desire will increase, so the result shows that it is highly significant, (p = 0.0000) and with positive coefficient sign, (0.330131), which mean that when the frequency increase by one time the probability of the desire increase by this value, 0.330131.

Regarding the accessibility in case of distance between the home of the families and the nearest private health facility, DSKM1 they used to visit in case of their illness, it has positive sign (0.009739), and significant,(0.1922) as expected, so when it increase by one unit (Km), the desire increase by 0.009739, while the distance to the public health facilities, DSKM2, has negative sign, (-0.001017), and insignificant, (p 0.8583), so when the distance increase by one unit, the desire decrease by, -0.001017, as expected.

Health services expenditure HSEX, was not significant, (p = 0.7985) and has positive sign, (0.000154), it means that when it increase by one unit, (one SDG), the desire increase by, 0.000154, as expected.

Regarding health insurance awareness, AWR1, which means the head of the families has perfect health insurance awareness, it is highly significant, (p = 0.0000) and has positive sign, (2.764641), so when it increase by one unit the desire increase by, 2.764641, which is very important for enrollment, as expected, as well as that for health insurance awareness AWR2, which means the head of the families has average awareness about health insurance which also is very important that is because it has positive sign (0.957798), and very significant, (p = 0.0001), so when it increase by one unit the desire increase by, 0.957798as expected.

6.2.2. Result of the Ordered Choice logit model

The Ordered Choice model had been used to identify the intensity of the desire for enrollment among the respondents, which ranged from 1 to 5 as well as to confirm the result of ERD.

The dependent variable here is INTEORD, which means (Intensity of Desire using Ordered Model).the independent variables were the same as these used in the logit model. The table below shows the result of the regression, followed by the details.

Table 6. 32 Result of the intensity (Ordered Choice Model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	-0.013205	0.006011	-2.196744	0.0280
ED1	-0.263028	0.149824	-1.755578	0.0792
LO	-0.079909	0.184267	-0.433658	0.6645
FIN	-2.87E-05	1.38E-05	-2.089791	0.0366
FS	-0.011820	0.010002	-1.181794	0.2373
OC1	-0.316897	0.185396	-1.709299	0.0874
OC2	0.225541	0.167891	1.343376	0.1792
MS1	0.239764	0.175978	1.362464	0.1731
HFHS	0.368306	0.176231	2.089913	0.0366
FDHS	-0.142919	0.174760	-0.817800	0.4135
MDHS	0.481549	0.185880	2.590652	0.0096
MASF	0.160224	0.039461	4.060304	0.0000
DSKM1	0.001371	0.004058	0.337879	0.7355
DSKM2	0.004094	0.004677	0.875231	0.3814
HSEX	0.000136	0.000410	0.330336	0.7411
AWR1	0.792972	0.198977	3.985245	0.0001
AWR2	0.169027	0.159046	1.062752	0.2879

Intensity to enroll significantly decreases with age, education, family income and type of occupation while it significantly increases with health status of head of family and male dependent, frequency of visits to health facilities and health insurance awareness. The following factors do not matter for the intensity to enroll: urban residency, family size, being farmer, being marred, female dependents health status, distance to private health facility, distance to public health facility, and average level of awareness. The negative sign on the age variable is against the expected; due to their ignorance with health insurance advantages, where there were 331 respondents have poor awareness level which may explains the result. The oldest people usually have many types of chronic diseases which make them in need to medication there for more desired to insurance cards to counteract the high health services costs. The result showed similarity and some different from that of the binary logit in term of sign and significant in these variables:

- Significantly positive in both logit and ordered models:
  - Health status of head of the family
  - Health of male dependents.

- Frequency of visits to health facilities
- Perfect health insurance awareness

- Significantly negative in both binary logit and ordered model:
  - Family income
  - Occupation,(OC1), being merchant
- Significantly positive in logit model
  - Urban residency
  - Average health insurance awareness
- Significantly negative in ordered model
  - Age
  - Education level/ secondary or university

The result of this model confirmed the result of binary logit model in majority of variables which gave the same result in the following variables: OC1, HFHS, MDHS, MASF and AWR1, where it found significant and positively affect the desire.

On the other hand these variables were found significant but negatively affect the desire which are: AGE, which may be due to the poor awareness level among the old people, ED1, which can be justified by those who have higher education level not satisfied with the current services, FIN, which means those who have high income have no desire, that may be due to their affordability to private health facilities which provides good quality of services and OC1, which indicate merchants, whom known have high income therefore look for the best services So this result broadly confirm the result of the desire to enroll among the families of the informal sector, as well as described the intensity of their desire for enrollment in NHIF..

This results when we look to the expectation of the informal sector, it indirectly show why all previous attempts to enroll this sector were failed, where it is clear that, the awareness of people about health insurance was not enough to convince them for enrollment, as well as the complicated method of enrollment, the current premium for the current packages and benefits also is not convince and the problems of availability of nearest health frailties also play an important role.

On the other hand many people want to be sponsored by Al.Zakat chamber, they wait for that although they can afford the premium.

CHAPTER VII
CONCLUSION AND RECOMMENDATIONS

This chapter includes three sections, the first one summarized the conclusion of the study, and the second one outlined the recommendations of this study, while the last one describes the limitation of the study.

7.1. Conclusion

Implementation of health insurance becomes one of the important issues for all the governments especially in the developing countries, that because of the scary in the public resources especially these for health subsides, the high costs of health services, which is very difficult for out-of pocket payment, can be the main sustainable source for health finance, and the majority of people of these countries considered as poor.

Sudan is one of the African Developing Countries, in which there is an urgent need for health insurance coverage especially for the informal sector, the voluntary sector that because the informal sector had been mandatory insured. The informal sector represent the majority of the population in Sudan, there for it was a very great challenge to achieve the health insurance by NHIF among the people, so many attempts were done to enroll the informal sector but the outcome was very poor.

The Northern State of Sudan was one of the States that failed to achieve the Universal Coverage among the informal sector, in which

The total number of families = 175,770.the formal sector (mandated), as families= 67,711, and was covered 100 %. While the total number of the targeted informal sector (voluntary), as families = 108,059, and was covered 3, 4%.

The aim of this study was to identify the potential determinants of the desire to enroll in NHIF among the families in the informal sector in the Northern State of Sudan, through interviewing of 717 respondents, (head of the families), to represent 108059 noninsured families in the informal sector who are distributing all over the 7 localities of the State, which subdivided into 21 sub units known as administrative units which contains about 442 villages. The study was carried from February 15 to March 18, using stratified multi stage method for data collection.

The result shows that 594 out of 717 head of the families were male and the rest were female with percentage of 82.8% to 17.2%, regarding their education level, 34 were university, 242, secondary school, 268, primary school and 133 0f them not

received any type of formal education. On the other hand 82.8% lives in rural while the rest on the urban, their occupations vary between merchants 19.1%, farmers 29% while the majority of them were deferent mixed occupations 51.9%. the dominant marital status were those who married 76.8% while few of them were single 10% and the rest were the other marital status.12.3%. of those respondents 80.9% have desire to enroll in NHIF , while only 19.1% have no desire.

The result also showed the intensity of the desire to enroll among the head of the families, when about 32.2% have very strong desire, 32.2% have strong desire, 12.4% were neutral, 12% were weak desire and those who have very weak desire were only 11.2%. Among those respondents 71.5% were in good health status while 28.5% were complaining of one or two of chronic diseases or some types of serious diseases during the last three months prior to the interview, while 69.9% of their female dependents were well, 30.1% were ill and 76.4% were well and only 23.6% of the male dependents were ill

On the other hand when those respondents had been asked about their desire to get health insurance card even if there were no either themselves or any one of their dependents were not ill, if they still have desire or not , 68.3% explained that they still have desire while 31.7% answered no have desire.to enroll in NHIF.

Regarding the types of health facilities on which the head of the families used to seek medical services, health centers comes on the top of the facilities where it represents, 55.5%, then the private clinics, which was 34.2%, rural hospital, 10%, and lastly the teaching hospitals which was only 3%. So when the head of the families were asked about their willingness to pay the premium which SDG 30, for the current health services provided by NHIF, the result shows, 92.2% of them have no willingness while only 7.9% have willingness to pay

On the other hand when they asked about the premium they suggest to pay for the current health insurance services, the mean for their suggestion amount was, SDG 18.44, the medium was, SDG,20, maximum amount, SDG,50, while the minimum was amount was, SDG,0, although the health services expenditure for these families during the last three month was SDG,150.4, as the mean , the medium amount was, SDG,100, while the maximum amount was, SDG,1800, and SDG 0,for minimum amount.

On the other hand the result shows the frequency of for medical services by these families where it revealed that the mean was 3 times, the median 3 times, the maximum was 20 times while the minimum number of times was zero

Regarding the head of the family income per year the mean was SDG 7198.8, the median was SDG 6000, while the maximum was SDG 30500 and the minimum was SDG zero, while the total family income which includes other incomes in the family such as the wife income in addition to the head of the family income was, SDG 8057.3 as the mean, SDG 7000 as median, SDG 30500 as maximum amount and SDG zero as the minimum amount. And the expenditure of these families per month was as following, SDG 654.2 as the mean, SDG 500 as the median SDG 9000 as the maximum amount while SDG zero as the minimum amount.

If we look back for the debt of these families during data collection the mean was SDG 591.5, the median was SDG zero while SDG 15000 as the maximum and SDG zero as the minimum amount, although some of head of the families used to smoke and snuff, where there spend some money on these habits as the mean amount was SDG 31.5, the median was SDG zero while the maximum was SDG 450 and the minimum was SDG zero

Regarding the age of the head of the families were 45.5 years as the mean, 45 years as median while the maximum for age was 90 years and the minimum for age was 19 years, and for their families size it was 5 persons

The result also showed that 17.95 of the head of the families have perfect level of health insurance awareness, regarding the packages and benefits or other characteristics while 36% have average level and the majority was poor awareness, 46.2% about health insurance, when they asked about preferable time for premium payment, the result showed 43% preferred payment every 12 months , 16.2%, preferred each 6 months while 14.9% said each three months and those who preferred monthly payment were 25.9%. On the other hand when the head of the families were asked about the preferable enrollment mechanism the result revealed that 46.7% preferred individually enrollment while 53.3% preferred enrollment in groups.

When looks to the preferable person for the premium collection the result showed that 52.4% of the head of the families preferred NHIF employee, 38.1% said the head of the community committee is preferable for them, while the rest of the head of the families preferred others such as (Omda or Shakh) of the village. The

result also showed that the impact of the people that have health insurance on those who have no health insurance cards was very important, where 67.1% of the respondents were encouraged to buy health insurance cards while 32.9% were discouraged to buy health insurance cards.

Regarding the relation between the head of the families desire to enroll and the health facilities types the result showed that those who have desire and used to seek medical services in teaching hospital were only 3%, for rural hospitals 10%, while 55.5% used to visit health centers and 34.2% used to seek the services in the private clinics, on the other hand those who have no desire only 1.55 visit teaching hospital, 4.4% for rural hospital while 58.4% used the health centers and 10% used the private clinics.

Regarding health insurance awareness and the relation with the head of the families desire to enroll the result showed that those who have desire to enroll and have perfect awareness represents 21.2%, 38.8% with average level and 40% have poor health insurance awareness, while those who have no desire to enroll 3.6% have perfect awareness, 24.1% have average while 72.3% have poor awareness.

The result also showed that 24.3% of those who have desire to enroll were ill while 75.7% were not ill and in good health and were not complaining from any chronic disease during the last three months prior to the interview, while those who have no desire to enroll 46.% were ill while 54% were not ill. For those who have desire and have no one of their female dependents ill were 71.6%, and 28.4% were ill, while those who have no desire and their dependents were ill represents 37.2% and 62.8% were in good health. While those who have no desire to enroll and ill male dependents represent 37.2%, and who have no illness were 62.8%, while those who have desire and ill male dependents were 20.3% and who have no illness represent 79.7%.

The result also showed that the head of the families who have desire to enroll vary in their preferable time for premium payment, where 25% prefer monthly , 16%every three months, 17.1% every 6 months while 41.9% preferred annual payment, while those who have no desire 29,9% preferred monthly, 10.2% each three months, 14.4% each six months and 47.4% preferred annuals payment.

On the other hand the enrollment mechanisms also were vary where those who have desire and preferred group enrollment were 51.9% and 48.1% individually

enrollment, while those who have no desire and preferred group enrollment were 59.1% and 40.9% for individual enrollment. 71.5% of those who have no desire were discouraged, 28.5% were encouraged while 23.8% of those who have desire were discouraged and 76.2% were encouraged by those people who already have health insurance cards, to get insurance cards

The regression result of desire to enroll in NHIF, revealed that, urban residency, (as expected), healthy families' head, healthy male dependents,(not as expected), more medical advice seeking frequency, (as expected), perfect and average health insurance awareness, (as expected) were significantly positive, but being merchant was significantly negative, (not as expected), while education level, family income, family size, being farmer, being married, female health status, the distance to health facilities, (private or public), were insignificant.

The result of the intensity of the desire to enroll showed, that the age, high education level, family income, and being merchant were significantly negative, (not as expected), while healthy families, head, healthy male dependents, were significantly positive, (not as expected), more medical advice seeking frequency and perfect health insurance awareness were significantly positive, (as expected), and the other variables were not significant.

The result of the study showed, the informal sector's desire to enroll in NHIF; significantly increases with urban residency, frequency of visits to health facilities, and health insurance awareness; which same as expected, that is because the availability of health services facilities in urban areas as well as existence of large number of individuals , those who belong to the formal sector and their mouth words about health insurance benefits; can encourage the people in these areas to joint NHIF. Furthermore those families who used to seek medical services more frequently, and those who have average or perfect level of awareness have more incentives to participate NHIF.

On the other hand the desire to enroll also significantly increases with health status of the head of the family and male dependents; which not as expected, this may be due to their perfect or average level of awareness, or to the fact that some people deny to tell truth about their health status. While it significantly decreases with type

of occupation, OC1, which means merchant; and it, is not as expected, may be due to affordability for private cost as well as seeking for better quality which available in the private facilities more than public one.

The following factors do not affect the desire for enrollment among the informal sectors families which includes: the age, education level, family income, family size, being farmer, health of the female dependents, the distance to private ad public health facilities and health services expenditure.

While the result of the intensity of desire to enroll, showed that it is significantly increases with frequency of visits to health facilities and health insurance awareness , as expected, while significantly increase with health status of the head of the family and male dependents which was not expected.

On the other hand the intensity to enroll significantly decreases with age , education level, family income and the occupation; when being merchant which were not expected, that can confirms the fact that the old people have less health insurance awareness and those who have high income, high occupation ranking and high income were not satisfied with the current health insurance services so they prefers private health services so staying away of participation.

Location, family size being farmer, marital status, health status of female dependents, distance to private and public health facilities, were found to be not affect the intensity of the informal sectors desire to enroll in NHIF.

7.2. Recommendations

As mentioned in the previous pages, the health insurance is very important for people in the Sudan especially the Northern State , because it represents the main sustainable source for health care finance as well as co-operation among societies, the rich and poor, the well and the ill. So the fundamental objective of this study was to identify the potential determinants of the desire among families of the informal sector aiming to increase coverage expansion.

As the result showed that the desire of the families in the informal sector to enroll in NHIF depends on many factors, which play an important role in decreasing or increasing their desire. One of these factors was health insurance awareness which was very significant, regarding increasing and decreasing the desire, so the NHIF managers should find ways to educate the people and increase their awareness about

the benefits, packages and enrollment mechanisms in NHIF, through campaign in villages and rural areas as well as urban areas also the health insurance can increase the awareness through mobile clinics through accompanied by other programs such as health insurance awareness and registration for participation, which can reach all insured people in their places especially the elderly patients, this absolutely will increase the satisfaction of insured people, increase their awareness as well as encourage those who have no insurance cards.

On the other hand the availability of the health facilities was very important, so the policymakers should find ways to increase the number of the facilities that provide health insurance services as well as to consider the distance from their homes; through increasing the numbers of acting health insurance facilities, as well as to consider the distances and geographical barriers. So through purchasing the health care services from the public and private facilities according to the existence of large number of people around these facilities also can encourage the informal sector in these areas to enroll as well as increase the insured people satisfaction

Also the NHIF managers should consider the head of the families' expectation for the health insurance such as the premium, where the mean of the suggested premium by the respondents for the NHIF current services, was SDG, 18.44. So as example it is better to enroll 100 families to enroll with SDG 18/ month, out of which may be only 10% need the health services per month which may be only primary health care,(large number including ill and well people) rather than to enroll 10 person who just joint the program because of his serious health condition, such as urgent need for spinal surgery or renal dialysis which is very expensive and it cost the NHIF more than 100 time the paid premium

Regarding the preferable enrollment mechanism, where 47% of the respondent prefer individually enrollment, so it should be considered with regulation to avoid adverse selection, such as specification of application time for participation. It also important to mention here individually enrollment was approved in March 2013, with regulations to facilitate the mechanism as well as to prevent adverse selection.

Also the study showed the importance of those who collect the premium from the clients, where they need the suitable person on whom they can truth, where 38.1% preferred the head of the community committee, 9.5% preferred other people such as

(Shakh and Omda), so it is important to cooperate with those persons who people trust to encourage enrollment as well as help for premium collection.

On the other hand timing for premium payment can be according to the financial situation of the targeted group, where some of them can pay annually, or each six month such as farmers, while merchants can pay monthly so it is important to consider these points to facilitate premium collection

The satisfaction of the formal sector also is very important, which is reflected by their effects on the informal sector by encourage or discourage depends on their satisfaction with NHIF packages and benefits, which reflects the quality of the services, so the current NHIF packages quality should be improved to be more attractive for both formal and informal sector as well as to increase the packages and services

Adverse selection is one of the most important factors that can affect the health insurance financial sustainability, so it should be considered, so there is an urgent need to study those families who participate through five family groups in depth to see whether there was real adverse selection or no, as well as to check the health services costs received by these families.

7.3. Suggestions

Because of the importance NHIF, and the urgent need to enroll the informal sector into this valuable program, here are some suggestions to expand the coverage among families of the informal sector as well as to solve the problems that lead to restriction of their participation through all previous attempts. First of all the NHIF, managers should focus on increasing the level of health insurance awareness among all people, revising the distribution of health services facilities to increase accessibility and equity activation of mobile clinics project and considering the people's expectation of NHIF.

On the other hand, Zakat chamber instead of full sponsoring for families, it can partially subsidies them by 25 to 50% of the NHIF, premium, so instead of enrolling 10 families, the number can be double, which makes people more committed to the NHIF project. Additionally, increasing of the current health services packages to make already inured families more satisfied as well as attract noninsured families to participate, considering all workers in NHIF, satisfaction through

increasing training chances as well as financial supporting to be more encouraged for work.

Also creation of competition among people at the level of the localities, administrative units and villages by giving special discount on the premium according to the large groups and earlier participation.

7.4. Limitation of the study:

The limitation of this study can be summarized in those constraints regarding, , the problem of endogeneity within the model that correlation between some independent variables and other variables, assumption that the desirability affect and lead to actual enrollment and the availability and accessibility to some of the important data such as those related to accurate distance between the health facilities in the State and the distribution of the sample accurately at the villages level where some selected families by sampling frame can be not available during data collection

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APPENDICES

APPENDIX A.

Technical and ethical review committee

الصندوق القومي للتأمين الصحي
National Health Insurance Fund
الادارة العامة للتخطيط والبحوث والمعلومات
ادارة البحوث والسياسات
لجنة المراجعة الفنية والاخلاقية للبحوث
Technical & Ethical Review Committee

NO/NHIF/rd/TC/2012 **Date**
28/03/2013

Certification

This is to certify that the National Health Insurance Fund is accepting the Request of Dr :Mohamed Mohamed Ahmed Elhassan Saeed from Department of Coverage and Clients' Affairs, National Health Insurance Fund to undertake the study entitled(Potential determinants of the desire to enroll in the National Health Insurance Fund among families in the informal sector in the Northern State of Sudan)to be carried in Sudan.

Dr Muna I Abdel Aziz
MBBS, MD, MPH, PhD, CCST, FFPH

APPENDIX B.

PARTICIPANT INFORMATION SHEET (ENGLISH)

Health insurance survey questionnaire for non-insured families-informal sector

NB. This questionnaire targets the head of the family, so the interviewer must ask directly then write his answer.

You are invited to participate in a research study conducted by

Mr. MOHAMED MOHAMED AHMED ELHASSAN SAEED,

I'm student in the M.Sc. in Health Economics and Health Care Management Programme, Faculty of Economics, Chulalongkorn University, Bangkok, Thailand**.**

Thesis title:

POTENTIAL DETERMINANTS OF THE DESIRE TO ENROLL IN THE NATIONAL HEALTH INSURANCE FUND AMONG FAMILIES IN THE INFORMAL SECTOR IN THE NORTHERN STATE OF SUDAN

By**: Mr. MOHAMED MOHAMED AHMED ELHASSAN SAEED**

Research Objectives:

I'm a student at **Chulalongkorn University, M.Sc. in Health Economic and Health care Management**, the main issue of this questionnaire is for my research which aims to identify the potential determinants of the desire to enroll in the National Health Insurance Fund **(NHIF),** among the informal sector in the Northern State of Sudan, aiming to increase health insurance coverage expansion.

The Procedures outlining what participating in the project involve:

The participant will be asked some questions regarding his demographic, socioeconomic characteristics and some information about his desire to the enrollment and participation in The National Health Insurance Fund in the Northern State of Sudan.

Risk for the participant and the mechanism of participation:

No expected risk and the participation in this survey is voluntary, that means you have the right to answer or not and to withdraw at any time. .

The benefits for the participant or the community:

The benefits will be for all society when identifying factors affecting the enrollment of the informal sector in The National Health Insurance Fund in the Northern State of Sudan, as the results can potentially contribute to achieving

universal health care coverage, but no financial benefit for the participant or the investigator.

Please contact the researcher if you seek further clarification about the research project or wish to file a complaint. (Telephone number: +249124757209, email. wdalgady@hotmail.com)

Consent Form: I have been informed of and understand the purposes of the study, and I agree to participate in the study as outlined to me**. Name of participant: ……**

Signature ……. date……..

Data collector Name:……..Date……Questionnaire No…..

Locality name	
Administrative unit name	
Name of: city, village, area.	

1. Who is the head of this family? The. Father ( ), the mother ( ), the son ( ) or the daughter ( ) ?
2. What is the age of the head of the family: (……..years)
3. What is the gender of the head of the family: 1. Male ( ) 2. Female ( )
4. What is the head of the family's highest education level:

   1. University or higher ( ) 2. Secondary, ( ) 3. Primary, ( ) 4. No formal education ( )

5. What is the head of the family income/year: amount (SDG……).
6. What is this family's income/year? Amount (SDG……..)
7. What is the average monthly expenditure of this family? amount (SDG……).
8. What is the head of the family debt at present: amount (SDG……..)
9. What is the family size: (No. of legal dependents according (NHIF), the father, the mother, the wife/s, the sons up to 18 years old and the unmarried daughters), (……person/s.)
10. Head of the family occupation: 1. Merchant ( ) 2. Farmer ( ) 3. Others ( ).
11. Marital status of head of the family: 1. Married ( ) 2. Single ( ) 3. Others ( )
12. Do you have desire to enroll in the National Health Insurance Fund:

1. Has desire to enroll ( ) 2. Dose not have desire to enroll ( )

13. Intensity of desire of the head of the family: what is the intensity of your desire to enroll?

1. Very weak desire ( ) 2. Weak desire ( ) 3. Neutral ( )

4. Strong desired ( ) 5. Very Strong desire( )

14. Head of the family health status, (chronic illness or serious disease during the last three month) 1. Well ( ) 2. Ill ( )

15. The female dependents (mother, wife/s and daughter/s), health status, do they have (chronic illness or other serious disease during the last three month) 1. Well ( ) 2. Ill ( )

16. The male dependents (father or son/s) health status, do they have (chronic illness or other serious disease during the last three month) 1. No they are Well ( ) 2. Yes they are Ill ( )

17. If the answer to question 12 and any one of question (14, 15 or 16), was yes, would you still have a desire to enroll in (NHIF), if you/ your dependents were not sick?

1. Yes ( ) 2. No ( ).

18. What is the average number of times you/ your dependents seek medical services per month during the last three months (……times).

19. If you smoker or snuffer, what is the average cost per month of your spending on smoking or snuffing? Amount (SDG……)

20. What is the type of health facilities they used to visit during the last three months:

1. Teaching hospital ( ) 2. Rural hospital ( ) 3. Health center ( ). 4. Private clinic ( )

21. Accessibility to health facilities: what is the distance from home to the nearest health facility in Km (…….Km).

22. Do you have willingness to pay premium. 1. Yes ( ) 2. No ( )

23. What is the maximum amount of premium that you would be willing to pay for current packages and benefits provided by the(NHIF)? Amount (SDG…….)

24. What is the out-of pocket health expenditure per month, (the average over the last three months): (SDG….).

25. Health insurance awareness,(do you know what is the packages, benefits, enrollment mechanism and the monthly premium of the (NHIF).

1. (NHIF) package and benefits, 2. insurance premium and 3. enrollment mechanism

1. If he knows the three (……perfect) 2. 1f he knows one or two (……..average)

3. If he knows nothing (……poor)

26. What is the preferable time for premium payment?

1. Monthly (…). 2. Three months (….). 3. 6 months (…). 4. 12 months (….).

27. What is the preferable enrollment mechanism: 1. Individually (….) 2. Groups (……)

28. What is the preferable person for enrollment premium collection?

1. The (NHIF) employee (….). 2. Head of the community committee (….) 3. Others (….).

29. Is there is any one of the insured individual encouraged or discouraged you to enroll?

1. (Encouraged). 2. (Discouraged).

APPENDIX C.

PARTICIPANT INFORMATION SHEET (ARABIC)

بسم الله الرحمن الرحيم

استمارة استبيان للاسر الغير مؤمن عليها فى القطاع غير الرسمى (التامين الاختيارى)

توضيح واقرار للشخص المستطلع

ملحوظة: يجب استطلاع رب الاسرة فقط وتدوين اجابتة حسب الاسئلة ادناه

عنوان البحث: العوامل التى تحدد الرغبة فى الدخول فى الصندوق القومى للتامين ا لصحى وسط الاسر فى القطاع غير الرسمى بالولاية الشمالية – السودان.

اسم الباحث: محمد محمد احمد الحسن سعيد

اهداف البحث:

انا طالب فى جامعة شولالونقكورن بتايلاند لنيل درجة الماجستير فى اقتصاديات الصحة وادارة الرعاية الصحية والهدف من هذا الاستبيان هو معرفة العوامل التى توثر او تحدد رغبة الاسر بالقطاع الغير رسمى (التامين الاختيارى) فى الدخول او الاشتراك فى الصندوق القومى للتامين الصحى بالولاية الشمالية بالسودان.

الطريقة التى توضح المطلوب من الشخص المستطلع :

يقوم الشخص المستهدف بالاستبيان بالاجابة على الاسئلة المرفقة فى الاستبيان بعد معرفة مضمون واهداف البحث وهى اسئلة تتعلق بالحالة الاجتماعية , الاقتصادية, الصحية والالمام بمعرفة بعض المعلومات عن التامين الصحى من حيث حزمة الخدمات المقدمة وطريقة الاشتراك فى التامين الصحى بلولاية الشمالية.

المخاطر المتوقعة للمستطلع ان وجدت وطرقة المشاركة فى الاستبيان:

ليست هنالك اى مخاطر على الشخص المستطلع مع العلم بان المشاركة طوعية ويحق للشخص المستطلع ان يرفض او يجاوب على الاسئلة وكل المعلومات التى تذكر تعتبر فى الحفظ وغاية السرية.

الفائدة للشخص المستطلع او المجتمع:

الفائدة المتوقعة من هذا البحث هى فائدة للمجتمع ككل من حيث زيادة الدخول فى التامين الصحى وليست هنالك مبالغ مالية او ربح مادى من وراء هذا البحث للباحث او المستطلع.

اقرار موافقة بالمشاركة فى الاستطلاع:

لقد اخبرت وفهمت الهدف من هذه الدراسة ووافقت على المشاركة فى هذا الاستبيان كما موضح لى.

اسم المشارك او(المستطلع):.....

التوقيع.....التاريخ.....

ا

اسم جامع المعلومات.....التاريخ .....رقم الاستمارة.....

اسم المحلية	
الوحدة الادارية	
القرية او المنطقة	

1.من هو رب هذه الاسرة.؟.....الاب الام الابن الابنة.....

.2.ما هو عمر رب هذه الاسرة؟ (.....سنة)

3.ماهو نوع رب هذه الاسرة؟: ذكر ( ) انثى ( ).

4.ما هو اعلى مستوى تعليمى لرب هذه الاسرة؟

1.جامعى فما فوق ( ) 2.ثانوى ( ) 3.ابتدائ ( ) 4.لم يتلقى اى تعليم حكومى ( )

5.ماهو مكان سكن الاسرة؟ 1.مدينة ( ) 2. ريف ( )

6.ماهو الدخل السنو لرب هذه الاسرة (.....جنيه سودانى)

7.ماهو متوسط الصرف الشهرى لهذه الاسره خلال الثلاثة اشهر الاخيرة؟ (.....جنيه سودانى)

8.كم يبلغ دين رب هذه الاسرة فى الوقت الحالى ان وجد ؟ (.....جنيه سودانى)

9.كم يبلغ عدد افراد هذه الاسرة والذين تشملهم كفالة رب الاسرة حسب مفهوم الاسر التامينية وهم(الوالد, الوالدة, الابناء حتى سن 18 والبنات الغير متزوجات)؟ (.....شخص)

10.ماهى وظيفة رب الاسره ؟ 1.تاجر ( ) 2. مزارع ( ) 3. اخرى ( )

11.ماهى الحالة الاجتماعية لرب هذه الاسرة؟ 1. متزوج( ) 2. عازب () 3. اخرى ( )

12.ماهى رغبة رب الاسرة فى الدخول فى الصندوق القومى للتامين الصحى؟

1.له الرغبة فى الدخول ( ) 2. ليست له الرغبة فى الدخول ( )

13.ماهو مدى او قوة الرغبة فى الدخول فى التامين الصحى؟

1.رغبة ضعيفة جدا ( ) 2. رغبة ضعيفة ( ) 3.رغبة وسط 4.رغبة قوية ( ) 5. رغبة قوية جدا ( )

14.ماهى الحالة الصحية لرب الاسرة؟ هل يعانى من اى نوع من الامراض المزمنة(ضغطو سكرى او نفسية) او اى مرض خطير اخر؟ 1. بصحة جيدة ( ) 2. مريض ( )

15.ماهى الحالة الصحية للمكفولين من الاناث (الام, الزوجة او البنات غير المتزوجات) هل يعانين من اى مرض مزمن او اى مرض خطيراخر ؟ 1. بصحة جيدة ( ) 2 مرضى ( )

16.ماهى الحالة الصحية للمكفولين من الذكور(الوالد والابناء اقل من سن 18), هل يعانوا من اى مرض مزمن او اى مرض اخر خطير؟ 1. بصحة جيدة ( ) 2. مرضى ( )

17.اذا كانت الاجابة للسؤال رقم 12 او اى سؤال من (14و 15 او 16) بنعم هل سيكون لك الرغبة فى الدخول فى التامين الصحى حتى لوكانت الاجابة بانك او اى واحد من افراد اسرتك غير مريض؟

1. نعم ( ) 2. لا ( )

18.ماهو متوسط عدد المرات فى الشهر التى تعاودون فيها المرافق الصحية بحثا للعلاج خلال الثلاثة اشهر الماضية (انت او اى فرد من المكفولين)؟ (عدد المرات .....مرة)

19. اذا كنت تدخن او تستعمل التمباك ماهو متوسط التكلفة فى الشهر (.....جنيه سودانى)

20.ماهو نوع المرفق الصحى الذى تتردد عليه كثيرا خلال الثلاثة اشهر الاخيرة؟

1. مرفق صحى خاص ( )2. مستشفى تعليمى ( ) 3. مستشفى ريفى ( ) 4. مركز صحى ( )

21.كم تبعد المسافة من منزلك الى اقرب مرفق صحى بالكيلومترات تقريبا (.....كلم)

22.هل لديك الرغبة لدفع قيمة الاشتراك الشهرية اذا كانت (30..جنيه سودانى) 1. نعم ( ) 2. لا ( )

23.ماهى اقصى قيمة يمكن ان تكون لك الرغبة فى دفعها للاشتراك الشهرى مقابل الخدمات التى يقدمها التامين الصحى الان (.....جنيه سودانى)

24.ماهو متوسط صرفك على تلقى الخدمات الصحية فى الشهر خلال الثلاثة اشهر الاخيرة (.....جنيه)

25.ماذا تعرف عن: 1. الخدمات التى يقدمها التامين الصحى للمشتركين, اذكر بعضها؟ 2.وكم تبلغ قيمة الاشتراك الشهرى؟ 3.وماهى طرق الدخول او الاشتراك؟

1.اذا كان يعرف (1, 2,و3 ,معرفة كاملة .....) 2..اذا كان (فقط واحدة او اثنين ,معرفة متوسطة....)

3.اذا كان لايعرف ا, 2 , 3 ,معرفة فقيرة.....)

26.ماهى المدة الزمنية المفضلة لك لدفع الاشتراك الشهرى؟

1.كل شهر ( ) 2. كل ثلاثة اشهر( ) 3. كل ستة اشهر ( ) 4. كل 12 شهر ( )

27.ماهى الطريقة المفضلة لك للدخول فى التامين الصحى 1. خول فردى ( ) . دخول جماعى( )

28.من هو الشخص المفضل لديك لجمع الاشتراك الشهرى للتامين الصحى؟

1.مندوب التامين الصحى ( ) 2. رئيس اللجنة الشعبية( ) 3. اخر,حدد( )

29. هل هنالك اى شخص من المؤمن عليهم شجعك او لم يشجعك للدخول فى التامين الصحى؟

1. شجع للدخول ( ) 2. لم يشجع للدخول ( )

APPENDIX D.

the results including (isi)

1. Binary logit model including insured satisfaction impact

Dependent Variable: ERD
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 05/07/13 Time: 17:54
Sample: 1 717
Included observations: 710
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.175156	0.652084	-1.802154	0.0715
AGE	-0.003491	0.010302	-0.338843	0.7347
ED1	-0.445349	0.262586	-1.696012	0.0899
LO	1.083350	0.390142	2.776811	0.0055
FIN	-4.49E-05	2.22E-05	-2.026036	0.0428
FS	-0.008627	0.016895	-0.510610	0.6096
OC1	-1.297779	0.298903	-4.341802	0.0000
OC2	-0.104709	0.302245	-0.346438	0.7290
MS1	0.426549	0.279233	1.527575	0.1266
HFHS	0.676282	0.286667	2.359120	0.0183
FDHS	-0.026444	0.306161	-0.086374	0.9312
MDHS	0.393153	0.314643	1.249522	0.2115
MASF	0.345002	0.089457	3.856638	0.0001
DSKM1	0.005619	0.008248	0.681192	0.4958
DSKM2	-0.003991	0.004978	-0.801712	0.4227
HSEX	-0.000241	0.000632	-0.380817	0.7033
AWR1	2.236106	0.580179	3.854168	0.0001
AWR2	0.886245	0.267263	3.316001	0.0009
ISI	2.054196	0.253763	8.094935	0.0000

McFadden R-squared	0.314403	Mean dependent var	0.808451
S.D. dependent var	0.393798	S.E. of regression	0.320492
Akaike info criterion	0.723297	Sum squared resid	70.97637
Schwarz criterion	0.845466	Log likelihood	-237.7703
Hannan-Quinn criter.	0.770491	Deviance	475.5407
Restr. deviance	693.6156	Restr. log likelihood	-346.8078
LR statistic	218.0749	Avg. log likelihood	-0.334888
Prob(LR statistic)	0.000000		

Obs with Dep=0	136	Total obs	710
Obs with Dep=1	574		

2. Ordered choice logit model including insured satisfaction impact

Dependent Variable: INTEORD
Method: ML - Ordered Logit (Quadratic hill climbing)
Date: 05/07/13 Time: 17:57
Sample: 1 717
Included observations: 711
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	-0.014274	0.006048	-2.359955	0.0183
ED1	-0.280664	0.150292	-1.867459	0.0618
LO	-0.077421	0.185756	-0.416786	0.6768
FIN	-4.48E-05	1.38E-05	-3.237307	0.0012
FS	-0.012588	0.009386	-1.341168	0.1799
OC1	-0.290131	0.186631	-1.554573	0.1200
OC2	0.141770	0.170336	0.832297	0.4052
MS1	0.194119	0.176314	1.100982	0.2709
HFHS	0.409323	0.176818	2.314932	0.0206
FDHS	-0.210032	0.175764	-1.194969	0.2321
MDHS	0.312804	0.188832	1.656522	0.0976
MASF	0.159724	0.039219	4.072595	0.0000
DSKM1	-0.001568	0.004077	-0.384446	0.7006
DSKM2	0.002475	0.004178	0.592381	0.5536
HSEX	-4.98E-05	0.000409	-0.121737	0.9031
AWR1	0.495395	0.203106	2.439097	0.0147
AWR2	0.031417	0.161964	0.193975	0.8462
ISI	1.298794	0.164834	7.879412	0.0000
Limit Points				
LIMIT_2:C(19)	-1.695744	0.388571	-4.364052	0.0000
LIMIT_3:C(20)	-0.631016	0.381285	-1.654972	0.0979
LIMIT_4:C(21)	0.117624	0.382820	0.307256	0.7586
LIMIT_5:C(22)	1.659992	0.387432	4.284603	0.0000

Pseudo R-squared	0.067977	Akaike info criterion	2.826662
Schwarz criterion	2.967965	Log likelihood	-982.8783
Hannan-Quinn criter.	2.881244	Restr. log likelihood	-1054.565
LR statistic	143.3727	Avg. log likelihood	-1.382389
Prob(LR statistic)	0.000000		

APPENDIX E

result of intensity of ERD when ERD = 1

Dependent Variable: INTEORD
Method: ML - Ordered Logit (Quadratic hill climbing)
Date: 05/09/13 Time: 15:53
Sample: 1 579
Included observations: 574
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	-0.012440	0.006768	-1.838064	0.0661
ED1	-0.228963	0.175045	-1.308024	0.1909
LO	-0.273685	0.201854	-1.355859	0.1751
FIN	-1.56E-05	1.58E-05	-0.984100	0.3251
FS	0.035313	0.038064	0.927743	0.3535
OC1	-0.059539	0.233266	-0.255240	0.7985
OC2	0.144975	0.189793	0.763861	0.4450
MS1	0.278607	0.222062	1.254639	0.2096
HFHS	0.168324	0.209508	0.803426	0.4217
FDHS	-0.074127	0.199803	-0.370999	0.7106
MDHS	0.375860	0.219055	1.715824	0.0862
MASF	0.090550	0.039554	2.289263	0.0221
DSKM1	-0.000385	0.004359	-0.088397	0.9296
DSKM2	0.005392	0.005517	0.977356	0.3284
HSEX	0.000154	0.000455	0.337505	0.7357
AWR1	0.065784	0.215028	0.305933	0.7597
AWR2	-0.407646	0.183568	-2.220689	0.0264
Limit Points				
LIMIT_2:C(18)	-3.570839	0.520686	-6.857951	0.0000
LIMIT_3:C(19)	-2.311343	0.474901	-4.867002	0.0000
LIMIT_4:C(20)	-1.083499	0.463533	-2.337482	0.0194
LIMIT_5:C(21)	0.694661	0.462264	1.502739	0.1329

Pseudo R-squared	0.021362	Akaike info criterion	2.579292
Schwarz criterion	2.738535	Log likelihood	-719.2568
Hannan-Quinn criter.	2.641404	Restr. log likelihood	-734.9571
LR statistic	31.40061	Avg. log likelihood	-1.253061
Prob(LR statistic)	0.017844		

APPENDIX F

correlation table

	age	gn	ed1	ed2	lo	fin	fex	fs	oc1	oc2
age	1									
gn	-0.0427	1								
ed1	-0.2561	0.1108	1							
ed2	-0.0123	0.0021	-0.6264	1						
lo	-0.136	0.0785	0.1343	-0.0386	1					
fin	0.0482	0.104	0.1045	-0.0316	0.0516	1				
fex	0.0058	0.0742	0.1259	-0.0433	0.0368	0.5316	1			
fs	0.0433	0.0603	-0.0637	0.0668	-0.0213	-0.004	-0.0162	1		
oc1	0.0075	0.1784	0.1737	-0.0241	0.0658	0.1711	0.1285	0.3212	1	
oc2	0.1332	0.2243	-0.0062	0.0228	-0.154	0.0521	0.0021	-0.0239	-0.2726	1
ms1	0.1952	0.5161	-0.0427	0.0784	-0.0409	0.1051	0.0949	0.0952	0.1197	0.1745
hfhs	-0.1789	0.1198	0.0723	-0.0647	0.0668	0.0792	0.0619	-0.0695	-0.1375	0.035
fdhs	-0.0794	0.0441	-0.0114	0.0091	0.0016	-0.0141	-0.0315	0.0209	-0.062	0.0849
mdhs	-0.0255	0.0565	-0.0112	0.0537	0.0618	0.0338	-0.0284	0.0111	-0.0492	0.0649
masf	0.1329	0.0614	-0.0105	0.0122	-0.1154	0.0689	0.0462	0.0139	-0.0324	0.1487
dskm1	-0.107	0.0484	0.0448	-0.0003	0.1208	0.0521	0.0656	0.0016	-0.0796	-0.051
dskm2	-0.0519	0.0205	-0.0322	-0.0241	-0.0591	-0.0066	-0.0171	-0.0076	-0.0482	0.027
awr1	0.003	0.0466	0.0873	-0.0067	0.047	0.2231	0.1129	0.0871	0.0729	0.0059
awr2	-0.0406	0.1592	0.0825	-0.0206	0.0999	-0.0819	-0.0758	-0.0333	-0.0024	0.0565
erd	-0.0202	0.0398	-0.0537	0.0266	0.0905	0.0125	-0.0442	-0.0643	-0.2088	0.1034

	ms1	hfhs	fdhs	mdhs	masf	dskm1	dskm2	awr1	awr2	erd
ms1	1									
hfhs	0.0826	1								
fdhs	0.0829	0.3635	1							
mdhs	0.0963	0.3961	0.4916	1						
masf	0.0614	-0.0701	-0.1256	-0.1048	1					
dskm1	-0.0165	0.1547	0.0318	0.0655	-0.0759	1				
dskm2	0.0432	0.0212	-0.0042	0.0097	-0.0173	0.0883	1			
awr1	0.0654	0.0531	-0.0103	0.0452	0.0282	0.1376	-0.0377	1		
awr2	0.0544	0.0637	0.0007	0.0639	0.0314	0.0053	0.0587	-0.3504	1	
erd	0.0838	0.1896	0.0803	0.1577	0.1269	0.1103	0.0203	0.1954	0.1049	1

BIOGRAPHY

Name: Mohamed Mohamed Ahmed Elhassan Saeed

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- Director of Dongola Sector, NHIF, Northern State-Sudan, (2011-2012).
- Director of Statistics Directorate & Chairman of Higher Committee for Total Coverage of NHIF, Northern State - Sudan (2010.-2011).
- Director of Marawee Sector, NHIF, Northern State, Sudan (2009-2010).
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