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Health System Resilience and Unequal Chances in Insurance in Nigeria: Implications on Health Cost

T. Henry Asogwa[1], Amakom Uzochukwu[1], R. Uju Ezenekwe[2], R. Ukwueze Ezebuilo[3]*, I. Amos Ugwuoti[4], Kelechi Iwuamadi[1], D. Bonifice Umoh[1], I. Ukamaka Anekeje[1]

[1] *Institute for Development Studies, University of Nigeria, Enugu Campus, Nigeria*

[2] *Department of Economics, Nnamdi Azikiwe University, Awka, Nigeria*

[3] *Department of Economics, University of Nigeria, Nsukka, Nigeria*

[4] *Department of Geoinformatics and Surveying, University of Nigeria, Enugu Campus, Nigeria*

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Abstract:
The need for a policy push toward universal health coverage (UHC) as a measure designed to ensure that all people have access to essential health services without enduring financial hardship. Hence, the need to investigate the effects of health system resilience and access to health insurance on households' health care costs among different income groups in Nigeria. Using the World Bank Financial Inclusion Survey of 2020, known as the Global Findex database, which provides in-depth data on households' financial resilience to health shocks, multinomial logistic regression estimation techniques and descriptive statistics with Stata 13 software were used for the analysis. Household financial health indicators (Q6081_) (which are a proactive proxy to health system resilience and health insurance) increase the relative risk ratio of medium-income group health care spending (Q6076_) compared to low-income and high-income groups by 18.52811 at 5% significance, given a p-value of 0.000 is less than 0.05. The negative effect of health system resilience on health costs highlights a significant danger to health sector sustainability in Nigeria. This has huge implications for achieving universal health goals, especially in Nigeria. Therefore, this study provided the opportunity to reshape health financing measures in a way that should provide equal chances for health access across locations and regions as it points to factors of inequalities, identity crisis, and marginalization crisis in Nigeria. The need for more robust regulators is necessary to counter the rising private health financing across different income groups in Nigeria. Policy direction should focus on first-level health insurance to a certain age level not limited to location, region, or religion as a way of mitigating health care costs as well as building a more pragmatic national identity considering the level of depravity in Nigeria.

Corresponding Author: R. Ukwueze Ezebuilo, Department of Economics, University of Nigeria, Nsukka, Nigeria; email: ezebuilo.ukwueze@unn.edu.ng

Keywords: health system, health cost, income group, health insurance, inequality.

尼日利亚的卫生系统弹性和保险机会不平等：对卫生成本的影响

摘要：
有必要在政策上推动全民医保（全民健康覆盖），这是一项旨在确保所有人都能获得基本医疗服务而无需忍受经济困难的措施。因此，有必要调查尼日利亚不同收入群体的医疗系统复原力和获得医疗保险的机会对家庭医疗费用的影响。世界银行 2020 年金融包容性调查（又称全球金融指数数据库）提供了有关家庭抵御健康冲击的金融复原力的深入数据，本研究利用该数据库，使用斯塔塔 13 软件的多项式逻辑回归估计技术和描述性统计进行分析。家庭财务健康指标（Q6081_）（是卫生系统复原力和医疗保险的前瞻性替代指标）使中等收入群体医疗保健支出（Q6076_）的相对风险比率比低收入和高收入群体增加 18.52811，显著性为 5%，因为 p 值小于 0.05。卫生系统复原力对医疗费用的负面影响凸显了尼日利亚卫生部门可持续性的重大危险。这对实现全民健康目标具有重大影响，尤其是在尼日利亚。因此，本研究为重新制定医疗融资措施提供了机会，这些措施应为不同地点和地区提供平等的医疗机会，因为它指出了尼日利亚的不平等、身份危机和边缘化危机等因素。尼日利亚不同收入群体的私人医疗筹资不断增加，有必要建立更强有力的监管机构。政策方向应侧重于不局限于地点、地区或宗教的一定年龄段的一级医疗保险，以此来降低医疗费用，同时考虑到尼日利亚的堕落程度，建立更加务实的国家认同。

关键词：医疗系统、医疗费用、收入群体、医疗保险、不平等。

1. Introduction

The relevance of universal health coverage (UHC) as a measure designed to ensure that all people have access to essential health services without enduring financial hardship or perhaps mitigating unexpected health risks has continued to dominate the literature argument. Although many have maintained its effectiveness as a measure that could bridge the prevailing unequal chances in health access among different incomes, it has shown a different outcome for the case in Nigeria. Nevertheless, this has engineered our research interest considering what many households go through while seeking health care use in Nigeria.

Evidence across studies in Nigeria has also validated the claim on the number of household members with health insurance, which remains very low. The growing gap or disparity level across those with health insurance and those without health insurance has continued to spread or widen. Interestingly, households with health insurance appear to be among those in public employment, and with the growing unemployment in the country, the number of those without health insurance has further widened. This has continued to generate serious concern for health care access as the spike in out-of-pocket expenditure on health constitutes the major health financing mechanism among households in Nigeria.

Interestingly, the health financial resilience to manage these unequal chances in health access has also not been adequate to support most income groups in Nigeria, as studies have proven that these have been a major health care financial issue. Da Lilly‐Tariah and Sule (2020) argued that despite Nigeria accounting for 20% of the population of sub-Saharan Africa (SSA), projected to be the third most populous country in the world, with over 400 million people by 2040, most households are still battling with challenges in accessing quality health care.

Asogwa, Ezenekwe, Ezebuilo, and Iwuamadi (2021) have argued that the burden of catastrophic health expenditures remains substantial in SSA and that health care financing measures should be geared toward increasing the resources for health services and efficient allocation and use of available resources to expand access to quality health services. Similarly, the attention of other studies in the region in identifying the critical gap created by health insurance as a financing approach in the region further argued that the need for investment in health and health infrastructure has been very insignificant to mitigate health risks in the country, which have continued to have multiplier effects on health conditions and outcomes that most households still encounter.

The concern that health system resilience aims at sustaining and providing essential health services, protecting human life, and producing good health outcomes for all during public health emergencies or shocks I (Fridell et al., 2020), such as Ebola virus disease (Kruk et al., 2015) and COVID-19, has underperformed in Nigeria. The negative consequences of Nigeria's health care system have continued to limit the country's health sector growth and performance.

The response to the COVID-19 pandemic demonstrates all these features, highlighting the vulnerability of health systems across different states in Nigeria. Ordinarily, universal health coverage (UHC)

and other supportive measures should have provided robust health systems and service resilience, which is of great importance to the functionality and performance of health systems in Nigeria. The uncertainty in health status has also been complicated by the fact that the demand for health services is inelastic; thus, the sick and vulnerable make catastrophic and impoverishing expenditures at the point of care because they lack financial risk protection through a well-structured pre-payment mechanism. Therefore, households in Nigeria shoulder the burden of health care costs as opposed to the Universal Health Coverage guiding principle that emphasizes public spending, as depicted in the diagram below.

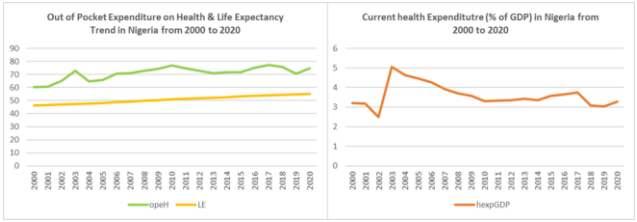

Figure 1. Health expenditure trends in Nigeria (The authors' computation, 2022)

Figure 1 clearly depicts the continuous rise in out-of-pocket expenditure on health and the current health expenditure as a share of GDP, which indicates the level of resources channeled to health relative to other uses. This shows the importance of the health sector in the whole economy and indicates the societal priority for which health should be measured in monetary terms. This has shown why Nigeria's health care system has consciously suffered over the years, as reflected in the poor and average life expectancy of 43 to 55 for over twenty years.

Despite some improvement at the primary level of care, decentralization of social health insurance to the states, and sustained advocacy for equity funds to finance the poor and vulnerable, Nigeria's health care system resilience and unequal chances in health access through health insurance remains a huge care trap for many income groups in Nigeria. Therefore, this study investigated the effects of health system resilience and access to health insurance on households' healthcare costs among different income groups in Nigeria.

2. Literature Review

The health care system is part of the critical infrastructure for health care use across local, regional, national, and even international health care models. Interestingly, adopting the health system into a model that addresses the catastrophic failure of the Nigerian health system through a more robust financing approach from both public and private intervention models has provided very poor results or even a robust impact in managing health care challenges.

The poor numbers in health or medical insurance have also constrained health access among countries such as Nigeria over the years, leading to increasing out-of-pocket healthcare spending. This has also widened the unequal chances in health access, which have become a huge burden across different income groups in Nigeria, as studies have demonstrated. Thomas et al. (2013) revealed that the financial crisis that hit the global economy in 2007 was unprecedented in the post-war era. In general, the crisis has created a difficult environment for health systems globally.

The need for resilient health systems is recognized as important for attaining health outcomes, given the current shocks to health services (WHO, 2021). Resilience has been defined as the capacity to "prepare and effectively respond to crises; maintain core functions; and, informed by lessons learned, reorganize if conditions require it (Karamagi et al., 2022).

However, Thomas et al. (2013) developed a framework for assessing the resilience of health systems in terms of how they have adjusted to the economic crisis. Resilience can be understood as the capacity of a system to absorb change while continuing to retain essentially the same identity and function. The Irish health system was used as a case study to assess the usefulness of this framework. The study identified three forms of resilience: financial, adaptive, and transforming. Findings showed strong evidence for adaptive resilience, with the health system showing efficiency gains from the recession. Nevertheless, easy efficiencies have been made, and continued austerity will mean cuts in entitlements and services. The prospects for building and maintaining transforming resilience are uncertain. While the direction of reform is clear and has been preserved to date, it is uncertain whether it will remain manageable given continued austerity, some loss of sovereignty, and capacity limitations. The study also revealed that the three aspects of resilience proved to be a useful categorization of performance measurement, although there is overlap between them. Transformatory resilience may be more difficult to precisely assess. It would be useful to test the framework against other countries' experiences and refine the measures and indicators. Further research on the comparative resilience of different health systems and building resilience in preparation for crises is encouraged.

Owoeye and Olaiya (2018) examined the effects of health insurance on the demand for health care in Oyo State and found a connection between age category and mode of payment was significant and that older people tend to use health insurance (NHIS) with a percentage of (22.0%) more than the other women in reducing the influence costs of health care on the economic well-being of male households' health care seekers.

In contrast, Obi, Okoronkwo, Iloh, Nwonwu, Ogbu, and Yakubu (2020) examined the effects of selected critical determinants on demand for health insurance services and how much these determinants can collectively account for the demand for services in the program. The study adopted a cross-sectional design with a quantitative approach and multistage sampling method to demonstrate that critical determinants of provider ownership, distance to the health care provider, and enrollee educational level have significant

positive effects on the demand for health insurance services. However, the effect of enrollee income was positively insignificant. Similarly, 75% of the changes in demand for health insurance services can be accounted for by the predictor variables in the study. Therefore, it was argued that the inability of the program to address these selected critical determinants significantly will lead to out-of-pocket spending for health care services with a resultant catastrophic effect on families' finances.

Demissie and Negeri (2020) evaluated the effects of a community-based health insurance scheme on the use of health care services in Yirgalem, southern Ethiopia. A quantitative and qualitative mixed approach was adopted using a comparative cross-sectional study design for a randomly selected sample of 405 (135 members and 270 non-members) household heads. Multivariate logistic regression revealed that community-based health insurance member households were about three times more likely to use outpatient care than their non-member counterparts.

Kharazmi, Bordbar, and Gholampoor (2021) argued that the health insurance system can largely improve its functions. Designing a model of a health insurance system based on the requirements of a resilient economy demonstrated an improvement during the COVID-19 crisis. They further argued that adopting structural components obtained in the form of 4 conceptual components, namely, knowledge-based economy, economic stability, economic resilience, and justice, revealed that the knowledge-based economy is the basis for the formation of economic resilience in health insurance systems. Health insurance systems achieve two crucial intermediate results, namely economic resilience and economic stability by building the basic infrastructure of a knowledge-based economy. In the long run, maintaining such intermediate results is the foundation of justice in the health insurance system (Anderson et al., 2011).

Karamagi et al. (2022) provided a detailed dichotomy between health system resilience conceptualization and its application in practice. However, reinforcing the categories of resilience, representing resilience targeted at potentially known shocks, and the inherent health system resilience are needed to respond to unpredictable shock events. They further provided the capacities for each of these categorizations and explored this methodological proposition by computing country-specific scores against each capacity for the 47 Member States of the WHO African Region. Also, overall resilience in the 47 assessed countries was generally at lower levels, and the capacities were weakest for transformation capacity, followed by mobilization of resources, awareness of own capacities, self-regulation, and finally diversity of services, respectively.

Behrens, Rauner, and Sommersguter (2022) argued that health care systems need to be resilient to deal with disasters such as the global spread of the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) in addition to serving the changing needs of a multi-morbid, aging, and often dispersed population.

This study pulls together an integrated concept of resilience characterized by organizational capabilities. Addressed the system level with many stakeholders, distinguishing exogenous shocks to the healthcare system into adverse events and planned innovations. Findings clearly showed that reducing the resilience discussion to bouncing back from adverse events could deceive organizations into cultivating a suboptimal mix of organizational capabilities lacking transformative capabilities, which pave the way for a structural change that aims at a sustainably higher functionality. Hence, building resilient systems needs to be strategically approached, not leaving it to the grassroots and exploiting individual passion and engagement. It needs to be built on the integrated presence of the capabilities characterizing the absorptive, adaptive and transformative resilience paths. Therefore, systems thinking must be taken on board, acknowledging that health care systems are interconnected and dynamic systems that include feedback. Unfortunately, Nigeria's health system has been categorized by poor health system resilience, health insurance disparity, and rising out-of-pocket expenditure, which has widened disparity levels across different income groups in Nigeria. This study investigates the effects of health system resilience and access to health insurance on households' health care costs among different income groups in Nigeria.

3. Methods

3.1. Formulas/Equations/Theorem Proofs

The framework for this study is built around the expected utility (EU) theory, which was earlier associated with Daniel Bernoulli in 1713. However, the theory has been further developed by Von Neumann and Morgenstern (1944) to deal with situations of quantifiable risk. In their approach, EU theory assumes that people are risk averse and make choices between taking risks that have different implications on wealth. At the time of insurance choice, consumers are uncertain whether they will be ill or not, and of the related financial consequences as such seek insurance, which by implication will help them reduce the uncertainty associated with health care access.

Therefore, this certainty allows the insured to reach a higher utility in the case of illness than those without insurance. Accordingly, insurance demand reflects individuals' risk aversion and demand for certainty, implying that the more risk-averse individuals are, the more insurance coverage they will buy (Schneider, 2004). This connects to the study outcome investigated by Schneider (2004) that argued on the positive correlation between insurance demand and user fee levels, with the higher mean level of illness; and a negative association between insurance demand and premium level demonstrating the study evidence

consistency with consumer theory, implying that insurance is a normal good.

Therefore, this study adopted multinomial logistic regression because of its ability to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables (which may be real-valued, binary-valued, categorical-valued, etc.) illustrated in the flowchart (Figure 2).

The multinomial logistic model assumes that data are case-specific; that is, each independent variable has a single value for each case. The multinomial logistic model also assumes that the dependent variable cannot be perfectly predicted from the independent variables in any case.

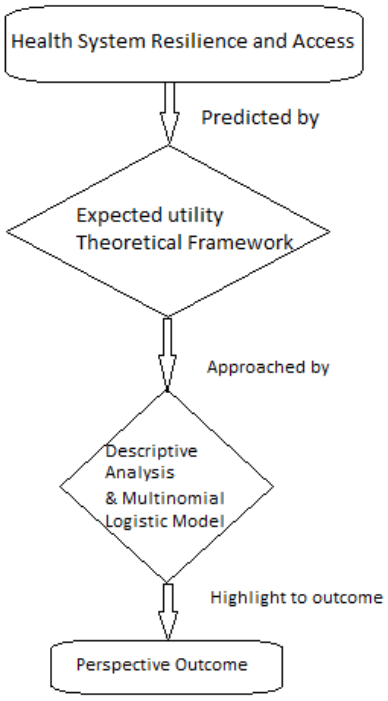

Figure 2. Methodological flowchart (The authors' computation, 2023)

As with other types of regression, there is no need for the independent variables to be statistically independent of each other (unlike, for example, in a naive Bayes classifier); however, collinearity is assumed to be relatively low, as it becomes difficult to differentiate between the impact of several variables if this is not the case (Erkan, 2016).

If the multinomial logit is used to model choices, it relies on the assumption of independence of irrelevant alternatives (IIA), which is not always desirable. This assumption states that the odds of preferring one class over another do not depend on the presence or absence of other "irrelevant" alternatives. The multinomial logistic regression model, in which dependent variables are more than two discrete and non-ordered categories that have nominal properties and exhibit multinomial distribution, is an expansion of the binomial logistic distribution for the category. A multinomial logistic regression with a dependent variable that has a single category must have "J-1" logistic regression models. The probability of a dependent variable being in the nth category in a multinomial logistic regression model is expressed as given in Equation 1:

$$\pi_j = \frac{exp(\sum_{k=1}^{k} \beta_{jk} x_k)}{1 + \sum_{j=1}^{j-1} (\sum_{k=1}^{k} \beta_{jk} x_k} \quad j = 1, 2, ..j-1$$

It is possible to write this definition in Equation 2 as well:

$$\pi_j = \frac{1}{1 + \sum_{j=1}^{j-1} (\sum_{k=1}^{k} \beta_{jk} x_k}$$

While the subscript k in the coefficient in Equation 2 denotes the dependent variable, the subscript j is used to denote the dependent variable category. The sum of probabilities of categories that belong to the dependent variable should be "1" as in binary. For example, in a multinomial logistic regression in which the number of dependent variable categories (D) has 3 levels, the sum of the probabilities of each category is equal to 1

$$P(D=0|x) + P(D=1|x) + P(D=2|x) = 1$$

Hence, the baseline category (j) should be determined to make comparisons or analyses can be selected arbitrarily by the packaged software (Hosmer and Lemeshow, 2000). For instance, the baseline category can be selected as 0 for a dependent variable that consists of 0, 1, 2, and 3 categories. Therefore, in the comparison, three different logistic models are obtained comprising 0 and 1, 0 and 2, and 0 and 3. Hence, for a model, the dependent variable, which has four categories, three odds ratios are calculated, each category is compared with these ratios, and the model is linearized by taking the natural logarithms of these odds ratios to obtain logistic models. If *j* is selected as the baseline category, the probability of the dependent variable being within the baseline category is defined as given in Equation 4 (Erkan, 2016).

$$\pi_j = P(y=j) \frac{1}{1 + \sum_{j=1}^{j-1} (\sum_{k=1}^{k} \beta_{jk} x_k} \quad j = 1, 2, ..., j-1$$

Furthermore, the probability of lying within the baseline category can be computed with the help of other probabilities, as given in Equation 5, if the other probabilities are known (Erkan, 2016).

$$\pi_j = P(y=j) = 1 - [P(y=1) + P(y=2) + ... + P(y=j-1)]$$

In a multinomial logistic regression model, the logit transformation is obtained by taking the logarithms of the odd ratios after selecting the baseline category. For the four-category example, when 0 is selected as the baseline category, the logarithms of the odds ratios can be obtained as given in Equation 6, Equation 7, and Equation 8 (Erkan, 2016).

$$ln\left[\frac{P(y=1|x_1}{P(y=0|x_1}\right] = \beta_1 + \beta_{11} x_1$$

$$ln\left[\frac{P(y=1|x_2}{P(y=0|x_1}\right] = \beta_2 + \beta_{21} x_1$$

$$ln\left[\frac{P(y=1|x_3}{P(y=0|x_1}\right] = \beta_3 + \beta_{31} x_1$$

Equation 8 can further be demonstrated to estimate

the effects of health system resilience and access to health insurance on households' health care costs among different income groups in Nigeria, as shown in Model 9.

$$ln\left[\frac{P(y=1|x_1}{P(y=0|x_1}\right] = \beta_1 + \beta_2 acc_1 + \beta_2 Q608_2 + \beta_3 Q604_3 + \beta_4 E7_4 + \beta_5 E8_5 + \beta_6 E4_6 + \beta_7 F5a_7 + \beta_8 QF5a_8 + \beta_9 Q5\_9 + \beta_{10} F14_{10} + \beta_{11} Q12_{11} + \beta_{12} Q607_{12} + \beta_{13} i.Q7_{13} + \delta_{it}$$

The estimation technique adopted for the study is multinomial logistic regression, while the relative risk ratio is employed to estimate the specified study objective for a more robust outcome and measurement. In addition, McFadden's pseudo-R-squared of the coefficient of determination (R^2) or the measure of goodness of fit was used to judge the explanatory power of explanatory variables on the dependent variable.

The z-statistic is also employed to determine the reliability/statistical significance of each variable coefficient. Here, the absolute z-value of each coefficient was compared with 1.96, and if greater than 1.96, the variable possessing the coefficient was accepted as statistically significant and fit used for inferences. The above-stated hypotheses were tested at a 0.05 level of significance such that the null hypothesis was rejected if the probability at which the z-value was significant was less than the chosen level of significance; otherwise, the alternative hypothesis would be accepted.

Justification for this model was based on its application to cross-sectional studies where variables are seldom continuous and fully observed. For example, discrete (e.g., death), censored (e.g., household expenditure), integer counts (e.g., doctor visits), or durational (e.g., time to death). Multivariate analysis of such dependent variables requires nonlinear estimation; therefore, this study adopted the main (parametric) nonlinear estimators that are relevant to categorical estimation. Therefore, this study employed the relative risk ratio estimation approach for measuring the study objective alongside descriptive statistics for the inference.

This study employs secondary data sources from the World Bank Financial Inclusion Survey (2021). The Global Findex database provides in-depth data on how individuals save, borrow, make payments, and manage risks (Adewole et al., 2015). It is the world's most comprehensive database on financial inclusion that consistently measures people's use of financial services across countries over time. The Global Findex consists of over 100 indicators, which are also shown by gender, income, and age. Collected in partnership with the Gallup World Poll and funded by the Bill & Melinda Gates Foundation, the Global Findex is based on interviews with approximately 150,000 nationally representative and randomly selected adults (age 15+) in over 140 countries.

4. Results

Figure 3 depicts the level of health resilience, access to medical insurance, and health cost in Nigeria. Interestingly, panel (a) shows that the level of financial health system resilience in Nigeria is as low as 49%.

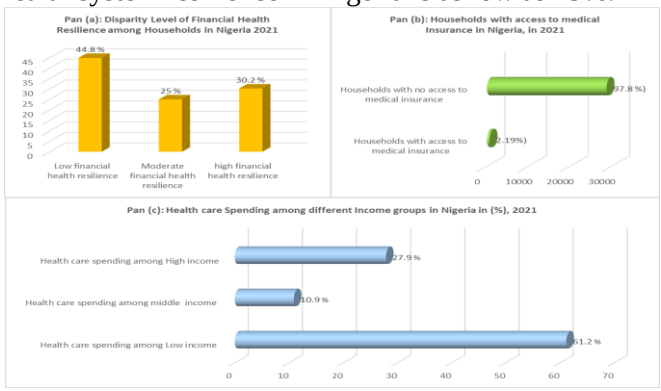

Figure 3. Disparity level of health resilience, access to medical insurance, and health cost in Nigeria (The authors' computation, 2022)

Panel (b) illustrates the disparity level of households with medical insurance at 98% compared to 2% with access to medical insurance in Nigeria. Panel (c) illustrates the level of health spending, which measures health costs across different income groups. The panel showed that health care spending among the low-income group accounts for 61% of their income, followed by the middle-income group at 11 % and the high-income group at 28%. This accounts for rising poverty across the country.

Figure 4 illustrates health spending and financial health resilience across urban and rural households in Nigeria. Panel (a) shows that health care spending differs slightly across urban and rural areas in Nigeria, although it is higher among rural households. This no doubt may account for the level of health financing resilience being as low as 46 % in rural areas compared with 41% in urban areas (Ejughemre et al., 2014).

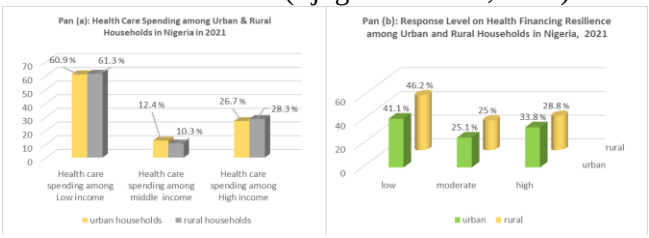

Figure 4. Health spending and financial health resilience across urban and rural households in Nigeria (The authors' computation, 2022)

Table 1 depicts the frequency selection of reference or base category groups among the three households' income groups. Interestingly, low-income households are the most frequent income group that tends to spend more on health and are adopted as the reference group compared to the medium-income and high-income groups in this estimation, as shown in Figure 3.

Table 1. Frequency selection of the reference or base category group (The authors' computation, 2022)

Categories of health cost financing		
Multinomial categorization of the HH	**HH class**	**Percentage**
Low cost	18,004	61.22
Average cost	3,197	10.87
High cost	8.206	27.90
Total number of households (HH)	29.407	100

The estimation showed that the low-income group accounted for 61% in terms of health care spending, which measured health care cost, followed by the high-income group, which accounted for 28%, and the medium-income group, which accounted for 11%.

Table 2 depicts the relative risk ratios for the multinomial logit outcome. These were obtained by exponentiating the multinomial logit coefficients. However, the RRR of a coefficient indicates how the risk of the outcome falling in the comparison group compared to the risk of the outcome falling in the referent group changes with the variable in question.

Table 2. Multinomial logistic estimation in terms of relative risk ratios (The authors' computation, 2022)

Q6076_	**RRR**	**Std. Err.**	**z**	**P>|z|**
Low (base outcome)				
Medium				
acchealthinsur	1.332021	.6670848	0.57	0.567
finHIn(Q6081_)	18.52811	6.929567	7.81	0.000
ALFC (Q6041_)	.6112386	.2520116	-1.19	0.232
age (E7)	1.010581	.0116382	0.91	0.361
eduLeve (E8)	1.031623	.0974433	0.33	0.742
gender (E6)	1.622787	.4452407	1.76	0.078
marStat (E4)	1.097033	.0473856	2.14	0.032
savings (F5a)	1.532756	.4016843	1.63	0.103
mmPay(QF5_5)	.4968698	.2182579	-1.59	0.111
AcceFnSe(F14)	.8168159	.2660055	-0.62	0.534
UrbRur (Q12_)	1.526055	.4440234	1.45	0.146
Resili(Q6079_)	.3032631	.0684678	-5.28	0.000
Region Q7_ (Northcentral as the base category)				
North East	.6482208	.3931205	-0.71	0.475
North West	.6786279	.345261	-0.76	0.446
South East	.2158029	.0996611	-3.32	0.001
South South	.2704948	.1072638	-3.30	0.001
South West	.5499777	.212575	-1.55	0.122
_cons	.0031432	.0057044	-3.18	0.001
High				
acchealthinsur	2.072511	.9247339	1.63	0.102
finHIn(Q6081_)	99.6051	42.27121	10.84	0.000
ALFC (Q6041_)	.3807498	.1546084	-2.38	0.017
age (E7)	.995479	.0114886	-0.39	0.695
eduLeve (E8)	.9496127	.0891305	-0.55	0.582
gender (E6)	1.062635	.2834583	0.23	0.820
marStat(E4)	1.104421	.0475702	2.31	0.021
savings(F5a)	1.887061	.4662212	2.57	0.010
mmPay(QF5_5)	.8907725	.341489	-0.30	0.763
AcceFnSe(F14)	.633657	.2128137	-1.36	0.174
UrbRur (Q12_)	1.369756	.3815822	1.13	0.259
Resili(Q6079_)	.2096633	.0481739	-6.80	0.000
Region Q7_ (Northcentral as the base category)				
North East	.5743751	.3735705	-0.85	0.394
North West	1.202672	.6073833	0.37	0.715
South East	.3063936	.1458589	-2.48	0.013
South South	.6111459	.2366794	-1.27	0.204
South West	1.240108	.4849677	0.55	0.582
_cons	.0006699	.0012343	-3.97	0.000

An RRR > 1 indicates that the risk of the outcome falling in the comparison group relative to the risk of the outcome falling in the referent group increases as the variable increases. In other words, the comparison outcome is more likely, whereas an RRR < 1 indicates that the risk of the outcome falling in the comparison group relative to the risk of the outcome falling in the referent group decreases as the variable increases.

Therefore, the result is interpreted for the three-income group despite the fact that not all the response indicators were significant at 5 per level. Hence, while financial health indicator (*Q6081_*), marital status (*E4*), financial health resilience (*Q6079_*), southeast region (*Q7*), and south-south were significant at 5 per level , household access to medical insurance (*acchealthinsur*), an average level of financial capability(*Q6041_*), household age (*E7*), household educational level (*E8*), gender (*E6*), household savings (*F5a*), the use of mobile money operator service for medical payments (*QF5_5*), access to financial products and services (*F14*), and urban and rural areas (*Q12*) were not significant at 5 per level under the medium-income group.

5. Discussion

5.1. The Medium-Income Group Relative to the Low-Income Group

An increase in household financial health indicators (Q6081_) (which are a proactive proxy to health system resilience and health insurance) increases the relative risk ratio of medium-income group health care spending (Q6076_) compared to low-income and high-income groups by 18.52811 at 5% significance given a p-value of 0.000 is less than 0.05. More generally, we can say that health care spending (*Q6076_*) is more likely to increase for the medium-income group than for the low-income and high-income groups. Similarly, an increase in marital status (*E4*) by one unit increases the relative risk ratio of medium-income group health care spending (*Q6076_*) compared to low-income and high-income group by a factor of 1.097033 at 5% significance given a p-value of 0.032 that is less than 0.05. Whereas a unit increase in a relative risk ratio of financial health resilience (*Q6079_*) of medium-income group health care spending (*Q6076_*) compared to low-income and high-income group decrease by a factor of 0.3032631 at 5% significance given a p-value of 0.000 that is less than 0.05.

However, it treats Northcentral as a base category for the classification of spreading households by region (*Q7*) in Nigeria compared to regions such as Northeast, Northwest, Southeast, South-South, and Southwest. The result further showed that only the southeast and south-south regions were significant at the 5% level. Nevertheless, a unit increase in the relative risk ratio of the medium-income group in the southeast and south-south regions decreases health care spending (*Q6076_*) by a factor of 0.2158029 and 0.2704948 at 5% significance, given a p-value of 0.001 each that is less than 0.05. The results also showed a relatively low

pseudo R2 of 0.2799 but a significant model at a 1% level of significance given the chi2 probability of 0.0000. This further shared similarity with the evidence provided by Owoeye and Olaiya (2018), Obi et al. (2020), Demissie and Negeri (2020).

5.2. The High-Income Group Relative to the Low-Income Group

The result of the high-income group differed from that of the low-income group. Results showed that an increase in household access to medical insurance (*acchealthinsur*) by one unit increased the relative risk ratio of high-income group health care spending (*Q6076_*) compared to low-income and medium-income group by a factor of 2.072511 at 5% significance given a p-value of 0.102 that is less than 0.05.

Similarly, the result showed that an increase in household financial health indicator (*Q6081_*) by one unit increased the relative risk ratio of high-income group health care spending (*Q6076_*) when compared to low-income and medium-income group by a factor of 99.6051 at 5% significance, given a p-value of 0.000 that is less than 0.05, whereas an increase in the household average level of financial capability(*Q6041_*) by one unit decreased the relative risk ratio of high-income group health care spending (*Q6076_*) when compared to low-income and medium-income group by a factor of 0.3807498 at 5% significance, given a p-value of 0.017 that is less than 0.05.

Nevertheless, an increase in marital status (*E4*) by one unit increases the relative risk ratio of high-income group health care spending (*Q6076_*) when compared to low-income and medium-income group by a factor of 1.104421 at 5% significance, given a p-value of 0.021 that is less than 0.05. In addition, an increase in household access to financial products and services (*F5a*) by one unit increases the relative risk ratio of high-income group health care spending (*Q6076_*) when compared to low-income and medium-income groups by a factor of 1.887061 at 5% significance, given a p-value of 0.010 that is less than 0.05. An increase in household financial health resilience (*Q6079_*) by one unit decreases the relative risk ratio of high-income group health care spending (*Q6076_*) when compared to low-income and medium-income group by a factor of 0.2096633 at 5% significance given a p-value of 0.000 that is less than 0.05.

Similarly, it treats Northcentral as a base category for the classification of spreading households by region (*Q7*) in Nigeria compared to regions such as Northeast, Northwest, Southeast, South-South, and Southwest. The result further showed that only the southeast region was significant at the 5% level. Nevertheless, a unit increase in the relative risk ratio of the high-income group in the southeast region decreases health care spending (*Q6076_*) by a factor of 0.3063936 at 5% significance, given a p-value of 0.013, which is less than 0.05. This shared similarity with the evidence provided by Owoeye and Olaiya (2018), Obi et al. (2020), Demissie, and Negeri (2020).

6. Conclusion

The relevance of universal health coverage (UHC) as a measure designed to ensure that all people have access to essential health services without enduring financial hardship. Interestingly, the illustration of the finding of this study demonstrated that more household members among the rural populations tend to spend more on out-of-pocket health as compared to households in the urban population, which has continued to deepen inequality and uncertainty gap between the rural and urban populations in Nigeria. Also, across the regional spreads in Nigeria, the southeast region seems to have a relative risk ratio when compared to other regions in Nigeria due to her high out-of-pocket spending on health and their purchasing power parity level. Although this further validates their enterprising nature, it still relates more to the level of neglect in the region by the government. This also accounts for the rising level of identity crisis and cases of marginalization by the Nigerian government in the region in recent times.

The study clearly reveals the degree of prevailing unequal chances in health access among different incomes in Nigeria using the World Bank Financial Inclusion Survey (2021) known as the Global Findex database, which provides in-depth data on households' financial resilience to health shocks. The multinomial logistic regression estimation techniques and descriptive statistics were no doubt helpful in providing data that demonstrated the degree of rising out-of-pocket health expenditure and inequality perspective in Nigeria.

The negative effect of health system resilience on health costs highlights a significant danger to health sector sustainability in Nigeria. This has huge implications for achieving universal health goals, especially in Nigeria. Therefore, this study provides an opportunity to reshape health financing measures in a way that should provide equal chances for health access across locations and regions as it points to factors of inequalities, identity crisis, and marginalization crisis in Nigeria. Policy direction should also focus on first-level health insurance to a certain age level not limited to location, region, or religion as a way of mitigating health care costs as well as building a more pragmatic national identity considering the level of depravity in Nigeria. The need for more robust patent medicine regulators is necessary to check the rising private health financing responsible for the out-of-pocket spending across different income groups in Nigeria through strengthening the public health care system in providing equal chances for access among different income groups in Nigeria.

7. Limitations and Further Study

We investigated the effects of health system resilience and access to health insurance on household health care costs among different income groups in Nigeria. Despite that, we adopted the World Bank Financial Inclusion Survey (2021), known as the Global Findex data, which has insufficient indicators on health system financing measures, which was published in 2021. Hence, we could say that our study is constrained by time and finances because we could have conducted a more recent survey. Hence, there is a need for a more recent survey that could provide a current and replicable report on health system resilience and access to health insurance's effects on health costs in Nigeria.

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Authors' Contributions

Asogwa, T.H., Uzochukwu A., and Ezenekwe, R.U. designed the study and performed the analysis. Umoh, D.B. and Anekeje I.U. systematically reviewed the publications, and Ugwuoti, I. Amos, Iwuamadi C.K. and Ezebuilo R.U. drafted and revised the manuscript.

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