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An Assessment of the Drivers of Health Care System: An Empirical Evidence from Nigeria

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Abstract- This study discusses the trend and features of the health care delivery system in Nigeria and delved into examining factors that affect its performance using data obtained from the CBN and World Bank spanning 1980 to 2014. Four models were estimated using different indices – economic and social - of health care system and the OLS technique used for estimation. Results obtained revealed that the states of institution and infrastructure as well as the levels of income and education were very significant determinants of health care system in the country. Government subsidy was not very significant and health policy or reform had no significant impact. Infrastructure, income and education had the expected relationships with all social indicators of health care as they improve life expectancy and reduce infant mortality rate; but were negatively related to the economic index with no significant impact. More so, institution and subsidy had a mixed relationship with the health care system. It recommends that the government, relevant authorities and practitioners in the health sector support policies that would bring about improved quality health outcomes in the country.

I. Introduction

The health care system (HCS) of a nation is the organizational framework for the production, consumption and distribution of health care services and the health needs of the communities in the nation. A good health care system will enable health services to be produced and provided to reach the citizens of the nation wherever they are located in their homes, educational institutions, work and public places (social, recreational or worship places). Basically, HCS is a continuum between a competitive market system and a state monopoly, indicating that HCS ownership could be completely by the private sector or the public sector or a combination of some sort by both private and public sectors. The private sector owns 38% of these facilities and provides 60% of orthodox health care in the country (Omoluabi, 2014; 15). Therefore, different countries would have their HCS organized within the continuum and they can be assessed by their responsiveness to economic, social, technological, environmental and historical factors.

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In Nigeria, HCS is shared between the private sector and the public sector which includes the three tiers of government-local, state/regional and national/federal. Health services are provided by federal state and local governments, missionaries, corporate organizations, private agencies and individuals. Health care service delivery in the country is at the primary, secondary and tertiary levels. The three tiers of government have basic responsibilities of each level of health care though there is no stringent rule or demarcation between their services. The Federal government's role is basically restricted to university teaching hospitals and federal medical centres, the State governments are in charge of general hospitals and the Local government is in charge of dispensaries and their services. It is important to note that the Federal government provides supervisory role overall health care deliveries through its agencies such as Ministries of Health (federal and state) and recently some parastatals such as National Agency for Foods and Drug administration and Control (NAFDAC), National Drug Law enforcement agency (NDLEA). The health service delivery system in Nigeria is characterized by: Federal government provision of supervisory role overall health care deliveries through its agencies and parastatals; modern and traditional health care which exists side-by-side; a free choice of health service provider by individuals; private production of health care services; fixed salaries for hospital based physician and national health insurance scheme (NHIS) at infancy.

Government total health expenditure-GDP of Nigeria ratio rose from 1.2% in 1980 to its peak of 9.2% in 2001 and declined to 3.5% in 2013 over the period (Figure1).The proportionate change in this ratio between 2001 and 2013 amounts to a significant 62.5% and average ratio for the period was 2.8%. The values of this ratio did not perform favourably in 1995 and 2005 when compared to those of some African countries like Ghana, South Africa and Egypt (Table 1).

Nigeria's female and male life expectancy values of 53.1 and 52.42 years respectively in 2014 are lower than those of Ghana, South Africa and Egypt in same year (Figures 2 and 3). Life expectancy position of the country lies below the sub-Saharan Africa regional values of 59.9 and 57.2 years for female and male respectively. In 2015, the infant mortality rate in Nigeria stood at 69.4 which is higher than those of Ghana

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(42.8), South Africa (33.6), Egypt (20.3) and even in the sub-Saharan Africa (56.3 (Figure 4).

Nigeria ranks among the countries with the highest child and maternal mortality rates globally: the under-five mortality rate is 201 per 1,000 live births, maternal mortality ratio is estimated at 800 per 100,000 live births (UNICEF, 2004). Among the major contributors to the disease burden of the country are malaria, tuberculosis (TB), and HIV/AIDS. Malaria is a major health and developmental problem in Nigeria, with a prevalence of 919 per 100,000 population (WHO, 2012). The HIV/AIDS epidemic has unfolded on a large scale in Nigeria with adult prevalence put at 3.9 percent and nearly 2.9 million people living with the virus (UNAIDS,2006). Tuberculosis cases have also increased dramatically with the increase in HIV/AIDS cases in the country, with an estimated prevalence of 546 cases per 100,000 population in 2004. (UNAIDS, 2006).

Nigeria has one of the largest stocks of human resources for health in Africa comparable only to Egypt and South Africa. There are about 39,210 doctors and 124,629 nurses registered in the country, which translates into about 30 doctors and 100 nurses per 100,000 populations (NHR, 2012). This compares to a Sub-Saharan African average of 15 doctors and 72 nurses per 100,000 populations (WHO 2006). While the number of healthcare professionals in the country represents a cause to be joyful, the current exodus of qualified doctors and healthcare workers coupled with the inadequacy and obsolescence of health infrastructure presents a worrying trend.

Possibly the falling and failing institutional standards which cuts across various sectors of the economy could be a reason for the dismal status of health care delivery in the country. Ejumudo (2013) adds that the plausible explanations for the poor performance are the decline in governance and near absence of quality culture. Therefore, considering the relatively poor health indices in Nigeria, it is very necessary to critically investigate what drives the performance of the health sector of the economy. This study seeks to answer this vital question and proffer remedial policy suggestions that could enhance the health system of the country.

II. Literature Review

a) *Theoretical Literature*

Grossman (1972) developed a model of the demand for the commodity "good health" with a central proposition that health can be viewed as a durable capital stock that produces an output of healthy time. The model assumes that individuals inherit an initial stock of health that depreciates with age and can be increased by investment in health. In this model, the "shadow price" of health depends on many other variables besides the price of medical care. It is shown that the shadow price rises with age if the rate of depreciation on the stock of health rises over the life cycle and falls with education if more educated people are more efficient producers of health. A major deduction from the model is that under certain conditions, an increase in the shadow price may simultaneously reduce the quantity of health demanded and increase the quantity of medical care demanded. Also the health investment function is synonymous to a health production function having cost of medical care or services, time spent in health enhancing or producing activities and other factors which includes environmental factors as its arguments.

In a related manner, Wag staff (1986) further emphasized the economic theory of the "demand for health" as an apparatus for analyzing the interaction of the socioeconomic determinants of health and indicates how it can be used to shed light on a variety of topical policy issues such as socioeconomic inequalities in health and the design of prevention policies. He extends the discussion of the theory to "the health production function", "the budget constraint", "consumer equilibrium" and "effects of changes in income, price of health care/service and technical knowledge". Among some others he came up with the prediction that increase in the price of health inputs should lead to the deterioration of health status.

b) *Empirical Literature*

Ichoku and Fonta (2006) examined the extent to which a system of healthcare financing leads to catastrophic expenditures, defined as a threshold percentage of a household's income, and the extent of impoverishment arising from healthcare spending. They used the Aronson, Johnson, and Lambert (1994) decomposition framework to analyze redistributive effects in terms of vertical and horizontal inequities, as well as re-ranking effect in Enugu State, Nigeria. The study showed that healthcare spending engenders high incidence of catastrophic spending and impoverishment in the population. Also, they found that healthcare spending is pro-rich in its redistributive effect, with significant vertical and horizontal inequities as well as re-ranking inherent in the system. The paper suggested policy reforms that separate healthcare utilization from healthcare financing if the poor are to have access to healthcare services.

Aina, Waheed, Isiaka and Oluremi (2015) investigated the determinants of demand for health care services among rural household in Ekiti State of Nigeria using descriptive and multinomial logit model to analyze collected data. They discovered that majority of the respondents are males, married, in their middle age and preferred using Dispensary/Primary health care because of its proximity as source of health care services in the study area. The empirical analysis showed that, sex, marital status, household expenditure, and waiting time out of all the explanatory variables used were found to

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be significant factors affecting demand for health care services, among the rural households sourcing health care services from dispensary/Primary health care, private hospitals/clinics, patient medicine stores, general / teaching hospitals and traditional/spiritual homes. Patient medicine stores were used as the base category.

Akacho (2014) examined the factors that influence the provision of healthcare service delivery in Kenya using UasinGishu District Hospital in Eldoret as a case study. The study found that poor communication among management, staff and patients influenced the quality of performance and contributed majorly to the inefficient delivery of healthcare services in the hospitals. She also found lack of enough financial resources, inadequate laboratory equipment and medicine for patients hindered the effectiveness of the hospital. Some recommendations of the study was that there should be enough qualified staff employed by the Ministry of Health, adequate and equitable financial allocation to all the hospitals in Kenya and availability of hospital facilities.

Ejumudo (2013) examined the critical role of the management of environmental stakeholders in quality service delivery with data derived from in-depth analysis of secondary sources. The study recommended exigency of a service culture and development orientation in the public health sector, proactive and pragmatic management of health institutions and organizations as well as their interface with key environmental stakeholders (players) and concerns and synergistic mentality and systematic practice.

Lewis (2006) presented a study that demonstrated the relationship between governance indices and measures of health performance and outcomes. Measles immunization coverage was used as a measure of public service performance of government and child mortality as a variable for measuring health outcomes. The ordinary least squares results showed that government effectiveness (measles immunization coverage) has a significant positive impact on health outcome (child mortality). The study asserted that government effectiveness is consistent in its effect on immunization coverage in the various models considered and concluded that good governance is important in ensuring effective health care delivery, and that returns to investments in health are low where governance issues are not addressed.

Rajkumar and Swaroop (2002) measured the impact of corruption on the effectiveness of health spending analyzing data for 1990 and 1997 controlling for GDP per capita, female educational attainment, ethno-linguistic fractionalization, urbanization among other factors. They concluded that the effectiveness of public health spending in reducing child mortality hinges on the integrity rating (1-5 range based on level of perceived corruption), with higher integrity associated with reduced mortality. And that poor governance may help to explain the inconclusive findings of some studies on the lack of association between public health expenditures and infant and child mortality.

In a similar study Wagstaff and Claeson (2005) further extended the above analyses using more recent data on the World Bank's CPIA score (Country Policy and Institutional Assessment as a measure of governance. Their findings revealed that under 5 mortality was reduced by spending; and study concluded that extra spending in medium and low CPIA countries would not be expected to reduce child mortality, and that per capita income growth offers a better investment if mortality declines are the objective.

Azfar, Kahkonen and Meagher (2001) conducted a survey in four provinces covering eighty municipalities in the Philippines. They found that corruption perceptions of households was negatively related with providers' knowledge (of required immunizations), which in turn was strongly related to immunization coverage and disease incidence in the survey areas. The study established a negative relationship between corruption and health delivery performance at the local level.

Ademiluyi and Aluko-Arowolo (2009) in a study on Infrastructural distribution of healthcare services in Nigeria found that from the colonial period, the distribution of medical care deli- very in Nigeria has favoured the urban population at the expense of the rural settlers and that the health services in the country has tended to be placed specifically on three pedestals of primary, secondary and tertiary health institutions for rural, mixed population and urban elite respectively. They also, found that infrastructural distribution of healthcare did not favour the rural areas (that is, the rural majority) in Nigeria largely neglected to satisfy the urban areas, where the educated, the rich and government functionaries reside. The paper suggested the need to redistribute the provision of this infrastructure to benefit all, irrespective of where they live.

Limwattananon et al (2011) assessed the effectiveness of the UC policy on financing of the Thai health care system which was equitable before the implementation of the UC policy but became more so after the introduction of policy. The study revealed that a larger contribution of more progressive direct tax payments and reduction in the share of regressive household out-of-pocket payments for health were two key influences on the progressivity of overall health care financing. The Kakwani index for overall health care finance, which measures the capacity of the health financing system to correct income inequity, changed from -0.0038 (overall regressive) in 2000 to positive (progressive) values of 0.0014, 0.0342 and 0.0406 in 2002, 2004 and 2006, respectively. And results clearly indicate that even before the UC Policy in 2001,

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outpatient and inpatient services were both pro-poor due to various government interventions in extending health service infrastructure in rural districts and a variety of health insurance arrangements. After the introduction of the UC scheme, public service utilization remained pro-poor. Overall, public subsidies were found to be pro-poor for both outpatient and inpatient services. In contrast, the utilization and benefits of teaching hospitals are pro-rich as they serve the better-off members of insurance schemes. They concluded that having a private sector which the rich are able to use as an alternative for shorter queues and affordable care is a further enabling feature favouring pro-poor utilization and public subsidies.

The empirical studies reviewed are mainly micro studies especially for Nigeria. No macro study was discussed except for that conducted in other climes using cross country data (Lewis, 2006;Rajkumar and Swaroop, 2002;Wagstaff and Claeson, 2005 and Limwattananon et al, 2011). None of the related studies on Nigeria considered education, health policy or reform and government subsidy as very useful arguments in their models; emphasis had been on income level, and infrastructure. Studies on Nigeria were also restricted to single models of health outcome. This study therefore contributes to the body of knowledge in an attempt to close this identified lapses using more robust estimation technique.

III. Theoretical Framework and Methodology

a) Theoretical Framework

This study adopts a framework by Lewis (2006) on producing public health care which states that the production function represents the core of public health care systems embodying capital, labour and governance. A simple representation is the following:

Health Outcomes = (L, K, G)

Where L, K and G denote labour, capital and governance respectively. Labor encompasses management, physicians, nurses and other medical staff. Capital is made up of infrastructure, equipment and other fixed assets, as well as financing while governance represents some measure of institutional quality or government transfers for local purchase, in-kind provision of drugs and supplies, and third party and consumer payments.. Increases in labor and capital can improve outcomes, but governance may dampen or enhance these effects. The functioning of the public system is determined by the incentives facing the actors in the system, the manner in which inputs are managed and the accountability imbedded in the incentive structure.

b) Model Specification

Following the above framework this study hypotheses a model of health care system (HCS) that depends on status of institution (INST), state of health infrastructure (INFR), level of income (INC), level of education (EDU), health policy or reform (HPR) and government subsidy (SUB). This is expressed mathematically as:

$$HCS = f(INST, INFR, INC, EDU, HPR, SUB) \quad (1)$$

In econometric form the model can be represented as:

$$HCS_t = \alpha_0 + \alpha_1 INST_t + \alpha_2 INFR_t + \alpha_3 INC_t + \alpha_4 EDU_t + \alpha_5 HPR_t + \alpha_6 SUB_t + \mu_t \quad (2)$$

The symbols α_is, for i taking values from 0 to 6 are coefficients to be estimated, t is the time period and μ is the white noise error term. The dependent variable HCS is considered from economic and social perspectives. Three HCS indicators are used under the social perspective thereby giving rise to four different models which includes one from economic and three from social perspectives presented below:

i. *Economic Model*

$$HEC_t = \alpha_0 + \alpha_1 INST_t + \alpha_2 INFR_t + \alpha_3 INC_t + \alpha_4 EDU_t + \alpha_5 HPR_t + \alpha_6 SUB_t + \mu_t \quad (3)$$

ii. *Social Models*

$$LEF_t = \alpha_0 + \alpha_1 INST_t + \alpha_2 INFR_t + \alpha_3 INC_t + \alpha_4 EDU_t + \alpha_5 HPR_t + \alpha_6 SUB_t + \mu_t \quad (4)$$

$$LEM_t = \alpha_0 + \alpha_1 INST_t + \alpha_2 INFR_t + \alpha_3 INC_t + \alpha_4 EDU_t + \alpha_5 HPR_t + \alpha_6 SUB_t + \mu_t \quad (5)$$

$$IMR_t = \alpha_0 + \alpha_1 INST_t + \alpha_2 INFR_t + \alpha_3 INC_t + \alpha_4 EDU_t + \alpha_5 HPR_t + \alpha_6 SUB_t + \mu_t \quad (6)$$

Apriori expectation is that all the parameter estimates (α and β) be greater than zero in equations 3 to 5 and otherwise in equation 6 as we expect the independent variables to be positively related to HEC, LEF and LEM and negatively related to IMR.

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Equations 3 through 6 are estimated with different economic and social indices of HCS discussed in the next section. The estimation procedure includes: unit root test for stationarity of variables, cointegration test for long run relationship among variables and Ordinary Least Squares (OLS) regression technique.

c) Data, Source and Measurement

Data set used for this study is sourced from the Central Bank of Nigeria (CBN) annual statistical bulletin 2017 and World Bank 2017 development indicators spanning 1980 through 2016. Economic index of HCS was measured using total health expenditure – GDP ratio (HEC) while its social indices were measured by female life expectancy (LEF), male life expectancy (LEM) and infant mortality rate (IMR). World Bank's CPIA score (Country Policy and Institutional Assessment) measured institution and health infrastructure was captured by government capital expenditure on social community services as a percentage of total capital expenditure. Secondary school enrolment rate and real GDP per capita measured levels of education and income respectively. Health policy or reform was captured by ratio of government total health expenditure to government total expenditure and government subsidy measured by pump price of gasoline.

IV. Empirical Results and Discussions

a) Tests for Unit Root and Cointegration

Results of the unit root test show that all the variables were integrated of different orders and their Augmented Dickey-Fuller (ADF) statistics significant at 1per cent level except EDU which was significant at 5 per cent (Table 2). Specifically, INFR was stationary at level I(0), LEF and LEM were stationary after second differencing I(2) while the other variables were stationary after first differencing I(1).Since the variables have different orders of integration (Table 3), residual series of the various models were tested for stationarity to test for cointegration among variables following the two-step approach established by Engle and Granger(1987). The residual series obtained from the various models were integrated of order zero -stationary at level- implying the existence of cointegration or a long run relationship among variables.

b) Ordinary Least Squares (OLS) Result

In Table 4 estimated variants of the model of HCS were quite robust and at least 81.7 per cent of the systematic variations in any of the dependent variables were explained by the independent variables. The F-statistic values of all the models were significant at 1 per cent level indicating that a hypothesis of a joint significant impact of the regressors on any of the regressands cannot be rejected. This validates the overall significance of these estimated models. Moreso, the Durbin-Watson statistical values suggest that there is no serious threat of serial correlation among residual terms in each model, thus the models are useful for this study.

Furthermore, Table 4 reveals that while INST and HPR have significant influence on health care delivery in economic terms the other regressors had no significant effect in the first model. The negative and positive signs INST and HPR respectively simply express their relationship with the health care delivery system measured using an economic index. However, emphasis shall be on models (2, 3 and 4) of all social measures of HCS in the country.

Apparently, INST has a consistent significant impact on all social measures of HCS except LEM. While it improved LEF and LEM, it has an adverse influence on IMR contrary to the study of Lewis (2006) in others climes which suggests a favourable relationship. This outcome is not desirable and it is an indication of a poorly organized system of health care delivery. It suggests that the pattern of medical care delivery, management practices and other activities obtainable in these health facilities are not effective and efficient which lends credence to the findings of Azfar et al (2001) and Rajkumar and Swaroop (2002).

The effect of INFR was significant with the expected signs on LEF, LEM and IMR It implies that INFR consistently enhanced HCS in the country which further explains the view of Ademiluyi and Aluko-Arowolo (2009).Although a larger proportion of health care services are provided by the private sector (Omoluabi, 2014) these enhancements also may not be unconnected with the increasing amount of medical facilities which includes newly established hospitals at the federal and state levels as well as the primary health centers and dispensaries at the local level, quantity of drugs and laboratory equipment available in these health institutions, number of medical personnel that graduates from colleges of medicine and so on. However, its negative relationship with the system in economic terms connotes that it is insufficient.

Again, INC had the expected signs with consistent significant impact on LEF, LEM and IMR. This implies that level of plays a vital role improving life expectancy and mitigating infant mortality rate supporting Aina et al (2015) claim that household expenditure is a significant factor affecting demand for health care services, among the rural households in Ekiti state sourcing health care services. The more income an individual gets, the higher his capability of producing health or ability to demand for health care services. This undoubtedly will improve the health status of such an individual.

Interestingly the level of EDU has the most appealing expected effect on all social and economics indices of health care delivery in the country over the period. It has a significant effect on LEF, LEM and IMR

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although its impact was not significant on HCS measured in economic sense but it is positively related to it. It simply indicates that EDU is a very potent input that contributes to a healthy health care delivery system. This is necessarily true because the more educated and informed health care seekers and providers are, the better the HCS and the more effective is the service delivery pattern of health care. The health care providers are abreast with the latest drugs and technology used in the treatment of diseases and seekers understand better any prescription given to them by medical professionals.

On the contrary, HPR has a very worrisome influence on all indices of HCS considered supporting earlier findings by Ichoku and Fonta (2006). Results clearly show that its impact on LEF, LEM and IMR was not significant but its relationship with these indices was inappropriate as it hinders their improvement which contradicts the results of the study conducted in Thai by Limwattananon et al (2011). However, its relationship with HCS in economic sense was significant but infinitesimal and negligible. It indicates that the state of policies and/or reforms made on health over the period were not strong enough to bring about the expected health outcomes and service delivery in the system. This may be attributed to a poor implementation of these policies or reforms which often does not cut across all income groups or geographical location coupled with the NHIS in a nascent stage.

Government subsidy removal on the pump price of gasoline has no significant impact on the measures of HCS except IMR. It also has a mixed relationship with the various indicators of health outcome used. A very disturbing relationship observed is the one with LEF. Consequent on these health outcomes, subsidy removal of gasoline does not send positive signals to the health sector performance in Nigeria, save for a situation where the government pumps in some of the monies realized from the process into the health sector. This way more funds is made available in the health care delivery system which could bring about desirable health outcomes in the country in line with the findings of Limwattananon et al (2011).

V. Summary, Recommendations and Conclusion

The study observed the trend and features of the health care delivery system in Nigeria and delved into examining factors that affect its performance using data obtained from the CBN and World Bank spanning 1980 to 2014. Four models were estimated using different indices – economic and social - of health care system and the OLS technique used for estimation. Results obtained revealed that the states of institution and infrastructure as well as the levels of income and education were very significant determinants of health care system in the country. Government subsidy was not very significant and health policy or reform had no significant impact. Infrastructure, income and education had the expected relationships with all social indicators of health care as they improve life expectancy and reduce infant mortality rate; but were negatively related to the economic index with no significant impact. More so, institution and subsidy had a mixed relationship with the health care system. While institution supported life expectancy, increased infant mortality rate and reduced the economic index; subsidy had a mixed relationship with life expectancy, reduced infant mortality significantly and increased the economic index. Health policy or reform had a wrong relationship with all social indicators as it reduced life expectancy and increased infant mortality rate. However, it had a positive relationship with the economic index though with a negligible significant effect.

Based on the findings above, it is imperative that the government, relevant authorities and practitioners in the health sector support policies that would improve the state of health infrastructure, reduce the income inequality hiatus among various groups and enhance educational standards. Also important is the entrenchment of working, functional and reliable institutions via good governance as this would boost peoples' confidence on the running of affairs of the state. There should be zero tolerance for corruption particularly in this sector and the economy as a whole as lives and well-being of people are at stake. Lastly, subsidy policy and health reform should be structured in a way that would be pro-poor and cover a wider range of people rather than a few rich individuals in the society.

The benefits inherent in an effective and efficient health care delivery system cannot be overemphasized as it is pertinent to having an improved health status and outcome in a country. It is therefore necessary for the government, affected authorities and all stakeholders to partner together in realizing this highly favourable target for a healthy and sustainable growth and development of the Nigerian economy.

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Table 1: Selected Health Expenditure by Country

Country	HE as % of GDP	HE as % of GDP	Immunisation of DPT3 %	Access to safe water
	1995	2005	2006	2004-2005
Algeria	3.3	4.1	95	85
Egypt	1.6	5.1	98	98
Ghana	1.5	8.1	99	75
Niger	1.6	6.5	64	46
Nigeria	0.4	4.5	69	51
South Africa	2.9	8.4	97	85

Source: AfDB 2007.

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Table 2: Unit Root Test of Variables

	Level		1st/2nd Difference		
Variables	ADF Stat	5% Cri Value	ADF Stat	5% Cri Value	Remark
HEC	-1.64804	-2.95711	-7.0798	-2.96041	I(1)***
LEF	0.388748	-2.98104	-4.45574	-2.62299	I(2)***
LEM	0.355982	-2.96777	-4.08711	-2.96777	I(2)***
IMR	-2.38896	-2.96041	-3.99873	-2.99806	I(1)***
INST	-0.82285	-2.95711	-5.56776	-2.96041	I(1)***
INFR	-4.60868	-2.95711	-	-	I(0)***
INC	0.962729	-2.95711	-4.13879	-2.96041	I(1)***
EDU	0.338715	-2.96777	-3.54148	-2.96777	I(1)**
HPR	-1.82412	-2.96041	-9.84247	-2.96041	I(1)***
SUB	0.644053	-2.98623	-5.07738	-2.99188	I(1)***

*Note: ***, ** and * denote significance at 1%, 5% and 10% respectively*
Source: Authors' compilation from E-views output.

Table 3: Unit Root Test of Residuals

	Level		
Model	ADF Stat	5% Cri Val	Remark
1	-4.90299	-2.98623	I(0)***
2	-2.82872	-2.98623	I(0)*
3	-3.78096	-2.98623	I(0)***
4	-3.72964	-2.98623	I(0)***

*Note: ***, ** and * denote significance at 1%, 5% and 10% respectively*
Source: Authors' compilation from E-views output.

Table 4: OLS Estimated Results

	HEC (1)	LEF (2)	LEM (3)	IMR (4)
C	2.43E-08	-6.502	27.41406	-147.216
INST	-3.58E-08***	70.10654**	16.63252	457.8187***
INFR	-5.42E-12	0.052111***	0.048129***	-0.22102**
INC	-6.54E-13	0.009609***	0.009007***	-0.04226***
EDU	2.75E-17	2.57E-07***	3.43E-07***	-2.60E-06***
HPR	0.0000000074**	-7.83488	-5.89768	17.10666
SUB	3.89E-13	-0.00402	0.004426	-0.09751**
R^2	0.817381	0.98307	0.993853	0.993629
F Stat	14.17362***	183.8788***	512.0184***	493.8898***
DW	2.011557	1.554139	1.520298	1.511518

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively
Source: Authors' compilation from E-views output.

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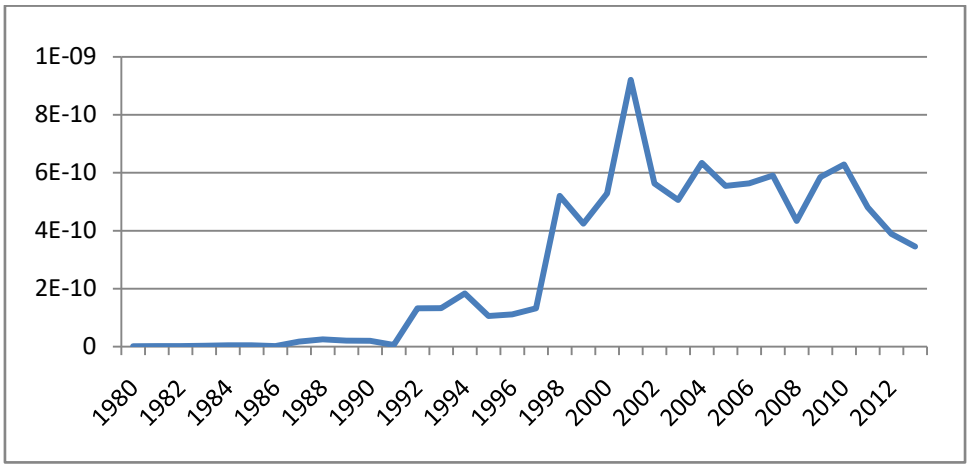


Source: Author, underlined data from CBN Statistical Bulletin 2017

Figure 1: Nigeria Total Health Expenditure – GDP Ratio 1980-2013

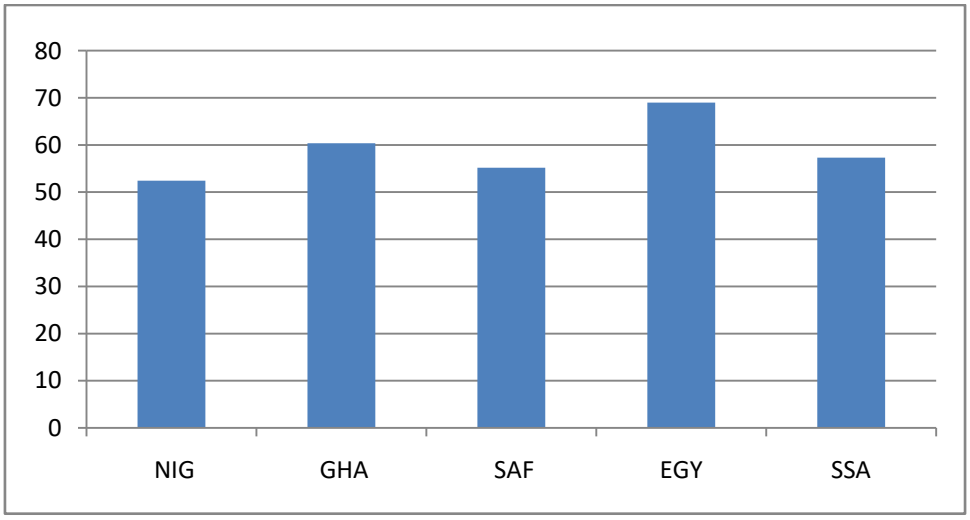
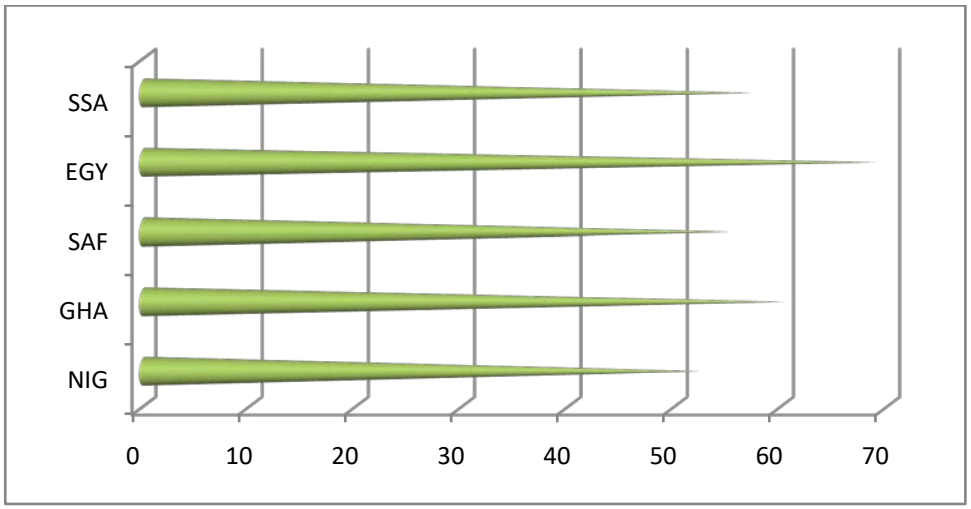


Figure 2: Female Life Expectancy 2016



Source: Author's, using World Bank Data 2017

Figure 3: Male Life Expectancy 2016

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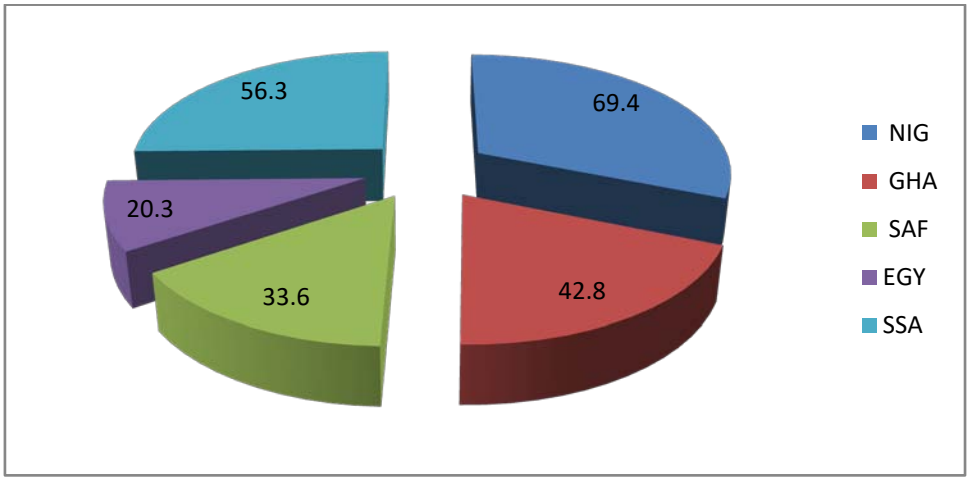

Figure 4: Infant Mortality Rate 2016

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