Adverse Selection in Health Insurance in Nigeria

SAHEED OLAWALE OLAYIWOLA[1], OLANREWAJU ADEMOLA OLANIYAN[2]

[1]Department of Economics, Federal University of Technology, Akure, Nigeria.
[2]Department of Economics, University of Ibadan.

Corresponding Author: saheedolayiwola@yahoo.com.

Abstract

Theoretical literature predicts that asymmetric information in insurance markets generate inefficient outcomes and literature have mostly focus on adverse selection and moral hazard caused by information advantage in insurance market. Adverse selection is the likelihood of those who anticipate more need of health care due to enhanced health risk to purchase health insurance. Therefore, this study investigates adverse selection in health insurance in Nigeria. Contract theory provided the framework for the study. The insurance-demand equation was derived from the solution to the optimality condition of insurance decision equation which gives the Marshallian insurance-demand equation. The model to measure the determinants of the demand for health insurance was a linear probability demand model. Health insurance model captured adverse selection and was estimated with probit and instrumental variable probit regressions. A positive coefficient for health status and health insurance status indicate the presence of adverse selection. Adverse selection was evident in health insurance, social and private health insurance with coefficients of 0.44, 0.25 and 0.24 respectively. Insurance income elasticity was also positive in health insurance, social health insurance and private health insurance with coefficients of 0.15, 0.23 and 0.05. There is a need for mechanisms of optimal mix of people with poor and good health status that may require working out different premium for different set of people based on the type and nature of their work and regulating the behaviour of the insured, HMO's and health provider as health insurance market grows in Nigeria.

Keywords: Demand for Health Insurance, Adverse Selection.

Introduction

Theoretical literature predicts that information advantage in insurance markets produce inefficient outcomes [32; 31; 30]. Adverse selection occurs when individuals buy health insurance due to the anticipated more need of health care as a result of enhanced likelihood of health risk [9]. Literature have also explored potential advantageous selection effects of health insurance [9; 7]. That is, the insured tend to be those with observed (e.g. higher education) and unobserved (e.g. more health-consciousness) characteristics that correlated with lower health risk. In either case, it means insured individuals are those who have observed and unobserved characteristics that correlated with demand for medical care [9]. Adverse selection generates inefficient outcome in health insurance market as a result of information advantage between buyers and sellers of health insurance.

Expansion of health insurance has become a public policy priority in many developing countries [22], but adverse selection and moral hazard are key counterbalanced concerns [21]. Though, evidences on adverse selection are limited in developing countries as previous studies mostly focused on developed countries such as the United States, the United Kingdom, Australia and Canada. The analysis of health care and health insurance system in emerging markets is limited [18]. This problem of lack of evidences in developing countries[1] Nigeria inclusive on insurance induced distortion on demand for health care is also associated with drawbacks due to escalating costs, cream skimming and increasing inequality among the uninsured [14]. Hence, measures like co-insurance rate and capitation are still used in private and social health insurance in developing countries to reduce consumption at the margin [17]. The above arguments show that most theoretical influences behind the inefficiency created by information advantages in health insurance market are from developed countries [16] where health providers are regulated and held accountable for their actions. Hence, the rationality of the empirical evidences from richer countries in low income countries is contentious, given different structure of health systems, the institutional and regulatory environment within which these two set of countries operate. Therefore, this study investigates the existence of adverse selection in the demand for health insurance in Nigeria.

The effect of asymmetric information on markets operation was first expounded by[2] [1] who argued that an information advantage of the seller over the buyer of a good with non-uniform quality causes bad quality to chase good quality from the market. Information advantage is a problem central to every insurance context and occur when buyers of health insurance tend to have more idea of their risk status than sellers of health insurance [8]. The first tests of adverse selection estimated a demand function for health insurance in which health status is incorporated as an explanatory variable and high probability of those in poor health to purchase insurance is considered evidence of adverse selection [17]. A number of studies have conducted such analysis using data from rich countries [e.g. 13; 7; 29, 30, 31 etc.)

Data from the health and retirement study was used by [3] to estimate a structural model of the demand for health insurance and medical care employing a two-step semi-parametric estimation strategy to disentangle adverse selection from moral hazard in health care and specified utility function using a standard functional form. The results show that distributions are skewed to the right with a probability mass close to zero, implying that a large number of individuals in insurance category do not suffer large health shocks, but there are individuals with large health shocks in each insurance category which suggests absence of adverse selection. Also, [4], estimated a dynamic panel data model with Living in Ireland Survey with panel data from 1994 to 2001. Numbers of GP visits, visits to a medical specialist and nights in hospital were used as three measures of health care utilisation. The data contains information on health, socio-economic characteristics, insurance status and medical consumption. Their models allowed for individual specific effects, which captured heterogeneity in preferences and health risk using pooled OLS as a baseline case and general methods of moments (GMM) to estimate dynamic panel data models that include unobserved effects and state dependence. The results show strong evidence for advantageous selection driven by heterogeneity in education, income and health preferences.

Invoices for hospital services from a regional hospital in Croatia was used by [19] to test for adverse selection with three categories of patients: with no supplemental insurance, who bought it and who are entitled to it for free. The identification procedure relies on the premise that the difference in the observed medical care consumption between the patients who bought the insurance and those entitled to free insurance is caused by pure selection effect, whereas the difference in healthcare consumption between the group that received the free insurance and the group that has no insurance is due to moral hazard. The empirical estimation was carried out by

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[1] To the best of researcher's knowledge, Lammers and Warmerdam (2010) is the only study related to adverse selection in health insurance in Nigeria.

[2] Akerlof (1970) formalized this phenomenon using the example of second-hand car markets in which the seller holds more accurate information than the buyer about the quality of a particular car.

the use of matching estimators which compares the outcomes of programme participants with those of matched non-participants where matches are based on the similarity in observed characteristics. The results for all age cohorts combined show that patients with supplemental insurance, purchased or given for free, have more hospital visits and higher total cost which suggest evidence of adverse selection effects.

Few studies tests for adverse selection in health insurance schemes in less-developed countries (LDCs). Willingness to pay for social health insurance was used in Ghana [2] and India [20] to examine adverse selection in health insurance using household data. [2], found that willingness to pay for social health insurance increases with income as well as in households with high recent health expenditures and difficulties in making payments, (a possible indication of adverse selection). [20], found that better education and being male increase, the amount people are willing-to-pay. [18], investigated adverse selection in voluntary micro health insurance in Nigeria. The results suggest that membership of voluntary micro-health insurance was driven by health risk, membership of association and perceived needs of medical care.

Methods

Design and Setting of the Study

Population of the Study and Sampling Design

The data for the study were collected using a purposive sampling survey carried out from September to October 2012 in the six geo-political zones in Nigeria. The six geo-political zones in Nigeria are South-West, South-East, South-South, North-West, North-East and North-Central. One State with a large presence of formal sector workers was chosen from each zone. This choice was based on the fact that the former sector workers are mostly covered by health insurance presently in Nigeria. Lagos State was chosen in the South-West, Imo in the South-East, Rivers in the South-South, Kaduna in the North-West, Adamawa in the North-East and Abuja in the North-Central. The survey for the study was conducted in hospitals, government parastatals, private companies and households. The target population used in the study was the formal sector employees (private or public) and informal sector workers with or without health insurance coverage.

Instrument for Data Collection

The tool for the study is a self-designed 48 items questionnaire containing questions regarding respondent household socio-demographic characteristics, health insurance status, health status, health care expenditures and health care utilisation. A total of 500 questionnaires were administered in each state. The survey for the study was conducted using trained enumerators. Facility used in each chosen state are teaching hospitals, health centres that serve as providers to NHIS in Nigeria and other health centres with health insurance facilities. Government parastatals, private sector establishments and households were also used. The facility used in the South-West were University of Lagos Medical Centre, Lagos University Teaching Hospital (LUTH), Lagos State University Teaching Hospital (LASUTH), Lagoon Hospital, Apapa; Imo University Teaching Hospital (IMSUTH) and Holy Rosary Hospital, Emekuku in the South-East; University of Port Harcourt Teaching Hospital, Cottage Hospital/Comprehensive Health Centre and Okrika General Hospital in the South-South; Ahmadu Bello University Teaching Hospital, Zaria; 345, Nigerian Airforce Hospital, Kaduna North and Al-Mansu Specialist Hospital, Kaduna South in North-West; Federal Medical Centre, Yola and Adamawa Hospital in the North-East and Gwarimpa General Hospital, National Hospital, Clean Bill Health Services Limited and Abuja University Teaching Hospital in the North-Central. Government parastatals used are State government secretariat, Federal government secretariat, private companies and Banks and randomly selected households in each State.

Administration of the Instrument

The questionnaires were distributed on the basis of ease of access to the respondents; 300 questionnaires were used for facilities, 100 questionnaires for government parastatals and 100 questionnaires for households in each state. The medical officers in each facility and the head of all government and private sector establishments used were approached and their cooperation was solicited. The enumerators through the medical officers administered the questionnaire to those who visited facility and agreed to participate during the survey period. The enumerators administered questionnaires to staffs in government and private establishments. The record officers in the health facilities were entrusted to ensure the questionnaires were properly filled and collect the questionnaires for onward transfer to the enumerators. The enumerators assisted in supervising the households' respondents and double-checked the questionnaires for consistency. Table 1 shows the variables used in the analysis and their definition.

Table 1: Description of the Variables used in the Analysis

Variable	Definition	Description
Dependent Variables		
Married	Marital Status: Single = 1, Married = 2, Divorce/Separated = 3, Widowed =4	Categorical
HINSTYPE	Health Insurance Type: NHIS =1, others = 0; Private Health Insurance =1, others = 0	Dichotomous
Independent Variables		
Married	Marital Status: Single = 1, Married = 2, Divorce/Separated = 3, Widowed =4	Categorical
Male	Gender Variable: Male =1, 0 otherwise	Dichotomous
Age	The age of the respondent as at the last birthday	Continuous
FMTYPE	Family Type: Monogamy = 1, Polygamy = 2	Categorical
FMHEAD	Head of the Family: Father = 1, Mother = 2	Categorical
FMHEDUC	Head of the Family Level of Education: No formal Schooling = 1, Primary Education =2, Secondary Education =3, Post-Secondary Education=4	Categorical
SFMHEDUC	Spouse of the Family Head Level of Education: 1=No formal schooling, 2=Primary education, 3=Secondary education, 4=Post-secondary education	Categorical
FMHOCC	Head of the Family Occupation: Government Worker=1, Formal Private Sector Worker=2, Trader=3, Transporter=4, Farmer=5, Self-Employed=6, Housewife=7, Unemployed=8.	Categorical
SFMHOCC	Spouse of the Family Head Occupation: Government Worker=1, Formal Private Sector Worker=2, Trader=3, Transporter=4, Farmer=5, Self-Employed=6, Housewife=7, Unemployed=8.	Categorical
MEXPFD	Monthly Expenditure on Food	Continuous
MEXPTC	Monthly Expenditure on Transport & Communication	Continuous
MEXPHLT	Monthly Expenditure on Health	Continuous
MEXPORS	Monthly Expenditure on Others	Continuous
MTOTAEXP	Monthly Total Expenditure	Continuous
MFEXPFD	Monthly Family Expenditure on Food	Continuous
MFEXPTC	Monthly Family Expenditure on Transport & Communication	Continuous
MFEXPHLT	Monthly Family Expenditure on Health	Continuous
MFEXPORS	Monthly Family Expenditure on Others	Continuous
MFTOTAEXP	Monthly Family Total Expenditure	Continuous
GHSTATUS	General Health Status measured using twelve questions about general well-being of the respondent where high score indicates bad health status.	Continuous
COINS	Co-insurance Rate Paid by the insured	Continuous
PRICEHC	Price of Health Care Computed as Coinsurance Rate Multiply by Health Exp.	Continuous
PLACEACES	Place of Access Health Care Facility: Self-Treatment =1, Traditional Healers =2, Private Hospital=3, Government Hospital=4, Pharmacy/Drug Shop=5, Spiritual Home=6, others =7	Dichotomous
MINCEMPL	Individual Monthly Income from Employment	Continuous
MINCGIFTS	Individual Monthly Income from Gifts	Continuous
MINCORS	Individual Monthly Income from Others	Continuous
MTINCO	Total individual monthly Income	Continuous

Estimation Technique

Given that the decision to take health insurance is made at time zero before utilization of medical care at time one (assuming illness occurs in time one) and that this depends on initial income, price of health care measured by the co-insurance, health status which cannot be observed by the insurer (and if positively related to health insurance take up indicate presence of adverse selection) and other individual characteristics that may influence the purchase of health insurance. The demand equation for health insurance decision take-up can be represented by Marshallian demand equation. Therefore, given a linear relationship between health insurance take up, income, co-insurance, health status and other factors that influence the decision to purchase health insurance, for measuring the determinants of the demand for health insurance can be written as a linear probability demand model of the form:

$$I_i = \alpha_1 + \alpha_2 P_m + \alpha_3 Y + \alpha_4 H + \alpha_i Z_i + \mu_1 \qquad (1)$$

Where I_i refers to the individual's insurance status, is the price of health care measured by co-insurance rate multiplied by individual monthly total health expenditure, Y is the individual's income in period

one before the purchase of health insurance, H is the individual's health status and Z_i are other household or individual's characteristics that can influence the purchase of health insurance such as the level of education, employment status and marital status. Bias in Equation (1) may arise if important unobserved determinants of insurance status such as health status (H) are correlated with the random error term . For example, those who are less healthy may have a higher than average propensity to seek health insurance and demand for health care. Also, unobservable factors influencing demand for health insurance may positively correlated with the error term (μ_1). This would mean correlation between insurance status I_i and the error term (μ_1). Theoretically, we expect the price of medical (P_m) care to be negatively related to insurance decision take up. The relationship between insurance take up and initial income depends on the level of individual risk-aversion but since there is no measure of risk aversion, the relationship between health insurance take-up and income was directly estimated. The sign obtained in estimation is an indication of individual risk-aversion. The individual health status is measured using 12 questions concerning general wellbeing of the respondent where a score greater than or equal to the quarter of the total score indicate bad health status. The vector (Z_i) captures additional individual household characteristics that may be important in the insurance and health care decision, like household size. And (μ_1) is the error term which captures the individual time-invariant unobserved characteristics. If I_i and H are positive coefficient (i.e. if $\alpha_4 > 0$), there is an evidence of adverse selection in health insurance, other things being equal.

Equation (1) estimates the determinants of demand for health insurance and adverse selection in health insurance (in which health insurance, social health insurance, and private health insurance were considered). The dependent variable; individual's health insurance status (whether an individual has health insurance or not) is dichotomous (between 0 and 1 and whether individual is covered by social health insurance and private health insurance). Health status (H) is likely to be endogenous with the health insurance status and other exogenous variable (e.g. household characteristics). Exogeneity test using Wald test was carried out on probit regression. Where the probit regression failed exogeneity test, instrumental variable probit (IVPROBIT) regression was employed.

Results and Discussion

Table 2 shows the summary statistics of the variables employed in the analysis. The results show that about 61.5% of the respondents have health insurance while 38.5% are without health insurance. On the type of health insurance, NHIS is a compulsory social health insurance for public and the formal private sector workers and private health insurance for private individuals. The statistics shows that about 90.9% of the respondents are covered by NHIS and about 2.9% are covered by private health insurance. The result further shows that total monthly income of the respondents ranges from 1000 ($6.25) to N3, 000, 000 ($18, 750) with average monthly income of N68, 860 ($430.4). The average health care price is around N750 ($4.7) and average general health status score is about 1.03. The average general health status score shows that the health status of respondents is relatively good. The results show that about 47.6% are single, 47.4% are married, 1.04% are divorced or separated and 3.9% are widow. Also, about 80.2%, 14.4%, 3.3%, of the respondents acquired post-secondary, secondary and primary education respectively while about 2.9% did not attend any formal school. On respondents' occupation, about 41.1% of the respondents are government workers, 35.4% are formal private sector workers, 9% are traders, 5% are transporters, 1% are farmers, 1% are self-employed, 2% are housewives and 0.9% are unemployed. This shows that about 76.5% of the respondents are formal sector employees.

Table 2: Summary Statistics of the Variables used for Estimation

Variables	Obs	Mean	Std. Dev.	Min	Max
HINSTATUS1 Non-Insured=1	1051	0.3853	0.4869	0.000	1.0000
HINSTATUS2 Insured=1	1051	0.6147	0.4869	0.000	1.0000
HINSTYPE1 NHIS=1	646	0.9087	0.2883	0.000	1.0000
HINSTYPE3 PVT =1	646	0.0294	0.1691	0.000	1.0000
GHSTATUS	1051	1.0313	1.5832	0.000	8.0000
COINS	1051	0.1051	0.0185	0.1	0.5
PRICEHC	1051	750.6553	690.2583	5.2540	10508.2
Male1 Male=1	1051	0.5119	0.5001	0	1
Male2 Female=1	1051	0.4881	0.5001	0	1
Age	1051	32.6870	11.3344	16	80
FMTYPE2 Polygamy=1	1051	0.2569	0.4371	0	1
FMHEAD1 Father = 1	1051	0.9125	0.2828	0	1
FMHEAD2 Mother = 1	1051	0.0875	0.2828	0	1
FMHEDUC1 No Formal Schl. =1	1051	0.0504	0.2189	0	1
FMHEDUC2 Primary Edu =1	1051	0.0428	0.2025	0	1

Table 2: Cont'd

Variables	Obs	Mean	Std. Dev.	Min	Max
FMHEDUC3 Sec. Edu =1	1051	0.1570	0.3640	0	1
FMHEDUC4 Post Sec. Edu =1	1051	0.7498	0.4333	0	1
SFMHEDUC1No Formal Schl. =1 (Mother)	1051	0.0676	0.2511	0	1
SFMHEDUC2Primary Edu =1	1051	0.0666	0.2495	0	1
SFMHEDUC3Sec. Edu =1	1051	0.1665	0.3727	0	1
SFMHEDUC4Post Sec. Edu =1	1051	0.6993	0.4588	0	1
FMHOCC1 Govt. Worker=1	1051	0.5404	0.4986	0	1
FMHOCC2Form. Pvt Sec Worker=1	1051	0.1408	0.3480	0	1
FMHOCC3 Trader=1	1051	0.0733	0.2607	0	1
FMHOCC4 Transporter=1	1051	0.0447	0.2068	0	1
FMHOCC5 Farmer=1	1051	0.0542	0.2266	0	1
FMHOCC6 Self-Employed=1	1051	0.1094	0.3123	0	1
FMHOCC7 Housewife=1	1051	0.0143	0.1187	0	1
FMHOCC8 Unemployed=1	1051	0.0076	0.0870	0	1
SFMHOCC1 Govt. Worker=1	1051	0.4234	0.4943	0	1
SFMHOCC2 Form Pvt Sec Worker=1	1051	0.1532	0.3604	0	1
SFMHOCC3 Trader=1	1051	0.1941	0.3957	0	1
SFMHOCC4 Transporter=1	1051	0.0238	0.1525	0	1
SFMHOCC5 Farmer=1	1051	0.0504	0.2189	0	1
SFMHOCC6 Self-Employed=1	1051	0.1075	0.3099	0	1
SFMHOCC7 Housewife=1	1051	0.0276	0.1639	0	1
SFMHOCC8 Unemployed=1	1051	0.0143	0.1187	0	1
MEXPFD	1051	18415.17	12204.4	100	100000
MEXPTC	1051	9626.948	7214.841	200	100000
MEXPHLT	1051	7173.292	6497.079	50	100000
MEXPORS	1051	9026.081	7569.926	100	120000
MTOTAEXP	1051	34784.7	25324.09	1500	400000
MFEXPFD	1051	36557.2	19730.38	1000	200000
MFEXPTC	1051	19571.56	14594.86	100	200000
MFEXPHLT	1051	16060.76	16929.89	100	320000
MFEXPORS	1051	23739.16	23422.79	100	300000
MFTOTAEXP	1051	77824.81	51010.94	2000	450000
PLACEACESS1	1051	0.0752	0.2638	0.000	1
PLACEACESS2	1051	0.0695	0.2544	0.000	1
PLACEACESS3	1051	0.2550	0.4361	0.000	1
PLACEACESS4	1051	0.5452	0.4982	0.000	1
PLACEACESS5	1051	0.0466	0.2109	0.000	1
PLACEACESS6	1051	0.0086	0.09218	0.000	1
MINCEMPL	1051	70262.81	112392.4	100	3000000
MINCGIFTS	1051	10025.23	5640.674	200	75000
MINCORS	1051	11438.38	5833.999	300	100000
MTINCO	1051	68859.98	106055.3	1000	3000000

In insurance equation (1), probit model was employed for estimation because the outcome of interest is measured as a binary variable which takes the values of either zero or one. The exogeneity tests using Wald test of exogeneity in probit model indicates that endogeneity problem is valid in health insurance and private health insurance models with probability value of 0.0004 and 0.0001 and absence of endogeneity problem in social health insurance model with probability value of 0.3569. As a result, IVPROBIT technique was employed for the determinants of the demand for health insurance and private health insurance while ordinary probit estimation method with robust standard error was employed for social health insurance.

The results in Table 2 revealed a positive coefficient between general health status and the decision to purchase health insurance, social and private health insurance and significant at 1% level. This indicates that irrespective of the type of health insurance, general health status is an important factor in the decision to purchase health insurance. This agreed with the submissions in the literature that insured individuals are those who have observed and unobserved characteristics that are correlated with demand for medical care. Price of health care services is also positively related to health insurance, social health insurance and negatively related to the decision to purchase private health insurance. The positive coefficient between the price of health care, health insurance and social health insurance may be due to the government regulatory role and involvement of government in the payment of the health insurance premium in Nigeria. Insurance income elasticity was also positive for health insurance, social health insurance and negative for private health insurance.

On socio-demographic characteristics, married, the

widowed and women are more likely to enroll for health insurance, social and private health insurance. Young individuals are more likely to purchase health insurance and private health insurance while elderly people have high probability of purchasing social health insurance. A female headed household have less probability to purchase health insurance, social and private health insurance than male headed household. Education of the family head is an important determinant of the demand for health insurance with results showing that household with head having post-secondary

education are more likely to purchase health insurance, social and private health insurance. Households headed by government worker, transporters, farmers, self-employed persons and unemployed persons are more likely to purchase social health insurance. Further, households in which the spouse of family head involved in trading, farming, self-employed and housewife have less probability of buying private health insurance while households with the spouses of the family head being formal private sector workers have high probability of purchasing social health insurance.

Table 3: The Demand for Health Insurance, Social Health Insurance and Private Health Insurance

Dependent Variable: Health Insurance Status	Health Insurance IVPROBIT		Social Health Insurance PROBIT		Private Health Insurance IVPROBIT	
	Coeff[a]	(se)[b]	Coeff[a]	(se)[b]	Coeff[a]	(se)[b]
GHSTATUS	0.4360*	0.0611	0.2480*	0.0382	0.2359*	0.0763
lnPRICEHC	0.1125**	0.0568	0.1444*	0.0569	-0.277**	0.1162
lnMTINCO	0.1518*	0.0476	0.2263*	0.0503	-0.0543	0.0789
Single[R]						
Married2	0.1784	0.1104	0.1882***	0.1104	0.4064	0.2618
Married4	0.9052*	0.2999	0.9877*	0.3038	-	-
Male[R]						
Male2	0.2766*	0.0867	0.3275*	0.0878	-0.2621	0.1925
Age	-0.0005	0.0049	0.0047	0.0051	-0.0178	0.0144
Monogamy[R]						
FMTYPE2	-0.2284**	0.0966	-0.2340**	0.0965	0.2937	0.2180
Father[R]						
FMHEAD2	-0.5057*	0.1627	-0.4891*	0.1590	-0.0892	0.2696
PostSecondary[R]						
FMHEDUC1	-0.4110***	0.2360	-0.2092	0.2317	-	-
FMHEDUC2	-0.2204	0.2356	-0.6110**	0.2660	0.7911	0.2814
FMHEDUC3	-0.0002	0.1471	0.1402	0.1487	-0.2466	0.3426
PostSecondary[R]						
SFMHEDUC1	0.3998***	0.2184	0.3838***	0.2119	-	-
SFMHEDUC2	0.2633	0.2038	0.1371	0.2055	0.8986*	0.3325
SFMHEDUC3	-0.1374	0.1374	-0.2708***	0.1426	0.6856**	0.2933
Govt-Worker[R]						
FMHOCC2	-0.0315	0.1312	-0.1479	0.1292	-0.7045***	0.3785
FMHOCC3	-0.1713	0.2010	0.4194**	0.1911	-0.7305	0.4669
FMHOCC4	0.3848	0.2517	0.2698	0.2373	-	-
FMHOCC5	0.1469	0.2244	0.1888	0.2281	-0.1159	0.4439
FMHOCC6	0.2499***	0.1486	0.0479	0.1482	0.3939	0.3985
FMHOCC7	0.0381	0.3279	0.0502	0.3495	-	-
FMHOCC8	0.7146***	0.4167	0.4008	0.4706	-	-
FMHOCC9	-0.3205	0.3282	-0.2954	0.3324	-	-
Govt-Worker[R]						
SFMHOCC2	-0.0979	0.1361	0.0453	0.1320	-0.3408	0.4432
SFMHOCC3	-0.1733	0.1331	-0.0660	0.0131	-0.7492***	0.4092
SFMHOCC4	0.4513	0.3074	0.1952	0.3095	-	-
SFMHOCC5	-0.4692**	0.2111	-0.4500**	0.2217	-0.2637	0.3998
SFMHOCC6	-0.0645	0.1439	-0.0377	0.1472	-0.3141	0.53389
SFMHOCC7	-0.0240	0.2612	-0.1234	0.2488	-	-
SFMHOCC8	0.6158	0.3910	0.7419	0.3779	-	-
SFMHOCC9	-0.1967	0.4267	-0.2227	0.4625	-	-
CONSTANT	-2.5411*	0.5518	-3.7021*	0.5563	0.4130	0.9686
	Wald (chic2) 179.23*		Wald chi2(3) = 192.67*		Wald (chic2) 68.64*	
The Wald test of exogeneity	$\chi^2((1)) = 12.54$; p-value = 0.0004		$\chi^2((1)) = 0.85$; p-value = 0.3569		$\chi^2((1)) = 14.63$; p-value = 0.0001	
Number of Observations	1040		1051		803	

[a] Estimated parameters; *, **, and *** significant at 1%, 5%, and 10% level; [b] Robust standard errors; [R] Reference group.

A priori general health status and health insurance take up decision are expected to be positively related. The probit and IVPROBIT estimations results of health insurance, different types of health

insurance and general health status in Tables III are re-produced in Table 4 to examine adverse selection in health insurance in Nigeria. The results show that general health status is positively related to health

insurance, social and private health insurance. This indicates that irrespective of the type of health insurance, general health status is an important determinant of the demand for health insurance. This show that individuals' characteristics that correlated with the high demand for medical care significantly influenced the demand for health insurance in Nigeria. That is adverse selection exists in the demand for health insurance in Nigeria.

Table 4: Adverse Selection in Health Insurance

Type of Health Insurance	General Health Status	
	Probit	**IVProbit**
Health Insurance	-	0.4360* (0.0611)
Social Health Insurance	0.2480* (0.0382)	-
Private Health Insurance	-	0.2359* (0.0763)

Conclusion

This study examined the existence of adverse selection in the demand for health insurance, social and private health insurance in Nigeria. General health status was found to be an important determinant of the demand for health insurance, social and private health insurance in Nigeria. This is an evidence of the existence of adverse selection in the demand for health insurance and all types of health insurance in Nigeria. An important policy issue from this is that there is a need for a mechanism of optimal mix of people with poor and good health status. This may require working out different premium for different set of people based on the type and nature of their work. Finally, there may be a need for mechanism to regulate the behaviour of the insured, HMOs' and health insurance provider as health insurance market grows in Nigeria.

Disclaimer

Olayiwola is a staff member of Federal University of Technology, Akure, Nigeria and Olaniyan is a Professor of economics in University of Ibadan, Nigeria. The authors alone are responsible for the views expressed in this publication.

Competing Interests

The authors declare that they have no competing interests.

Authors' contributions

Olayiwola carry out the study as a Ph.D. student under the supervision of Olaniyan. Both authors read and approved the final manuscript.

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