Out of Pocket Health Spending and Poverty Level in Nigeria

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Abstract

This study investigated out-of-pocket health spending and poverty level in Nigeria from 1980 to 2022. The study used secondary data and variables used are percentage of out-of-pocket health spending, poverty rate, per capita income and gini index which were sourced from World Bank Database, CBN Statistical Bulletin and World Health Organization. Data were analyzed using Auto Regressive Distributed Lag (ARDL) Model. The results show a positive relationship between poverty rate, gini index in Nigeria and percentage of out-of-pocket health spending which implies that a percentage increase in out of pocket spending and gini index in Nigeria brings about 0.4543 and 2.0605 percentage increase in poverty rate in Nigeria. This implies that when out of pocket spending and gini index increases, poverty rate also increases and the result equally shows a negative relationship between per capita income and poverty rate in Nigeria. This implies that a percentage increase in poverty rate reduces per capita income by 0.2491 percent and vice versa. The study concluded that high level of out-of-pocket health spending in Nigeria poses a substantial financial burden on households, especially those with lower incomes. The study recommended that strategic investments in healthcare infrastructure and the implementation of comprehensive health insurance schemes can help mitigate the financial burden on households and foster a more

inclusive and sustainable healthcare system. Government should design and implement health insurance programs that specifically target low-income individuals and families.

Keywords: Out-of-Pocket Health Spending, Poverty Level, Gini Index and Per Capita Income.

Introduction

The concept of health is a complex idea that encompasses various aspects of an individual well-being (Osborne, 2023). Health is even considered to be a basic human right according to World Health Organization (WHO) 1948 constitution and the fundamental goal of every health care system is to ensure that its population have access to high quality health care. Good health plays a crucial role in the economic well-being and productivity of individuals, communities, and nations (Takanao & Okamoto, 2021). A healthy population is essential for sustainable economic growth (Oladosu, Chanimbe & Anaduaka, 2022). A nation with a large proportion of healthy individuals can attract more investments, both domestic and foreign (Osborne, 2023). This was part of what led to series of reforms taken by African countries to increase investments in health in order to meet the health Millennium Development Goals (MDGs) (Oladosu *et al*., 2022). African leaders have expressed this trust through actions such as the 2001 Abuja declaration on an increase in government funding for health by allocating 15% of the government budget to the health sector, the 2006 Addis-Ababa declaration on community health in the African region and the 2008 Ouagadougou declaration on primary health care and health systems in Africa (Piabuo & Tieguhong, 2017). Towards sustainable development goals (SDGs) also, Nigeria has developed and updated its National Health Policy to address current challenges and align with global health goals. These policies aim to improve healthcare access, quality, and equity. Nigeria has implemented various programs to combat specific diseases, such as the National Malaria Elimination Program (NMEP) and the National Immunization Program (NIP) (Marcus, 2024). These programs focus on reducing the incidence of malaria, polio, and other infectious diseases. Nigeria collaborates with international organizations, NGOs, and development partners to enhance its health sector. Partnerships with entities like the World Health Organization (WHO), UNICEF, and various global health initiatives play a crucial role in supporting Nigeria's health goals.

Government health expenditure is crucial as it helps in ensuring the well-being of the population, supports economic and social development (Oleribe, Udofia, Oladipo, Ishola & Taylor-Robinson, 2018). In a country where government health expenditure is not adequately provided, people resolve to alternative options such as: Social Health Insurance (SHI) scheme, Out-of-pocket health expenditure (OOP), Corporate Health Programs (CHP), private individuals and organisations donation, orthodox medical health care services (Ataguba, Ichoku, Nwosu & Akazil, 2020). Among those health care financing listed, this study focused extensively on out-of-pocket (OOP) health financing which is the major health financing mechanism across developing countries (Jogelkar, 2018). Out-of-pocket health expenditure is a payment where individuals and families directly pay for healthcare services, medications, and treatments which are not covered by insurance or public programs (Rahman, Gasbarro & Alam, 2022). These costs can encompass a wide range of medical services and products, including consultations, hospitalizations, surgeries, prescription drugs, medical equipment, and various types of therapies or treatments (Reshmi, Sreekumaran, Unnikrishnan & Bhaskaran, 2017).

In countries where out-of-pocket expenditure is the most important source of health care financing, the effect of health expenditure on household economic status can be severe, particularly among the poor (Priyanka & Sumalatha, 2021). Although, Grossman theory of demand for health care propagates that spending on health care is an investment and not wholly a consumption spending (Grossman, 1972). A poor person has to rethink before making such spending. High out-of-pocket health spending, especially in low-income or impoverished populations can result in catastrophy (Ikpe, Agu & Okwor, 2023).

One of the Millennium Development Goals (MDGs) of Nigeria was to eradicate poverty or reduce it to a barest minimum by 2015, but the alarming rate of increase in poverty level in the country shows that realizing this goal even in the nearest future is still far-fetched because poverty rate in Nigeria as at 2020 stood around 40.1% (National Bureau of Statistics, 2020). The Nigeria Ministry of Health admits that around 39 million Nigerians are pushed into poverty because of ill health every year (Nigeria Ministry of Health, 2018). Furthermore, about 30% of rural area dwellers in Nigeria could not go for treatment due to lack of finance in 2014 (Nigeria Health Agencies, 2017). The statistics released by World Bank as at 2023 showed that about 87 millions of Nigerians are living below poverty line and Nigeria is the world's second largest poor population after India.

Despite the laudable contributions of the health sector to economic development, the Nigerian health sector has witnessed various turbulences that have negatively affected the progress recorded at various times (Ataguba *et al*., 2020). Some of the factors that affect the overall performance of the health system include; inadequate health facilities, poor human resources and management, poor remuneration and motivation for health workers, corruption, low government spending on health, high out-of- pocket expenditure on health, shortage of essential drugs and supplies and inadequate supervision of health care providers among others (Oleribe, Udofia, Oladipo, Ishola, & Taylor-Robinson, 2018). Nigerian doctors, pharmacists, nurses and other health professionals continue to leave Nigeria to apply their services in more profitable countries (brain drain) or now prominently the "Japa Syndrome" is one of the persistent problems of health sector in Nigeria (Kumar & Umakant, 2019). In 2023, it was said by the Ministry of Health that Nigeria has 1 doctor per 6000 patients (1:6000) in its hospitals. The government percentage of health expenditure has not been encouraging over the years as it was 3.19% in 2001, 5.05% in 2003, it reduced in 2004 to 4.63% and kept reducing till 2010 i.e. 4.63% in 2004, 4.47% in 2005, 4.26% in 2006, 3.91% in 2007, 3.70% in 2008, 3.58% in 2009, 3.30% in 2010. It rose to 3.32% in 2011 and kept fluctuating until 2019 that it fell to 2.99%. Since 2020, there has been an increase in government health expenditure i.e. 3.38, 4.18 and 4.70% in 2020, 2021 and 2022 respectively (World Health Organization, 2023).

Many studies had been carried out in relation to out of pocket health spending and poverty level in Nigeria and outside Nigeria but most of those studies focused on out-of-pocket health expenditure and health outcome, health outcome and poverty level, health outcome and economic growth, government health expenditure and health outcome, amongst others but limited efforts have been made with reference to out-of-pocket health spending and poverty level in Nigeria and those few ones available such as Abdalla and Norashidah (2021) that used poverty headcount ratio, the poverty gap index, and the poverty gap squared index as proxy for poverty rate, Aregbeshola and Khan (2018) used poverty headcount as proxy for poverty rate when there is actual data for poverty rate and percentage of out of pocket health expenditure in Nigeria. This study also examines the relationship between out-of-pocket health expenditure and poverty rate as they influence per capita income of an individual.

This study is also important and unique for a number of reasons. Firstly, this study improves on the previous study by covering the period before and after covid 19, Ebola and other pandemics in recent time. Secondly, this study relates how out of pocket health spending affected the income of individual household and poverty level in the country. Theoretically, previous studies reviewed various theories such as supply and demand theory for health, determinants of healthcare utilization theory, health insurance theory among many other theories but this study reviewed and adopted human capital theory of health care demand because the theory emphasizes how investment in health increases the health status productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability, which is a product of innate abilities and investment in human beings. The theory promotes policies aimed at reducing health disparities by ensuring that all individuals have the opportunity to invest in their health and education.

Conceptual Review

Concept of Out of Pocket Health Spending

Out of Pocket expenditure is any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individual or population groups (Gündüz, Gudek, & Kasapkara, 2023). Out-of-pocket health expenditures include payment of cash or goods for direct health care services, such as medicines consultation fees, and laboratory diagnostic tests (Ogunbekun *et al.*, 2019). Out of pocket expenditures are non-reimbursable fees which a patient or family is responsible for paying directly to health practitioners or suppliers, without intervention of a third party. It often occurs, when publicly funded facilities are unable to provide the required health services and supplies for free or through insurance.

Concept of Poverty

Poverty was classified to five dimensions of deprivation: personal and physical deprivation experienced from health, nutritional, literacy, educational disability and lack of self-confidence; economic deprivation drawn from lack of access to property, income, assets, factors of production and finance; social deprivation as a result of denial from full participation in social, political and economic activities; cultural deprivation in terms of lack of access to values, beliefs, knowledge, information and attitudes which deprives the people the control of their own destinies; and political deprivation in term of lack of political voice to partake in decision making that affects their lives. Related to the definition of poverty is the measurement of poverty (Magaji, Yakeen, Eke & Musa, 2021).

According to Schimmel (2009), HDI combined three components in the measurement of poverty: (i) life expectancy at birth (longevity); (ii) education attainment and; (iii) improved standard of living determined by per capita income. The first relates to survival vulnerability to death at a relatively early age. The second relates to knowledge being excluded from the world of reading and communication. The third relates to a decent living standard in terms of overall economic provisioning. Poverty has various manifestations which include among others: lack of income and productive resources sufficient to ensure sustainable livelihood, hunger and malnutrition, ill health, limited or lack of access to education and other basic services, increased morbidity and mortality from illness, homelessness and inadequate, unsafe and degraded environment and social discrimination and exclusion. It is also characterized by lack of participation in decision making in civil, social and cultural life (Chukwuemeka, 2009).

Various Forms of Poverty

Absolute poverty: Also known as extreme poverty or abject poverty, it involves the scarcity of basic food, clean water, health, shelter, education and information. Those who belong to absolute poverty tend to struggle to live and experience a lot of child deaths from preventable diseases like malaria, cholera and water-contamination related diseases (Robert 2018). Relative poverty: It is defined from the social perspective that is living standard compared to the economic standards of population living in surroundings. Hence it is a measure of income inequality. For example, a family can be considered poor if it cannot afford vacations, or cannot buy presents for children at Christmas, or cannot send its young to the university. Usually, relative poverty is measured as the percentage of the population with income less than some fixed proportion of median income. Situational poverty: It is a temporary type of poverty based on occurrence of an adverse event like environmental disaster, job loss and severe health problem. People can help themselves even with a small assistance, as the poverty comes because of unfortunate event.

Theoretical Review

Human Capital Theory of Health Care Demand

Much of the economic theory of health care demand is based on the Grossman human capital approach to health (Grossman 1972; 1999; 2004). In his model, health services are sought because they improve health status implying that demand for health care is derived from demand for health. In the Grossman model, each person inherits an initial stock of health which decreases with age, but can be increased through investments. Health is demanded, first as a consumption commodity which directly enters the individual's utility function, and second, as an investment commodity which increases the stream of healthy days that permit market and nonmarket activities. The theory's mathematical foundation is based on utility maximization, which can be expressed as follows: The utility function represents an individual's satisfaction or well-being, which depends on the quantity and quality of healthcare consumed (H) and other goods or services (C) that are available for consumption, Y represents income or resources available to the individual.

U = *f* (H, C, Y)

The Vicious Cycle of Poverty Theory

Malthus (1798), in his original essay observed the relationship that exists between population growth and economic well being of the people. He postulated that any increase in living standards would result in an increase in population size. But, food production could not be increased at the same rate due to the operation of the Law of Diminishing Returns. Population growth would, therefore, always exceed the growth of the means of subsistence and mankind was doomed to remain in poverty.

The idea of Malthus can be represented as: Y $(Pg - Fg) = f(Pg - Fg)$

From the equation, economic well being (Y) is a function of population growth and food growth. But since the rate of growth in output is increasing in an arithmetical form while population is increasing in a geometric form it simply means that Y in eqn one is negative, hence:

$Y'\ (Pg - Fg) = f'(Pg - Fg) > 0$

$Y''\ (Pg - Fg) = f''(Pg - Fg) < 0$

If this condition has been established, based on the Nurkse vicious cycle of poverty theory, the economy will remain on the path of poverty or continue to reduce in per capita income. Based on the assumption that output is inversely related to population growth hence:

Y = 1/P = ñ

Solving for ñ

ñ = Y/P Where ñ is the symbol for per capita income which will continue to fall in a poor economy until there is an exogenous force to first make it constant and then increase

Stylized Facts on Out Of Pocket Health Spending

Nigeria was ranked as having the 42nd highest out-of-pocket expenditure on health with 74.4% of private expenditure being paid as out-of-pocket expenditure (WHO, 2011). Over 80% of the total health financing is private financing (Osborne, 2023). A survey shows that the overall impacts of out of pocket health spending on households remains large between 2015-2019 as government budget for health dropped drastically and percentage of out-of-pocket health expenditure stood at 85% compared to 37% of average Africa countries (WHO, 2020). Recently, there are some improvement between 2020-2022 shortly after Covid 19 as government increased

her spending on health and restructured health centers, the percentage of out of pocket health expenditure dropped to 77% (Health and Human Service Statistics, 2022).

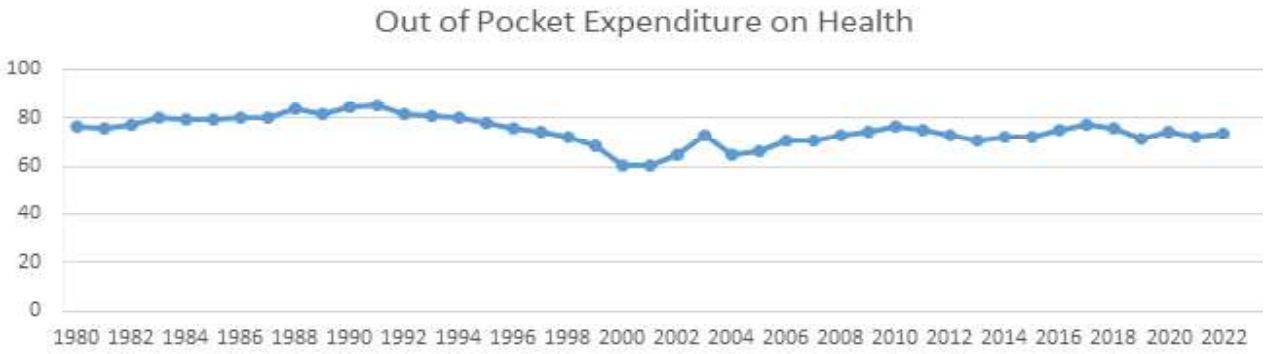

Figure 1: Overview of out of pocket health spending in Nigeria from 1980 to 2022.
Source: World Health Organization Global Health Expenditure Database (2023)

Stylized Facts and Trends of Poverty in Nigeria

Poverty trend in Nigeria is very high with a significant portion of the population grappling with economic hardships. Factors such as high unemployment rates, inadequate access to education and healthcare, economic inequality among others (Gambo *et al*., 2022). The use of socio-economic indicators like per capita income, life expectancy at birth (years), access to health care services, access to safe water, access to education, access to sanitation facilities, and electricity also depicts the extent of poverty in Nigeria (World Health Organization, 2023). The rate of poverty in Nigeria have not shown any remarkable reduction when compared with some other developing countries (Oleribe *et al*., 2018).

Empirical Literature

Recent Studies in Nigeria

Using ADePT 6.0 and STATA 12, Aregbeshola and Khan (2018) evaluated out-of-pocket payments, catastrophic health expenditure and poverty among households in Nigeria. Secondary data from the Harmonized Nigeria Living Standard Survey (HNLSS) was utilized to assess the catastrophic and impoverishing effects of OOP health payments on households in Nigeria.

Abdalla and Norashidah (2021) employed dynamic panel threshold analysis to examine out-of-pocket health expenditure and poverty. The dynamic panel threshold method, which allows for the endogeneity of the threshold regressor (out-of-pocket health expenditure) was used. Three indicators were adopted as poverty measures, namely the poverty headcount ratio, the poverty gap index, and the poverty gap squared index.

Okunogbe *et al.* (2022) examined short and longer-term impacts of health insurance on catastrophic health expenditures in Kwara State, Nigeria. The analysis is based on a panel dataset consisting of 3 waves of household surveys in program and comparison areas. The balanced data consists of 1,039 households and 3,450 individuals. They employed difference-in-differences (DiD) regression approach to estimate intention-to-treat effects, and then computed average treatment effects on the treated by combining DiD with propensity score weighting and an instrumental variables analysis.

Using fixed percentage, rank-dependent thresholds and the logistic regression model, Edeh (2022) studied dynamics in catastrophic health care expenditure in Nigeria using real GDP and GEXP.

Recent Studies outside Nigeria

Using multivariate logistic regression and Covariates logistic regression, Shivendra *et al.* (2019) evaluated Burden of out-of-pocket health expenditure and its impoverishment impact in India:

evidence from National Sample Survey. Standard catastrophic, inequality and impoverishment measures were used to analyse the burden and impact of OOP health expenditure

Sayem *et al.* (2021) assessed the incidence of catastrophic health expenditure and impoverishment from out-of-pocket payments and their determinants in Bangladesh: evidence from the nationwide household income and expenditure survey 2016. A household that made OOP payments of >10% of its total or 40% of its non-food expenditure was considered to be facing CHE. Multiple logistic models were employed to identify the determinants of CHE and impoverishment.

Batbold *et al.* (2022) used 3-stage least squared method to examine the crowding-out effect of out-of-pocket health expenditures on consumption among households in Mongolia. The mean monthly OOP health expenditure per household was ® 64 673 (standard deviation [SD]=259 604), representing approximately 6.9% of total household expenditures.

Kolasa and Weychert (2023) studied causal effect of catastrophic health expenditure on poverty in Poland through recursive bivariate probit models using Polish Household Budget Survey data covering years from 2010 to 2013 and from 2016 to 2018.

Hilaire *et al.* (2023) studied out-of-pocket health expenditure and household consumption patterns in Benin: Is there a crowding out effect? The study used multivariate analysis of the QUAIDS model using six categories of consumption items. The study estimated a system of conditional Engel curves with three stage least squared (3SLS) and seemingly unrelated regression (SURE) for seven categories of goods using the Quadratic Almost Ideal Demand System (QUAIDS) in the form of budget shares corresponding to proportions of total non - health expenditure.

Methodology of The Study

The research design for this study is descriptive design and relevant data for this study were gathered from secondary sources such as, World Health Organization (WHO), World Bank data, CBN Statistical Bulletin, National Bureau of Statistics of various editions and other sources of data collection between 1980 to 2022.

Theoretical Framework

The study adopted Grossman human capital approach to health (Grossman 1972; 1999; 2004). Grossman argues that medical care is different from other goods and services, since what an individual is actually buying is better health. The theory's mathematical foundation is based on utility maximization, which can be expressed as follows: The utility function represents an individual's satisfaction or well-being, which depends on the quantity and quality of healthcare consumed (H) and other goods or services (C) that are available for consumption, Y represents income or resources available to the individual.

$$U = U (H,C, Y)$$

Health (H) is seen as an input that contributes to an individual's productivity, quality of life, and overall utility. The individual's health depends on the level of healthcare (Hc) consumed and other factors, such as genetics, lifestyle, and environmental conditions, X represents other determinants of health, not directly related to healthcare.

$$H = H (Hc, X)$$

The theory emphasizes how investment in health increases the health status productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability, which is a product of innate abilities and investment in human beings (Oboh *et al*., 2012).

Model specification

This study adopted and modified the model of Abdalla and Norashidah (2021) to develop the relationship between Out of pocket expenditure and poverty level in Nigeria. Therefore, this study models the short run and long run on out of pocket expenditure and poverty level in Nigeria using autoregressive distributed lag model proposed by Pesaran *et al.* (2001). The model of Abdalla and Norashidah (2021) is stated below:

$$POVit = \beta OOPit + \pi Zit + \varepsilon it$$

Povit = ui + ñPovit"1 + â1OOPitI (OOPit d" ã) + â2OOPitI (OOPit> ã) + ðZit + åit

Where POVit refers to poverty, as measured by the poverty headcount, the poverty gap, and the poverty gap squared.

OOPit is out-of-pocket health spending, as a percentage of total health expenditure;

Zit is a vector of other explanatory variables;

GDPit is the real income per capita;

GHEit is government health expenditure, as a percentage of total health expenditure;

εit is an error term; i = 1, . . . , N denotes the country (N = 145 countries); and t = 1, . . . , T denotes the time, which is between 2000 and 2017. As suggested in the existing literature, out-of-pocket health expenditure should be treated as an endogenous variable in its relationship with poverty. Therefore, it is critically important to control for the endogeneity of out-of-pocket health expenditure.

This study adopted and modified the above model to achieve the study objectives:

Auto-regressive distributed lag (ARDL) is adopted to examine both long and short run relationship between the variables, Bound Test comprise of the transition information from the short-term to the long-term. The coefficients $\Phi, and\ \pi$ are normalized on ρ and it is computed as follow to give the long run estimates;

$$-\frac{\Upsilon}{\rho} = \sigma, -\frac{\Phi}{\rho} = \alpha, and\ -\frac{\pi}{\rho} = \beta$$

Thus, the modified model is expressed as follows;

$$PR_t = \alpha_0 + \alpha_1 POE_t + \alpha_2 PCI_t + \alpha_3 GI_t + \mu_t$$

$$\Delta PR = \alpha + \sum_{i=1}^{N1} \emptyset_i \Delta POE_{t-i} + \sum_{j=0}^{N2} \beta_i \Delta PCI_{t-j} + \sum_{k=0}^{N3} \gamma_j \Delta GI_{t-j} + \rho POE_{t-1} + \partial PCI_{t-1} + \lambda GI_{t-1} + \mu_t$$

The Autoregressive Distributed Lag (ARDL) model, which comprise of both long run and short run estimates. The estimates of ∂, λ and Ψ are normalized on ρ and computed as $-\partial/\rho, -\lambda/\rho$ and $-\Psi/\rho$ to yield the long run estimates of out of pocket expenditure and poverty respectively and the constant is computed as $-\alpha/\rho$, since $\Delta PR = \Delta PCI = \Delta GI$ in the long run. Let: PR = Poverty Rate; POE = Percentage of Out of pocket health expenditure; PCI = Per Capita Income GI = Gini Index; μ = Disturbance or Error Terms; t = time in years; α_0 is the intercept while $\alpha_1, \alpha_2\ and\ \alpha_3$ are the elasticity coefficients of the explanatory variables.

Sources of Data

The relevant data for this study were gathered from secondary sources such as, World Health Organization (WHO), World Bank data, CBN Statistical Bulletin and National Bureau of Statistics of various editions and data spanned from 1980 – 2022.

Description and Measurement of Variables

Variables	Definition	Formula
Poverty rate	The poverty rate is a crucial indicator used to assess the proportion of a population living in poverty. It is typically expressed as a percentage and is calculated based on income or consumption levels.	Poverty Rate = $(\frac{\text{Total Population No of People Below Poverty Line}}{Total\ Population})$ ×100
Per capita income	Per capita income is a commonly used economic indicator that represents the average income earned by an individual in a specific geographical area, such as a country, region, or city. It is calculated by dividing the total income of the area by its population.	Per Capita Income = $(\frac{\text{Gross National Income}}{Total\ Population})$
Percentage of out of pocket health expenditure	The percentage of out-of-pocket health expenditure is a key indicator that reflects the proportion of healthcare costs that individuals or households pay directly, without financial protection from insurance or government programs.	Percentage of Out-of-Pocket Health Expenditure = $(\frac{\text{Out of pocket health expenditure}}{Total\ Healt\,h\ Expenditure})$ ×100
Gini index	The Gini Index, or Gini coefficient, is a measure of statistical dispersion representing the inequality of a distribution. It is often used to quantify income inequality within a population or the distribution of wealth.	$G = (\frac{\sum i=1\ \sum j=1\ \lvert xi-xj\rvert}{2n2x})^n$

Results and Discussion of Findings

Table 2: Unit Root Test (Augmented Dickey Fuller)

Variables	Levels	Critical values		First difference	Critical values		Order of integration	Remark
PR	-2.473471	1%	-4.211868	-4.160552	1%	-4.198503	**I(1)**	Stationary at 1st difference
		5%	-3.529758		5%	-3.523623		
		10%	-3.196411		10%	-3.192902		
GI	-3.328840	1%	-4.219126	-5.112083	1%	-4.198503	**I(1)**	Stationary at 1st difference
		5%	-3.533083		5%	-3.523623		
		10%	-3.198312		10%	-3.192902		
PCI	-4.407162	1%	-4.637008	-3.653800	1%	-4.672009	**I(0)**	Stationary at Level
		5%	-3.720918		5%	-3.728911		
		10%	-3.526009		10%	-3.726891		
POE	-2.014740	1%	-4.192337	-5.706160	1%	-4.198503	**I(1)**	Stationary at 1st difference
		5%	-3.520787		5%	-3.523623		
		10%	-3.191277		10%	-3.192902		

Source: Author's computation, 2023.

The summary of the augmented dickey fuller test shows that poverty rate, percentage of out of pocket health expenditure and gini are stationary at first difference and the probability value are significant at 1%, 1% and 5% level of significance respectively which is represented as I(1) in the order of integration. Meanwhile, per capita income is stationary at level and significant at 5% level of significance I(1). Therefore we accept the alternative hypothesis and reject the null hypothesis and this equally shows that the regression result is free of spurious result. Since the variables are stationary at first difference and at level, the study employed auto-regressive distributed lag ARDL model.

Table 2:Auto-Regressive Distributed Lag (ARDL)

Panel A: Long Run Estimates using ARDL				
Dependent Variable: LPR				
Variable	**Coefficient**	**S.E**	**t-stat**	**Prob**
PR(-1)	0.918146	0.169586	5.414030	0.0000
PR(-2)	-0.054846	0.242598	-0.226077	0.8227
PR(-3)	0.192937	0.241809	0.797891	0.4312
PR(-4)	-0.301760	0.151737	-1.988713	0.0559
POE	0.004543	0.014713	0.308788	0.7596
POE(-1)	-0.021983	0.015785	-1.392664	0.1740
PCI	-0.002491	0.001842	-1.352073	0.1865
GI	0.020605	0.006553	3.144280	0.0037
C	1.127386	0.315394	3.574532	0.0012
Panel B: Short run Estimates				
Dependent Variable: LPR				
C	1.127386	0.315394	3.574532	0.0012
PR(-1)*	-0.245523	0.064779	-3.790169	0.0007
POE(-1)	-0.017440	0.010625	-1.641506	0.1111
PCI**	-0.002491	0.001842	-1.352073	0.1865
GI**	0.020605	0.006553	3.144280	0.0037
D(PR(-1))	0.163669	0.149702	1.093301	0.2830
D(PR(-2))	0.108823	0.152643	0.712925	0.4814
D(PR(-3))	0.301760	0.151737	1.988713	0.0559
D(POE)	0.004543	0.014713	0.308788	0.7596

Panel C: Diagnostic Tests	**Statistic**	**Prob.**
Bound Test	4.3135	
Serial Correlation	1.0922	0.0930
Heteroscedasticity	3.9043	0.1213
Normality Test	10.892	0.0033
Linearity Test	0.0930	0.0393
Adjusted R-Square	0.9486	
F-Statistic	3.3065	0.3452
Stability Test	CUSUM Stable	

Source: Author's computation, 2023.

Notes: ***, **, and * respectively represent statistical significance at 1%, 5% and 10% levels.

The ARDL short run of poverty rate, percentage of out of pocket health expenditure, per capita income and gini index in Nigeria and the result shows a positive relationship between poverty rate, gini index and percentage of out-of-pocket health spending in Nigeria which

implies that a percentage increase in out of pocket spending and gini index in Nigeria brings about 0.4543 and 2.0605 percentage increase in poverty rate in Nigeria. This implies that when out of pocket spending and gini index (income inequality) increases, poverty rate also increases and the result equally shows a negative relationship between per capita income and poverty rate in Nigeria. This implies that a percentage increase in poverty rate reduces per capita income by 0.2491 percent and vice versa. This is in tandem with the work of Abdalla and Norashidah (2021) that found that out-of-pocket health spending led to increased poverty.

R-squared measures the goodness of fit of model. In the analysis the R-squared is 95% which is a good measure of fit which shows that percentage of out of pocket health expenditure, per capita income and gini index accounts for about 95% variation in the dependent variable (poverty rate) whereas the remaining 5% are other factors which affects poverty rate but not captured in the model. The value of F-Stat is 3.306527 and it is lesser than the critical values bound at upper bound of 4.31 at 5 percent level of significance. This implies that the variables co-moved in the long run. Having found a long-run relationship between poverty rate, per capita income, out of pocket health spending and gini co-efficient in Nigeria, the study then estimates the long-run and the short-run elasticity and in the long run, there is evidence that poverty rate has positive relationship with gini co-efficient.

Conclusion and Recommendation

From the outcome of the analysis on the relationship between out-of-pocket health spending, poverty level, gini index, and per capita income in Nigeria, the result concluded that a positive relationship between poverty rate, percentage of out of pocket health spending and gini index in Nigeria which implies that a percentage increase in out of pocket spending and gini index brings about 0.4543 and 2.0605 percentage increase in poverty rate in Nigeria. The study also concluded that high level of out-of-pocket health spending in Nigeria poses a substantial financial burden on households, especially those with lower incomes and this burden is exacerbated by the fact that a considerable portion of the population lives below the poverty line. As individuals and families allocate a significant portion of their income to health expenses, this also contribute to a perpetuation of poverty cycles, hindering the ability of households to invest in education, housing, and other essential aspects of well-being.

Based on the findings of this study, the study recommended that policymakers in Nigeria needs strategic investments in healthcare infrastructure and the implementation of comprehensive health insurance schemes which can help mitigate the financial burden on households and foster a more inclusive and sustainable healthcare system. Also, government should design and implement health insurance programs that specifically target low-income individuals and families. These programs can subsidize or fully cover the cost of healthcare services, reducing the financial burden on the poor.

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