

ON THE SUSTAINABILITY OF GHANA NATIONAL HEALTH INSURANCE SCHEME: AN ACTUARIAL APPROACH CASE STUDY OF THE KPANDO DISTRICT

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ABSTRACT

There is considerable interest at present in exploring the potential of health insurance to increase access to and affordability of health care in Ghana. Ghana's National Health Insurance Scheme (NHIS) was passed into law in 2003 but fully implemented from late 2005. It has already reached impressive coverage levels. This study seeks to check the sustainability of Ghana's National Health Insurance Scheme (NHIS) vis-à-vis the treatment of the top nine diseases from the designated health institutions within the Kpandu District of the Volta Region. Probability theory was used to estimate the total cost of health care. A

sample of both the insured and staff of the health insurance scheme were interviewed in addition to the secondary data collected. The research finding indicated that the NHIS is heavily reliant on tax funding for its revenue. This has permitted quick expansion of coverage, partly through the inclusion of large exempted population groups. Policyholders (Membership) increased from 7% of the population in 2005 to 53.3% in March 2008 within the Kpando District of the Volta Region.

KEYWORDS: Ghana National Health Insurance Scheme, Actuarial Approach, Kpando District, Volta Region.

INTRODUCTION

Insurance may simply be defined as “pooling of risk”. It is a means of transferring risk from the insured or policyholder (the person who is protected against risk) to the insurer (the person or company who assumes or takes the risk). Insurance is a practice which allows interested persons to contribute periodic funds (premium) towards a central “pool” which may be used to compensate people who suffer the actual loss for which the contributions were made. Insurance can be classified as either private or government insurance. Private insurance includes life and health insurance and property and liability insurance. Government insurance includes social insurance programs and all other government insurance plans. Healthcare is insurable since it has a high probability of occurrence and can be predetermined or calculated according to rules of probability.

The Government through the Ghana Poverty Reduction Strategy (GPRS) has outlined its policy strategies for dealing with poverty in the country. One of the major components of this GPRS is the strategy to deliver quality, accessible and affordable healthcare to all residents in Ghana especially the poor and vulnerable. The method of financing healthcare determines its quality, accessibility and affordability. As part of the GPRS, the previously operated system of “Cash and Carry” was phased out to give way to the newly established system of Health Insurance. This policy framework allows for the establishment of multiple health insurance schemes across the nation with a focus on the social-type which is called District Mutual Health Insurance and this is to address the needs of the poor with the districts. Government is aimed at achieving its set health goal within the Poverty Reduction Strategy by instituting the National Health Insurance Scheme. This insurance does not prevent ill health (sickness). The basic principle is to compensate the policyholder(s) by spreading out the risk of health cost on the shoulders of the entire community (district). The scheme thus, acts as a middleman of such a social co-operation. The more subscribers the scheme has, the more likelihood of available funds to support members when they require healthcare. The point to note here is that individuals still make payment for services consumed but in a more humane manner as they do not have to carry the burden of healthcare all alone. This underscores the policy of making it compulsory among others for every resident in Ghana to belong to a health insurance scheme of his or her choice.

Access to healthcare is made easier for those who readily need it. Nonetheless, access is a function of location of providers of services, cost of care and the ability to pay, quality of

care and socio-cultural aspects of service provision. Financial barrier to health care is dependent on the payment mechanism that is put in place at the time of use of service. Out of pocket payment (cash and carry) at the time of use reinforces non-access to healthcare. Pre-payment schemes minimize or remove entirely the financial barrier to accessing healthcare. Thus, access to healthcare becomes independent of the individuals ability to pay out of pocket at the time of ill health. Direct out of pocket payment is regressive in that a higher proportion of income of the poor and lower income groups goes into healthcare.

Moreover, people are expected to pay for services consumed at the time of ill health when in fact they are non-productive during the period. The National Health Insurance Scheme (NHIS) as the name suggests is a government operated system of insurance that seeks to eliminate the financial constraints in acquiring basic healthcare across the country. The management of the scheme entails keeping information of beneficiaries and their contributions. The stakeholders of the scheme thus (the government, the board of trustees, the management team, medical service providers and the beneficiaries of the scheme), will therefore be concerned with its efficient management hence the need to establish defined procedures or structures to oversee the program.

The National Health Insurance ACT 2003 is an ACT to secure the provision of basic healthcare services to persons resident in the country through mutual and private health schemes, to put in place a body to register, license and regulate health insurance schemes and accredit and monitor healthcare providers operating under health insurance schemes; to establish a National Health Insurance Fund that will provide subsidy to licensed district mutual health insurance schemes, to impose a health insurance levy and to provide for purposes connected with these.

There is established by this ACT a body corporate known as the National Health Insurance Council referring to in this ACT as the “Council”. This Council is headed by a Chairperson who together with the other members of the council is appointed by the President of the Republic of Ghana in consultation with the Council of State. At the district level where the scheme is mainly operated, we have various departments that play the role of seeing to the successful management of the scheme.

With just a little percentage of the Ghanaian population living in cities - metropolitan areas, a greater number of the population live in towns and villages. The economic and social fabric

of these high-density clusters is elaborately interwoven, with the well-being of each citizen intricately enmeshed with the activities of others. Strong interdependencies arise in all areas of human need: health, food, shelter, safety, clothing, recreation, maintenance, energy provision, and so on. Servicing these needs requires highly structured transportation and communication networks throughout the city for effective provision of a variety of services: emergency medical, police, mail collection and delivery, fire protection, street and highway maintenance, utility repair, street cleaning, refuse collection, bus and train transportation, taxi transportation, and so on. Increasingly, citizens are demanding more services, by type, quantity, and quality. Yet the ability to pay for additional services has been severely strained by the economic capability of these same citizens who are demanding for the services. The resulting pressure, between the demands for more and better services, on the one hand, and decreased costs, on the other, has created a strong need for improved management decision making in services. It is a primary purpose of this research to provide methods for assisting these decisions specifically that of health – Health Insurance.

HISTORY OF INSURANCE

Insurance has been in existence for thousands of years as far back as the Babylonians, the early Greeks and the Romans. To protect themselves against the dangers to travel, the traders of Babylon often agreed with the owners of the goods traded that the traders would not be held responsible if the goods were stolen. Making cargo loans that would be rapid contingency upon safe arrival was a practice among the Phoenicians and Greeks, and was recognised under Roman law.

Life insurance was very common in the ancient religious societies of the Egyptians and the Greeks. The members of these societies made periodic contributions to provide burials for themselves in accordance with existing religious rites. The earlier known insurance policy contract originated from Pisa, Italy in 1343. Maritime commerce flourished in the Italian republics and Merchants dealing internationally sought the maritime coverage provided by this Italian policies. The body of rules known as the “law merchants” was developed for the settlement of disputes by tribunals of Merchants. Maritime insurance was the first great step in the history of the insurance industry. The second was insurance against fire. Insurers of the periods worked without statistics or calculation of probability relying solely on their personal assignment of these risks. In 1706, the founding of the amicable or perpetual assurance in

London finally signalled the breakthrough of actuarial science as the means of assessing risks and setting rates.

THE AFRICAN PERSPECTIVE

To develop an insurance culture in Africa, particularly for those in rural areas living from agriculture, will undoubtedly require time and patience. If poverty is not an inescapable trap, sustainable development can be appreciated over the long-run. This horizon is several decades away; far beyond one term of government.

Micro-insurance is emerging as a critical pillar in poverty reduction in Africa. “Poverty is a worldwide phenomenon complex and multidimensional that requires that strategies designed to fight it be transversal and supported by long-term commitments at the international level.

Traditional approaches to fighting poverty based on direct subsidies have shown their limitations and inefficiencies in the African context. Fighting poverty is a key element to maintaining peace worldwide, both at the national and international level” (Pascal Koupaki June 2007). However, if those in poverty are hit by one or more of the generally insurable perils – such as ill health, cattle death, crop loss, flood and fire – the likelihood of recovery is small. In reality, life perils and hazards are the most frequent cause of default in such schemes hence it is essential to find insurance solidarity solutions to mutualise those risks.

One major cause of poverty in Sub-Saharan Africa is the fact that low income households and markets do not have the same opportunities to finance investments, accumulate capital, and protect their health and properties. In order to facilitate good health, economic development and alleviate poverty, the financial systems must be made more inclusive by improving access to savings, credit and insurance services to the poor. The distribution systems of most insurers are not designed to serve the low income market. The contribution of insurance industry to the Gross Domestic Product (GDP) of countries in Sub-Saharan Africa is low and this is because most of the people operate informal sector as petty traders, artisans, subsistence farmers, fishermen, etc. Such people, who ironically happen to be the majority, usually have the low education, low and irregular income and therefore do not have access to regular financial services. The only way to reach out to these people is to use appropriate micro-insurance mechanisms or government (or state) driven insurance schemes. These appropriate mechanisms include insurance products that are tailored to the needs of these

low-income households such as mutual health insurance schemes or national health insurance. These mechanisms must be designed with appropriate and affordable insurance premiums and should factor in the irregular cash flows of those who work in the informal sector. The policy wording should be in very simple language, which can easily be understood by low-income clients who are often illiterate. Regulations should be formulated to protect low income clients from the two main forms of abuse and these are from agents who may mislead them in order to increase sales and to prevent MFIs from forcing clients to purchase insurance when borrowing. Despite these challenges, there is a surge of micro-insurance initiatives in Africa as of late.

THE GHANAIAN PERSPECTIVE

Protection against the risk associated with everyday life is essential to everyone's wellbeing and peace of mind. Insurable risks surround us in all walks of life, in some ways that we may be aware of and others that may not be, such as:

- Insuring your home and property against risk of burglary
- Insuring on the unexpected in the case of an accident
- Preparing for retirement by saving for a pension
- Protecting employers and providing assurance for employees

Insurance is a useful intervention capable of securing people against unforeseen risks. As a social device, it allows the individual to contractually transfer the potential financial consequences of a loss exposure to an insurer. An important benefit of insurance is the reduction of uncertainty and worry. It helps businesses to protect themselves from risk and provides a wide range of services to ordinary people from car and home insurance to pensions, health, among others. The insured, in buying insurance, transfers some of the losses he/she cannot avoid and which are too expensive to prevent and too large to be retained to an insurer. The insurance industry contributes immensely to economic growth by converting savings made by individuals into portfolios of assets and smoothing investment return, as well as allowing individuals to share in the prosperity of the economy. The funds raised by the industry are long-term in nature, especially that of the life insurance business, making it the most critical fund for economic development. Insurance companies also assist economic growth by using the income they receive to provide long-term capital for investment and by providing a large pool of investment funds, cuts the risk and cost of investing, allowing businesses to invest in a wider range of activities. This indicates that with stable economic

conditions in Ghana – low inflation, low interest rates and high income – the industry could fulfil its important role as the favourite savings vehicle in the country's economic development by providing financial security for businesses and individuals, since people would have more disposable income to start thinking positively about insurance. In view of this, the industry needs to be innovative in engineering products to attract the public's interest in areas such as Health and Life to increase gross premium income.

There is need for a change in perception and attitude of Ghanaians towards insurance. Although insurance is a useful tool for health and business risk management and social protection, the insurance culture of Ghanaians is still low. The industry needs to create public awareness, not only through advertisement of products but also by providing education on the importance of insurance as well as trying to dispel people's mistrust of the industry. For the public to imbibe the culture of insurance and have confidence in the industry, it is imperative that the public know that insurance companies are not there to take advantage of them, but rather that they are established to fill an important gap in the socio-economic development of every nation. Discrepancies in the payment of insurance claims arise due to the lack of understanding of insurance products by the insured. Bureaucracy is sometimes a problem in the industry because administration approvals for instance, take longer than they should. This can be curbed through the collaborative effort of the companies, service providers and the insuring public to enhance transparency and efficiency. Often times, many of the insuring public failed to painstakingly read and understand the policies bought, hence when their expectations are not met, they lose confidence in the entire business of insurance.

To overcome the challenges facing the sector, there is the need to educate the public on the importance of insurance. The NIC must also ensure Insurance Companies endeavour to make their products meaningful and easily understandable to the public by the use of simple language. They must also improve their marketing skills to encourage more people to take up insurance policies especially in the area of Health Insurance. The public should try to understand the products of the insurance companies and the policies they buy so that they do not get disappointed when it comes to payment of claims. This should be the case in the Social Insurance Schemes especially, because not everything is covered under such policies, thus it is intended to cover some specific issues. Public confidence in the industry should be enhanced with the presence of a good regulatory body, the NIC, ensuring that insurance companies and service providers transact business to the satisfaction of the public.

CHALLENGES TO FINANCIAL SUSTAINABILITY IN NHIS IN GHANA

Underlying the cash flow difficulties now emerging are some fundamental design issues which threaten the long-term sustainability of the NHIS. These are summarised as follows;

Table 1: Challenges to Financial Sustainability if NHIS in Ghana

Dimension	Current challenges
Funding sources	Majority of income grows with growth in consumption, not with membership. Very low premium for informal sector in relation to cost of care.
Benefits package	Benefits package comprises an estimated 95% of all treatments in Ghana, with no limit to consumption.
Coverage	Large proportion of population is exempt and these categories continue to grow. Membership is growing and with a growing rate of utilization by members.
Payment systems	Prices have risen with new Diagnosis-Related Group (DRG) payment system. Drug costs additional-incentive to over-prescribe Anecdotal evidence of “tariff creep” and gaming by providers Reported increase in fraudulent claims. Increasing role of private sector (increase access but also raises costs)
Cost-control	No co-payments. Gate-keeping not effective-patients self-refer to secondary hospitals and tertiary ones use their polyclinics as an entry point into specialist care
Monitoring	Poor monitoring and control systems within the NHIS, although a new IT system is being introduced which may improve the situation.

While in a ‘normal’ insurance system, increased membership would bring in increased income from premia, in the NHIS, the income is largely de-coupled - 90-95%, according to the CEO in 2008, coming from SSNIT and the VAT levy. The bulk of its income will therefore grow with national income rather than membership numbers. GDP growth (6.2% in 2008) is below the rate of growth of membership (from 36% in 2007 to 45% of valid card holders in 2008). This means that the more successful the NHIS (in terms of coverage), the greater the risk of financial difficulties.

In 2008 a new tariff structure was introduced by the NHIA, based on a Diagnosis-Related Group (DRG) system (paying per episode of care, according to disease groups, but also differentiated by level of care and sector). This replaced the previous payment system which was based on fees for service.

Although financial data is not yet available from the NHIA to analyse the overall impact of the new tariffs, scrutiny of selected health facilities' claims shows an immediate jump in NHIS claims, sometimes a doubling within the month of the new tariff being introduced.

Drug costs are currently billed separately on top of the fixed DRG payment per episode, and it is reported by the NHIA that the number of drugs per prescription have increased, from 4.5 in 2004 to 6 now, with some more expensive drugs being particularly favoured by some doctors.

Another common result of the introduction of DRG systems is 'tariff creep' – shifting to diagnoses which attract a higher tariff - which is being reported by NHIA informants. ('We don't get simple malaria cases any more – all malaria is complicated'.)

In addition to the increase in tariffs and increase in members, there has been an increase in utilisation of services by members, which is the expected result of any reduction in financial barriers to care. While this is a positive development (OPD per capita visits remain under the expected norm), it is also something to monitor carefully, in terms of the implications for cash flows and, ultimately, sustainability. Increased utilisation of curative care is not self-evidently positive and care patterns can be distorted by provider interests and also unequal access by different groups. In addition, improving the quality of care is critical to realising health gains from increased utilisation. The poor gate-keeping in the health system, which is a general issue in Ghana, not limited to care provided under the NHIS, also raises prices, as it means people frequent higher level facilities more, which results in higher reimbursement per episode. An increase in accredited providers widens access, which is positive, but also has an impact on the cash flow of the NHIS. In 2008, there were 1,551 accredited private providers, providing one-third of all services reimbursed by the NHIS. Given that the tariff for private providers is higher (and consumers in urban areas have no price disincentive to visiting them), this is likely to be another driver of cost escalation.

There is anecdotal evidence of various types of fraud (against schemes but also, some allege, by and with schemes). It is not easy to assess their scale, not least because some mis-billing reflects lack of understanding of the new tariff. The shift from fee for service, which health facilities are accustomed to, to a DRG-based payment system is not simple. The payment is per illness episode, but the definition of episodes, and the rules about return visits (designed

to control costs) are quite complex for providers to follow. As a result of this in one region, an estimated 20-25% of claims presented were rejected, for a variety of reasons.

CHALLENGES TO SUSTAINABILITY IN NHIS IN THE KPANDO DISTRICT

The general problems facing the Kpando Mutual Health Insurance Scheme are divided into four (4) main categories.

- **Clients and Facilities Management**

Some accredited Healthcare Providers and Community Premium Collectors do not render accurate accounts to the scheme's secretariat after selling out copies of the Health Facilities Attendance Cards (HFAC) that were given them to sell out within the communities where they operate. Some Sister-Schemes delay in making payment on behalf of their members who by no fault of theirs had to enjoy the facility from the Mutual Scheme under consideration. In the second half of April, 2008, Management embarked on an aggressive debts recovery exercise and an amount of GHC103,180. 69 was recovered from some Sister-Schemes.

- **Provider Side**

Non-adherence to the Health Insurance Tariff Manual which include: (i) Over prescription of drugs (ii) Taking money from clients for drugs even in the National Health Insurance Drug List. (iii) Refusal to fill the Health Insurance Prescription Form for the National Health Insurance Client who could not get all the drugs at the Service Providers' drug section (dispensary or pharmacy).

For the scheme's inability to pay its debts owed to Margret Marquart Catholic Hospital in Kpando, Health Insurance Clients from outside the region are not been treated unless they make payment for the services provided them.

- **Clients Side**

Over-utilisation of the facilities by the clients and this include multiple reviews, moving from one hospital to another daily, taking drugs from non-health insurance clients by their relatives and many others. Several cases have been reported where a whole family or household intentionally visits the hospital when they are not sick but because they have been registered under the NHIS. High rate of adverse selection. Thus, only people with particular medical problem rush to enrol with the scheme.

- **In the Scheme**

Re-imbursement from Sister-Schemes for the Cross-Border Arrangement had not been timely coupled with delay in disbursement of subsidy from National Health Insurance Authority, inadequacy of subsidy and human resource constraints are stressing the Kpando District Mutual Scheme.

This main objective of this research work is to establish a practical National Health Insurance Scheme Funding Policy after carefully analysing the existing funding approach coupled with the other numerous existing challenges the scheme faces. The careful analysis will include estimating the financial and economic bearing of the diseases.

MATERIALS AND METHODOLOGY

Study Area

The study area of this research work was carried out in the Margret Marquart Catholic Hospital which serves as the Kpando District Hospital was sourced for this information together with information from the Scheme's Secretariat. This funding policy will take into account how much should be paid as premium and how much government subsidy is needed in order to sustain the scheme.

As of the time of this research, the Kpando District of the Volta Region in Ghana, out of a district population of 73,778 (from the National Census of 2000) the scheme has registered 39,343 as at 1st March, 2008 which is 53.3% of the district population. The breakdown of the total number registered is as follows;

• Formal Sector (SSNIT Contributors)	3,535
• Informal Sector (18 – 69 years)	8,958
• Dependants (under 18 years of age)	19,502
• Aged (70 years and above)	7,295
• Pensioner (SSNIT Retired)	389
• Indigents	629
• Partially Paid-up Members	283
• Number of expired membership	217

From the above figures, it is clear that non-contributors are more than contributors to the scheme. This suggests that there will be financial burden on the scheme which might eventually collapse the scheme.

The following is the breakdown of the claims management.

- Total premium collected from the formal sector as at April, 2008
GHC100,716.20
- Total subsidy from National Health Insurance Authority (NHIA) for exempt groups
GHC489,291.45
- Distress Fund from NHIA
GHC198,767.46
- Total claims paid from Jan. 2006 to April 2008
GHC881,240.50
- Total amount in arrears as at April, 2008
GHC377,503.40
- The actual amount for the Kpando District Scheme as at April, 2008
GHC267,102.15
- Total amount owned by Sister-Schemes as at April, 2008
GHC 110,401.25
- Monthly average of claims paid to service providers
GHC 28,860.76
- Average per capita of claims paid
GHC15.71
- Total attendance at facilities as at 28th February, 2008
49,616 persons
- Monthly average attendance
1,837 persons.

DATA ANALYSIS AND DISCUSSION OF RESULTS

Table 2: *Number of insured persons who accessed healthcare in 2008 in Kpando District*

Month	Malaria	Hypertension	URI	Rheumatism & Joint Pains	Skin Disease & Ulcers	PUD	Intestinal Worms	Diarrhoea	Anaemia	TOTAL
January	2,984	894	493	176	163	193	179	125	122	5,329
February	2,868	963	465	252	377	247	164	111	141	5,588
March	2,922	774	368	187	235	185	198	141	109	5,119
Sub-Total(1st Qtr)	8,774	2,631	1,326	615	775	625	541	377	372	16,036
April	2,654	861	438	243	193	127	193	163	123	4,995
May	4,457	854	558	269	155	184	154	219	125	6,975
June	3,678	745	614	274	189	147	198	194	116	6,155
Sub-Total(2nd Qtr)	10,789	2,460	1,610	786	537	458	545	576	364	18,125
July	3,865	717	321	326	376	376	184	157	134	6,456
August	2,589	614	296	217	217	217	204	125	145	4,624
September	2,721	557	447	304	203	213	197	126	136	4,904
Sub-Total(3rd Qtr)	9,175	1,888	1,064	847	796	806	585	408	415	15,984
October	1,990	704	626	288	288	288	169	109	129	4,591
November	2,620	755	595	214	194	254	176	105	128	5,041
December	3,806	648	587	285	185	245	184	114	141	6,195
Sub-Total(4th Qtr)	8,416	2,107	1,808	787	667	787	529	328	398	15,827
TOTAL	37,154	9,086	5,808	3,035	2,775	2,676	2,200	1,689	1,549	65,972

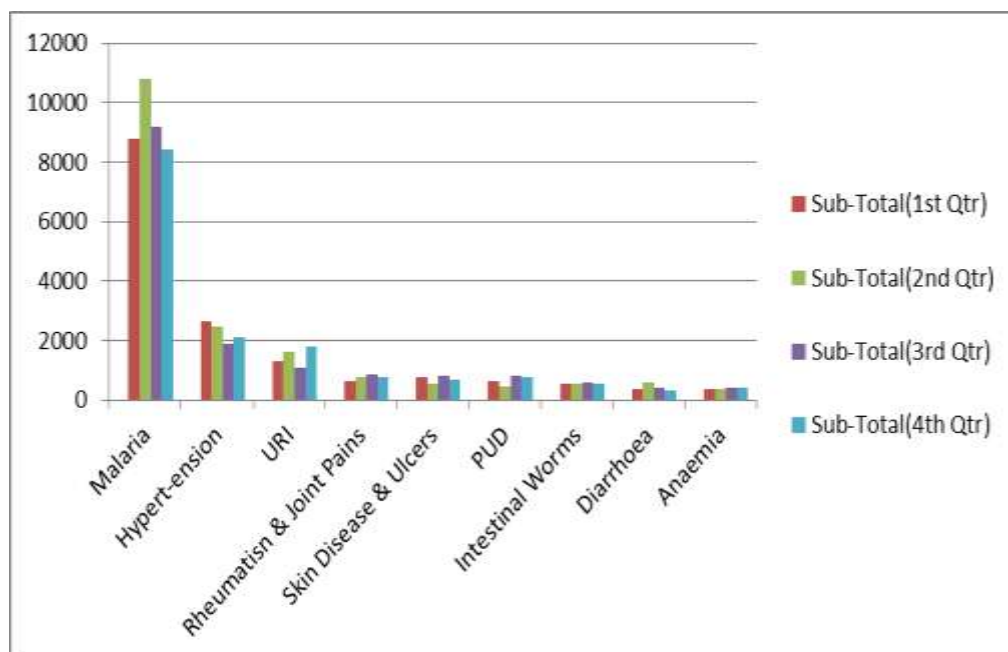


Figure 1: Reported Attendance of the top 9 Diseases in a Bar-chart.

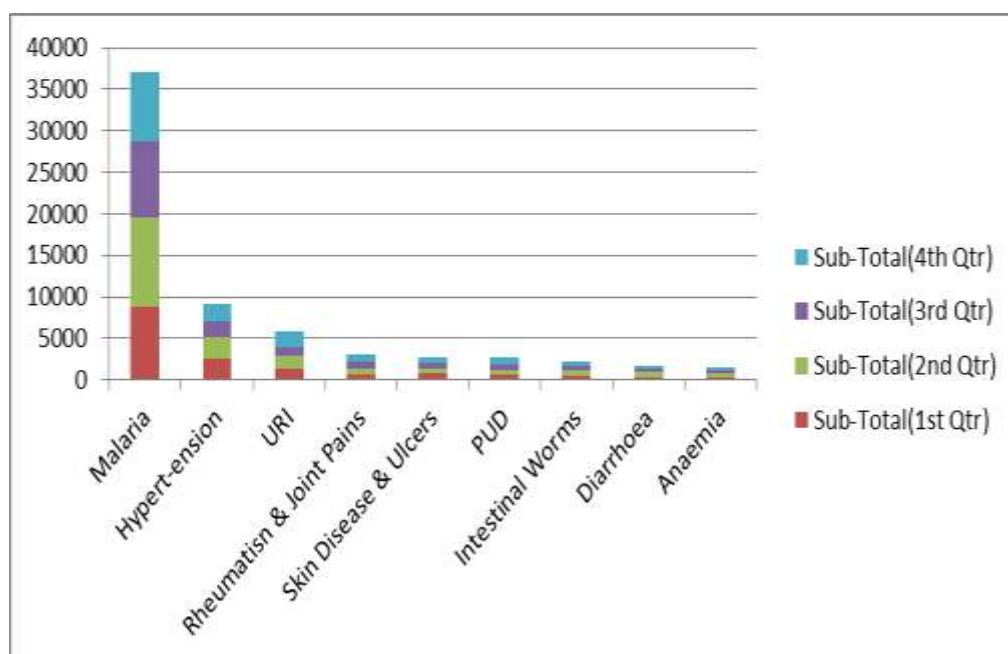


Figure 2: Reported Attendance of the top 9 Diseases in a Stacked Column Graph

Table 2 illustrating the number of insured persons who accessed healthcare in 2008 in Kpando District, whereas Figures 1 and 2 reporting attendance of the top nine (9) diseases in a Bar-Chat and attendance of the top 9 Diseases in a Stacked Column Graph (Multiple Bar Chart) respectively.

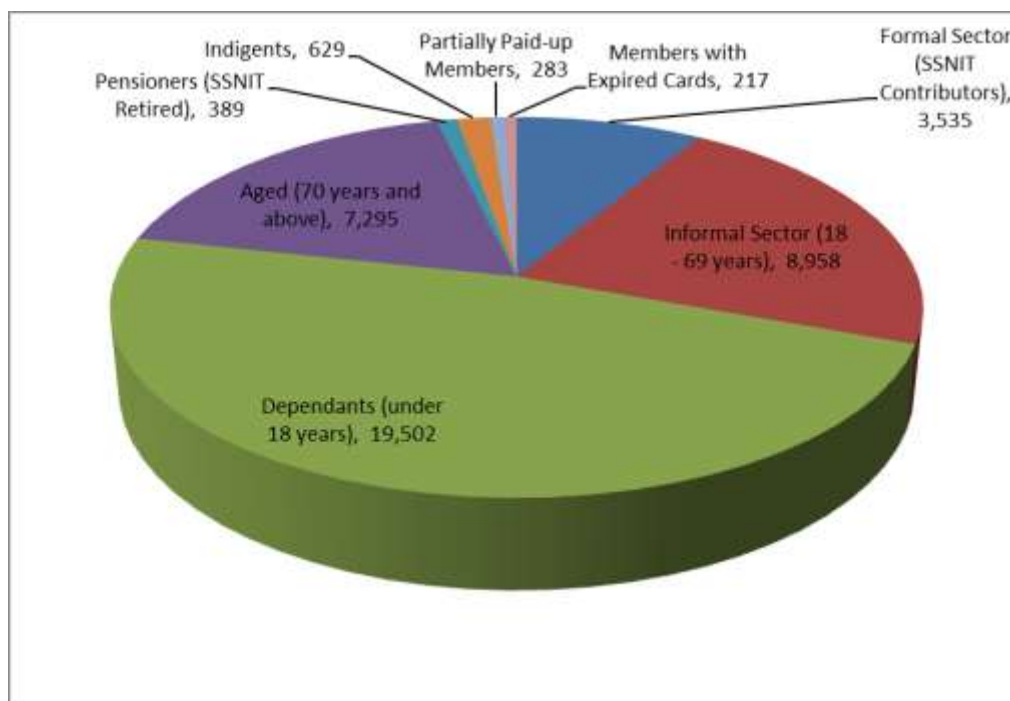


Figure 3: Showing the Pie Chart of Membership of the Kpando District Mutual Health Insurance Scheme

In figure 3, we show categories of membership of the Kpando District Mutual Health Insurance Scheme in Pie Chart form,

Now, we shall be finding the various probabilities of the various categories of diseases will come out as; probability that someone from the entire target population, Kpando district will fall sick is given by;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons reported sick within the population})}{n(\text{total no. of persons in the population})}$$

$$P(\text{someone falls sick}) = \frac{65,972}{73,778} = 0.8842$$

$$\text{Average of reported malaria cases for the quarters is } \frac{8,774 + 10,789 + 9,175 + 8,416}{4} = 9,289$$

Probability that someone on the scheme falls sick of malaria is given as;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of malaria})}{n(\text{no. of registered persons on the scheme})} = \frac{9,289}{40,808} = 0.23$$

From the conditional probability;

$$P(\text{malaria}) = P(\text{malaria/sick}) \times P(\text{sick}) = 0.23 \times 0.8942 = 0.20$$

Then an estimated number of malaria cases in the district is given as;

$$= 0.20 \times 73,778 = 15,017$$

The cost of treatment for malaria is GHC19.17 for Out-Patient-Department (OPD) cases.

Then treatment of malaria for the estimated number from the population is given as;

$$= 15,017 \times 19.17$$

$$= \text{GHC } 287,877.23$$

Average number of reported Hypertension cases is $\frac{2,631+2,460+1,888+2,107}{4} = 2,272$

Probability that someone on the scheme falls sick of Hypertension is given as;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of hypertension})}{n(\text{no. of registered persons on the scheme})} = \frac{2,272}{40,808} = 0.06$$

From the conditional probability;

$$P(\text{hypertension}) = P(\text{hypertension/sick}) \times P(\text{sick}) = 0.06 \times 0.8942 = 0.0498$$

Then an estimated number of hypertension cases in the district is given as;

$$= 0.0498 \times 73,778 = 3,672$$

The cost of treatment for hypertension is GHC33.73 for OPD cases.

Then treatment of hypertension for the estimated number from the population is given as;

$$= 3,672 \times 33.73$$

$$= \text{GHC } 123,863.52$$

Average number of Upper Respiratory Infection (URI) cases is $\frac{1,326+1,610+1,064+1,808}{4} = 1,452$

Probability that someone from the target population falls sick of upper respiratory infection is given as;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of URI})}{n(\text{no. of registered persons on the scheme})} = \frac{1,452}{40,808} = 0.04$$

From the conditional probability;

$$P(\text{URI}) = P(\text{URI/sick}) \times P(\text{sick}) = 0.04 \times 0.8942 = 0.032$$

Then an estimated number of upper respiratory infection cases in the district is given as;

$$= 0.032 \times 73,778 = 2,347$$

The cost of treatment for upper respiratory infection is GHC15.11 for OPD cases.

Then treatment of malaria for the estimated number from the population is given as;

$$= 2,347 \times 15.11$$

$$= \text{GHC } 35,468.71$$

Average number of Rheumatism & Joint pains cases is $\frac{615+786+847+787}{4} = 759$

Probability that someone from the target population falls sick of rheumatism and joint pains is given as;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of rheumatism \& joint pains})}{n(\text{no. of registered persons on the scheme})}$$

$$= \frac{759}{40,808} = 0.02$$

From the conditional probability;

$$P(\text{rheumatism \& joint pains}) = P(\text{rheumatism \& joint pains/sick}) \times P(\text{sick})$$

$$= 0.02 \times 0.8942 = 0.0166$$

The estimated number of rheumatism and joint pains cases in the district is given as;

$$= 0.0166 \times 73,778 = 1,227$$

The unit cost of treatment for rheumatism and joint pains is GHC20.98.

Then treatment of rheumatism and joint pains for the estimated number from the population is given as;

$$= 1,227 \times 20.98$$

$$= \text{GHC } 25,742.46$$

Average number of reported Skin disease & Ulcer cases is $\frac{775+537+796+667}{4} = 694$

Probability that someone on the scheme falls sick of skin disease and ulcers is given as;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of skin disease \& ulcers})}{n(\text{no. of registered persons on the scheme})} = \frac{694}{40,808} = 0.02$$

From the conditional probability;

$$P(\text{skin disease \& ulcers}) = P(\text{skin disease \& ulcers/sick}) \times P(\text{sick})$$

$$= 0.02 \times 0.8942 = 0.0152$$

The estimated number of skin disease and ulcers in the district is;

$$= 0.0152 \times 73,778 = 1,122$$

The cost of treatment for the skin disease and ulcers is GHC23.27.

Then treatment of skin disease and ulcers for the estimated number in the population is;

$$= 1,122 \times 23.27$$

$$= \text{GHC } 26108.94$$

Average number of reported Pelvic Ulcer Disease (PUD) cases is $\frac{625+458+806+787}{4} = 669$

Probability that someone on the scheme from the population falls sick of PUD is;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of PUD})}{n(\text{no. of registered persons on the scheme})} = \frac{669}{40,808} = 0.016$$

From the conditional probability;

$$P(\text{PUD}) = P(\text{PUD/sick}) \times P(\text{sick}) = 0.016 \times 0.8942 = 0.0147$$

The estimated number of PUD cases in the district is;

$$= 0.0147 \times 73,778 = 1,082$$

The cost of treatment for PUD is GHC16.00 for OPD cases.

Then treatment of PUD for the estimated number from the district is given as;

$$= 1,082 \times 16.00$$

$$= \text{GHC } 17,312.00$$

Average number of reported Intestinal worms is $\frac{541+545+585+529}{4} = 550$

Probability that someone on the scheme from the population falls sick of intestinal worms is;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of intestinal worms})}{n(\text{no. of registered persons on the scheme})} = \frac{550}{40,808} = 0.013$$

From the conditional probability;

$$P(\text{intestinal worms}) = P(\text{intestinal worms/sick}) \times P(\text{sick}) = 0.013 \times 0.8942 = 0.0121$$

The estimated number of intestinal worm cases in the district is;

$$= 0.0121 \times 73,778 = 889$$

The cost of treatment for intestinal worms is GHC21.49

Then treatment of intestinal worms for the estimated number in the district is given as;

$$= 889 \times 21.490$$

$$= \text{GHC } 19,107.92$$

Average number of reported Diarrhoea cases is $\frac{377+576+408+328}{4} = 422$

Probability that someone on the scheme from the population falls sick of PUD is;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of diarrhoea})}{n(\text{no. of registered persons on the scheme})} = \frac{422}{40,808} = 0.010$$

From the conditional probability;

$$P(\text{diarrhoea}) = P(\text{diarrhoea/sick}) \times P(\text{sick}) = 0.010 \times 0.8942 = 0.0093$$

The estimated number of diarrhoea cases in the district is;

$$= 0.0093 \times 73,778 = 683$$

The cost of treatment for diarrhoea is GHC14.50

Then treatment of diarrhoea for the estimated number from the district is given as;

$$= 683 \times 14.50$$

$$= \text{GHC}9,903.50$$

Average number of reported Anaemia cases is $\frac{372+364+415+398}{4} = 387$

Probability that someone on the scheme from the population falls sick of anaemia is;

$$P(\text{someone falls sick}) = \frac{n(\text{total no. of persons sick of anaemia})}{n(\text{no. of registered persons on the scheme})} = \frac{387}{40,808} = 0.0095$$

From the conditional probability;

$$P(\text{anaemia}) = P(\text{anaemia/sick}) \times P(\text{sick}) = 0.0095 \times 0.8942 = 0.0085$$

The estimated number of anaemia cases in the district is;

$$= 0.0085 \times 73,778 = 626$$

The cost of treatment for anaemia is GHC18.91 for OPD cases.

Then treatment of anaemia for the estimated number from the district is given as;

$$= 626 \times 18.91$$

$$= \text{GHC } 11,839.00$$

The treatment cost burden on the scheme is the sum of the treatment cost of the various diseases and this **GHC 557,223.28** for a quarter which translates to **GHC 2,228,893.12**. To deduce the actual cost burden on the scheme, the loadings are then added to the estimated treatment cost. Loading is the additional premium insurance or higher rating incurred by items that are more valuable or at greater risk. The loadings here are; (i) Overhead cost (ii) Administrative cost (iii) Allowances (iv) Profit margin

THE PREMIUM MODEL

The model for a premium is given as;

$$\text{Premium} = \frac{\text{Expenditure} + \text{Loadings} + \text{Profit}}{\text{Total No. of exposure units (No. of persons paying premium)}}$$

THE PURE NHIS PREMIUM MODEL

From the everyday life situation where actual cost on the insurance is handed down to the insured, management then decides to add a certain percentage of the premium as the profit element but this is not the case in this calculation, therefore the model becomes;

$$\text{Premium} = \frac{\text{Expenditure} + \text{Loadings}}{\text{Total No. of exposure units (No. of persons paying premium)}}$$

From the Implementation Budget, the loadings which also burden the scheme in the form of Overhead cost, Administration cost and Allowances for staff sums up to GHC966,434.12 and the government subsidy is GHC1,406,991.60. Since the calculations are assumed to be for a quarter, it is again assumed that the quarterly loadings and subsidy are a fourth of GHC966,434.12 and GHC1,406,991.60 which becomes GHC241,608.53 and GHC351,747.90 respectively.

Hence;

$$\text{Premium} = \frac{557,223.28 + 241,608.53}{12,993} = 61.48 \cong 62.00$$

Thus, the Pure Premium is estimated as GHC62.00 per quarter.

On the other hand, the Government of the Republic of Ghana is determined to have the scheme work and succeed therefore has taken away the loadings and the profit element and then subsidising the premium to a great extent. Hence, the model now becomes;

$$\text{Premium} = \frac{\text{Expenditure} - \text{Government Subsidy}}{\text{Total No. of Persons paying Premium}}$$

$$\text{Premium} = \frac{557,223.28 - 351,747.90}{12,993} = 15.81 \cong 16.00$$

Thus, the Social Premium is approximately GHC16.00 per quarter.

To translate these quarterly estimates into annual premiums the deduced estimates should be multiplied by four (4). Thus;

Table 3: Showing Premium type with Quarterly and Annual Estimates

Type of Premium	Quarterly Estimate	Annual Estimate
Pure premium	GHC 62.00	GHC 248.00
Social premium	GHC 16.00	GHC 64.00

From table 3, it is clear from estimates that the existing premium of GHC12.00 in the Kpandu district is woefully inadequate to sustain the scheme.

THE ACTUARIAL APPROACH

Suppose the 73,778 independent persons in the Kpandu district on day x purchase a continuous whole health annuity of 1 per day. If 0.001 and 0.02 are values of the forces of interest and morbidity respectively then the fund per individual person necessary to have a 90% chance of providing the annuity payments for the group on day (x) is deduced as;

For the mean,

$$E[Y] = a_x = \frac{1}{\mu + \delta} = \frac{1}{0.02 + 0.001} = \frac{1}{0.021} = 47.619$$

Then the variance of Y is

$$\begin{aligned} \text{var}(Y) &= \frac{{}^2A_x - (A_x)^2}{\delta^2} = \frac{\left(\frac{\mu}{\mu + 2\delta}\right) - \left(\frac{\mu}{\mu + \delta}\right)^2}{\delta^2} \\ &= \frac{\left(\frac{0.02}{0.02 + 2(0.001)}\right) - \left(\frac{0.02}{0.02 + 0.001}\right)^2}{0.001^2} = \frac{\left(\frac{0.02}{0.022}\right) - \left(\frac{0.02}{0.021}\right)^2}{0.000001} = 2060.00 \end{aligned}$$

For the fund F per quarter and assume $z_{0.1} = 1.282$ the substitutions are effected as,

$$\begin{aligned} \frac{F}{n} &= E[Y] + z_{\alpha} \sqrt{\frac{\text{var}(Y)}{n}} \\ &= 47.619 + 1.282 \sqrt{\frac{2060.00}{73,778}} \end{aligned}$$

$$\Rightarrow \frac{F}{n} = 49.06809$$

$$\therefore F = 49.06809 \times n$$

$$= 49.06809 \times 73,778 = \text{GHC } 3,620,146.10 \quad \text{per quarter}$$

Therefore the annual amount from the fund F is GHC 14,480,584.40 which points to the fact that the fund per person per annum is

$$= \frac{3,620,146.10 \times 4}{73,778} = \frac{14,480,584.40}{73,778} = \text{GHC } 196.27 \cong \text{GHC } 196.00$$

For the scheme to break even on the policy, i.e. $Z = E[Z]$, with zero profit that is income being equal to expenditure, the premium should be quoted as GHC196.00 For the scheme to be able to take care of eventualities i.e. $Z > E[Z]$ the premium should be a more than the GHC196.00.

The premium from the actuarial approach and the static probability approach confirm the need for some adjustments to be made for the sustainability of the scheme.

CONCLUSION

Table 4: Showing the Cash In-Flow for the year under review

Cash In-Flow for the year under review	
Total premium collected from informal sector	GHC 116,331.20
Total subsidy received from NHIA for exempt groups	GHC 1,047,962.85
Distress Fund from NHIA	GHC 359,028.75
Total registration & renewal fees collected	GHC 10,085.00
Total	GHC 1,533,407.80

It is patent from the above breakdown and deductions that, there is a deficit of **GHC 173,871.33** for a quarter and **GHC 695,485.32** annually which points to the fact that the cash out-flow is greater than the cash in-flow.

The actual cost burden on the scheme less the profit margin now becomes treatment cost burden on the scheme plus the other loadings which also burden the scheme

Actual cost burden = Treatment cost + Other loadings

$$= 557,223.28 + 241,608.53 = 798,831.81$$

At this point the deficit now escalates to;

$$\begin{aligned} \text{Expenditure less Income} &= \text{GHC}383,351.95 - 552,223.28 \\ &= \text{GHC}173,871.33 \end{aligned}$$

RECOMMENDATIONS

For the scheme to be sustained and the purpose of its implementation achieved, the following are measures suggested that need to be adopted. Stakeholders could increase the income of the scheme by having the courage and will power to

- Increase the premium being paid now,
- Increase the government subsidy to the scheme or
- Increasing both the premium being paid and the government subsidy.

Within the Kpando District of the Volta Region of population 73,778 the health insurance premium should be at least **GHC64.00** (without the loadings and the profit element). Thus, the existing **GHC12.00** should be increased.

Considering the prevailing premium being paid in the district, it points to the fact that income is far less than expenditure. Therefore this measure will balance this anomaly (cancel out the deficit) but not allow for any profit for investment on the part of the scheme.

Government subsidy could be increased by a margin of GHC51.00 per person which is about 63% of the total revenue to take care of the difference between the existing GHC12.00 and the estimated GHC64.00.

Stakeholders should also take a second look at the long process involved in paying claims which then pushes facilities to most often than not add an element of interest to their claims when submitting them.

Good accounting principles must be adopted to check the management of the Kpando District Mutual Health Insurance Scheme to reduce, if not eliminate entirely the financial misapplication.

A system should be put in place to check, detect and punish inflation of claims by the facilities.

Recommendations on part of strategic health management system

- Data collection should be scientific and representative of the nation. This should be collected weekly which will allow for the morbidity and mortality tables to be computed for more robust exercises to be carried out in the future.
- A fund should be set aside solely for the health insurance scheme and well managed so that cash in-flow is periodic and actually paid into the fund. The fund should be targeted at growing from subsistence to a bigger fund that will have reserves.
- Insurance companies in the country could be taxed to contribute some percentage of the vehicle insurance premium collected into the national insurance fund.
- Food and Drugs Board (FDB) could tax companies and industries which produce items such as alcoholic beverages and cigarette that have indirect negative effect on the health of consumers and contribute this income to the health insurance fund.
- Environmental Protection Agency could also ask companies whose activities affect the environment to pay some tax which will go into the health insurance fund.

Recommendations on part of Strategic Health Projects

When the health insurance fund is established and in operation;

- NHIA can support district assemblies to improve their sanitation conditions which will go a long way to reduce the spread and transmission of diseases.
- NHIA can also join in the malaria control program by distributing mosquito nets and discourage the sale of these nets.
- NHIA can move into the preventive measures of diseases other than concentrating on the curative only, thus move this public health education.

REFERENCE

1. Esenam Dzirasa, Samuel Oduro Dua, Frank Sedor; Trends in Policies of the Insurance Industry - SIC, July 1999.
2. Ghana Government Manual; National Health Insurance ACT, 2003 – (ACT 650)
3. National Health Insurance Authority. Accreditation tool for health facilities. 2008. Accra.
4. Ghana Government Manual; National Health Insurance Regulations 2004
5. Kpando District Mutual Health Scheme; Status Report on Activities, May 2008.
6. Kpando District Mutual Health Scheme; Financial Statement on Activities, May 2008.
7. www.works.bepress.com/vikas.singh/4/; (accessed 2009, January 8,9 & 10)
8. www.riskmanagementmagazine.com.au/article/e3/0c04dae.asp
9. www.ruralfinancenetwork.org (accessed 2008, May8,9 & 10)
10. www.nhis.gov.com and www.nhia.gov.com; (accessed 2008, 8, 9, & 10)
11. F. Y. Berkoh Nketia: Feature Article on Saturday 29th September, 2001 hosted at www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel
12. World Health Organization (2002), 'World Health Report 2002: Reducing risks, promoting healthy life', WHO: Geneva.
13. Beekman J. A.; An Alternative Premium Calculation Method For Certain Long-Term Care Coverages
14. Asante F, Aikins M. Does the NHIS cover the poor? Accra, DANIDA, 2007.
15. Nyongator F, Kutzin J: 'Health for some? The effects of user fees in the Volta region of Ghana. *Health Policy and Planning* 1999; 14: 329-341.
16. National Health Insurance Authority. Accreditation tool for health facilities. 2008. Accra, NHIA.
17. George E. Rejda: Principles of Risk Management and Insurance – 9th Edition/
18. Louisot J. J: Risk Management Magazine 21st June 2007.

19. Geoffrey Crofts, Michael A. Gauger, Dick London: Actex Study Manual for the Course 150 Examination of the Society of Actuaries (Vol.1)
20. Rice, Thomas, and Kathleen Morrison: Patient Cost-Sharing for Medical Services: A Review of Literature and Implications for Health Care Reform, *Medical Care Review*, Vol. 51(3): Pgs 235-287, March 1994.
21. Wining, Eric A., George E. Rejda, Constance M. Luthardt, and Cheryl L. Ferguson: Personal Insurance 1st Edition, 2002.