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THE IMPACT OF STATE HEALTH INSURANCE SCHEME UPON FINANCIAL PROTECTION FROM CATASTROPHIC HEALTH EXPENDITURE: AN EMPIRICAL EXAMINATION OF KANO STATE CONTRIBUTORY HEALTH INSURANCE SCHEME

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Abstract
States health insurance schemes are becoming increasingly recognised as an instrument for financing healthcare in Nigeria. Taking the example of Kano State contributory health insurance scheme in Nigeria. This study analyzed and investigated the impact of State health insurance scheme upon financial protection from catastrophic health expenditure among the insured using two binary logit and bivariate probit model(s). Although the biprobit not reported. Empirical findings from the study revealed that after 6 years of commencement about 28.5% of the employees are yet to be enrolled in the health insurance scheme, partly due to negligence from the employees in one hand and due to lack of adequate awareness campaign from the authorities concern on the other hand. Also empirical representation from the models marginal effect suggest that being enrolled reduced the probability of catastrophic health expenditure by 24% and that level of education is an increasing function of enrollment and a decreasing function of catastrophic health expenditure buy 24% and 24.5% respectively. Moreover, finding with regards to health insurance awareness HIA and consultation of general practitioner CGP being a proxy of serious illness are statistically significant that HIA is an increasing function of enrolment and for CGP any additional hospital made is associated with decrease in catastrophic health expenditure by 26.2%. This empirical study pointed to a reduction of catastrophic health expenditure among the sampled respondent traced to their enrollment into the health insurance scheme. Hitherto, the State government should exploit this medium as a means of indirect cross subsidisations for the poor and foster awareness campaign among the employees to close the gap of non-enrollment.

Keywords: Contributory Health Insurance Scheme, Financial Protection, Catastrophic Health Expenditure, Logit Model, and Probit Model

Introduction

The cost of obtaining and accessing proper healthcare in developing countries is relatively higher when compared to richer and more developed countries due to the prevalence of fees or health service charges combined with the high transportation costs encountered by people who have to travel long distances for treatment; these may include both medical and non-medical expenditures, (Somdeth and Pongpnich, 2019). Medical expenditure refers to direct payment paid to health facilities, whereas non-medical expenditure refers to other costs that may occur while receiving health services, including transportation costs, loss of opportunity cost from being unproductive, etc. Substantial levels of healthcare expenditure could lead patients and/or their family into financial catastrophe and impoverishment. Conversely, untreated illness could also push them into poverty through loss of productivity during such times. Domestic financial resources are unevenly distributed when providing for the needs of the poorer sectors of the population, leading to it taking considerable amount of time to obtain funding from donors or to arrange loans from external sources. Developing nations are unable to collect significant amounts of tax revenue, face insufficient and volatile external funds, suffer from high costs of accessing healthcare services, have inequalities in the health services provided, lack service-minded health practitioners, have inefficient financial management and transparency issues, demonstrate limited accountability in their financing system, and lack scientific evidence for priority policy setting (WHO 2005).

In the absence of health insurance households use savings, sells assets, procure loans or borrow from family and friends to cope with high out of pocket payment in Nigeria. Out of pocket payment can lead to impoverishment when payment is required to access healthcare services and when households do not have the ability to pay. (Caraphinha 2012)

National Health Insurance (NHI) schemes have been initiated in more than 60 developing countries including Nigeria. In line with provisions of National Strategic Health Development Plan (NSHDP) 2010-2015 Nigeria has aligned itself with the global push for universal access to quality health care devoid of risk of financial catastrophe. This plan highlighted that, a vital feature of "protection from catastrophic expenditure" is the availability of prepayment for health care costs. At present, only about 5% of Nigerians have prepaid health care through social and voluntary private insurance. Whereas the NHIS and private insurance has gained sufficient traction in providing coverage to federal public sector workers, their families and workers of large private organizations, majority of Nigerians are without any form of coverage. This situation has made the aspiration for UHC difficult to attain. State governments have been slow in the uptake of social insurance regulated by NHIS because they feel excluded from the scheme. (Okpani and Seye 2017) Expanding coverage and minimizing out-of-pocket expenditure primarily through greater federal government health care funding is not a realistic proposition given Nigeria's income status, and more important, the autonomy that the constitution gives the states to determine their health care priorities and spending choices. The foregoing presents the rationale for the proposal put forward by National Strategic Health Development Plan (NSHDP) 2010-2015 for reforming health care financing in Nigeria as a prerequisite for progress toward UHC. This proposal recommends shifting away from the federal-led social health insurance scheme toward leveraging the constitutional autonomy enjoyed by the states to extend social insurance coverage to residents of each state by establishing states health insurance schemes.

projections from the 2006 census reveals that states in Nigeria range in population from about 2-11 million, with Kano State being the most populous among the 36 states of the federation, and has the largest number of public service employees in the country. Beside it's on this background that the state comes up with its insurance scheme to ensure that every resident has access to good health care service, protect families from the financial hardship of huge medical bills and to ensure equitable distribution of health care cost among depreciate income groups. According to its management, the state health insurance/contributory scheme had commenced operation for almost 6 years, and had become successful with over 370,000 enrollees accessing healthcare. The scheme is presently operating in 245 health facilities, comprising 134 primary healthcare facilities, 37 secondary healthcare facilities and 74 private healthcare facilities across the state. The above demographic feature presents the state with a large pool of working population without health insurance. In essence, lack of Access to affordable healthcare continues to be a challenge for most of the state residents due to high levels of poverty (especially in the rural areas) and significant reliance on out of pocket payments. However, it's on the heel of this, that this study seeks to explore the impact of the Kano State insurance scheme upon financial protection from catastrophic health expenditure.

Literature Review

The primary aim of nearly all insurance is protection from large financial losses. After enabling people to utilize health care, health insurance should reduce health expenditure. Ideally, in order to examine financial protection, one would want to examine whether or not consumption smoothing occurs in the long or medium term, and further, whether consumption levels change in the same way as they do for people with the same socio-economic status (Deaton 1997; Townsend 1994). Health insurance, together with a very good health system, should provide protection from large one-off health expenditures and reduce the impact on the workforce due to ill health. There is little rigorous empirical evidence measuring the impact of health insurance in its ability to provide financial protection. catastrophic health expenditure is a situation where healthcare expenditure is greater, or equal to, 40% of the capacity to pay. Capacity to pay is defined as non-subsistence effective income, of which subsistence spending is equal to one dollar, per day, per person according to WHO (2019).

The existing literature examines the impact of health insurance on out-of-pocket expenditures for health care measured in either absolute or in terms relative to income (expenditures are labeled catastrophic if they exceed a certain threshold). Wagstaff and Moreno-Serra (2007) study of Central and Eastern Europe and Central Asia finds an increase in government spending per capita on health but not in private health spending, while a switch to fee-for-service does increase private health spending. They find negative effects of social

health insurance on overall employment levels but positive effects on average gross wages in the informal sector.
Wagstaff et al. (2007) in their study of the rural health insurance program in China, find no impact on out-of-pocket health expenditures which contrasts with Wagstaff and Yu (2007) who find reduced out-of-pocket payments, lower incidence of catastrophic spending and less impoverishment due to health expenditures. By contrast, in a later study, Wagstaff and Lindelow (2008), find health insurance to increase the risk of high and catastrophic spending in China. The authors define high spending as spending that exceeds a threshold of local average income and catastrophic spending is defined as exceeding a certain percentage of the household's own per capita income. This finding contradicts the hypothesis that health insurance always will reduce financial risk. The authors question whether or not this finding implicitly indicates a reduction in welfare due to health insurance. If the mechanism by which spending increases is that individuals are seeking care when they fall sick that they wouldn't have sought otherwise, then in terms of health status, there are welfare gains. Another notable finding includes impact heterogeneity across income groups, highlighting the importance of distributional analysis.

According to King, Gakidou, Imai, Lakin, Moore, Nall, Ravishankar, Vargas, Tellez-Rojo, Hernandez Avila, Hernandez Avila, and Hernandez Llamas (2009), in their study of the randomly assigned Mexican universal health insurance program Seguro Popular, find 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 (though no effect on spending for medication and medical devices).
Ekman (2004) focused on community-based health insurance in low-income countries. He concluded that this provides some financial protection by reducing out-of-pocket spending. His review, however, did not consider whether the schemes protected households from catastrophic health expenditure or falling below the poverty line. Moreover, the review was limited to community health insurance schemes. Parmar et al. (2011) evaluate how Community-Based Health Insurance scheme protect household assets in rural Burkina Faso, the scheme was shown to have a financial protection effect that ranges from a 1% to 24.6% increase in per capita household assets. Chankova et al. (2010) evaluate the effects of national health Insurance Scheme implementation on health care use and spending in Ghana findings reveals that implementation was associated with substantial improvements in financial protection for health care, including lower out-of-pocket spending on outpatient curative care, hospitalization, and delivery care.
As mentioned above, Gustafson-Wright et al. (2013) evaluate the short term impact of the Health insurance fund program in central Kwara, Nigeria. Findings from their study reveals that the intervention enhances financial protection in that it reduces out-of-pocket health expenditures by on average 1000 Naira per person per year (despite increasing utilization) representing an average reduction of 40% of the estimated oop expenditure. Some additional studies which examine the relationship between health insurance and financial protection include Trivedi (2003), Wagstaff and Pradhan (2005), Asfaw and Jutting (2007).

Research Methodology
This study employed both descriptive and diagnostic research design using survey method via a binary probit models. This research design has been used by various studies in the past to assess the impact of health insurance upon financial protection from catastrophic health expenditure, in different countries. See Somdeth and Pongpanich (2019); Gottret and Schieber (2006); Belotti *et al*. (2006) and Hidayat and Pokhrel (2009).
The research population is the entire employees of Kano state and its 44 local governments covered by the state contributory health insurance scheme. A multistage cluster sampling procedure is employed in the selection of respondents from the three senatorial zones, while 3 state and local government public sector organizations is selected each from Kano north and south zones, 6 public sector organizations is selected from Kano central, because the nature of distribution of public sector employees and their corresponding organization is statistically skewed in favor of Kano central. In each selected organization a department is randomly select and from the departments a section is selected, and from each section respondents is selected randomly, and the sample size of 360 respondents where used.

To assess the impact of the state health insurance scheme on financial protection two aspect have to be taken into consideration; the probability of visiting a healthcare provider and the out of pocket expenditure borne by the individuals. The strong disadvantage of using health expenditure alone as a predictor of financial protection is that this will allow to capture the lack of financial protection for those who choose not to seek

for healthcare because they cannot afford it. The first part of the model assesses the determinant of utilization and thereby we can analyze whether being insured reduces the barrier to assess healthcare services. This research employed two-part model developed as part of rand health insurance experiment in the US (Manning Et-al 1987)

A logit model, which assess the probability of visiting healthcare provider

Prob (visit >0) = X_0 +M_0 + U where x stands as a vector for individual household characteristics

A log- linear model that estimates the incurred level of out- of pocket expenditure conditioning on positive use of healthcare services;

Log (out of pocket expenditure/ visit >0) = X_y +M_i + e

Where x again represents a set of independent variables that are hypothesized to affect individual pattern of Utilization, M dummy variables for membership in health insurance scheme and U and e as terms of inferences. The independent variables determining the demand for healthcare and expenditure in the case of illness are among others – age, gender, education, health status and level of income.

A structured questionnaire was used to retrieve all required information, including information on household socioeconomics, accessibility to health services, and financial payment for both OPD and IPD services. Independent variables, based on the demand and supply sides of the health system, were considered, including gender, marital status, age, occupation, level of education, size of house- hold, level of income, closest health facilities, travel time to health facility, town of residence, OPD use within 3 months, and IPD use within 12 months. Conversely, the dependent variables were health service utilisation (as a proxy of accessibility to healthcare services) and financial protection against catastrophic expenditure. catastrophic health expenditure is a situation where healthcare expenditure is greater, or equal to, 40% of the capacity to pay. Capacity to pay is defined as non-subsistence effective income, of which subsistence spending is equal to one dollar, per day, per person according to WHO (2019).

Results

1. Determinants of enrolment in the State contributory health insurance scheme

Although entitlement to be enrolled in the State health insurance scheme is mandatory, but up to 6 years from its commencement some of the employees of State and its 44 local governments are yet to be enrolled, despite a monthly premium being deducted out of their salaries. In essence, this study seeks to explore the reason behind this and assesses weather those enrolled have more access to health care utilisation and attained financial protection from catastrophic health expenditure as compared to those not enrolled. A priori, we expect individual employee's personal characteristics to influence their enrollment and participation in the scheme. These variables may include level of income, age, level of education, sex, health insurance awareness, place of residence (urban or rural) and presence of serious illnesses. As documented by previous empirical studies and subsequent desk analysis in this study on the subject matter, all the aforementioned socioeconomic and demographic variables are expected to co-vary and influence individual employee's enrollment, which will in turn provide access and utilization of healthcare, as well as grant protection from catastrophic health expenditure.

Table 1. Summary statistics of health insurance enrolment variables

Variable	Obs	Mean	Std. Dev.	Min	Max
hise	207	.7149758	.4525203	0	1
edu	201	3.313433	.7323037	1	5
fs	202	6.133663	3.907762	1	14
mexp	198	6540.404	8701.968	2500	7500
phc	199	1.497487	.6503641	1	4
cgp	196	.4591837	.4996074	0	1
hia	204	.8235294	.3821579	0	1
che2	207	.6231884	.4857618	0	1
incq	207	3.821256	1.893251	1	7
mb	136	1834.007	2886.933	0	3000

Table 2. Percentages of health insurance enrollment, catastrophic health expenditure and senatorial zones of the respondents

		Cum.
0	59	28.50
1	148	100.00

CHE -2	Freq.	Percent	Cum.
0	42	20.28	20.28
1	165	79.71	100.00

SEN,Z	Freq.	Percent	Cum.
1	59	28.50	28.50
2	104	50.24	78.74
3	44	21.26	100.00

Table 1 and 2 above present summary statistics of health insurance enrollment variable and cross tabulation of enrollment status, catastrophic health expenditure and the senatorial district of the respondent. The foregoing revealed that about 28.5% of the total respondent are yet to be enrolled into the scheme, and about 20.28% reported the incident of catastrophic health expenditure in the last six months. this finding indicate a severe gap in the state government attempt to facilitate access and Utilization of healthcare and protection of its employees from catastrophic financial expenditure associated with demand for healthcare.

Table 3: Marginal Effect after logit, health insurance enrollment

VARIABLES	DY/DX	SES..ERR	P. VALUE
AGE	**.5507**	**0.0363**	**0.163**
FS	**.1908**	**0.898**	**0.004**
EDU	**.7342**	**0.0475**	**0.077**
INCQ	**.0376**	**0.0183**	**0.004**
CHE*	**.0311**	**0.0712**	**0.663**
CGP*	**-.025**	**0.0683**	**0.011**
HIA*	**.1718**	**0.0717**	**0.007**

(*) dy/dx is for discrete change of dummy variable from 0 to 1
Significant at 0,1 level ** Significant at 0,05 level ***significant at 0,01 level

Table 3 above present the marginal effect after logit of the determinants of health insurance enrollment vide the afore mentioned a priori expectation, that those enrolled should have a better access to health care facilities than non-enrollees. As stated earlier this study measure access in two respects: the probability of frequentation of a health care facility, i.e. in this case a hospital and the out-of- pocket expenditure at the point of use. The study hypothesize that the probability of members to frequent a hospital is higher, while at the same time they pay less for their treatment in comparison to non-enrollees, after taking cognizance of individual, employees characteristics. This would mean that membership has a positive coefficient for the demand for health care and a negative one for the effect on expenditure. Beside enrollment status, other variable of key interest is income as we want to see how much demand of health care utilization and out of pocket expenditure is due to the income level and the ability to pay., this empirical finding suggest that a unit increase in income quantile increases the probability for enrollment by 3.8%. another key finding from this research is the HIA the health insurance awareness where any increase in the level of respondents awareness leads to 17% increase in probability of being enrolled, one of the great discoveries of this research is link to the level of education of the respondents where any increase in educational level completed leads to 24% increase in probability of an employee being enrolled in the health insurance scheme.

Table 4. Marginal Effect after logit, Catastrophic health expenditure

VARIABLES	DY/DX	SES..ERR	P. VALUE
AGE	**.5661**	**0.0233**	**0.063**
FS	**.2908**	**0.4218**	**0.304**
PTNH	**.1285**	**0.2212**	**0.006**
EDU	**-.244**	**0.0545**	**0.017**
INCQ	**-.081**	**0.0203**	**0.014**
HISE*	**-.245**	**0.0752**	**0.063**
CGP*	**-.262**	**0.0435**	**0.031**
HIA*	**.1725**	**0.0717**	**0.012**

(*) dy/dx is for discrete change of dummy variable from 0 to 1
Significant at 0,1 level ** Significant at 0,05 level ***significant at 0,01 level
Significant at 0,1 level ** Significant at 0,05 level ***significant at 0,01 level

Table 4 above present the marginal effect after logit of the determinant of Catastrophic health expenditure, the foregoing as in our a priori expectation, that those enrolled should have a better access to health care facilities than the non-enrollees, while at the same time pay less for their treatment in comparison to non-enrollees, the variable **HISE** which represents health insurance enrollment is statistically significant at 10% and that being enrolled reduces the probability of Catastrophic health expenditure by 24.5% also one of the meaningful exploration of this research is the association between Catastrophic health expenditure and of educational level of the respondents, where any increase in educational level completed leads to 24.4% decrease in probability of an employee incurring Catastrophic health expenditure subject to his enrolled status. Another key variable of interest is the consultation of general practitioner CGP representing presence of serious illnesses, the variable is statistically significant at 10 % and that any additional hospital visit they made is associated with decrease in catastrophic health expenditure by 26.2%. INCQ represent income quantile, which is significant at 10% and that any increase in income quantile (increase in income) is associated with decrease in Catastrophic health expenditure by 8.1%, this finding is line with previous findings of jutting (2001). Finding with regard to age of the respondent is also of interest because an increase from one age group to another leads to 5.6% increase in Catastrophic health expenditure. However other variables like family size Fs is an increasing function of Catastrophic health expenditure that the higher the number of the family the more the probability of incurring more expenditure in the family.

Conclusions

Findings from this cross sectional analysis of Kano State government and its 44 LGs employees provide a valid evidence that State lead health insurance scheme are both feasible and attainable in Nigeria, result point to increase in access and utilization of healthcare among the sampled respondent. Although not all employees are enrolled into the scheme due to their negligence in one part and lack of health insurance awareness campaign by the State. On the other hand, the scheme has in its spillover effect led to provision and improvement of healthcare facilities in the state, because in most case when insurance is made available, participating facilities are upgraded. Naturally, we might also expect individuals to have better health if the quality of the health care they receive is improved or upgraded. Hitherto point to the need for more awareness campaign among the employees especially outside the metropolis or the sub-urban LGs. The primary aim of

nearly all insurance is protection from large financial losses. After enabling people to utilize health care, health insurance should reduce health expenditure. Health insurance, together with a very good health system, should provide protection from large one-off health expenditures and reduce the impact on the workforce due to ill health. This empirical study point to a reduction of catastrophic health expenditure among the sampled respondent traced to their enrollment into the health insurance scheme. In essence the State government should exploit this medium as a means of indirect cross subsidisations for the poor. The findings point to the needs for more awareness campaign among the employees to close the gap of non-enrollment.

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Marginal effects after
Bivariate probit model, of health insurance status and probability of catastrophic health expenditure

Marginal effects after biprobit

y = Pr(hise=1,che2=1) (predict)
= .47793577

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
hia*	.0833477	.0973	0.86	0.392	-.107361	.274056	.842697
incq	-.046655	.01822	-2.56	0.010	-.082361	-.010949	3.62921
edu	.0118596	.04923	0.24	0.060	-.084622	.108341	3.32584
mexp	2.36e-06	.00000	0.59	0.556	-5.5e-06	.00001	6713.48
cgp*	.1246228	.07137	-1.75	0.081	-.2645	.015255	.466292
age	-.0234892	.03851	-0.61	0.542	-.098971	.051993	2.28652
fs	-.0030387	.00961	-0.32	0.752	-.021868	.015791	5.98876

(*) dy/dx is for discrete change of dummy variable from 0 to 1