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Health insurance pricing model in Nigeria

Abere Omotayo Johncally[1], Adeleke, Ismaila Adedeji[2]

[1, 2]Department of Actuarial Science & Insurance, University of Lagos, Nigeria.

Correspondent author: johncally68@yahoo.com DOI 10.31150/ajebm.Vol3.Iss1.120

Abstract: The quality of the health status of the citizens and other factors such as health costs are the pivots that propel the economy from under-development to industrialized ones. In view of this, many countries (of which our dear country, Nigeria, is not an exception) implement social intervention program in form of health insurance to help alleviate the cost of financing healthcare of their citizens. The focus of this study is on the variation in the estimates of average patients' costs of medical treatment through health insurance techniques. It explores different decision making tools that can gear towards informed and quality healthcare system in Nigeria. The geographical scope of the study is limited to Nigerian situations. The major secondary data were got from the internet, articles, journals and other publications of health or health related organizations. The major analysis was done on the utilization payments obtained from one of the leading health maintenance organizations in Nigeria. In other to standardize this research work, the International Classification of Primary Care (ICPC) was used to categorize the ailments. Different models and probability distributions were employed and analysed by EasyFit Software to arrive at decision making parameters. Analysis carried out on healthcare costs helps decision making strategies on matters relating to effectiveness and efficiency of healthcare services in Nigeria.

Keywords: Health Insurance, Models, Pricing, HMO, Premium, Healthcare.

Introduction

Costs in health insurance markets frequently do not reflect individual differences, either because consumers have private information or because prices are not usually risk rated. This creates inefficiencies when consumers are self-selected into plans. Whether competition in health insurance markets leads to efficient outcomes is a central question for health policy. Markets are effective when prices direct consumers and firms to behave efficiently. But in health insurance, prices often do not reflect the different costs of coverage for different enrollees. This generates two concerns: If insurers receive premiums that do not reflect enrollee risk, they have an incentive to engage in risk selection through plan design (Rothschild and Stigiltz, 1996). Similarly, if consumers face prices that do not reflect cost differences across plans, they may select coverage

inefficiently (Fieldman et al, 2002). While it is widely recognized that these problems may impair the efficiency of competitive health insurance markets, evidence on their quantitative importance for social welfare is limited. In Nigerian health insurance, a menu of plans is created from which citizens select coverage. To address incentive problems in plan design, the actuaries have begun to "risk adjust" payments to plans (Van de Ven and Ellis, 2000). Consumer prices, however, are typically not adjusted for individual risk. In this research work, effect of plan costs on allocated efficiency will be analysed. A basic theoretical point regarding plan costs and efficient matching will also be made. Though existing work suggested that while poorly chosen contribution policies may lead to inefficient outcomes, the problem can be solved by choosing an optimal uniform contribution even in the presence of substantial asymmetric information. The analysis, however, assumes perfect correlation about the relationship between preferences and plan costs. It will be shown that if assumptions are violated, a uniform contribution policy (which is a policy under which individuals face/pay the same prices for plans) cannot induce efficient consumer choices. In principle, risk-adjusted contributions can correct or mitigate this distortion. As a matter of fact, observed pricing policies are less efficient than what could be achieved with risk-rated plan contributions. Approximately, one-quarter of inefficiency can be attributed to non-optimal uniform contributions, capturing the remainder would require setting premiums for people in the same firm. Possibility that consumers choose plans based on private information about their health status will be accounted for. It is often observed that consumers select into the plans based on both household preferences and health status, but in contrast to some other studies, we do not observe any single plan experiencing serious adverse selection. Consumers face a choice between different physicians and provider organizations, as well as differences in cost sharing. Health insurance is dominated by managed care plans which use different mixes of supply-side and demand-side utilization management so that plans vary not just on financial characteristics such as copayments and deductibles, but on physician access and the scope of provider networks (Kaiser Family Foundation, 2009). This evolution suggests that classic insights based on purely risk-based selection may not adequately capture the dynamics of today's market. Here, two forces play a key role: heterogeneity in household preferences and cost advantage of the integrated system for individuals in worse health. In risk-rated pricing, reclassification risk can be created. This research will also shed light on two puzzles in the health insurance literatures. One is why employers have not systematically adopted contribution policies that pass the full increment of choosing higher cost plans on to employees. The second puzzle is why the integrated model of healthcare delivery has struggled to catch on widely. It has been found out that the insurance achieves substantial

savings for people in poor health, but the current pricing makes it difficult to target these households where it has a comparative advantage. The number of patients requesting "public-spirited individuals" to save their lives by donating money for their local or overseas treatments has been growing in recent times in Nigeria. They include patients on expensive dialysis treatments or sufferers of heart ailments, cancer and other deadly diseases. Foreigners wonder why these patients do not enjoy any form of health insurance. As the Nigerians joined the world to celebrate the World Health Day in 2012, health experts said the health insurance system in Nigeria was still below the expected level. They spoke with the News Agency of Nigeria (NAN) in separate interviews in Lagos. At that time, the Chairman, Lagos State Medical Guild told NAN that access to medical services in the country was still low as many died because they could not afford medical expenses. He said that 70% of healthcare services in the country were being provided by private hospitals. Amaechi Obiora, the Joint Chairman (Eko Hospital), said that medical tourism, whereby people seek medical services outside the country, had become "in-thing" in Nigeria because most Nigerians have lost faith in the healthcare of their country. Besides, there is mutual distrust among the Health Maintenance Organisations (HMOs) and the service providers on resource sharing and prompt service delivery. Sometimes, they place their profit before life saving role. This is because they have not fully understood actuarial principles of Nigerian health insurance pricing system or mechanism in a way that it will benefit all parties involved. The financial risks providers accept in capitation are traditional risks. Provider revenues are fixed, and each enrolled patient makes his/her claims against the full resources of the provider. In exchange for this fixed payment, physicians resolve their patients' claims at the point of care and assume responsibility for their unknown future health care costs. Physicians and other healthcare providers lack the necessary actuarial, underwriting and pricing skills for health insurance risk and cost management in Nigeria. Their most severe problem is the greater variation in their estimates of the average patient cost, which leaves them at a financial disadvantage. Therefore, the purpose of this study is to examine the greater variation in the estimates of the average patients' cost in order to manage health insurance in Nigeria effectively and efficiently. At the end of this study, the following research questions must be addressed in precise format.

i. Has the introduction of health insurance removed burden caused by huge medical bill?
ii. Does low priority given to health sector in Nigeria affect its pricing mechanism/system or does lack of good maintenance support for existing equipment in the health sector affect the efficacy of healthcare costs in Nigeria?

iii. Are health insurance costs too high or is Nigeria health insurance pricing effective enough?

iv. What conditions determine the rates of capitation in health insurance and what are the variables to be considered in health insurance pricing methods?

v. Are the players of health insurance organizations adequately equipped and informed of appropriate concepts and pricing system of health insurance? What are the pros and cons of health insurance risk modeling, underwriting, pricing and forecasting?

This study focuses on the analysis of healthcare cost system. Its scope shall be limited to situations in Nigeria health insurance business as they cause variation to the estimated costs of different health plans offered by different health providers or organizations. The great treasure which lies in the health insurance business is directly related to the pricing mechanism or system adopted in achieving effectiveness, efficiency, growth and development of healthcare. The potentials in health insurance are left untapped due to the absence of adequate skills and knowledge of the variation in the estimates of average costs of health plans. The result of this study will be of great use to players/stakeholders in the health insurance industry.

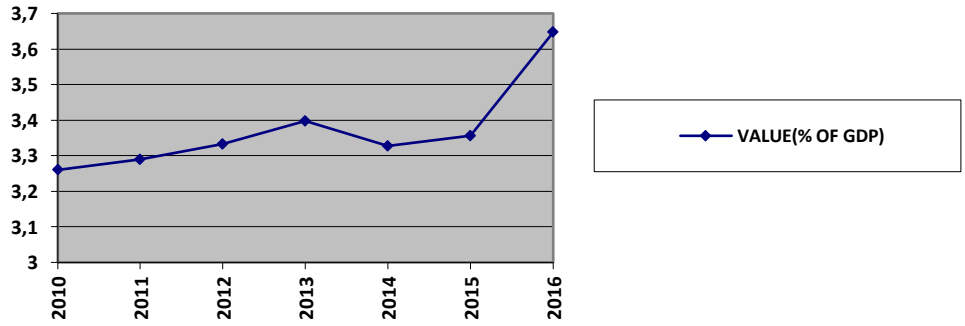
Review of relevant literatures

2.1 HEALTH INSURANCE IN NIGERIA.

Insurance in one form or the other remains a veritable and sustainable tool for financing the hardware, delivery structure and management systems of healthcare. It is only recently being applied by poorer developing nations to address the glaring problem of inadequate healthcare provision, which was financed exclusively from public budget only. Ever since Emperor Otto Von Bismarck of Germany enacted the mandatory legislation on the sickness fund for working Germans in 1883, different models for health insurance have continued to evolve worldwide with the same general principle. Insurance can be described as a risk transfer mechanism whereby the proposer (insured) agrees to make small periodic payments called premium to another person (the insurer) in return for the payment of a larger benefit on the occurrence of a specified event. In the context of health insurance, the premium is the amount charged by the insuring organization or health provider with the promise to pay for any covered medical treatment for the designated coverage. In line with this, health insurance makes it possible to substitute a small but certain cost (premium) for a large but uncertain loss (claim) under an arrangement in which the healthy majority compensate for the risks and costs of the unfortunate ill minority. Therefore, pooling of health risk is a fixture of every society and takes many forms. It was even practiced in our traditional society where the overall contributions are placed into a pool of funds from which

payment is made. Health insurance is based on the principle of probability and all parties involved predicate its sustainability on the law of large numbers and the meticulous observation of the principles of insurance. The regulator, the HMO, the providers, the payers and the Users are the major parties in the Nigerian health insurance system. Health insurance in Nigeria can be applied to few instances: free healthcare provided and financed for all citizens, healthcare provided by government through a special health insurance scheme for government employees, or private firms entering contracts with private healthcare providers. However, there are few people who fall within the three instances. Healthcare provision in Nigeria is a concurrent responsibility of the three tiers of government in the country. However, because Nigeria operates a mixed economy, private providers of healthcare have a visible role to play in health care delivery. The Federal government's role is mostly limited to coordinating the affairs of the university teaching hospitals and federal medical centres (tertiary healthcare) while the state government manages various general hospitals (secondary healthcare) and the local government focuses on dispensaries or health centres (primary healthcare). From Figure 1, In 2016, health expenditure as a share of GDP for Nigeria was 3.647 %. Nigeria health expenditure as a share of GDP fluctuated substantially in recent years. This shows that the existing health system is chaotic and inefficient. There is an increasing demand for more and better medical facilities as a result of increasing population and increasing aw

Figure 1: Health Expenditure (% of GDP) - Nigeria



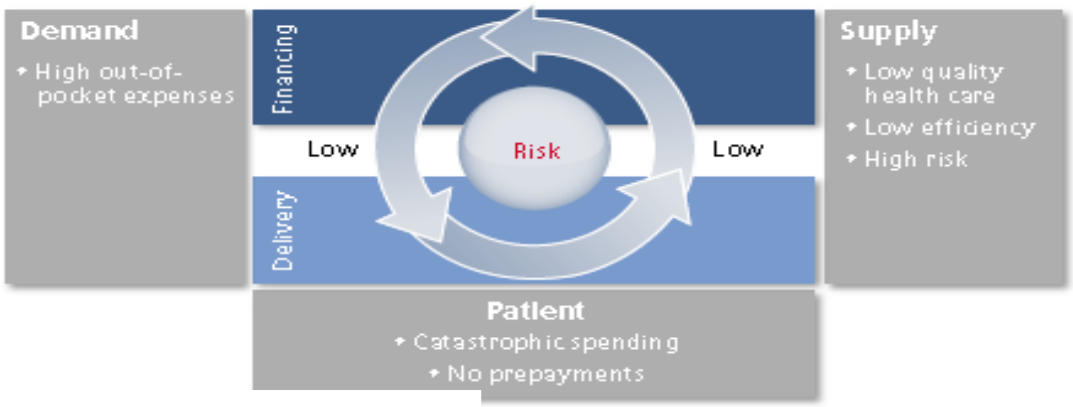
Source: https://data.worldbank.org/indicator/

In order to curb huge sum of medical bills expended by the general public, health insurance is a mechanism protecting people against high cost of healthcare by making payment prior to falling ill. This serves as a special social security arrangement in which everybody will be his brother's keeper and it also ensures that healthcare providers have ready-made patient pool where capitation (a fixed amount of money per unit of time paid in advance to the physician, clinic or hospital for the delivery of healthcare services for each enrolled person whether or not that person seeks care within the time frame) will be paid in advance while specialist doctors are paid on fee-for-service.

Health insurance, being the insurance against the risk of medical expenses among individuals, estimates the overall risk of health care and health system expenses among a targeted group by developing a routine finance structure such as a monthly premium or payroll tax to ensure money is available to pay for the healthcare benefits specified in the insurance agreement. The benefit is administered by a central organization such as a government agency, private business or not-for-profit entity. In health insurance terminology, the Provider is a clinic, hospital, doctor, laboratory, healthcare practitioner or pharmacy. The Insured is the owner of the health insurance policy (that is, the person with the health insurance coverage). In some countries (e.g. UK, Canada) with universal healthcare coverage, health insurance is commonly provided by the state and seen as every citizen's right. It is grouped along with public education, the police, firefighters, street lighting and public road network, as a part of public services for the nation. Conversely, health insurance coverage is seen somewhat differently in Nigeria. It is the individual's responsibility to be insured or covered. The question here is whether health insurance coverage is a human right or another product one can buy. Everybody at some time in their life and often on many occasions will need some kind of medical attention or treatment. When medical care is required, ideally the patient should be able to concentrate on getting on better rather than wondering whether he/she has got the resources to pay for all the bills. This view is becoming more commonly held in nearly all the developing and underdeveloped nations. It is known that health insurance covers medical expenses for illness, injuries and other health conditions According to a Harvard University study, 62 percent of personal bankruptcies were the result of medical expenses. Many bankrupt filers in the study had rare or serious injuries and high medical bills often wiped out their savings, education or retirement funds. Health insurance could help to pay some of these bills and protect policyholders from financial distress. This shows how important it is to have health insurance. The dream of universal health insurance may not be attainable in Nigeria except major factors militating against its attainment (such as the low awareness, poor education, inadequate information and lack of modern technology) are addressed (Premium Times Newspaper, 2012). The MD/CEO, Avon Health Care Ltd, Mrs. Sumbo Ukiri who disclosed this in Lagos during the media presentation of Avon Health Maintenance Organization, noted that HMOs were prepared to storm the Nigerian health scene by setting new standards. A broad range of risk-pooling mechanisms or insurance schemes are increasingly being utilized across the developing world to increase access and reduce the financial burden of health. The number of evaluations of such efforts is growing. The overall findings on impacts of health insurance are encouraging (Vanguard, 2013). In theory, it is expected that health insurance contributes to achievement of health coverage

because it increases access and utilization by lowering the price of healthcare. That is, financial protection is provided because financial risk associated with falling ill is reduced. Financial risk in the absence of health insurance is equal to the out-of-pocket expenditures because of illness. King et al (2010), in their study of the Mexican health insurance, found reductions in the proportion of households that suffer from catastrophic expenditures and a reduction in out-of-pocket expenditures for in-and-outpatient medical care. There are few impact evaluations of health insurance in African countries and those that exist demonstrate a weaker methodology. Nigeria's health indicators have either stagnated or worsened during the past decade despite the efforts to improve healthcare delivery. Life expectancy is below the world average, while the numbers on mortality are astounding. The necessary elements to ensure a functioning health system are: financing (risk pools and repayment); administrative systems; health care providers such as clinics and hospital; medication and laboratories; and the client/patient relationship. The demand (financing) side and the supply (delivering) side should be aligned and managed to deliver care to the patient, who will therefore be willing to prepay to ensure the availability of quality services when needed. If the demand and supply sides are not well aligned, the poor will be stuck in a vicious cycle for health care, as shown in the figure 2

Figure 2 The poor are stuck in a vicious cycle for health care

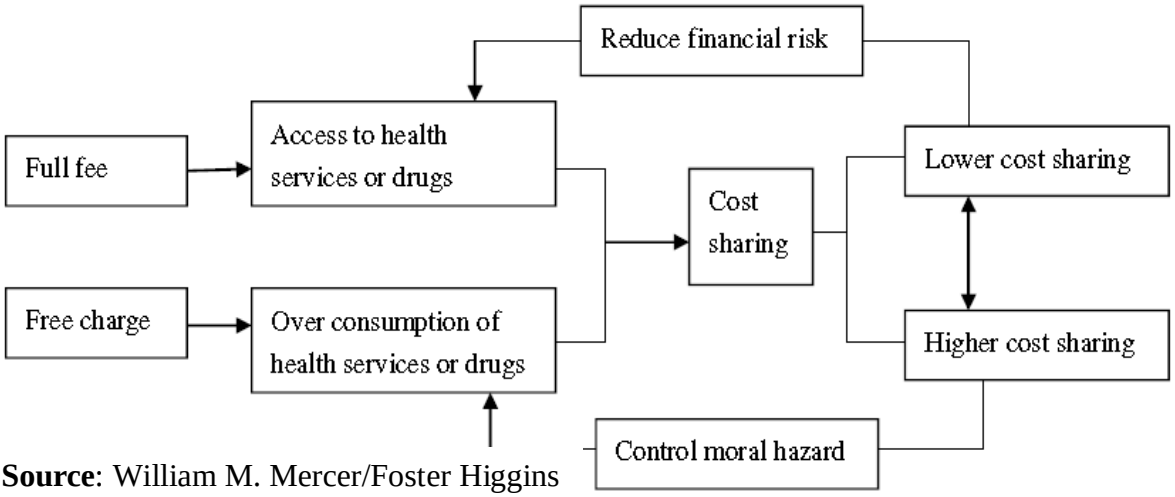


Source: PharmaccessFoundation

In a simple health insurance model, donor funds can be used to catalyze the development of a more sustainable health system by stimulating investment and risk pooling mechanisms. In this way, both the demand and supply sides are addressed. Health insurance providers, administrators and the government require considerable technical assistance to expand health coverage to lower income groups. Clear understanding is needed between the partners about mutual benefits, sharing of responsibilities and obligations as well as clarity on partner's starting level of capacity (technical and managerial skills, information system etc.). In developing a model for health insurance, knowledge about the group/customer behavior and the emphasis on mobilization and

marketing are important. Incentives in the form of subsidies can make coverage affordable and motivate people to participate in the health insurance, since higher enrollment reduces adverse selection. Medical data on the target population and actuarial data on health care utilization and costs are vital to accurately determine size and cost of healthcare package and calculate premiums (Duta and Hongoro, 2013). Cost sharing in health insurance is a crucial method that would influence both healthcare utilization and financial burden of the insured population. According to O'brien (1999), the categories of cost sharing methods used by different countries are diverse.

Figure 3: Conceptual Framework of Cost Sharing Analysis



Source: William M. Mercer/Foster Higgins

In brevity, cost sharing policy plays different roles in controlling moral hazard and changing financial risk in health insurance. As a matter of fact, the way a country finances its healthcare system is a key determinant of the health of its citizenry. Selection of an adequate and efficient method(s) of financing in addition to organizational delivery structure for health services is essential if a country is set to achieve its national health objective of providing health for all. Health care in Nigeria is financed by tax revenue, out-of-pocket payments, donor funding and health insurance (private, social and community). However, achieving successful healthcare financing system continues to be a challenge in Nigeria. The first wealth of a nation is its health. There is empirical evidence that the health of a nation significantly enhances its economic development and vice versa (Adeleke and Ibiwoye, 2008). HIV/AIDS, maternal mortality, infant mortality, malaria, tuberculosis, polio etc. have undermined development and impoverished many developing nations such as Nigeria. Nonetheless, it has been enunciated that the pursuit of better health should not await an improved economy. Measures to improve health will themselves contribute to economic growth. A healthcare financing system involves the means in which funds are generated, allocated and utilized for healthcare. It has three basic functions of collecting

revenues, pooling resources and purchasing services. The mechanisms for implementing health systems are not mutually exclusive (Soyibo,Olaniyan, Lawson2009). In fact, most health systems adopt a mixture of various methods. The success of the different health financing methods can be measured by the overall effect on equity of access and health outcomes, revenue generation and efficiency, and the effect on user behaviour and provider. It is necessary to propose a framework for managing health systems where most health systems can be successfully managed by employing managed care tools such as managing cost (managing insurance risk, provider and supplier prices and utilization of services); managing care (developing and managing community-wide practice guidelines, care pathways, case management processes, and disease management across the continuum of care) and managing health (development and management of population-based interventions and pooling/shifting resources among health and other sectors). The success of these tools depend on some features of a country's health system which include: structure of provider market, proportion of population covered by health insurance, information and communication system, infrastructure, consumer expectations and socio-political values. While all of the managed care tools may not apply in all the systems in the overall health system of a nation, they do provide a useful basis for analyzing the management of health systems. Cost management procedures include explicit underwriting criteria, adoption of a drug formula, laboratory and procedures price list and concurrent review. Consumer cost sharing, through the use of co-payment for drugs, is used to counter moral hazard and also helps to control costs. Managing health is limited to health education provided to enrollees through an actuarially determined scope and prevention of cost over-runs resulting from claims that may go beyond financial capacity. In short term, strategies such as re-evaluation of reward systems to ensure that health workers are provided with incentives sufficient to discourage migration and encourage them to go to rural areas, and the use of substitute workers taking into consideration quality concerns should be considered. In the long run, more workers will be trained and good working environments provided for them. The Nigerian health care system is grossly underfunded. Budgetary allocations to the health sector needs to be increased, while other sources (such as dedicated sales, tax) need to be explored (Pharmanews, 2013). Government should wake up to its responsibilities of providing effective health coverage to its people and stop putting it in the hand of private providers who consider health to be "business as usual". On Wednesday April 23, 2014, Victor Ahiuma-Young &ChiomaObinna (Vanguard) reported that Hygeia (a leading health management organization in the country) and some of its enrollees were heading for a showdown over an alleged plan by Hygeia to de-enlist individual enrollees in the bid to concentrate only on

corporate organizations. The enrollees who were claiming that sequel to the alleged plan, Hygeia sent what they considered an unacceptable text message (SMS) informing the recipients that on expiration of their current health plans they should not bother to renew their plan. The SMS sent reads as follows …. "Dear enrollee, please be informed that you can no longer continue on our healthcare due to high utilization of our services. Therefore, do not renew your plan with us. Thank you." Though dealing with corporate bodies brings more money than some individual plans, but the health conditions of different/all individual enrollees are the major priority here. Moreover, a message like that for somebody who is not in good health could trigger hypertension and imagine if such person has no effective and efficient alternative. Health insurance as an alternative of funding is feasible in Nigeria with potential to secure universal access. But with low coverage rate and slow progress, health insurance may be facing many challenges. What is needed: strengthen existing structure; modify some areas; creative stakeholder engagement; and facilitate rapid health programme. According to the Budget Office of the Federation (Federal Ministry of Finance), proportions of total budget allocated to health sector ranged only between 2% and 6% over an eighteen-year period (2000-2018).This is less than half of the 15% target set by African heads of state in April 2001 in Abuja to fund the health sector. According to Care Net Nigeria (2011), the society at large still puzzles on the following questions concerning health insurance: What is the state of health insurance in Nigeria?; How has this system worked to reduce financial burden of ordinary people in accessing health care services?; What experience has been gained from protection against the financial risk of ill-health in a vast country such as Nigeria?; What major challenges is the system being confronted with?; What practical actions should be taken to rapidly scale up health insurance in a way that it protects the vast majority of the population from financial difficulties when accessing health care services? Chapin (2012) observes that the insurers, being profit making organizations, are skewing enrollments towards those groups that are relatively favoured by the risk adjustment/rating plans. Caution should be seriously taken in relying on unfettered choices to generate efficient outcomes in health insurance markets. Capon (1992) stresses that if health insurance is to strengthen preventive public healthcare systems, there would be value for money spent, reduction of disease burden and promotion of overall health system. World Bank (2003) reveals that most African countries fail in their health insurance policies because the health insurance policies only address the system of healthcare failure without reducing the disease burden which results from lack of preventive healthcare system. This failure of preventive healthcare can escalate costs of curative medicine which can eventually consume all the money of financing the healthcare. In Nigeria before 2005, the 'cash and carry' health financing

made it compulsory for patients to pay cash in the clinics and hospitals. This system was not affordable to many people because it presented a strong barrier to healthcare access (Agyepong & Nagei, 2011). Therefore, an innovative and risk pooling mechanism to provide health security for the citizens became inevitable which necessitated the introduction of national health insurance scheme. Experts have said that the elusive goal to provide consumers more transparency about prices may soon be achieved by 2020. Health insurance companies will develop and provide consumers free access to an online tool that will offer consumers the comprehensive information about the price and quality of healthcare services. On May 14, 2014, the United Health Group said in a statement to Forbes, "educated consumers benefit the entire health care system". The information on prices will include information about quality and other information in an effort to help healthcare become more transparent. Consumers/enrollees, employers and regulatory agencies will now have a single source of consistent, transparent healthcare information based on the most reliable data available, including actual costs, which only insurers currently have. Japsen (2014) also stresses that voluntarily making this information available will be immeasurable value to consumers and other health system participants as they seek to manage the cost and quality of care. Delivering reliable, transparent cost and quality information to consumer is a major part of that process. The risk process of health insurance is an important part of actuarial modeling. There are different approaches, but the most popular one is Markov process. The classical actuarial model for health insurance is used for the analysis of transitions between basic states (healthy, sick and dead). Walter (2004) believes the basic problem in doing this is how to estimate the probabilities/forces of transition since the model must allow specifying actuarial estimations used/adopted in risk management, underwriting and claims policy. As a result of this, problems such as standardization and rationing of medical services, diagnostic and treatment process management, resources planning of health care services, and malpractice problems can be resolved. Reid (2008) says Nigeria is still searching for appropriate healthcare formula. The health financing system is still characterized by low investment by the government, extensive out-of-pocket payments, limited insurance coverage and low donor funding. Thus, achieving the objectives of good health outcome, equity, patients and providers satisfaction is very challenging. However, there may still be a way forward for Nigeria. This will require strengthening the healthcare price system. The system should ensure that everyone who requires health services is able to access them and not denied due to inability to pay. Citizens must be able to benefit from at least one of the financing mechanisms in accessing health care services. Given the backdrop of the weak institutional capacity, technical expertise and high level of poverty, Nigeria will have to rely

on a combination of mechanisms to achieve effective healthcare price system. The time has come for healthcare financing to be seen as an investment, which certainly requires an effective management and political commitment for it to be profitable (WHO, 2010).

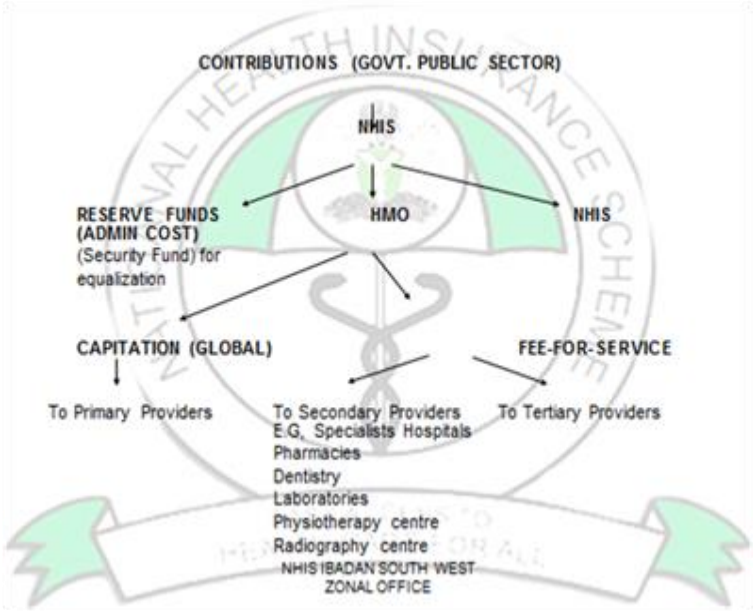
2.2 MAJOR PARTIES INVOLVED IN HEALTH INSURANCE

2.2.1 The National Health Insurance Scheme (NHIS)

The National Health Insurance Scheme (referred to as the "Scheme") was established for the purpose of providing health insurance. It entitles insured persons and their dependents the benefit of prescribed good quality and cost effective health services. There is no denying the fact that Nigeria's healthcare index is very poor, and that the poor are suffering (Agba et al 2010). In order to address a number of problems plaguing the health system in Nigeria and to improve service access and coverage, the National Health Insurance Scheme was promulgated in 1999 (Decree 35,1999 now Act 35 of 1999) by the military regime of Abdulsalam Abubakar and launched in 2005 by the Obasanjo Administration. Although the idea was conceived in 1962 (Halevi committee's) Lagos Health Bill, it was only executed forty three years after because of lack of political will to actualize the dream by successive (military and civilian) governments (Falegan, 2008). In general, Government under the Scheme provides not only standards and guidelines but ensures the enforcement of the programme. The scheme covers civil servants, the armed forces, the police, the organized private sector, students in tertiary institutions, self-employed, vulnerable Persons among others. NHIS is a mixed bag of two broad categories of stakeholders – government and the private sector. Participation in the scheme is optional except for workers in the organised private and public sectors who are expected to contribute percentages of their basic salary to the scheme, while their employers also contribute on their behalf. This entitles a contributor, a spouse and four children to access medical care from any approved service provider. As at February 2009, the scheme has registered over 4 million federal civil servants and their dependents (Agba 2010). According to Kujenya (2009), this figure just represented 3% of Nigerian working population under formal sector. There are concerns that this figure is still currently low, but it represents a step forward towards the right direction of providing adequate health insurance coverage for all Nigerians. There has not been remarkable improvement in national health indices if the MDGs are used as a guide. Moreover, the little improvements seen are localized and often directly attributable to intervention programs and projects designed, funded and implemented by non-public actors in the health sector. It is universally accepted that improved national health indices can only be possible if the health services delivered are acceptable, available, accessible, accountable and affordable. For this to happen, a strengthened and evidence-driven health system must be in place.

Kujenya maintains beneficiaries have been limited to employees of the government and large corporate bodies. Out-of-pocket expenditures still account for about 70% of health care financing in Nigeria, therefore, making healthcare services economically inaccessible especially to the populations in greatest need. Considering that 70.8% of Nigerians live below the poverty line (on less than $1 per day) and are therefore not in position to afford high cost of healthcare. It means millions are left without any coverage thereby leading to the spiral downward of Nigeria's key health indicators (Nnamuchi, 2007). This is not the same in Ghana where the NHIS had succeeded in extending health insurance coverage to 45% of the Ghanaian population by the end of 2008, a level of coverage unprecedented in the region by various world organizations (UNICEF, 2009).

Figure 4: **Transfer of Fund from NHIS to HMO**



Source: NHIS IBADAN SOUTH WEST ZONAL OFFICE

Table 1: **Apportionment of Funds**

Breakdown as follow	proportions (% of ABS)
HMO Administrative	1.0
NHIS Administrative	1.0
Reserve Fund	0.5
IT Contribution	0.5
Benefit Package (Primary,Secondary/Tertiary	7.0
Total	10.0

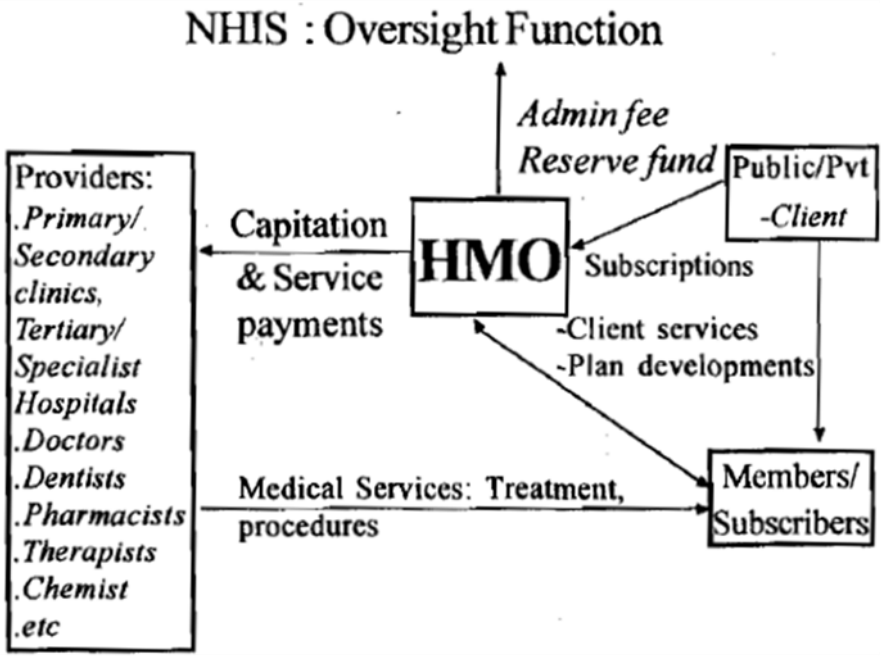
2.2.2 Primary Health Care (PHC)

Primary Health Care (PHC) is at the core of the Nigerian health system and key to providing basic health services to people with their full participation. The principles of PHC allow individuals and groups particularly rural communities, active participation in planning, implementing, monitoring and evaluating health interventions. Planning for any intervention is therefore incomplete without clear mechanisms for collectively monitoring and evaluation which allow people to articulate

strategies and make informed decisions on matters relating to their health. Nigeria has systematically decentralised the delivery of basic services in health to locally elected governments. PHC being an entry point into the health system is highly ineffective and has deteriorated due to lack of political will in the country (Ekunwe, 2006). In 1998, the Federal Government of Nigeria, in collaboration with UNICEF, integrated child survival programmes such as immunization and oral rehydration therapy into the primary healthcare model. Despite this effort, Nigeria still has high infant and child mortality rates. As a result of this, the Nigeria Academy of Science (NAS) organised a two-day workshop with the theme "Effective Primary Health Care Delivery in Nigeria" which was held in Abuja on Tuesday 20th May and Wednesday 21st May 2008. It was discovered by experts at this workshop that factors contributing to the decline of primary healthcare delivery in Nigeria include: inequitable and inadequate distribution of health personnel; top-down minimal community involvement; and political/constitutional impediments. Thematically, presentation of papers and discussions at the workshop further explored challenges and possible solutions relating to health policies; community participation; financing of primary healthcare services; inter-sector collaboration; staff development and retention strategies; primary healthcare service delivery and the typical problems of basic healthcare needs. To address these, a conference speaker noted that the federal government in improving access to primary healthcare services has made provision for the construction of modern ward primary healthcare centres nationwide. Participants however commented that due to massive violations of the electoral processes, non-elected leaders emerge thus creating a wide gap between the expectations of the community and that of its leaders who rarely involve them in health project implementation. The communication gap between the people and that of the leadership at the local government level means that the basic health needs of the community such as water, education, and a clean environment, remain unmet. For maximum efficiency of the workforce in primary healthcare, it was also pointed out that indicators for assessing health workforce performance include: availability; competence; responsiveness and productivity. The conclusion was that sustainable change within the primary healthcare system is impossible without specific funding and participation of the community and other stakeholders.

2.2.3 Health Maintenance Organization (HMO)

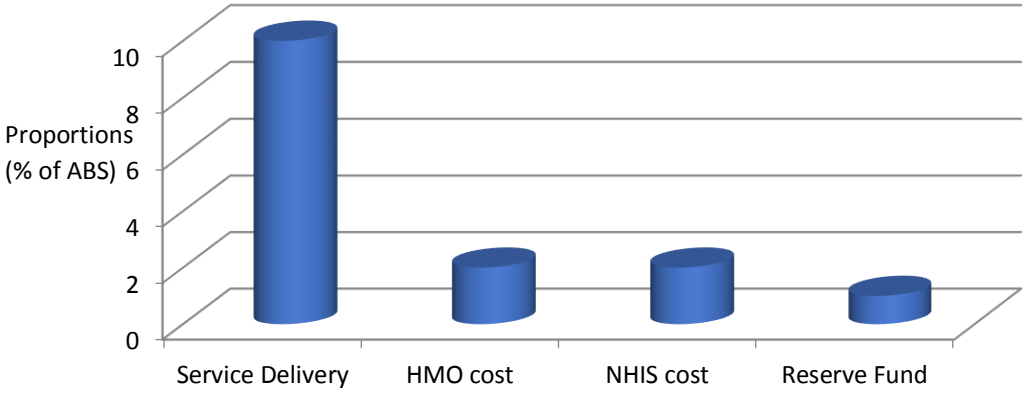
HMO is an organization that offers prepaid, comprehensive healthcare coverage for doctors' and hospital services. The financial risk of over-using health services is borne by the HMO and/or its service providers. The major activities of HMO are best depicted in figure 5 below.



HMOs could be staff model, group model or a mix of both. They could also be for profit or not-for-profit (Awosika, 2005). Staff model HMOs own their clinics or hospitals and employ their own full time medical staff, while group model HMOs operate with independent providers at all levels. The mixed model HMOs share group and staff models characteristics. Objectively, the HMOs are responsible for the collection and disbursement of contributions; provision of care and administration of providers. The incorporation of HMOs into the National Health Insurance Scheme is said to be underpinned by the desire of the government to promote an economic policy based on pursing a private sector driven economy of which health sector is regarded to be a significant part. Due to the numerous functions performed by these organizations on healthcare delivery, there is no doubt that much of the success or otherwise failure of the NHIS depends on how well the organizations are operated and managed (Robinson and Steiner 2011). Conversely, HMOs like to pride themselves as having predated the NHIS but up till this moment, they have failed to effectively carry out the functions assigned to them within the framework of the NHIS. They are expected to mobilise contributors to the scheme, set up health funds and creatively expand coverage through market segmentation to reach a greater proportion of the population. At best, many of them only act as third party administrators rather than as vehicles for integrating, financing and providing healthcare (FGN, 1999). The mainly functional programme covering government employees has attracted nearly all sorts of persons and organizations to set up HMOs in order to have their own piece of the pie. Otherwise, how come there are over 50 HMOs in the country catering for health needs of just 4 million beneficiaries, while the vast majority of the population (of over 150million) are without any form of cover? This state of affairs added to the

myriads of capacity issues of HMOs, has also been largely attributed to the weak regulatory framework of the NHIS. Meanwhile, there are few progressive HMOs that are maturing into significant corporate entities and fit for purpose. Experts have argued that NHIS lacks understanding as to its purpose of existence. Is it a regulator, an organization or just a scheme? In the course of implementation of NHIS, its council has assumed several functions which include mobilization of funds and registration of enrollees that should have been done by HMOs, and therefore not able to undertake its expected oversight duty. According to Table 1 and figure 6, it is interesting to note that funds disbursement to providers out of the total contributed by both the employer and employe

Figure 6: Disbursement of Contribution



Accordingly, about 67% of the premium being spent on service delivery, about 27% spent on administrative charges while less than 7% is set aside for the reserve fund. It is palpably clear that the administrative cost is very high compared to 5-15% of premium recorded in other developing or developed countries where health insurance is well established and considered as a good practice. It is also not that clear how the expenditure pattern will be monitored in order to ensure that only payment for services rendered will be deducted. A major goal in establishing a network is the arrangement on a method and rate of payment for providers on some bases other than bill charges, which are inherently inflationary. The major payment mechanisms currently in use are: per diem; per case; fee-for service; capitation and retainer basis/global budget. In per diem payment, a daily rate is paid to the provider(s) to cover all services and expenses (medical treatment, drugs, consumables, admission fees etc.) of the patient per day of confinement, but sometimes adjusted according to type of institution involved. This method is suitable when the provider charges on "bed space" method. Per case payment method is based on a single case rather than on a treatment act. That is, a provider gets paid for every case handled. In other words, a flat rate is agreed upon for the treatment of a particular illness or illnesses in a category or Diagnosis Related Groups (DRGs). If the cost of treatment is greater than the agreed flat rate, then the

provider incurs a loss. But if less than the agreed flat rate, profit is made. This method is generally used for specialist or tertiary services. Fee-for-service payment method pays debtors, hospitals and other providers based on the bill they charge for specific services rendered on a fee schedule that represents an upper or lower limit on the prices that may be charged. In most cases, the secondary and tertiary providers are paid through this method. Capitation method is a negotiated per capita (or per member) rate payable to the provider who is then responsible for delivery or arranging health services required by the beneficiary over a certain period irrespective of utilization. This method is the commonest method. Global budget is adopted when a given amount is paid to the provider(s) as whole, who are then responsible for covering the total cost of services consumed by beneficiaries during a given period of time. The advantages of one method may be the disadvanta

Table 2: Comparison of Fee-For-Service and Capitation Methods

FACTORS	FEE-FOR-SERVICE	CAPITATION
Variability	Payments depend on number and type of services provided	Payments do not vary with the number or type of services
Timing	Payments received after services provided	Capitation is prepaid at regular interval
Risk	HMO is at risk for higher than expected cost and utilization	Provider is at risk for higher than expected cost and utilization
Economic incentive to provider	Perform more services and more expensive services. That is, expenses are directly related to services rendered.	Perform few services and less expensive services. That is, expenses are not directly related to services provided

Source: William M. Mercer/Foster Higgins

2.3 MODELING RISK, UNDERWRITING AND PRICING

The model of health insurance adopted by Nigeria allows each insured person decide which health centre or clinic he/she intends to use as first point of contact, and registers with the facility. A monthly capitation is paid to the health centre that has been designated to provide healthcare services as and when necessary to the insured. The activities of the health centres and clinics are coordinated by intermediary organisations known as the Health Maintenance Organisations (HMOs), while the overall regulation of the scheme rests squarely on the shoulder of the council of the National Health Insurance Scheme (NHIS). Haberman and Pitacco (2009) offered advanced

approach of health insurance modeling based on Markov processes. Such model allows specifying actuarial estimations used for underwriting; claims policy; risk management; premiums estimation and reserves evaluation for the appropriate health plans. A special type of such kind of a model is the model of diagnostic and treatment process which allows representing state "sick" from the basic model as a process itself. Risk process is a very important aspect of the effectiveness of actuarial modeling for health insurance costs. The classical model is based on a series of implicit assumptions for the model simplification in order to improve an informational support. The diagnostic and treatment processes can be modeled with a random process. The use of Markov processes (especially Markov Chains) would allow constructing the model more effectively from mathematical point of view. In Markov, some of initial states concerning a particular sequence of diagnostic and treatment manipulations could be united in aggregated ones which describe the sequence as a unit (Kemeny and Snell, 1990). The basic problem is to find the degree of aggregation in order to achieve Markov property, but not to decrease the adequacy of the model. Underwriting is a method by which the contribution and access to health insurance scheme are determined. The number of insured may determine the level of individual contribution such that, the larger the number in the insured pool, the less the individual premium. The costs and effectiveness of specific drugs are determined through the use of drug formulary. A formulary is a list of pharmaceutical products with details of their use, preparation, properties and formulas, which the providers in a program may prescribe at all times. According to Lurie (2007), the health insurance world changes gradually. The pricing of contribution rates has the following components.

Pricing of contribution rates = Central estimate of future payments + administration expenses allowance + risk equalization allowance + risk margin – investment income allowance.

The actuary is responsible for the appropriateness of the data collected and used to determine the assumptions in the pricing and enhancement of the health insurance liability methods. When investigating solvency and capital adequacy, the model would be extended to include the components of the future period of forecast. It must also be borne in mind that some actuaries use different methods for the hospital, medical and ancillary pricing categories, while some use more than one method per pricing category (GN690, 2007).

Research methodology

This section gives insight into how materials were gathered in relation to the research work. It focuses on the various measures that are aimed at providing empirical support for the study. The

collection of data was not limited to a particular method. Visits were made to experts, friends and family members in the relevant organizations for personal interviews and/or corporate observations. The major secondary data were got from the internet, periodic reports, textbooks, newspapers, paper presentation, seminar talks, articles, journals and other publications of health or health related organizations. Also, the major analysis will be done on the utilization payments obtained from one of the leading health maintenance organizations in Nigeria. The focus of this study is on the variation in the estimates of average patients' cost of medical treatment in Nigeria through health insurance techniques. The geographical scope of the study is limited to Nigeria. In order to have an incomparable success of the study, the sample contains about sixty thousand utilization payments on behalf of the beneficiaries of health insurance. The data obtained shows dates of birth of beneficiaries, utilisation dates, ailments/diagnosis billed, categories of ailments/investigations, provider payments and HMO payments. The sample size is based on the large size of the study population. The major problem in this research was the reluctance of the health organizations to give out their data to be used for a research purpose. Some admitted that the major reason was to prevent competitors from having the opportunity or access to their secret through the detailed analysis or presentation of their raw data, while some hid under the pretense that a letter must come from the office of the "President of the Federal Republic of Nigeria (GCFR)" before any data could be released for research purpose. Due to this, the sample size of the study may not totally reflect the complete and true situation in the health insurance practice in Nigeria, but steps were taken to reduce this effect to the barest minimum through structured and carefully formulated research questions. Nevertheless, the quality of data collected/ used was highly commended and recommended by concerned lovers of this area of study. Health insurance is not yet at its peak in Nigeria.

Analysis and presentation of data

4.1 Ailment categories.

In other to standardize this research work, a world classification of care known as the International Classification of Primary Care (ICPC) will be used to categorize the ailments to be analysed. ICPC has become an acceptable standard all over the world because it is fully compatible with structuring data in the episode of healthcare costs, and reflects the essential elements of each patient, HMO or Provider encounter. The classification was developed by the World Organization of Family Doctors (known as WONCA) which comprises; the World Organization of National Colleges/Academics and Academic Association of General Practitioners/Family Physicians. In

this research, seventeen categories of ailments with at least one ailment in each category will be analysed. Table 3 shows the categories and kinds of ailments in each category.

S/N	CODE	CATEGORY	AILMENT
1	A	General and Unspecified	Fever,swelling,tuberculosis, measles, chicken pox,plasmodiasis, malaria, death, general disease e.t.c
2	B	Blood, Blood Forming Organs And Immune Mechanism	Anaemia, hiv/aids, leukaemia, e.t.c
3	D	DIGESTIVE	Heartbun, abodiminal cramps/pain, vomiting, diarrhea, constipation, jaundice, teeth/mouths problems, ulcer, liver disease, worm/other parasites e.t.c
4	F	EYE	Eye pain/discharge/infection, cornea ulcer, detached retina, conjunctivitis, glaucoma, blindness e.t.c
5	H	EAR	Otitis media, deafness, bleeding ear, ear discharge/pain/ache/injury e.t.c
6	K	Cardiovascular	Hypertension, PHD (Pulmonary Heart Disease), Irregular heartbeat, Heart pain/Failure/Murmur e.t.c
7	L	Musculoskeletal	Back pain, muscle pain, fracture, dislocation, neck/elbow/knee/jaw/finger/toe pain/ injury e.t.c
8	N	Neurological	Headache, epilepsy, Migrane, convulsion seizure, speech disorder e.t.c
9	P	Psychological	Stress, anxiety, depression, sleep disturbance, drug abuse, suicide, bedwetting, psychological disorder, e.t.c
10	R	Respiratory	Cough, nasal congestion, pneumonia, asthma, throat disease, upper respiratory tract infection (urti)
11	S	SKIN	Rash, boil/carbuncle, bruise, burn/scald, scabies, dermatitis, acne, colour change e.t.c
12	T	Endocrine/metabolic and nutritional	Excessive thirst/appetite, obesity, weight loss/gain, goiter, diabetes, dehydration, growth delay e.t.c
13	U	Urological	Urinary disease, bladder/kidney problems, urethritis, urinary tract infection e.t.c

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14	W	Pregnancy childbearing, family planning.	Ante partum bleeding, contraception, infertility/sub fertility, abortion, labour/delivery, family planning/contraception, breast symptom/complaint e.t.c
15	X	Female Genital	Menstrual pain/disorder, vaginal discharge/bleeding, pelvic inflammatory disease, (PIV), STD, Fibroid, e.t.c
16	Y	Male Genital	Urethral discharge, syphilis, gonorrhea, pain in penis/testis/scrotum, STI, impotence, infertility, circumcision e.t.c
17	Z	Social problems	Food/water problem, rape, relationship problem, partner illness problem, healthcare system problem, neo-natal care e.t.c

Source: Wonca International Classification Committee (WICC)

4.2 Demographic characteristics.

The original data collected contained over eighty thousand ailments from different categories. Having grouped them into appropriate categories, and removed entries suspected to be invalid, a total of fifty-nine thousand, three hundred and eighty-five (59,385) ailments were left for analysis.

Table 4: Demography of Ailments

Category code	Ailment	Sample size
A	All	24,796
	Plasmodiasis	4,989
	Fever	503
B	All	457
	Anaemia	111
D	All	5,917
	Dental Care	1,006
	Ulcer	485
F	All	2361
	Conjunctivitis	1286
H	All	427
	Otitis media	291

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K	All	3080
	Hypertension	2773
L	All	2028
	Back pain	122
N	All	579
	Headache	139
P	All	320
	Stress	83
R	All	7463
	Cough	157
	Upper Respiratory Tract Infection (URTI)	4119
S	All	2630
	Dermatitis	581
T	All	755
	Diabetes	534
U	All	921
	Urinary Tract Infection (UTI)	642
W	All	5439
	Infertility/Subfertility	560
	Family Planning/ Contraception	251
X	All	1842
	Pelvic Inflammatory Disease (PIV)	407
Y	All	236
	Circumcision	138
Z	All	134
	Neo Natal Care	121

Source: HMO Utilization Data

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TABLE 5: DESCRIPTIVE STATISTICS (PROVIDER)

Code	Ailment	Model						Distribution	parameter	Value	mean	Standard variations	Coefficient Of variations	Standard error	skewness	kurtosis
		Kolmogorov smirnov		anderson Darling		Chi-square										
		Statistic	Rank	Statistic	Rank	Statisic	Rank									
A	Plasmodiasis (A73)	0.05142	1	766.3	8	N/A		Gen. Pareto	□	0.62942	10885	38301	3.5187	542.31	28.553	1287.4
									□	3752.2						
									□	759.69						
	Fever (A03)	0.03609	1	0.9717	1	7.083	1	Gen. Extreme Value	□	0.64953	11726	27261	2.3249	1215.5	6.4337	49.359
									□	3449.6						
									□	3533.2						
B	All	0.05429	1	3.8286	2	12.606	1	Frechet	□	1.077	10436	22314	2.1383	1043.8	5.3524	35.746
									□	2818.5						
	Anaemia (B80)	0.1112	1	2.762	3	12.541	1	Gen. Extreme value	□	0.5522	13743	36157	2.631	1140	11.586	183.2
									□	5891.2						
									□	2231.1						
D	Dental care (D19)	0.04941	1	73.325	16	N/A		Gen Pareto	□	0.5522	13743	36157	2.631	1140	11.589	183.2
									□	5891.2						
									□	587.01						
	Ulcer (D86)	0.0606	1	75.116	11	N/A		Gen Pareto	□	0.6744	10493	28326	2.6996	1286.2	7.8538	75.6
									□	0.6744						
									□	1068.8						
F	All	0.0447	1	17.712	5	112.65	1	Frechet	□	0.9854	12382	43680	3.5277	898.96	24.575	847.06
									□	2685.8						
	Conjunctivitis (F70)	0.0545	1	9.0663	2	124.22	5	Log Logistic	□	1.2801	12803	31818	2.4852	887.27	9.69	137.89
									□	4730.0						
H	All	0.0805	1	76.057	11	N/A		Gen Pareto	□	0.5937	7236.1	14350	1.983	694.44	6.029	48.239
									□	2570						
									□	911.96						
	Otitis media	0.0743	1	6.629	5	N/A		Frechet	□	1.249	7023.5	13585	1.9342	796.38	6.468	57.203

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	(H72)							(3P)	□ □	2368.4 57.161						
K	All	0.01712	1	N/A		N/A		Welbull	□ □	0.5424 1.586E.4	10852	23021	2.1214	414.81	7.3502	82.791
	Hypertension (K87)	0.0555	1	132.72	4	261.28	2	Freceht	□ □	0.88115 2835.8	10886	23102	2.122	438.48	7.4848	86.325
L	All	0.06148	1	31.958	3	182.62	1	Frechet	□ □	0.864 3133.1	14596	46676	3.198	1036.5	13.616	243.06
	Back pain (L02)	0.06512	1	7.6692	2	10.173	2	Inverse Gaussian	□ □	4544.6 9041.9	9041.9	12754	1.411	1154.7	4.0366	22.967
N	All	0.5561	1	2.174	1	33.024	1	Gen Extreme Value	□ □ □	0.65521 2837.2 2902.9	9771.3	25949	2.5636	1041	8.9782	105.49
	Headache (N01)	0.05871	1	0.77822	1	10.291	3	Log logistic (3P)	□ □ □	2.2801 3737.9 51.502	6450.8	15832	2.4543	1342.9	10.146	112.25
P	All	0.0533	1	1.2598	1	8.9187	1	Frechet	□ □	0.9822 2891.3	14443	36632	2.5363	2047.8	6.2618	45.83
	Stress (P02)	0.07086	1	0.4244	1	6.2303	3	Frechet (3P)	□ □ □	0.989 4965 -796	26504	61529	2.3215	6753.7	3.8337	15.362
R	Cough (R05)	0.05734	1	0.55448	2	7.7658	1	Frechet	□ □	1.0404 2026.2	10132	29742	2.9354	2373.6	7.1211	59.909
	Upper Respiratory Tract Infection R(74)	0.2238	1	44.267	4	33.492	3	Log Normal	□ □	1.1138 8.9189	15833	56228	3.5513	876.1	32.708	1533
S	All	0.04039	1	47.788	2	119.86	2	Log Normal	□ □	1.4694 4435.7	12092	47655	3.941	929.25	23.593	735.3
	Dermatitis	0.05022	1	3.1009	1	27.705	1	Frechet	□	1.3735	11387	30778	2.703	1276.9	6.3915	49.031

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	(S87)							(3P)	□ □	3637.8 -936.96						
T	All	0.07115	1	142.33		N/A		Gen Pareto	□ □ □	0.70671 2625.8 756.73	9709.7	29723	3.0612	1081.7	8.5629	89.191
	Diabetes (T89)	0.01873	1	N/A		N/A		Weibull	□ □	0.4878 3.69E-5	9184.4	30157	3.2835	1305	9.1219	99.739
U	All	0.0274	1	6.8216	2	21.263	3	Log Logistic	□ □	1.5346 7103.4	15485	40785	2.6339	1343.9	11.668	182.18
	Urinary Tract Infection (U71)	0.02614	1	4.4748	2	13.108	4	Log Logistic	□ □	1.5568 7434.7	16856	47154	2.7974	1861	10.64	144.57
W	Infertility/ Subfertility (W15)	0.0365	1	8.5887	2	9.7988	1	Log Logistic	□ □	1.5227 5916.4	13192	26024	1.9726	1099.7	5.4258	36.014
	Family Planning/Con -ntraception (W14)	0.04725	1	1.4536	1	12.59	2	Gen Extreme Value	□ □ □	0.66966 1990.4 2364.5	7430	18218	2.452	1149.9	7.417	68.85
X	All	0.04959	1	17.777	2	139.42	5	Log Logistic	□ □	1.5629 4253.6	10623	26205	2.4667	610.57	8.3822	101.61
	PIV (X74)	0.06362	1	4.9956	3	28.508	3	Log Logistic	□ □	1.7093 3142.9	6665.2	12479	1.8723	618.58	5.9456	48.193
Y	All	0.3747	1	0.35387	1	5.9786	2	Frechet (3P)	□ □ □	1.7907 5727.8 -2135.2	9160.1	17303	1.889	1126.3	6.811	55.987
	Circumcision (Y80)	0.04977	1	0.25712	1	4.7465	1	Log Logistic (3P)	□ □ □	22729 4947.9 -510.21	7030.7	17303	1.889	1126.3	6.811	55.987
Z	All	0.07332	1	1.0444	1	3.6785	1	Gen Extreme Value	□ □	0.54916 1289.3	4537.4	5762.1	1.2699	497.77	3.7719	16.839

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									☐	2273.1						
	Neonatal Care (Z 1 8)	0.07305	1	1.1801	2	4.5366	1	Gen Extreme Value	☐	0.55253	4327.1	5684.4	1.3137	516.76	4.149	20.068
									☐	1201.8						
									☐	2197.0						

Source: EasyFit Data Analysis.

TABLE 6: DESCRIPTIVE STATISTICS (HMO)

Code	Ailment	Model						Distribution	Parameter	value	mean	Standard variations	Coefficient of Variations	Standard error	Skewness	Kurtosis
		Kolmogorov smirnov		Anderson darling		Chi-square										
		Statistic	Rank	statistic	Rank	statistic	Rank									
A	Plasmodiasis (A 7 3)	0.07921	1	1221.1	17	N/A		Gen Pareto	☐	0.65701	8697.5	36301	4.1737	513.99	32.816	1595.7
									☐	2900.7						
									☐	240.52						
	Fever (A03)	0.03444	1	0.83801	1	9.834	2	Gen Extreme Value	☐	0.66847	10065	25630	2.5465	1142.8	6.9451	57.85
									☐	2909.5						
									☐	2690.8						
B	A l l	0.0672	1	3.405	1	32.118	2	Gen Pareto	☐	0.5881	8316.5	18517	2.227	866.18	4.795	27.733
									☐	3498.6						
									☐	-177-63						
	Anaemia (B 8 0)	0.1705	1	3.869	1	32.216	3	Gen Extreme Value	☐	0.757	5038.1	15228	3.0226	1445.4	5.178	28.594
									☐	1203.7						
									☐	686.6						
D	Dental Care (D 1 9)	0.07455	1	7.545	1	124.13	4	Gen Pareto	☐	0.57695	11816	35270	2.985	1112	12.305	203.4
									☐	5171.9						
									☐	-409.42						
	Ulcer (D86)	0.03505	1	N/A		N/A		Weibull	☐	0.4987	7596	23217	3.0565	1054.2	8.179	80.84
									☐	8.65E-6						
F	A l l	0.05488	1	20.137	2	195.21	4	Gen Pareto	☐	0.621	10363	41717	4.0257	858.73	27.528	1015.16
									☐	3936.2						
									☐	18.526						
	Conjunctivitis (F 7 0)	0.08528	1	166.95	4	100.28	1	Log Logistic	☐	1.1942	10471	27956	2.67	779.87	10.452	172.89
									☐	355.6						

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H	All	0.0985	1	7.778	1	85.393	2	Gen Extreme Value	☐ ☐ ☐	0.6443 1538.4 1584.7	5175.2	10635	2.0551	514.68	6.4085	62.141
	Otitis media (H72)	0.0942	1	6.964	1	74.516	3	Gen Extreme Value	☐ ☐ ☐	0.6426 1403.5 1554.8	4812.4	10522	2.1864	616.79	8.055	90.377
K	All	0.08366	1	41.716	1	651	6	Gen Pareto	☐ ☐ ☐	0.564 3969.2 -46.436	9058.3	20299	2.2409	365.94	7.4417	87.64
	Hypertension (K87)	0.08422	1	324.61	9	594.94	6	Frechet	☐ ☐	0.687 1952.3	9244.2	20669	2.2358	392.5	7.522	88.746
L	All	0.02959	1	N/A		N/A		Weibull	☐ ☐	0.5505 5.6E-5	13043	45983	3.5254	1021.1	14.168	259.2
	Back Pain (L02)	0.08195	1	0.93631	1	8.9268	4	Johnson SB	☐ ☐ ☐ ☐	2.1308 0.6401 94544 -245.37	7214.3	10867	1.5063	983.83	2.88	10.185
N	All	0.02591	1	N/A		N/A		Weibull	☐ ☐	0.60627 2.1E-5	8319	24087	2.8954	1001	9.7001	123.02
	Head ache (N01)	0.06807	1	6.7895	8	N/A		Gen Extreme Value	☐ ☐ ☐	0.66474 1347.5 2052.5	5423.3	15760	2.906	1336.8	10.449	117.09
P	All	0.07137	1	3.4621	2	38.674	6	Gen Pareto	☐ ☐ ☐	0.6482 4288.1 -56.878	12132	33693	2.7772	1883.5	7.0226	58.687
	Stress (P02)	0.10918	1	1.4047	1	9.677	3	Gen Pareto	☐ ☐ ☐	0.70678 7402.5 -616.27	24629	60781	2.4678	6671.5	4.0007	16.939
R	Cough (R05)	0.08178	1	1.9372	1	12.296	2	Gen Extreme Value	☐ ☐ ☐	0.77365 1220.3 1033.1	5808.4	19600	3.3745	1564.3	6.7899	50.451
	Upper Respiratory Tract Infection	0.03185	1	124.71	3	35.373	1	Log Normal	☐ ☐	1.2027 8.766	14586	55779	3.824	869.11	33.475	1585.5
S	All	0.06375	1	15.506	1	189.75	1	Gen Extreme Value	☐ ☐	0.7076 2798.6	10363	46806	4.5166	912.86	24.852	793.56

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										2162.4						
	Dermatitis (S87)	0.0768	1	4.5476	1	62.115	2	Gen Extreme Value		0.7519 2355.4 1867.2	1084	30627	3.0075	1270.6	6.5426	50.792
T	All	0.09343	1	11.854	1	141.32	3	Gen Extreme Value		0.75589 1863.2 1610.4	8310.5	28458.0	3.4244	1035.7	8.8614	95.362
	Diabetes (T89)	0.10428	1	16.808	1	157.58	6	Gen Extreme Value		0.7805 1559.7 1407.3	7723.4	29009	3.7559	1255.3	9.3472	104.42
U	All	0.02823	1	N/A		N/A		Weibull		0.5516 9.76E.5	14527	40535	2.7904	1335.7	11.868	187.49
	UTI (U71)	0.0303	1	45.687	3	12.542	1	Log Normal		1.2755 8.7472	16345	46917	2.8704	1851.7	10.77	147.75
W	Infertility/ Subfertility	0.02679	1	N/A		N/A		Weibull		0.59016 1.255 7E.4	10552	23066	2.1859	974.72	5.6224	40.076
	Family Planning/con traception	0.07667	1	28.409	3	6.3185	1	Log Logistic		1.6561 2803.3	6263.4	15393	2.4577	971.62	6.0224	42.83
X	All	0.06178	1	395.77	19	N/A		Gen Pareto		0.61687 3235 195.93	8639.4	23025	2.6651	536.48	9.1881	129.32
	PIV (X74)	0.05861	1	2.4088	1	28.22	1	Gen Extreme Value		0.63649 1634.2 1485.9	5203.7	11300	2.1716	560.14	6.2598	52.885
Y	All	0.06045	1	35.305	19	N/A		Gen Pareto		0.52765 3117.5 354.09	6954.2	14801	2.1284	963.47	7.2285	67.977
	Circumcision (V80)	0.04955	1	7.7109	3	5.7801	2	Log Logistic		1.7639 2196	4594.9	14760	3.2122	1256.4	10.319	114.69
Z	All	0.01493	1	N/A		N/A		Weibull		0.60012 0.00304	3527.4	5029.9	1.426	434.52	4.4103	24.28
	Neo Natal Care (Z18)	0.09277	1	3.3043	1	17.318	1	Log Logistic		2.5409 2202	3419.3	4932.1	1.4424	448.37	4.8665	29.104

Source: EasyFit Data Analysis.

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4.3 Data interpretation.

4.3.1 General Interpretation.

Three models (Kolmogorov Smirnov, Anderson Darling and Chi-Square) were used to analyze payments/costs of ailments in each category. The statistics obtained in each model were used to rank and determine the best fitness for the distribution used. Some values obtained are too extreme due to effect of capitation in the costs of ailments. That is, the HMO does not pay for additional utilization of services by enrollees since the payment to provider capitates. This made some entries in the data collected to have some zero values due to over utilization of services by the enrollees. The presence of these values caused the payments to have some outliers or extreme values. Though different statistical measures were used to remove or at least mitigate the effects of this variability. These include: measures of central tendency (mean, median, and mode), measures of dispersion (range, quartile deviations), measures of variation (variance, standard variation, coefficient of variation, skewness, and kurtosis) and regression (testing of fitness, standard error). The mean shows the average payment or cost in each category of ailments. That is, the value that is considered as the most representative and typical cost of ailment. All other payments/costs must revolve/cluster around the average (mean) payment/cost. The standard deviation helps to measure variability in the results obtained in each category of ailments. The coefficient of variation in payments/cost is the standard deviation expressed as a percentage of the average payment/cost of ailment. This tests the stability or normality of the fitted distribution used. The skewness measures the departure from symmetry of the distribution used. In other words, it indicates the extent of which the central (average) payment/cost of the ailment is not located at the centre. The result obtained, according to the tables, indicates that nearly all the payments or costs of ailments are positively skewed, while those of kurtosis are leptokurtic. As earlier stated, in the face of skewness and highly peaked distribution, there is a need to choose a centre of gravity which will balance the values on either side of it for the purpose of simplicity of analysis and without losing generality. It must be noted that this Interpretation of results is based on the analysis of the data collected and presented.

4.3.2 Categorical Interpretation

A. General and Unspecified Ailments

Fever (A03)

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The distribution was best fitted by Generalised Extreme Value for both the provider and the HMO. Using the distribution of Generalized Extreme Value, a patient can pay an average amount of eleven thousand, seven hundred and twenty six naira (₦11 726) to treat fever within a given period of time. Going by health insurance, an HMO will make an average payment of ten thousand and sixty-five naira (₦10 065) to its provider for the same period of time. Since health insurance is a pool of payments, an individual with greater probability of contracting fever, in the presence or absence of a risk factor, is advised to procure any form of healthcare since what the HMO will charge any enrollee will be less than ₦10 065 as compared to ₦11 726 that will be paid if such individual has no health insurance cover.

PLASMODIASIS (A73)

Plasmodiasis is a malaria-like ailment. The difference being that malaria is contracted through mosquitoes while plasomodia cause plasmodiasis. Following the same interpretation under "fever", plasomdiasis can be best fitted by Generalized Pareto for both the provider and the HMO. It will cost an individual with no health care plan a sum of ten thousand eight hundred and eighty five naira (₦10 885) to treat this ailment, while a less sum of eight thousand six hundred and ninety seven naira and fifty kobo (₦8 697.50) can be paid, provided such a patient has a health plan in force. This result is reliable as the variability shown by the coefficient of variation is very small (less than 5%) in all cases under the general and unspecified ailments.

B. Blood, Blood Formation and Immune Mechanism Ailments

Under this category of ailments, distribution of ailments is based on Frechet (with two parameters: α and β) for provider payments while Generalized Pareto was used to model distribution of ailment costs under HMO. Using corresponding probability distribution functions in each case, an amount not less than ten thousand, four hundred and thirty six naira (₦10 436) is expected to be paid by an uninsured citizen. Alternatively, an insured citizen can go through a recognized health management organization to pay an amount not more than eight thousand three hundred and sixteen naira and fifty kobo (₦8 316.50) to treat any blood or blood related ailments.

Anaemia (B80)

This is a notable ailment in category B. Both the provider and the HMO payment distributions can be modeled by Generalized Extreme Value. For treatment, an uninsured person can pay as low as four hundred and fifty naira (₦450) or as high as one hundred and eighty-two thousand seven

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hundred and sixty naira (₦182 760) depending on the severity of the ailment at that particular period. To combat this by transferring the risk to an insurance, treatment of anaemia may not cost up to five thousand and thirty eighty naira and ten kobo (₦5 038.10).

D Digestive Ailments

The major ailments (Ulcer and Dental Care) were analysed in this category.

Ulcer (D86)

Provider distribution follows Generalized Pareto while that of HMO follows Weibull Distribution with two parameters (***α*** and ***β)***. The parameters under the Provider distribution are ***k***, ***α*** and ***μ.*** Fitting these parameters into the respective probability distributions, an individual can make an average payment of ten thousand four hundred and ninety three naira (₦10 493) to treat ulcer, while an HMO is expected to make an estimated payment of seven thousand five hundred and ninety-six naira (#7 596) to its provider on behalf of the enrollee to treat same ailment for the same period of time.

Dental Care (D19)

Both the provider and the HMO distributions follow the Generalized Pareto Distribution. An individual making use of health facilities without any intermediary (HMO) is excepted to provide an amount not less than thirteen thousand seven hundred and forty three naira (₦ 13 743) for the utilization of service, while an amount not more than eleven thousand eight hundred and sixteen naira (₦ 11 816) can be paid, provided the service of an intermediary is to be required.

F. EYE DISEASES

Distributions of the costs for HMO and the Provider follow the Generalized Pareto Distribution and Frechet (with two parameters) respectively. The excepted cost of treatment for any eye problem is twelve thousand three hundred and eighty-two naira (₦ 12 382), while there can be a reduction of two thousand and nineteen naira (₦ 2 019) if a health maintenance organization is carried along in the provision of such treatment.

CONJUNCTIVITIS (F70)

This is an ailment under category F. Both the Provider and the HMO distributions of costs follow Log-Logistic Distribution with two parameter (***α*** and ***β***). A provider can charge twelve thousand

eight hundred and three naira (₦ 12 803) on the average while this amount can be reduced by a sum of two thousand, three hundred and thirty-two naira (₦2 332) through health plan/insurance.

H. EYE PROBLEMS

Generalized Pareto Distribution parameters (***k***, ***α*** and ***β***) for the Provider's costs and the Generalized Extreme Value Distribution parameters (***k***, ***α*** and ***β)*** used for HMO stated an average cost of treatment of seven thousand two hundred and thirty-six naira and ten kobo (₦7 236.10) and five thousand one hundred and seventy-five naira and twenty kobo (₦5 175.20) respectively.

OTITIS MEDIA (H72)

A three-parameter Frechet Distribution (***α***, ***β*** and ***ϒ***) was used to model the Provider's costs while those of HMO follow a Generalized Extreme Value Distribution. Seven thousand, twenty three naira and fifty kobo (₦7 023.50), and four thousand eight hundred, twelve naira and forty kobo (₦ 4 812.40) represent average payment made to provider and HMO respectively.

K CARDIOVASCULAR DISEASES

A two-parameter Weibull Distribution was used for provider costs while HMO costs were modeled by a Generalized Pareto Distribution. Using the results obtained, all the HMO payments revolve around nine thousand fifty eight naira and thirty kobo (₦9 058.30) while direct treatment of any cardiovascular disease by uninsured person can cost as high as four hundred and sixteen thousand naira (₦416 000). This amount explains/reveals reason every social medium is littered with cases of uninsured citizens soliciting for help in order to pay their medical bills.

HYPERTENSION (K87)

Hypertension is a popular ailment under cardiovascular ailment category. Both the payments for treatments under the provider and the HMO follow a two-parameter Frechet Distribution. Fitting the parameters correctly and appropriately, the results show a sum of average amount of ten thousand eight hundred and eighty six naira (₦10 886) for uninsured individual while insured person can pay less than nine thousand two hundred, forty-four naira and twenty kobo (₦9 244.20). Having made the agreed payment to the HMO, an insured person can utilize the services of a provider as the need arises within a particular period without further payments. In the case of uninsured person, payment will be made to provider every time such person needs health services of the Provider.

L MUSCULOSKELETAL

A two-parameter (***α*** and ***β)*** Frechet and Weibull Distributions were used for the Provider and the HMO payments respectively. To be treated for any musculoskeletal problem through health plan put in place, the enrollee can still have extra sum of one thousand, five hundred and fifty-three naira (₦1 553) saved in his/her pocket at every utilization of service since payment not less than fourteen thousand, five hundred and ninety-six naira (₦14 596) will be made any time an uninsured person requires such treatment.

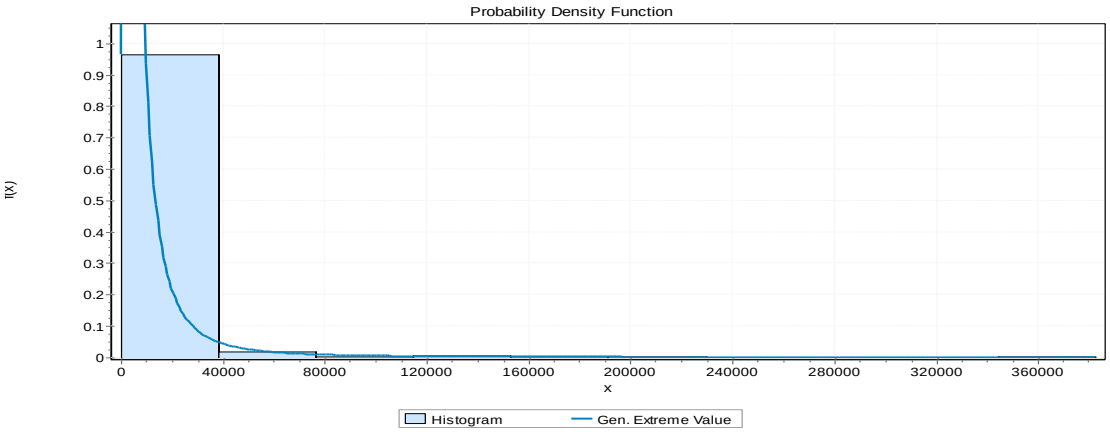
BACK PAIN (L02)

The Provider's payments follow Inverse Gaussian Distribution while Johnson SB Distribution best suits HMO payments. In direct service (without insurance), the range (difference between smallest and highest costs of treatments) is about one hundred thousand, one hundred and fifty naira (₦100 150). On the other hand, the range of HMO payments is sixty-two thousand, nine hundred and fifty-two naira (₦62 952). This requires an enrollee to make an average payment of not more than seven thousand, two hundred, fourteen naira and thirty kobo (₦7 214.30) to be able to enjoy healthcare services as wanted within the insured period.

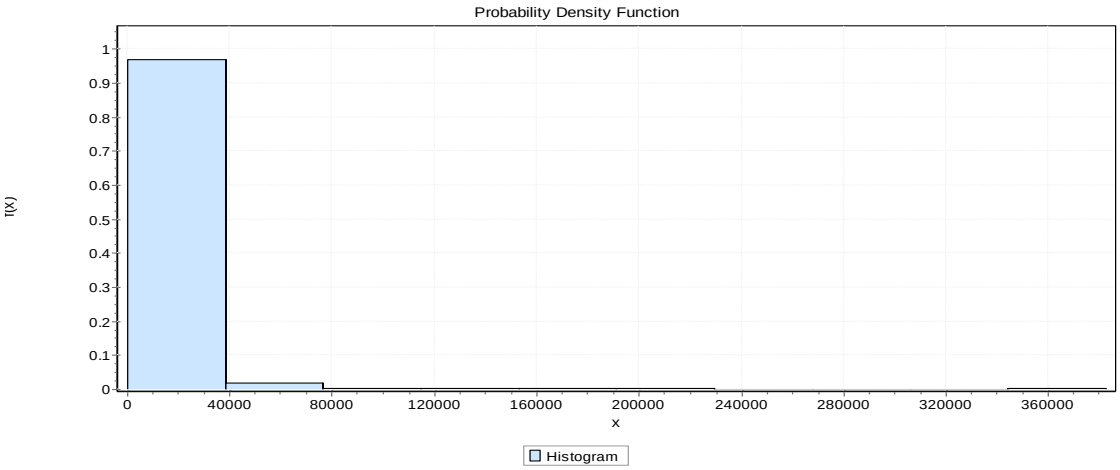
N. NEUROLOGICAL AILMENTS

Figure 7: Neurological Ailments

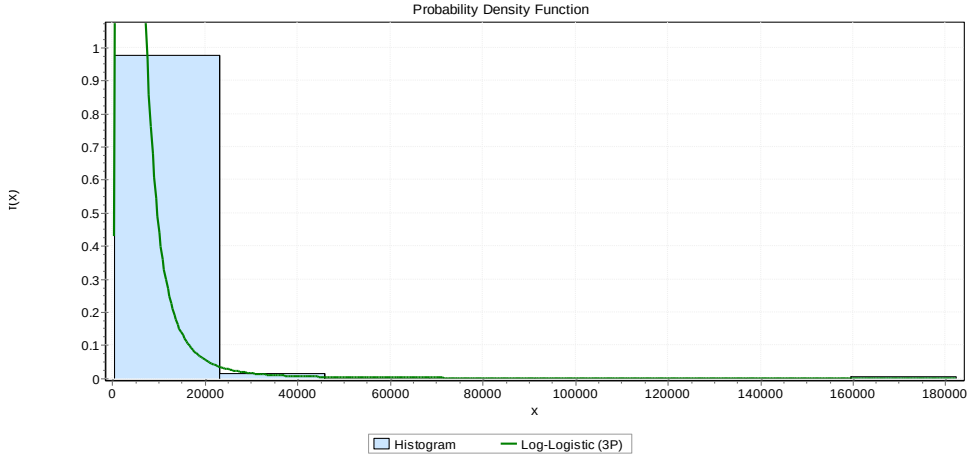
PROVIDER(ALL)



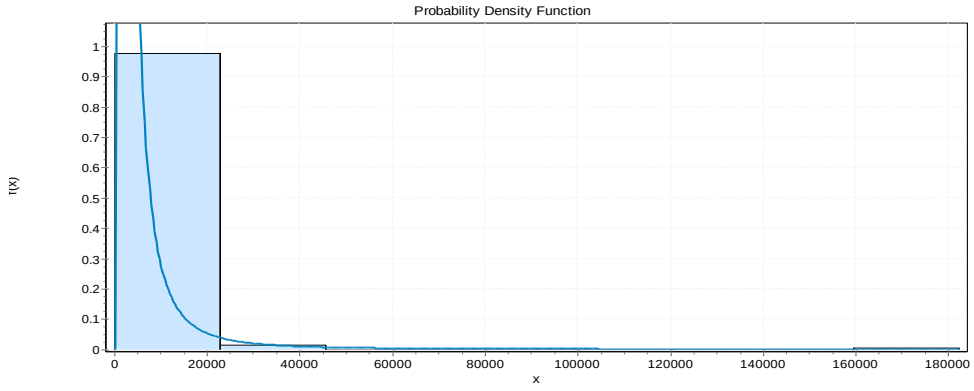
HMO(ALL)



PROVIDER (HEADACHE)-N 01



HMO(HEADACHE)

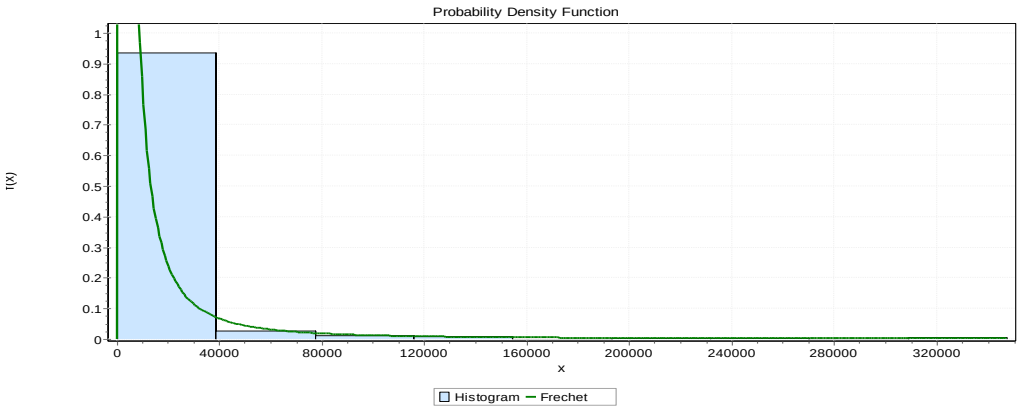


Source: Graphs From Easyfit Software Analysis

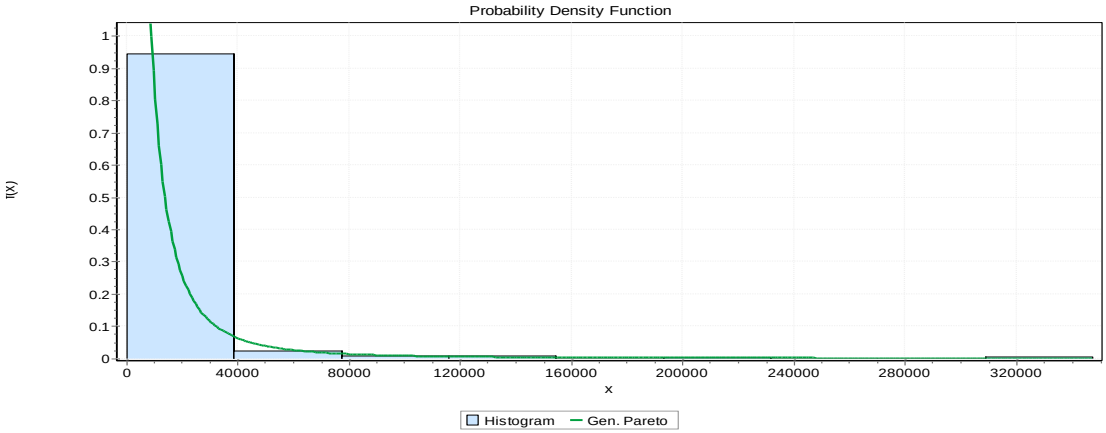
P PSYCHOLOGICAL DISEASES

Figure 8: Pyscholgocial Diseases

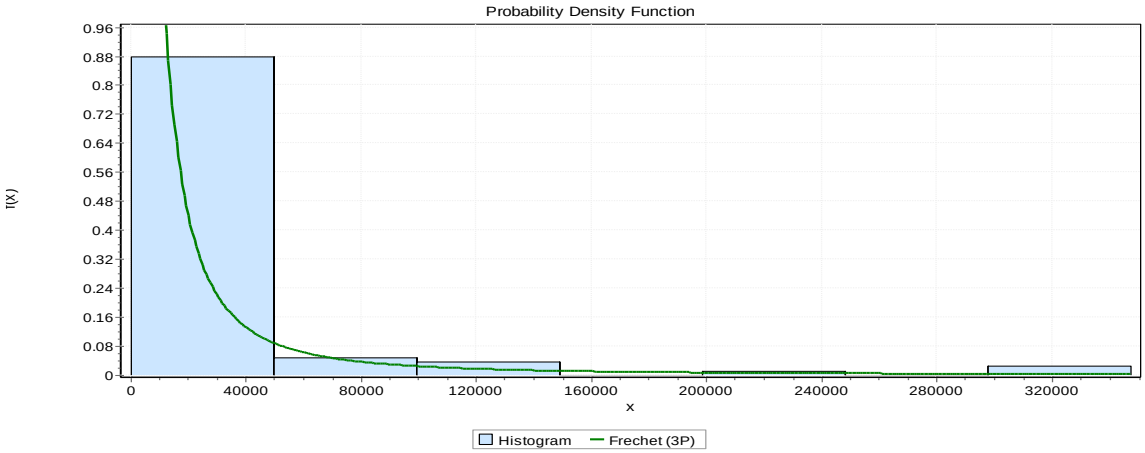
PROVIDER(ALL)



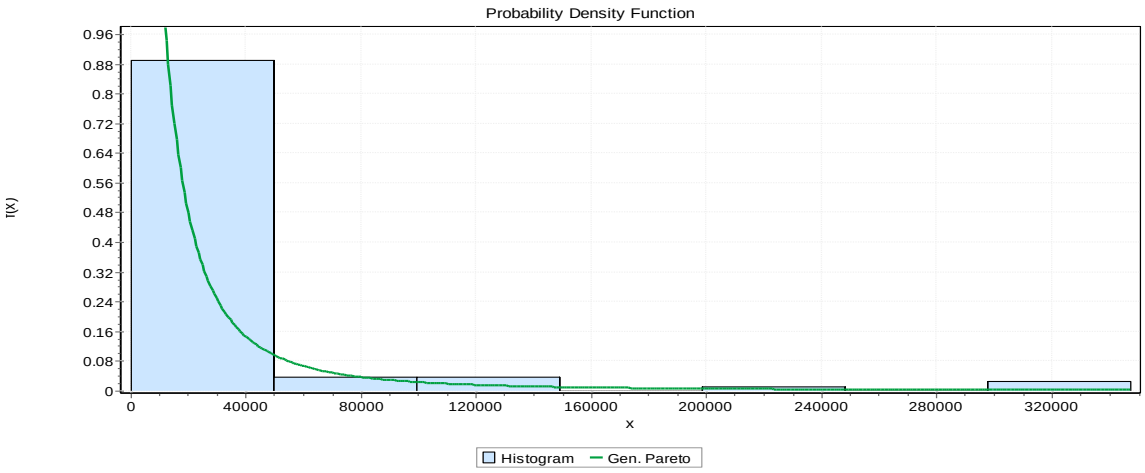
ALL (HMO)



STRESS(PROVIDER)



STRESS(HMO)



Source: Graphs From Easyfit Software Analysis

R. RESPIRATORY AILMENTS

Upper Respiratory Tract Infection and cough will be considered in this category.

Upper Respiratory Tract Infection (URTI) – R 74

Lognormal Distribution with two parameters (δ and μ) was used to model the costs in both groups (Provider and HMO).

If Log X $\frown$ N (μ, δ^2) for $-\infty < \mu < \infty$, $x < \infty$ and $\delta^2 > 0$.

The average cost of treatment is determined by substituting the values of δ and μ in $e^{\mu+\frac{1}{2}\delta 2}$. The average cost of treating URTI by out-of-pocket method is fifteen thousand, eight hundred and eighty three naira (₦15 883) while it is about fourteen thousand five hundred and eighty-six naira (₦14 586) through health insurance, irrespective of the number of visits to the Provider within the coverage duration.

COUGH (R05)

The provider and the HMO follow a 2-parameter Frechet (α and β) and 3-parameter Generalized Extreme Value (k, μ and λ) Distributions respectively. Using the parameters to compute modal payment (the most often paid amount) for both out-of-pocket and capitation methods, a sum of one thousand, sixty naira and fifty kobo (₦1 060.50) and four hundred, sixty eight naira and twenty-three kobo (₦468.23) are expected to be made by using the methods respectively.

S. SKIN DISEASES

While the provider costs are best fitted by Log-Logistic distribution, the best fitness for HMO costs is the Generalized Extreme Value.

	₦
Excepted Cost of Treatment (without health insurance)…….	12 092
Excepted Cost of Treatment (with insurance)……	10 363
Difference……..	₦1 729

DERMATITIS – S87

Distributions:

Provider – Frechet

Parameters – α, β and Υ.

HMO- Generalized Extreme Value

Parameters – k, α and μ.

Estimated/Expected/Average Cost of Treatment:

	₦
Out-of-Pocket…….	11 387
Insurance ……	10 184
Savings …….....	₦1 203

T ENDOCRINE, METABOLIC AND NUTRITIONAL AILMENTS

A total of about seven hundred and fifty-five ailments were analyzed in this category. Arranging the payments in increasing or decreasing order of magnitude, the middle (median) payments are:

		₦
Provider	=	2 900
HMO	=	2 250
Difference	=	₦ 650

DIABETES – T89

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Provider

Distribution – Weibull

Parameters - α and β

Mean cost - ₦9 184.40

HMO

Distribution - Generalized Extreme Value

Parameters - k, α and μ

Mean - ₦7 723.40

U UROLOGICAL AILMENTS

Log-Logistic and Weibull Distributions were used for analysing the Provider and the HMO payments respectively. Using the probability density functions to calculate the average of all payments, values generated are ₦14 527 (HMO) and ₦15485 (Provider).

Urinary Tract Infection (UTI) – U78

Table 7: Urinary Tract Infection (UTI)

Property	**Provider**	**HMO**
Distribution	Log-Logistic	Lognormal
Best Model	Kolmogorov Smirnov	Kolmogorov Smirnov
Parameters	α and β.	δ and μ.
Median	₦ 7 500	₦6 909.30
Mode	₦2 793	₦ 1 236.80
Mean	₦1 6856	₦1 6 345

W PREGNANCY, CHILD BEARING, FAMILY PLANNING

Family Planning/Contraception – W14

Family planning/contraception method of preventing unwanted pregnancy can cost an average sum of seven thousand, four hundred and thirty naira (without health insurance) while the cost is about six thousand, two hundred, sixty three naira and forty kobo if it is through health plan.

Infertility and Sub Fertility – W15

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Based on the data collected, treatment of infertility or sub fertility can cost as high as two hundred and fifty thousand naira (₦250 000) depending on the severity or degree of such infertility/sub-fertility. In a mild situation, an average cost of ten thousand five hundred and fifty-two naira if through health insurance or thirteen thousand one hundred and ninety-two naira is the corresponding cost of out-of-pocket arrangement.

X Female Genital Diseases

Average cost of treatment (Provider)= ₦10 623

Average cost of treatment (HMO) = ₦8 639.40

Pelvic Inflammatory Disease (PIV) - X74

Average cost of treatment (Provider) - ₦ 6 665.20

Average cost of treatment (HMO) - ₦5 203.70

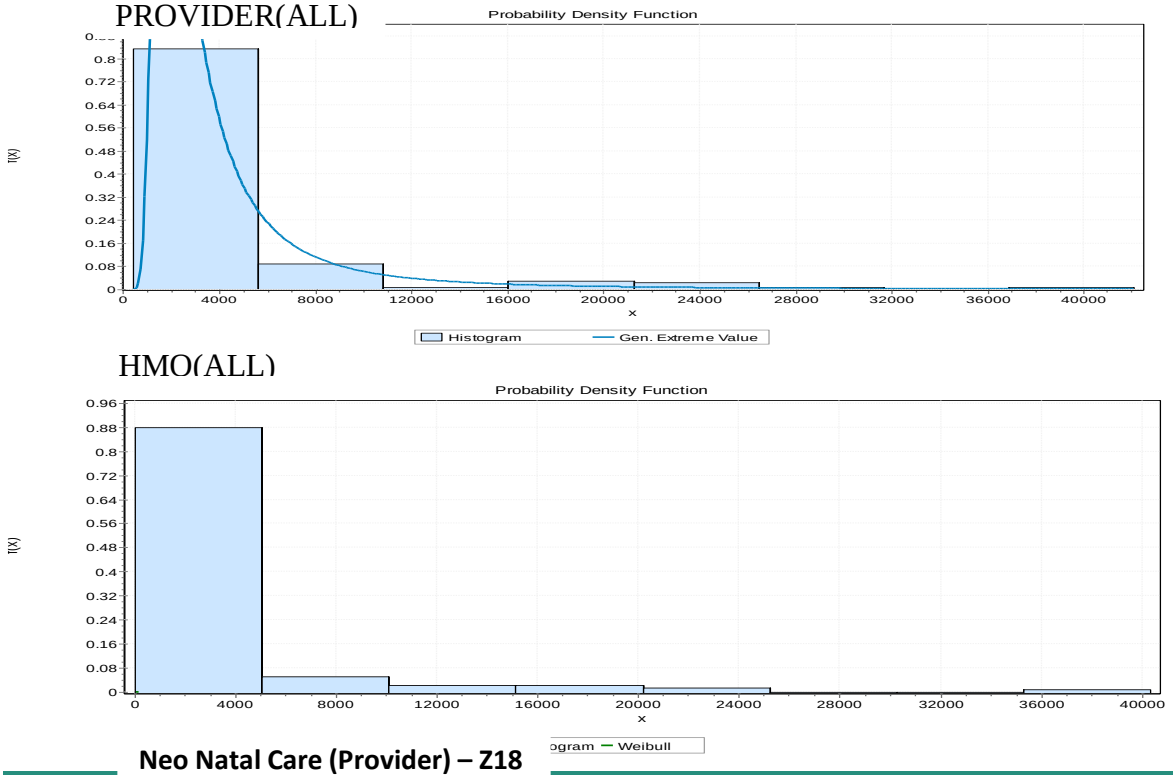
Y- Male Genital Diseases

Excepted cost of treatment (Provider) - ₦9 160.10

Excepted cost of treatment (HMO) - ₦6 954.20

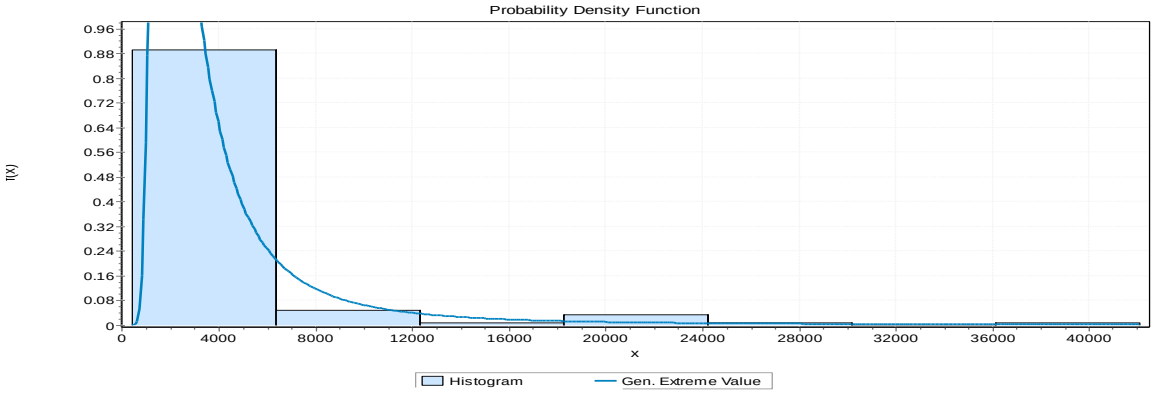
Z - SOCIAL PROBLEMS

Figure 9: Social Problems

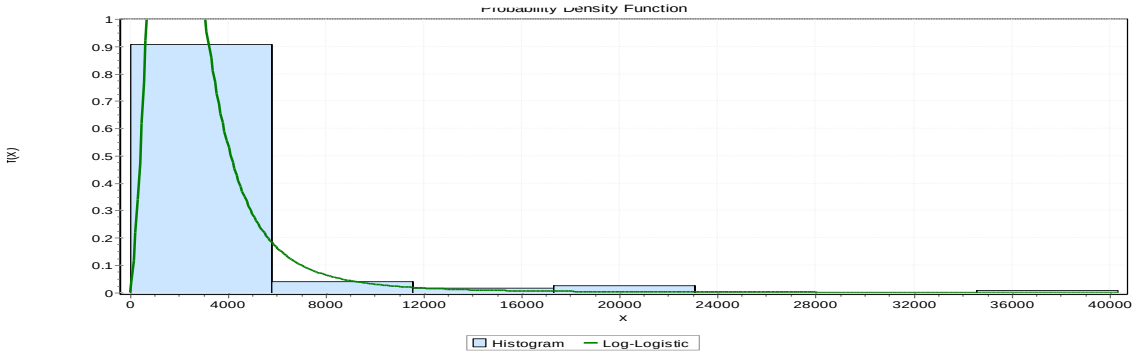


Neo Natal Care (Provider) – Z18

Neo Natal Care (Provider) – Z18



Neo Natal Care (HMO) – Z 18



Summary, conclusion and recommendations

Based on the data collected, analyzed, presented and interpreted, this section summarizes, concludes and gives recommendations on the whole findings of the study.

5.1 SUMMARY

As it was earlier quoted, the health of a nation's citizens shows the wealth of that nation. In this research, series of situations concerning health insurance have been extensively discussed. They include; various health conditions in Nigeria, modes of operations of health insurance system, health risks, modeling, underwriting, healthcare costs, forecasting and variation in the estimates of the average patients' health costs as it affects preference. Quality healthcare delivery constitutes a high profile challenge in Nigeria. The drive by government to ensure universal access to health care and at low cost is proving even difficult. The study revealed that some citizens have more access to healthcare services than the others. Specifically, it demonstrated that there is discrepancy among employees or households in their access to quality healthcare delivery. According to World Health Organization (WHO, 2010), the provision of quality, accessible and affordable healthcare remains a serious problem in Africa because of inadequate funding and lack of government commitment to the provision of healthcare policies that cover all citizens. Even the affluent

individuals, politicians and government officials, especially the President himself, will prefer to travel abroad to get treated for small ailments (such as ear infection) which are "easy-peasy" for our doctors to treat/cure/prevent. It was pointed out in the course of this study that people in rural areas seem not to participate in full capacity in any form of health insurance as compared to the people living in the urban areas. Findings showed that it was not because they were not well informed about any form of health insurance, but it was due to costless access to cheaper purported healthcare alternatives. They prefer to use free/cheap herbal drugs of any prescriptions from native doctors or traditionalists. This may be attributed to high level of poverty in Nigeria as vast majority of the population live below poverty line. Bureaucratic corruption and various electoral malpractices are presumed to be responsible for government inability to effectively provide social services and reduce poverty in Nigeria. They undermine and weaken vital institutions of development (including that of health) and contributed to the continual ranking of Nigeria by United Nations Development Programmes (UNDP) as one of the countries with health crisis, high mortality, food insecurity and poor nutrition. Lack of adequate medical personnel in hospital and clinics is another impediment to the effective health insurance system in Nigeria. People who have health insurance often complain they do not receive the best services from their providers. The situation is even worse in the rural areas where the medical consultants hardly reside due to poor conditions of living. Evidence shows that the exodus of medical personnel from Nigeria to the United States of America and the United Kingdom is jointly responsible for the personnel situation in the health sector. According to WHO (2010), there were 2,393 Nigerian doctors practicing in the U.S and 1,529 in the UK. Vanguard Editorial observed that the movement of medical personnel outside the country is detrimental to the health sector, since Nigeria is still managing with 0.28 physicians per 1000 persons and 1.03 nurses per 1000 persons. Under this condition, the realization of NHIS objectives in Nigeria becomes an uphill task, as some hospitals in the country still battle with inadequate and obsolete medical equipment problems. Variation in pricing, which is the focus of this study, is another big issue in health insurance in Nigeria. Though the rising cost of health equipment justifies the cost of health services, but only few of the entire population can regularly meet up the payment requirements as and when due since the vast majority live on less than $1 per day. How can somebody who lives on less than $1 per day afford to pay for health insurance which is more than $1 per day? Notwithstanding the shortcomings of the health insurance industry and practitioners alike, there is need to preserve the country's health insurance market. Health insurance business has helped to mitigate health risks by spreading them from individuals and

companies to the larger and global community, and provides an important source of long term finance for the public and the private health sectors.

5.2 CONCLUSION

As it has earlier pointed out, curbing the rising costs of health plans should not be limited to prices only. The primary healthcare system provides Nigeria with a strategic framework for mass movement towards achievement of the health-related Millennium Development Goals (MDGs). Monitoring and Evaluation (M&E) is the burning platform of that movement which will enable us to stay on track. The use of advanced data mining techniques to improving decision making has already taken root in insurance industry as well as many other industries. However, the application of such techniques for more objectives, consistent and optimal decision making in health insurance is still in a nascent stage. This research has described ways data mining and multivariate analytical techniques can be used to improve decision making processes and functions such as; health insurance underwriting, modeling, pricing and forecasting. Most people would agree with the idea that all individuals should have access to health services and should not face financial hardship if they fall ill or are injured. However, more than 100 million people suffer financial catastrophe and fall into poverty due to out-of-pocket health expenditures every year. The call for universal healthcare (health systems providing both access to health services and financial protection) challenges the governments to make efforts towards achieving this goal in the near future. More fundamentally, the need for reliable and instructive measure of healthcare pricing is increasing and new sectors of the healthcare industry are demanding such information. Systematic evaluation of the standard tools for health plans effectiveness and performance is critical. In the analysis, high internal consistency was observed for most of the measures sets. This research implies that there are opportunities for variable reduction and simplification. To price health insurance products, health actuary can rely on two kinds of statistical data: external and internal data. In general, the external data cannot supply the actuaries with the information needed for premium/cost calculation due to different bases of observation. Until now, most Nigerian health maintenance organizations still have not got enough professionals and IT system to accumulate or analyze the real claim record of their health insurance business. The health actuaries still have difficulty in making valid/effective assumptions from their own company data. Building a database is the first step for pricing. When pricing a health insurance product, the actuary must make sound actuarial assumptions based on the total amount of financial loss due to likelihood of injury and illness of the insured over a certain period. This can be separated into two aspects: frequency and severity.

Frequency is how often a loss case occurs during a given period of time while severity is the average amount of loss and this is called Continuance Table by American actuaries. Lacking experienced claim data from the insured, the Nigerian health actuaries use and rely on external data from report on national investigations on health service to form continuance table. Therefore, Nigerian health actuaries introduce a contingency margin into the premium calculation in order to avoid the situation that the actual claims significantly exceed the expected. In practice, this safety loading varies from one organization to the other based on the risk premium. The actuaries have realized that a sound expense assumption is necessary for an enough and competitive price. This is made as a proportion of net or gross premium. When pricing a long term or lifelong health insurance product, a level premium rating is adopted. The actuaries estimate not only the current benefits but also the whole benefit to the end of the contract. Additional assumptions such as mortality, interest, lapses rate and trend factor must be set. The probability of an insured staying healthy or sick must be ascertained with high degree of accuracy. The technical rate of interest is an important factor to get the cash value of premium income and the claim cost when calculating level premium. The Nigerian actuaries have known from their experience that the probability of hospitalization and the days of hospital stay are relatively steady, but the medical service costs keep rising. So, when estimating the expected amount of claims in the future, the rising medical service/equipment costs must be taken into account. In doing this, a correction factor known as trend factor is usually applied. It has been observed that there are four principles that an actuary must follow in setting the premium rate of health insurance products: adequacy, reasonableness, competitiveness and equity. In practice, principle of adequacy is considered as the most important principle. In order to keep the amount of premium enough to cover the benefit payment and the cost of administration, actuaries make a very conservative premium rate. Also, more attention is given to the principle of competitiveness. Though competiveness in Nigeria is not like some other mature health insurance markets, the actuaries still consider this principle and keep their health prices not to be significantly higher than those from others for the same coverage. For the principle of equity, the prices of most medical expenses differ for people of different genders and ages. In order to keep the premium each insured pays in consistent with the expected claim to get, health actuary must get the help from the health underwriter to review the health status of the insured. The first step of pricing a health policy is predicting the amount of claim payments. The annual claim cost and the risk premium can be derived by multiplying the frequency of occurrence and the severity. Finally, the most important issue in health insurance is the premium calculation. Actually, the pricing of health insurance plans is involved with many aspects such as the

management of anti-selection and moral hazard; uncertainty and risk aversion; the demand for health insurance; information disparities; regulation; supply-side and demand-side selection. Based on this research, health insurance cost computations may be very difficult compared to other forms of insurance business. This is due to some factors such as insufficient data, unsound regulation and dramatically changing environment of ours.

Table 8: Summary of Research Findings Based on Research Questions

Question content	**Findings**
Health care financing functions	Collection of revenues, pooling of resources and purchases of healthcare services.
Major source of bankruptcy	Huge medical expenses
Health insurance market	Competitive: This leads to efficient outcome as it directs consumers and firms to behave efficiently.
Poorly chosen contributions	They mitigate efficient outcomes
Actuarial principles	They are not fully understood and applied in a way to sufficiently benefit all parties. HMOs and other participants place their returns above beneficiaries' healthcare needs.
State/condition of health insurance in Nigeria.	Not at its peak
Awareness of health insurance	About 70% of rural settlers do not know some crucial and salient facts, while not less than 30% of urban settlers are aware of it.
Funding	Inadequate funding, lack of government commitment and political will to make funds available. Major sources are: government budget, donor funding, health insurance and out-of-pocket method (commonest and covers about 70%)
Health insurance: human right or product to buy?	Human right to selected minority while it is bought by the majority as a product
Major payment mechanisms or methods	Per diem, per case, fee for service, capitation, global budget

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Accessibility and affordability	Economically inaccessible of healthcare by the populations in greatest need is due to out-of-pocket expenditure method.
Corruption	Bureaucratic corruption is one of the factors responsible for government inability to effectively provide universal healthcare and reduce poverty level.
Disbursement of contributions	About 67% on healthcare service delivery, 27% on administrative charges while less than 7% on reserve fund.
Premium principles	Adequacy, reasonableness, competiveness and equity
Data mining techniques and technology	The use of data mining techniques to analyse costs is still in nascent stage. There are no enough professionals and IT system to accumulate or analyse the real claim record and statistical/actuarial data pertaining to health insurance/plan.
Usage of assumptions	Wrong assumptions used by purported health experts have adverse effect on healthcare costs.
Medical personnel	Nigerian medical personnel migrate to UK and US for greener pasture. This leads to shortage of personnel in Nigeria.
Equipment and quality of medical services	Rising cost of equipment responsible for high cost of healthcare plans. Also, people with health plans complain they do not receive best services from providers.

5.3 RECOMMENDATIONS

Based on the findings arising from this study, the following recommendations are offered.

- Hospitals, clinics and healthcare centres providing health services to beneficiaries/insured should be properly equipped. Government should provide funding to ensure that these establishments are properly equipped.
- Adequate and well trained medical personnel should be employed to man the various hospitals, clinics, labs and healthcare centres where health services are provided to the enrollees of any health plans.

- Government agencies responsible for fighting corruption should peruse the activities of the providers and health maintenance organizations to ensure that corruption does not limit and weaken the health programmes in the country.
- It must be noted that health insurance pricing is not about micromanaging doctors as they practice medicine or about putting profits above patient care. It is about the introduction of pricing models and management tools which will automatically raise the quality of healthcare to everyone. It is a new system that will bring about lower costs, higher quality and greater convenience than could be achieved under out-of-pocket system. That is, providing healthcare that is simpler, more convenient and less costly.
- As health insurance business penetration increases, the purchaser preference for "managed" benefit packages such as lower costs and higher quality of services begin to drive the industry. Therefore, the providers need to be proactive and consistent in identifying and selecting which viable HMOs to contract with.
- Government should provide subsidies to employers who wish to provide health insurance coverage for their employees. The purpose of the subsidies would be to reduce the net cost of providing coverage, thereby, increasing their willingness to provide health insurance for their employees. Multivariate models of the employer decision to sponsor coverage and the impact of pricing on coverage should be estimated. This will show or measure how the employee willingness to enroll in an employer plan varies with the employee premium contribution requirement.
- Clearly, the insuring public would like to have lower health insurance premiums in the face of rising cost of medical treatments. The low premiums would do health maintenance organizations no good because the solvency of the health organizations and their providers must be preserved. Whatever the source of pressure in pricing health plans; be it underwriting, modeling, planning or regulation, the actuary must attempt not to be the advocate of anything except the TRUTH.
- Cost sharing should be introduced. This will help to charge the utilization of services or prescription drugs for enrollees of public or private health insurance schemes by controlling moral hazards and financial risks.
- Finally, it is no more news that most people entrusted with the responsibility of developing pricing models for health plan costs do not actually know the rudiments and principles involved in developing such models. The pricing models in any health insurance plans

should be actuarially and professionally determined, developed, constructed and built. Monitoring is also required for efficiency, transparency and the quality of services which is essential to increase the willingness to prepay for health care. Flexibility is important in health insurance pricing model as circumstances can change at the time of implementation.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

Due to the problems encountered in this research, there are things that were not possible to be easily carried out. These areas will be further research study. They include:

- Detailed analysis of health plan premium calculation and underwriting processes.
- Details on risk assessment and management of various health insurance products.

Details on health plans design and cost sharing.

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