Out-of-pocket Health Spending and Associated Factors in Nigeria

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Abstract
Out-of-pocket health (OOP) expenditure in Nigeria poses a significant financial burden on households, especially those with members living with HIV/AIDS. To assess the macroeconomic factors associated with OOP health spending, the ADRL approach was adopted using the Grossman's Model as the baseline equation, and the scope of the study was 1986-2025. Independent variables included HIV/AIDS prevalence rate, literacy rate, life expectancy, and public health expenditure, with OOP as the dependent variable. Data were sourced from the Central Bank of Nigeria's Statistical Bulletin, Annual Reports, and National Bureau of Statistics, along with World Development Indicators and International Financial Statistics. The Autoregressive Distributed Lag (ARDL) method revealed that higher HIV/AIDS prevalence is associated with OOP expenses, while literacy rate and life expectancy have no association. Also, increased public health spending reduces OOP spending on health. Based on these findings, the study recommends increased public spending on health, and strengthen supports for HIV/AIDS programme as a strategy to reduce the burden of OOP health spending.

Keywords: Macroeconomics, out-of-pocket, health spending, Nigeria.
JEL: I10, I18, 055, E31, E62, and H51.

1. Introduction
Out-of-pocket (OOP) health spending is common in almost all countries around the world, in the form of direct payments for services not covered by insurance or benefits, as well as cost-sharing mechanisms such as deductibles and coinsurance (Aregbeshola & Khan, 2018). Although a moderate share of OOP spending as a proportion of total health expenditure is sometimes considered useful for revenue generation and demand regulation, its high prevalence in many countries has raised concern among policymakers (Ahuru et al., 2021).

First, the provision of healthcare as a public good has increasingly shifted toward a market-oriented system in which access to a wide range of health services depends largely on ability to pay, driven by OOP expenditures (Ichoku & Fonta, 2009; Aregbeshola & Khan, 2018). Second, heavy reliance on OOP payments reduces healthcare utilisation, deepens inequalities in access to care, and exposes low-income households to the risk of catastrophic health expenditure (O'Donnell et al., 2005). Third, OOP payments are often unpredictable and unevenly distributed relative to household income, making financial planning for healthcare difficult (Kimani, 2014).

OOP health expenditures are significantly associated with health outcomes and access to care in Nigeria. Evidence shows that high OOP payments discourage many

Nigerians from seeking necessary medical care, thereby worsening health inequalities and health outcomes (Aregbeshola & Khan, 2018). Research further indicates a strong link between increased OOP spending and catastrophic health expenditure, which frequently pushes vulnerable households into poverty (Opeloyeru & Lawanson, 2023). Similarly, Olaniyan et al. (2024) found that OOP expenditures are closely linked to inadequate health insurance coverage, highlighting the need for stronger financial protection mechanisms.

These findings underscore the urgent need for equitable healthcare financing in Nigeria. Despite global and national commitments toward universal health coverage (UHC), Nigeria's health system remains heavily dependent on OOP payments. According to the Nigerian Economic Recovery and Growth Plan (2017-2020), the health sector continues to struggle to meet the population's healthcare needs. The system is pluralistic, comprising public institutions, private for-profit providers, non-governmental organisations (NGOs), faith-based organisations (FBOs), traditional healthcare providers, and community-based organisations (CBOs) (World Health Organization, 2022).

As a result, households bear the largest share of healthcare financing, accounting for over 70% of total health expenditures (Ahuru et al., 2021). The public sector contributes approximately 19-23%, while health insurance schemes, including the National Health Insurance Scheme (NHIS), account for only about 2-3% (Odeyemi & Nixon, 2013; Orji et al., 2021). This heavy reliance on OOP payments exposes Nigerians to catastrophic health expenditure (Ahuru & Daniel, 2026).

The World Health Organization (2015) further noted that inadequate health insurance coverage is a major driver of catastrophic health financing in Nigeria. Despite the establishment of the NHIS, more than 90% of Nigerians remain uninsured. In addition, only about 3% of the informal sector has voluntary private insurance coverage, while less than 5% of those in the formal sector are enrolled in the scheme (Onwujekwe et al., 2010). Onwujekwe et al. (2012) also found that OOP spending increases the risk of catastrophic health expenditure, reduces healthcare utilisation, and worsens inequalities in access to quality healthcare, particularly among poor households.

Furthermore, evidence links high OOP spending to poor health outcomes in Nigeria (Hodo & Emmanuel, 2012). According to WHO guidelines, financial protection is considered adequate when OOP health expenditure accounts for less than 20% of total health expenditure, as this is associated with lower levels of financial catastrophe and impoverishment. In the light of the foregoing, this study is set to examine the determinants of OOP health spending in Nigeria using a macroeconomic framework. This is among the few studies that adopted macroeconomic analyses of OOP, unlike previous studies that conducted microeconomic analyses by focusing on selected households (see Opeloyeru & Lawanson, 2023; Olaniyan et al., 2024).

2. Literature Review

Out-of-pocket (OOP) health spending remains a dominant feature of health financing systems globally, representing direct payments made by households for healthcare services not covered by insurance or public subsidies. According to Aregbeshola and Khan (2018), OOP payments include both full payments for uninsured services and cost-sharing mechanisms such as deductibles and coinsurance. While a moderate level of OOP spending may contribute to revenue generation and demand regulation in healthcare systems, excessively high reliance on OOP payments raises serious equity and financial protection concerns (Ahuru et al., 2021).

Empirical evidence suggests that OOP-heavy financing systems are associated with reduced healthcare utilisation, increased inequality in access to care, and higher risk of catastrophic health expenditure, particularly among low-income households (O'Donnell et al., 2005). In many developing economies, the reliance on OOP payments reflects a broader shift from public provision of healthcare toward market-based delivery systems, where access is increasingly determined by ability to pay (Ichoku & Fonta, 2009; Aregbeshola & Khan, 2018). Furthermore, OOP spending is often unpredictable and unevenly distributed relative to income, making households vulnerable to financial shocks (Kimani, 2014).

In Nigeria, evidence consistently shows that high OOP payments are a major barrier to healthcare access and a driver of health inequality. Studies indicate that OOP expenditures discourage healthcare utilisation and contribute to poor health outcomes (Opeloyeru & Lawanson, 2023). In addition, Olaniyan et al. (2024) highlight the strong association between OOP spending and inadequate health insurance coverage, reinforcing concerns about weak financial protection mechanisms. The World Health Organization (2015) further notes that insufficient insurance coverage is a key factor driving catastrophic health expenditure in Nigeria.

Despite global commitments to universal health coverage (UHC), Nigeria's health system remains heavily dependent on household financing. The Nigerian Economic Recovery and Growth Plan (2017-2020) highlight persistent challenges in meeting population health needs within a pluralistic system comprising public providers, private for-profit facilities, non-governmental organisations (NGOs), faith-based organisations (FBOs), traditional providers, and community-based organisations (CBOs) (World Health Organization, 2022). As a result, households finance over 70% of total health expenditure, while the public sector contributes approximately 19-23%, and health insurance schemes, including the National Health Insurance Scheme (NHIS), account for only 2-3% (Odeyemi & Nixon, 2013; Orji et al., 2021). Consequently, a large proportion of Nigerians remain exposed to catastrophic health expenditure (Ahuru & Daniel, 2026).

At the macroeconomic level, the relationship between income and OOP health spending remains inconclusive. Musgrove et al. (2002) found that higher GDP per capita increases public health spending while reducing the OOP share of total health expenditure across 191 countries. In contrast, Fan and Savedoff (2014) reported no

significant relationship between national income and OOP spending, suggesting that income alone does not explain variations in health financing structures. Similarly, Grigorakis et al. (2018) found no significant effects of GDP growth or government debt on OOP spending in OECD and European countries.

Other studies highlight more complex and context-specific relationships. Ke et al. (2011) found that GDP growth is associated with higher OOP spending in some lower-middle-income countries, while also identifying demographic and health system factors as important determinants. However, Fan and Savedoff (2012) again reported no significant income effect on OOP expenditure shares. Keegan et al. (2013), studying European countries during the 2007-2009 financial crisis, found that GDP growth, unemployment, and government debt were not statistically significant determinants of OOP expenditure growth, suggesting the presence of policy buffers in some health systems.

Fiscal and institutional factors are also important determinants of OOP spending. Fan and Savedoff (2014) emphasise that government fiscal capacity and policy choices are more influential than income levels, highlighting the importance of political commitment to public health financing. Similarly, increases in unemployment have been linked to higher OOP spending in some OECD countries, as job loss often leads to loss of insurance coverage and reduced financial protection (Grigorakis et al., 2018). Ke et al. (2011) also show that foreign health aid may, in some cases, be associated with higher OOP spending due to inefficiencies in fund allocation and weak institutional structures.

Demographic factors further shape OOP health expenditure patterns. An ageing population increases demand for healthcare services, particularly for chronic diseases, leading to higher household spending on health. Evidence shows that older individuals allocate a larger share of income to healthcare (OECD, 2019). In the absence of strong public financing systems, population ageing therefore increases OOP burden through higher utilisation of health services.

Overall, the literature demonstrates that OOP health expenditure is shaped by a combination of macroeconomic conditions, fiscal capacity, demographic structure, and institutional design rather than income alone. In the Nigerian context, these factors interact with weak insurance coverage and high poverty levels to produce significant financial vulnerability among households.

3. Methodology

3.1 Analytical Framework and Model Specification

Grossman's (1972) model of health demand posits that individual's function as both producers and consumers of health. In this model, health is conceptualized as a form of "capital" that deteriorates over time without proper investment, akin to a depreciating asset. The model distinguishes between two roles: as an investment good, health yields indirect benefits such as higher wages, fewer sick days, and increased productivity; and as a consumption good, it provides direct satisfaction and utility

through the reduction of illness. To maintain or improve their health, individuals must allocate their time and resources, often involving trade-offs with other priorities, such as exercising. This inherent cost of investing in health underscores its expense and the challenge of balancing it with other personal goals.

The model indicates that various factors such as age, wages, nutrition, and education, can influence the optimal level of health capital. For instance, as individuals age, the rate of health deterioration (δ) increases, which diminishes health stock. Conversely, improvements in wages, nutrition, and education tend to enhance health stock. Grossman's theory emphasizes that investing in human capital, including health and education, is crucial for improving outcomes both in the market and non-market sectors. The human capital theory, which asserts that increasing an individual's knowledge and skills boosts productivity, underpins Grossman's model. Thus, investing in health and education not only improves individual health outcomes but also contributes to higher GDP. Health as a capital good can be represented by the following equation:

According to Grossman's model, the best place to invest in health is when the marginal benefit and the marginal cost of health capital are equal, that is $MC = MB$. Health deteriorates with time at a certain rate δ. R is a representation of the interest rate that the customer will pay. Therefore, by including the following factors, the marginal cost of healthcare can be determined:

$$MC_{hc} = r + \delta.$$

The rate of return from health capital is known as the marginal benefit of health capital, or MBhc. The model suggests that various factors, including age, wages, nutrition, education, and so on, can affect the optimal health stock. For example, an increase in age causes δ to rise, which in turn lowers the health stock. Conversely, health stock rises in tandem with increases in wage, nutrition, and education.

Grossman thus presents the notion that, in order to enhance health outcomes in both the market and non-market sectors of the economy, investments in human capital (health and education) are necessary. The human capital theory, which holds that an increase in an individual's stock of knowledge or human capital boosts productivity in a market economy, is the foundation of his model. It can be inferred from this that investing in health and education, regardless of the economy, results in better or more favorable health outcomes, which in turn raise GDP. The following equation can be used to represent health as a capital good:

$$H = H_{t-1} + \eta + I \qquad (1)$$

Where:H is the total stock of health;$H_{t-1}$is the initial endowment of health, I is the rate of investment in health, and δH is rate of depreciation in health. A person is

born with an initial endowment of health stock, which decreases with time and increases with investments in health, as demonstrated by the equation above. Therefore, the effectiveness of health investment will determine the rate at which health is produced.

The study builds on the works of Akpan and Riman (2010) and Orji et al (2015), which examined the relationship between OOP health spending and health outcomes. It extends their approach by estimating the association between OOP health spending and macroeconomic variables through a re-specified model.

$$H = f(X, Y) \qquad (2)$$

A health production function is represented by equation (2), where X is a vector of exogenous variables, Y is a vector of health care inputs, and H is the expected health output. In accordance with the findings of Gaspar et al. (2009), Orji et al. (2015), Akpan and Riman (2010), and the theoretical foundations provided by Grossman (1972), the empirical model is expressed as follows:

$$OOP = f(HIV, LTR, LEX, PHE) \qquad (3)$$

Where:
OOP = Out-of-pocket health spending.
HIV = HIV/AIDS prevalence rate
LTR = Literacy rate
LEX = Life expectancy
PHE = Public health expenditure
The functional specification in equation (3) can be written in econometric form as follows:

$$OOP = \alpha_0 + \alpha_1 HIV + \alpha_2 LTR + \alpha_3 LEX + \alpha_4 PHE + \mu \qquad (4)$$

Where: α_0 to $\alpha_5$are parameter estimates and μ is the disturbance term.
A priori expectations: it is expected that HIV/AIDs prevalence rate, literacy rate and life expectancy are positively related to OOP health expenditure while public health expenditure is negatively associated with OOP health expenditure in Nigeria.

3.2 Estimation Method

The Autoregressive Distributed Lag (ARDL) method is used in the study. "The ARDL is a dynamic estimation method that produces efficient estimates even when the variables of the study exhibit different orders of integration such as zero (0) and one (1). The ARDL method variant of equation (4) is as in equation (5) where lack of prior knowledge of the direction of the long-run relationship among the variables is presumed."

$$OOP_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta OOP_{t-i} + \sum_{i=1}^{n} \beta_2 \Delta HIV_{t-i} + \sum_{i=1}^{n} \beta_3 \Delta LTR_{t-i} + \sum_{i=1}^{n} \beta_4 \Delta LEX_{t-i} + \sum_{i=1}^{n} \beta_5 \Delta PHE_{t-i} + \gamma_1 HIV_t + \gamma_2 LTR_t + \gamma_3 LEX_t + \gamma_4 PHE_t + \mu_t \quad (5)$$

The lag order was determined using the Akaike Information Criterion (AIC). To test for co- integration, the ARDL Bound test was applied to equation (5). If co-integration was found, equation (5) would be separated into parsimonious long-run and short-run models, as described in equation (6).

$$OOP_t = \gamma_0 + \gamma_1 HIV_t + \gamma_2 LTR_t + \gamma_3 LEX_t + \gamma_4 PHE_t + \mu_t \quad (6)$$

In equation (6), $\gamma_0, \gamma_1, \ldots, \gamma_4$ are the long run parameters. Conversely, equation (7) represents the short run model.

$$\Delta OOP_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta OOP_{t-i} + \sum_{i=1}^{n} \beta_2 \Delta HIV_{t-i} + \sum_{i=1}^{n} \beta_3 \Delta LTR_{t-i} + \sum_{i=1}^{n} \beta_4 \Delta LEX_{t-i} + \sum_{i=1}^{n} \beta_5 \Delta PHE_{t-i} + \rho ECM_{t-1} + v_t \quad (7)$$

In equation (7), Δmeans the first-difference,$\beta_0, \beta_1, \ldots, \beta_5$ are the short run parameters. "The $\rho$is the long-term rate at which the short-term disequilibrium is corrected. It is anticipated that the coefficient will be negative, less than one (1), and statistically significant. An Augmented Dickey-Fuller test is conducted to assess the stationarity of each variable, which is crucial for determining the co-integration relationships among the study's variables.

3.3 Sources of Data

The study's scope is 1986-2025. The analysis utilized data from reputable sources, including several editions of the Central Bank of Nigeria's Statistical Bulletin, Annual and Financial Reports, Bullion, and the National Bureau of Statistics. It also incorporated datasets from established sources such as the World Development Indicators and International Financial Statistics. The study's use of these broad and reliable sources enabled a rigorous and detailed analysis that covered a wide range of economic and financial variables. This method improved the reliability and validity of the findings, increasing the range of understanding of the structure of the issue of study.

4. Results and Discussions

The empirical findings and the analysis are presented in this section. The presentation of the variables' descriptive statistics marks the start of the analysis. Also, the correlation analysis of the variables was reported. These are followed by the

presentation of the results of the unit root test, Engel-Granger residual-based test and the fully modified ordinary least squares equation and their discussion.

4.1 Descriptive Statistics

The results of the descriptive statistics are reported in Table 1.

Table 1: Descriptive Statistics

	HIV (Million)	LEX (Year)	LTR (%)	OOP (Million naira)	PHE (Billion Naira)
Mean	102983.4	48.27619	36.20731	8.32E-07	52527.88
Maximum	214131.0	55.60000	51.15700	1.44E-06	447948.2
Minimum	20000.00	45.10000	22.67100	4.60E-07	183.7000
Std. Dev.	66497.51	3.453511	8.059288	2.62E-07	81889.98
Skewness	0.171202	0.875172	0.183536	0.949376	3.145825
Kurtosis	1.368865	2.266394	2.036702	2.988359	14.85228
Jarque-Bera	4.861223	6.303290	1.859699	6.309439	315.1074
Probability	0.087983	0.042782	0.394613	0.042650	0.000000

Source: *Author's computation using EViews 10.0*

As revealed in Table 1, the mean value of HIV/AIDs prevalence in Nigeria is 102,983.4 cases. It indicates HIV/AIDs disease is prominent in Nigeria. Life expectancy rate averaged 48 years over the period of review. This shows that the life expectancy of the average Nigerian citizen is very low. Literacy rate is about 36%. Also, the educational level of Nigerian citizens is low compared to its large population. OOP expenditure per capita averaged N8.32E- 07million within the period of review. It ranged from N1.44E-06 million to N4.60E-07 million within the period 1979 to 2020. Public health expenditure averaged N52.5 billion within the period of review. It ranged from N447.9 billion to N183.7 billion within the period 1979 to 2020. All the variables are positively skewed. Based on the p-values of the Jarque-Bera statistics, HIV/AIDs prevalence and literacy rate are normally distributed while life expectancy, public health expenditure, and OOP health expenditure are not normally distributed at the 5% level of significance.

4.2 Correlation Analyses

The results of the correlation coefficients among the variables are reported in Table 2.

Table 2: Correlation Matrix.

Correlation Probability	OPP	HIV	LEX	LTR	PHE
OPP	1.000000				
HIV		1.000000			

	0.6658				
	0.0000	-----			
LEX	0.4855	0.9014	1.000000		
	0.0000	0.0000	-----		
LTR	0.8068	0.8752	0.7422	1.000000	
	0.0000	0.0000	0.0000	-----	
PHE	0.4277	0.3159	0.3680	-0.0012	1.000000
	0.0001	0.0017	0.0004	0.0053	-----

Source: *Author's computation using EViews 10.0*

As shown in Table 2, the correlation coefficient between OOP expenditure and HIV/AIDS prevalence is positive indicating a strong positive association between these variables in Nigeria. Conversely, the correlation coefficient between OOP expenditure and life expectancy is positive, reflecting a moderate positive association between health expenditure and life expectancy. Additionally, the correlation coefficient between OOP expenditure and literacy rate is positive. It shows that a positive association exists between OOP and literacy rate in Nigeria. However, the correlation coefficient between OOP expenditure and public health expenditure i**s** positive ($r = 0.42$, $p = 0.01$). It shows that the association between HIV/AIDS and OOP is moderate.

The correlation coefficients between and among the explanatory variables are not too strong. This suggests that there is no problem of multicollinearity among the explanatory variables in the model. However, there is need to conduct a formal test of multicollinearity. Therefore, a Centered Variance Inflation Factor (CVIF) test was performed to formally investigate the possibility of multicollinearity among the independent variables used in the study. According to Patrick, Hagan, and Attah-Obeng (2013), a centered variance inflation factors larger than 10 indicates severe multicollinearity or otherwise. Thus, the CVIF test result is presented in Table 3.

4.3 Multicollinearity Test

The result for the multicollinearity test is presented in Table 3.

Table 3: Multicollinearity Test Result

	Coefficient	Uncentered	Centered
Variable	**Variance**	**VIF**	**VIF**
HIV	9339.322	7.237	1.717
LEX	7034.037	16.722	3.452
LTR	16621.87	22.267	3.656
PHE	17646.424	24.264	3.783

Source: *Results extract from EViews 10*

The Centered Variance Inflation Factor result obtained in Table 3 indicated that multicollinearity does not exist among the independence variables because the CVIF value for each of the variable is less than 10. Therefore, the result suggests that the econometric problem of multicollinearity does not exist in model.

4.4 Unit Root Test

The results of Augmented Dickey-Fuller (ADF) unit root tests of the variables at levels and differences are presented in Table 4. The ADF regressions included an intercept but not a trend.

Table 4: Summaries of Augmented Dickey-Fuller Unit Root Tests

At Levels				***At Differences***			
Variable	*ADF Statistic*	*Critical Value*	*Remarks*	*Variable*	*ADF Statistic*	*Critical Value*	*Remarks*
HIV	0.195	-2.935	Non-Stationary	***D(HIV)***	-6.082	-2.937	Stationary
LEX	1.809	-2.939	Non-stationary	***D(LEX)***	-7.402	-2.939	Stationary
LTR	-1.733	-2.935	Non-stationary	***D(LTR)***	-6.181	-2.937	Stationary
Log (OOP)	-1.467	-2.935	Non-stationary	***D(OOP)***	-5.260	-2.937	Stationary
PHE	-1.913	-2.939	Non-stationary	***D(PHE)***	-7.751	-2.939	Stationary

Source: *Results extract from E-views 10.0*

Notes: The test was conducted at 5% level of significance; "D" depicts difference operator of the variable.

The results indicate that HIV, LEX, LTR, OOP, and PHE are non- stationary at their initial levels. However, after first differencing, all variables became stationary, showing they are integrated of order one. With unit root tests confirming that all variables are integrated of the same order, the ARDL Bound Test was used to test for cointegration.

4.5 ARDL Bound Test of Co-integration

Using the estimated ARDL model, the study tested for a long-run relationship among the variables with the Bound test. Table 6 shows that the F-statistic of 11.4021 exceeds the upper bound threshold of 4.37 at the 1% significance level. This result indicates that we can reject the null hypothesis of no co-integration among the variables at the 1% level. Therefore, the variables exhibit a long-term relationship and trend together over time.

Table 6: ARDL Bounds Cointegration Test

Null Hypothesis: No long patronships exist run re		
Test Statistic	Value	Number of Parameters (K)
F-statistic	11.4021	4

Critical Value Bounds

Significance	I (0) Bound	I (1) Bound
10%	2.20	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: *Results extract from EViews 11.0*

4.6 ARDL Result

In estimating the ARDL model, first, the basic optimal model was estimated as summarized in Table 4. It is a fitted model from which the short-run and long-run parameter estimates are derived.

Table 5: Short Run Estimated Coefficients Selected Model: ARDL (1, 2, 0, 4,0).

Dependent Variable: D (log (OOP))

Regressor	Coefficient	Standard Error	T-Ratio	Probability
D(HIV(-1))	1.1059***	0.3387	3.2646	0.0031
D(LTR(-1))	-0.1298***	0.0173	-7.4978	0.0000
D(LTR(-2))	-0.0439***	0.0136	-3.2253	0.0034
D(LTR(-3))	1.3210***	0.1372	9.6224	0.0000
ECM (-1)	-0.6028***	0.0667	-9.0315	0.0000

R-Squared 0.9319 R-Bar-Squared 0.9187
F-Statistic 14.4172 [< 0.01] DW-Statistic 2.2858

Source: *Results extract from EViews 10*

The short-run analysis results in Table 5 show that only HIV/AIDS prevalence and literacy rates are significantly associated with OOP health expenditure. According to Table 5, HIV/AIDS prevalence has a positive and significant association with OOP expenditure. This further shows that HIV/AIDS prevalence is positively associated with OOP health spending. Additionally, results also revealed that literacy rate has negative association with the out-of-pocket expenditure from D (LTR (3). By implication improving will be linked with a decline in OOP health spending. The negative association between literacy rates and OOP is consistent across the first, second and third term lagged values of literacy rates. The other regressors, public expenditure (PHE) and life expectancy was excluded from the equation in the short-run.

The ECM puts at -0.6028 is both statistically significant, and has negative coefficient, show that the ECM can serve as error equilibrium. The ECM of -0.6028 shows that 60.28% of the deviation of the OOP from its long-run equilibrium will be reconciled per annum. The result shows that the speed of adjustments is fasts.

The data showed that the coefficient of determination is puts at 0.9319, which shows that 93.19% of the variation in out-of pocket is associated for the variation in out-of-pocket in the ARDL. The adjusted R-squared value of 0.91 indicates that about 91% of the systematic variation in out-of-pocket health expenditure is linked with these variables. The F-statistic confirms that the overall ARDL model is significant at the 1% level. Additionally, the Durban-Watson statistic of 2.28 suggests there is no autocorrelation among the residuals in the model.

4.7 Analysis of the Long Run Model

Given the established long-run relationship among the variables, the long-run model was estimated using the Autoregressive Distributed Lag (ARDL) regression method. The results are detailed in Table 7.

Table 7: Estimated Long Run Coefficients of the ARDL Model

Dependent Variable: Log (OOP)

Regressor	Coefficient	Standard Error	T-Ratio	Probability
Log (HIV)	2.3813***	0.4447	5.3547	0.0000
Log (PHE)	-0.5147***	0.1041	-4.9406	0.0000
LTR	0.027	0.0489	0.5467	0.5892
LEX	0.0442	0.0675	0.6546	0.5185
C	21.9444***	4.3623	5.0303	0.0000

Source: *Results extract from EViews 10*

The estimated coefficients of the explanatory variables in the long-run model HIV/AIDS prevalence rate, PHE, LER, and LTR align with their apriori expectations. Specifically, the coefficient for HIV/AIDS has positive associated with OOP (β= 2.3813) and statistically significant at the 1% significance level. Specifically, a 1% increase in HIV/AIDS prevalence is associated with a 2.38% increase in OOP ($p<0.01$), while a 1% increase in PHE is associated with a 0.51% decrease in OOP ($p<0.01$). This implies that HIV/AIDS is associated with an increased in OOP expenditure. However, the analysis showed that PHE is negatively associated with OOP expenditure and this is significance. By implication decrease in PHE is associated with an increase in OOP expenditure.

4.8 Discussion of Results

This study examined the long-run determinants of out-of-pocket (OOP) health expenditure in Nigeria using an ARDL framework. The results confirm the existence of a stable long-run relationship between OOP health expenditure and HIV/AIDS prevalence, literacy rate, life expectancy, and public health expenditure. Overall, the findings highlight that OOP health financing in Nigeria is shaped by an interplay of epidemiological burden, human capital factors, and health system financing capacity, consistent with the Social Determinants of Health (SDH) framework and the Grossman health capital model (Grossman, 1972).

The results indicate a positive and significant long-run relationship between HIV/AIDS prevalence and OOP health expenditure. This suggests that a higher disease burden increases household-level health spending. From a theoretical standpoint, this finding aligns with Grossman's (1972) health capital model, which posits that poor health increases the demand for healthcare investment to restore or maintain health stock. In Nigeria, where health financing is heavily dependent on households, the burden of HIV/AIDS translates directly into increased private spending.

This result is consistent with Olaposi (2018), who documented a long-run association between HIV/AIDS prevalence and OOP expenditure. Similarly, Shukla et al. (2015) reported that HIV-positive patients incur substantial OOP costs, with a significant proportion experiencing catastrophic expenditure. Barennes et al. (2015) further showed that households affected by HIV/AIDS face high financial burden beyond direct treatment costs, reinforcing the vulnerability created by chronic illness in weakly insured systems.

Public health expenditure is negatively and significantly associated with OOP spending, indicating that increased government spending reduces household financial burden. This finding strongly supports the health financing protection theory, which argues that public financing acts as a risk-pooling mechanism that substitutes for direct household payments.

This finding aligns with Fan and Savedoff (2014), who emphasise that government fiscal capacity and policy choices are critical determinants of OOP expenditure. It also supports the SDH framework, which identifies health system

financing as a structural determinant of health inequality. Conversely, it contrasts with Grigorakis et al. (2018), who found no significant relationship between macroeconomic indicators and OOP spending in OECD countries, suggesting contextual differences between high-income and low-income health systems.

The positive but statistically insignificant relationship between literacy rate and OOP expenditure suggests that higher education may be associated with increased healthcare utilisation and spending. Theoretically, this is consistent with human capital theory, which argues that education increases awareness, preferences for quality care, and willingness to invest in health. However, the direction of the relationship highlights a "paradox of education" in health financing: while education improves health awareness, it may also increase demand for higher-quality private services in contexts where public healthcare is perceived as inadequate. This finding is consistent with da Silva et al. (2015), who reported higher health spending among educated mothers in Brazil, and Leone et al. (2013), who found similar patterns in India. Within the SDH framework, education influences health behaviour but interacts with system-level constraints, such as weak insurance coverage and high reliance on OOP payments.

From the result, Life expectancy is positively associated with OOP expenditure, though not statistically significant. This result reflects lifecycle effects in health economics, where longer life expectancy increases cumulative exposure to illness and healthcare needs. This finding aligns with Grossman's (1972) model, which suggests that individuals demand more healthcare as their health depreciates with age. Ebaidalla and Ali (2017) similarly found that elderly individuals and those with chronic conditions are major contributors to OOP spending. In ageing populations, especially in the absence of strong public financing systems, longer life expectancy tends to increase household health spending pressures.

5. Conclusion and Recommendations

This study concludes that OOP health expenditure in Nigeria is significantly influenced by HIV/AIDS prevalence, public health expenditure, and socioeconomic factors within a long-run equilibrium relationship. High disease burden and weak public financing increase household health spending, while government health expenditure reduces financial burden. Literacy and life expectancy show positive but weaker effects. The findings highlight Nigeria's persistent reliance on OOP financing and limited financial protection. It is recommended that government increases health budget allocation, expands health insurance coverage, strengthens HIV/AIDS support programs, and improves access to affordable quality healthcare, particularly for vulnerable populations, to reduce catastrophic health spending.

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