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Research Paper

Global Health Risk, Government Health Expenditure and Economic Growth: Empirical Evidence from Nigeria

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Abstract— This study examined the effect of health risk and government health expenditure on economic growth with focus on Nigerian economy. ARDL model was operationalized within the human capital development theory and Grossman model adopted to analyze the dataset spanning 1994-2021 and found out that health risk significantly retards the growth of the economy. The study also discovered that government spending, while negligible, had a short-term negative impact on the Nigerian economy but a long-term favorable impact. The study therefore recommended amongst other things that relevant stakeholders (government, non-governmental organizations and private individuals) should increase advocacy program on preventive measures against global disease outbreaks to minimize the risk factor associated with spread of such diseases as well as ensuring prudent investment in health sector, hence to achieve the desired growth of the economy.

Keywords— Global Health Risk, Government Health Expenditure, Economic Growth

JEL: I0, I15, I18, I25

1. Introduction

Just as it is popularly alluded that health is wealth, every nation while pursuing the macro-economic objective of achieving a sustained economic growth, invest heavily in health sector to ensure that human capital is well developed hence, to remain healthy, active and productive in wealth creation. This is so important that the 2030 agenda for Sustainable Development Goals (SDGs) adopted by all United Member States in 2015 captured healthcare among its 17 goals, specifically, to ensure healthy lives and promote well-being for all at all ages. Admittedly, WHO [1] noted that United Nations strategies that improve health and education and reduce inequality must be adequately engaged in order to spur economic growth and tackle poverty and other deprivations.

In this connection, several deadly diseases (epidemics and pandemics) such as human immune virus/human immune deficiency syndrome (HIV/AIDS), tuberculosis (TB), Ebola and the recent corona virus (COVID-19) pandemic, among others have adversely affected the wellbeing of people globally, hence, what could be termed global health risks. Going historically, these diseases threatening human lives have been for decades. For example, The Ebola virus was first identified in 1976 in the area around the Ebola River in the present-day Democratic Republic of the Congo, while a few cases were also reported in Nigeria. [2]. Also, HIV/AIDS virus was discovered in 1986 (FMOH, 2001) with over 3.6 million people reported to be living with the scourge as at 2016 in Nigeria [3] and in 2020, the corona virus (COVID-19) which was also first identified in December, 2019 in a city called Wuhan, China [4] spread into the country, affecting virtually, every economy of the world, the reason why it is called a pandemic.

The effect of these diseases has always been heavy on the healthcare systems. Economic wise, these illnesses have had a direct financial impact on people's incomes because of early deaths, absenteeism from work, and decreased productivity. They have also caused a negative supply shock because manufacturing productivity has decreased, which has disrupted financial markets and distorted global supply chains. For example, it became evident that most governments around the world were largely reactive in their crisis response and misjudged the hazards of rapid COVID-19 spread. Since disease outbreaks are unlikely to stop anytime soon, proactive international measures are needed to preserve lives and advance the economy. Focusing on Nigerian economy, after slipping in to its first recession in 2016 since past 25 years, with poor performance of gross domestic product (GDP), and the fact that the country is still dependent on oil despite its price fluctuations, effect of disease outbreaks which weakens people's purchasing power further plunged down the economy of the country as well as increasing the poverty rate. [5] affirmed this claim, noting that a combination of falling oil prices and COVID-19

spillovers caused Nigeria's 2016 economic crisis, which is still going strong. It has brought about reduction in earnings, an increase in the jobless rate, and disturbances in the transportation, service, and manufacturing sectors, etc. worse still is the poor state of the Nigeria health facilities, which if nothing drastic is done about it will increase the risk factor of the health personnel and the people as a whole.

With all these threatening effects, the question that remained unanswered therefore is what fiscal policy should be initiated to mitigate the overall adverse effects of these diseases on the growth of the global economies, focusing on Nigerian economy. Interestingly, to the best of the researcher's knowledge, no study has addressed this question. The existing empirics which were mostly centered on either HIV/AIDS [6] [7] [8] [9] & [10] or COVID-19 [11] [12] with their mix results and without specifically capturing the impact of government spending on health in Nigeria, further created a gap for this study. Even the work of [13] which was on public expenditure and economic growth, apart from the fact that the study covered only up to 2015 data, it did not bring out the health component of public expenditure in relation to prevailing health trends. This context led to the investigation of the impact of global disease outbreaks and government health expenditure on economic growth, with focus on Nigerian economy for the period 1994-2021. The remainder of this paper captures section 2, literature review; section 3, methodology; section 4, results and discussion and lastly, section 5 which presents conclusion and policy recommendation.

2. Literature Review

2.1 Conceptual Issues

Global Health Risks, Public Health Expenditure, and Economic Growth

[14] conceptualized health risks as factors that raises the probability of adverse health outcomes. In other words, global health risks are those factors that have the potential of increasing negative effects on the overall health status of people. These factors include incidence or number of exposures to infectious disease, bad health habit, malnutrition amongst others. This study focuses on the use of incidence or number of exposures to infectious disease, specifically, HIV/AIDS and tuberculosis which tend to have high rate of global spread. Equally, it captures the current risk of getting a particular disease.

Public Health expenditure on the other hand can be described as government spending which includes costs associated with health and wellness. That means that public expenditure on health refers to the cost outlays or the amount that the government spends on health care, prevention, promotion, rehabilitation, community health initiatives, health administration and regulation, and capital generation with the primary goal of enhancing public health. A nation experiences economic growth when its per capita output or income rises quantitatively over time and is accompanied by increases in the labor force, consumption, and trade volume. [15]. [16] affirms that economic growth is the process that results in a persistent increase in the output of goods and services per person, which is consistent with this definition.

2.2 Theoretical Review

This study employs human capital development theory and Grossman's Model to simulate how health affects economic expansion. They are briefly reviewed thus.

The Human Capital Development Theory

According to [17], this theory was brought to limelight by Ravillion in 1994. This theory is associated with a conscious and continuous process of acquiring and increasing the number of people with the requisite knowledge, educational skills and experience and political development of a country. Human capital theorists have demonstrated that people in low-skilled occupations are more productive when they possess a basic literacy level. People are the stock of economically valuable human talents, according to supporters Shuts, Becker, and Mercer, who also consider investments in people as human capital. [17].

Grossman's Model

According to Michael Grossman's 1972 health production model, every person is both a producer and a consumer of health [18]. Health is seen as a type of capital, managed like a stock that gradually deteriorates in the absence of "investments." The model recognizes that health is both an investment good that provides consumers with indirect satisfaction in the form of higher salaries, fewer sick days, and increased productivity, and a consumption good that provides direct satisfaction and utility. According to this approach, the best place to invest in health is when the marginal cost and benefit of health capital are equal.

By way of application, investment in human capital via expenditure in health sector to control for global risk factors and make human capital healthy to be able to increase productivity will stimulate economic growth.

2.3 Empirical Review

[11] examined the relationship between stock market returns and inflation, concentrating on how the COVID-19 pandemic affected Nigeria between February 27, 2020, and April 30, 2020. Using the GJR-GARCH, the accounting innovation tests, and generalized autoregressive conditional heteroskedasticity type models (GARCH (1,1), the study discovered that COVID-19 increases volatility and distorts the positive link between inflation and stock market returns. Similarly, [12] investigated the economic effects of Covid-19 pandemic on the economies of the world using threshold-augmented multi-country econometric model and found out that the pandemic ushered in a global recession with no exemption to any country.

[19] examined the link over time and causality between poverty, health status, and government health spending in Nigeria. They established a substantial causal bi-directional link between life expectancy and poverty in Nigeria by using the Granger causality test and the Vector Error Correction Model (VECM). Using pooled Ordinary Least Square (OLS)

and fixed effect methods, a panel data study of 45 African countries examined the relationship between healthcare spending and maternal mortality. The results [20] showed that the impact of healthcare spending on mortality varied by region in Africa, with negative effects observed in the Central and Western regions and positive effects in the Southern region.

Using descriptive analytical techniques and a logistic regression to analyze primary data gathered from a sample of 120 respondents affected by HIV/AIDS, [8] investigated the effects of HIV/AIDS on production and income among rural households in Adamawa State, Nigeria. The study found that HIV/AIDS had a negative impact on households' productivity, income, saving, and capital formation. In related studies, [6], [7], [9] had similar findings that HIV/AIDS has negative effect on productivity.

Also, [10] Utilizing time series data on agricultural output, health expenditures, and GDP, the impact of HIV/AIDS on the Nigerian economy was evaluated through the application of ordinary least squares (OLS). The results showed that, although government spending had a notable positive influence on economic growth, HIV/AIDS had a substantially negative impact on it. Using random effect GLS, [23] conducted a panel study to examine the impact of COVID-19 on the relationship between healthcare spending and economic growth. They found that, prior to COVID-19, healthcare spending had a positive influence on economic growth, but that, during the pandemic, an excessive burden of healthcare spending negatively impacted economic stability.

The impact of government spending on economic growth in Nigeria from 1984 to 2015 was investigated by [13] using Johansen co-integration and the Error Correction Model on Keynesian and Endogenous growth theories. It was discovered that public (recurrent and capital) spending has a significant positive long-term impact on economic growth and a negligible short-term negative impact. Also, [21] investigated the effect of health expenditure on economic growth in Nigeria for the period 2000-2021 using ECM and found out that increase health expenditure negatively affects the growth of Nigerian economy both in the short-run and the long-run.

3. Methodology

3.1 Variable Description and Data Sources

Except for GDP taken from Central Bank of Nigeria (CBN) statistical bulletin, all the data for the rest of the variables were gotten from World Development Indicators (WDI). This is summarized in table 1.

Table 1: **Variable Description and Data Source**

Variable	Description	Measurement
INAID	Global risk of getting HIV/AIDS	Incidence of HIV/AIDS, all per 1000 un-infected persons
INTUB	Global risk of getting Tuberculosis	Incidence of Tuberculosis, all per 1000 un-infected persons
GHE	Government health Expenditure	Government health expenditure as a % of GDP
LITE	School enrollment	School enrollment, primary (% gross)
GDP	Gross Domestic Product	GDP (constant 2010 US$)

3.2 Model Specification

Drawing from the theories (human capital development and Grossman Model) adopted for this study, the model is specified as

$Y= \beta_0 + \beta_1 X_i + £_i$…….....1

The reduced form of the model is

GDP=f(GHR, GHE, LITE)…….……2

where GHR stands for global health risk, decomposed into incidence of HIV/AIDS (INAID) and incidence of tuberculosis (INTUB). The model therefore becomes

GDP=f(INAID, INTUB, GHE, LITE)……..……..3

The econometric form of the model is specified as;

$GDP = \beta_0 + \beta_1 INAID_t + \beta_2 INTUB_t + \beta_3 GHE_t + \beta_4 LITE_t + \varepsilon_t$……..…4

Economic a priori requires that β's >0 except for INAID and INTUB.

4. Econometric Procedure

Pre-estimation tests (Multicollinearity and unit root tests and cointegration tests) were conducted to confirm the reliability and appropriateness of the model employed for the study. Multicollinearity diagnostic test helps to check if the variables are highly correlated, hence if multicollinearity exist or not while unit root test enables determination of stationarity of the dataset. Cointegration test enables the determination of existence of long-run relationship between the variables. Autoregressive Distributed Lag (ARDL) model was employed to determine the parameter estimates. Finally, post estimation test (CUSSUM stability test) was conducted to ascertain the stability of the parameter estimates.

5. Results and Discussion

5.1 Multicollinearity Diagnostic

Table 2 report the result of multicollinearity diagnostic test conducted with the use of matrix correlation. The finding shows a positive correlation between economic growth (GDP) and government expenditure on health (GEH), but negative relationship exists between GDP and the rest of the variables (INAID, INTUB and LITE). By the rule of thumb, since the coefficient of the relationship between all the variables are less than 0.8, it can be inferred that there is no problem of multicollinearity in the model.

Table 2: Correlation Matrix

	GDP	INAID	INTUB	GEH	LITE
GDP	1.00	-0.42	-0.37	0.17	-0.07
INAID	-0.42	1.00	0.38	-0.76	0.04
INTUB	-0.37	0.38	1.00	-0.05	0.09
GEH	0.17	-0.76	-0.05	1.00	0.33
LITE	-0.07	0.04	0.09	0.34	1.00

5.2 Unit Root Test Results

Table 3: Unit Root Test Results

		ADF			PP	
Variable	**Levels**	**1st Dif**	**Status**	**Levels**	**1st Dif**	**Status**
INAID	0.73	-3.12	I(1)	0.21	-3.1	I(1)
P-Values	0.99	0.04		0.97	0.04	
INTUB	-2.18	-2.62	I(1)	-2.30	-2.45	I(1)
P-Values	0.22	0.04		0.18	0.01	
GEH	-1.54	-6.21	I(1)	-1.5	-6.20	I(1)
P-Values	0.50	0.00		0.52	0.00	
LITE	-2.77	-5.15	I(1)	-2.6	-6.84	I(1)
P-Values	0.07	0.00		0.10	0.00	
GDP	-1.42	-2.25	I(1)	-1.76	-9.25	I(1)
P-Values	0.56	0.02	I(1)	0.39	0.05	I(1)

Table 3 shows the result of stationarity tests (Augmented Dickey-Fuller (ADF) and Philips-Peron (PP) tests' results for the series). The results of ADF and PP indicates that all the series of the variables (INAID, INTUB, GEH, LITE and GDP) are stationary at first difference. This means that the trend deviations of these variables are not stable. In other words, effect of policy change on any of these variables changes from time to time, hence the need to review policy on these them from time to time.

5.3 Cointegration Test Results

Table 4: Johansen Cointegration Test Result

	TRACE TEST	
Hypothesized No. of CE(s)	**Trace Statistic**	**0.05 Critical Value**
None*	90.8558	69.8189
At most 1*	49.4347	47.8562
At most 2	27.0943	29.7971
At most 3	8.2391	15.4947
At most 4	0.8449	3.8415

From the decision rule to reject the null hypothesis of no cointegration if none of the trace statistic is greater than the critical value at 5%, the result in table 4 confirms the existence of cointegration at 'at most 1' as the trace statistic at this level (49.4347) is greater than its corresponding critical value at 5% (47.8562). This is further confirmed with the result of ARDL Bounds test which shows that long run relationship exists among the variables of study with the F-statistic (4.6527) being higher than the upper (3.49) and lower bounds value (2.56) at 5% significance level (see table 5).

Table 5: Result of ARDL Bounds Test

Model for Estimation	**F-Statistic**	**Sig. level**	**Critical F-Statistic I(0) UCB**	**Bound LCB**
GDP=f(INAID, INTUB, GEH, LITE)	4.6527	1%	3.29	4.37
		5%	2.56	3.49
		10%	2.2	3.09

Since the result of our cointegration tests shows existence of long run relationship, both the short and long run results are presented in table 6.

5.4 Autoregressive Distributed Lag (ARDL) Result

Table 5: Results of ARDL

Variable	**Coefficients**	**t-stat.**	**p-value**
Long Run Results			
INAID	-1.4778	-3.1377	0.0043
INTUB	-0.4166	-0.9197	0.3665
GEH	-0.0875	-0.6873	0.4983
LITE	0.0019	-0.1428	0.8876
Short Run Results			
ECT(-1)	-0.3674	-1.8812	0.0134
INAID	-1.1594	-2.1974	0.0375
INTUB	-0.3268	-0.9089	0.3721
GEH	-0.0686	-0.6453	0.5246
LITE	-0.0015	-0.1443	0.8864
R-Square = 0.7876	**F-Stat. = 18.5381**	**Durbin-Watson Stat.= 2.1009**	

The result of ARDL in table 6 shows the relative differences in the size, direction, and significance of coefficients throughout the sample. The result of ECM-1 is significant and appropriately signed. It shows that the self-mean reverting ability of the variables is 38% (approximately) within a year. The findings indicate that the incidence of HIV/AIDS, or INAID, has a major and detrimental effect on the expansion of the Nigerian economy over the long term. It demonstrates that a 1% increase in INAID will result in a short-term GDP reduction of 1.16% and a long-term GDP decrease of -1.47%. Similarly, the coefficient of INTUB (incidence of tuberculosis) indicates negative impact on GDP and insignificant both in the long and short run respectively. The result shows that a 1% increase in INTUB will cause a 0.42% and -0.33% decrease in GDP in the long and short run. This result implies that increase in global health risk brings about a declining growth of the economy. This finding is consistent with the a priori as a declining health condition is likely going to reduce the level of productivity and hence, output. The evidence from the study of Iya et al. (2012) and Sunday et al. (2017) supports this result.

The result also shows that GEH (government health spending) has negative but insignificant effect on the GDP growth. It indicates that a 1% increase in GEH will bring about 0.09% and 0.07% decrease in GDP. This finding contradicts a priori but yet is consistent with the finding of Awogbemi (2022) who found negative relationship between spending of government on health both in the short and long term. This may be because higher percentage of this spending on health is recurrent, not capital aspect that would revamp the health sector and place it on the path to be able to satisfy health demand in the future, hence to conserve capital spent on foreign medical consumption.

The literacy coefficient's finding shows that, despite its small value, LITE affects GDP both positively and negatively over the long and short terms. According to the results, a 1% rise in LITE will raise GDP by 0.0019% over the long term but decrease it by 0.0015% in the immediate term. Long-term LITE (literacy) results are consistent with the a priori, but short-term results do not. The reason for this deviation in the short run may be because of the proxy for literacy being number of school enrolment as enrolment may not automatically translate to acquisition of require skills that will trigger productivity.

Additionally, the high value of R-square (0.7876) in the model shows that the variations in the GDP are jointly explained to the tune of 78.8% by the explanatory variables (INAID, INTUB, GEH and LITE) in the model while the prob(F-statistic) shows that the entire model has a good fit with Durbin-Watson value of 2.10 depicting absence of serial autocorrelation.

5.5 Post-Estimation Statistical Diagnostic Test

A post estimation statistical diagnostic test of residual stability test was carried out to confirm the stability of the parameters of the model and is presented in figures 1. The result confirmed that the parameters of the model are stable as the graph of the cumulative sum (CUSUM) lies with the 0.05 threshold lines on both sides.

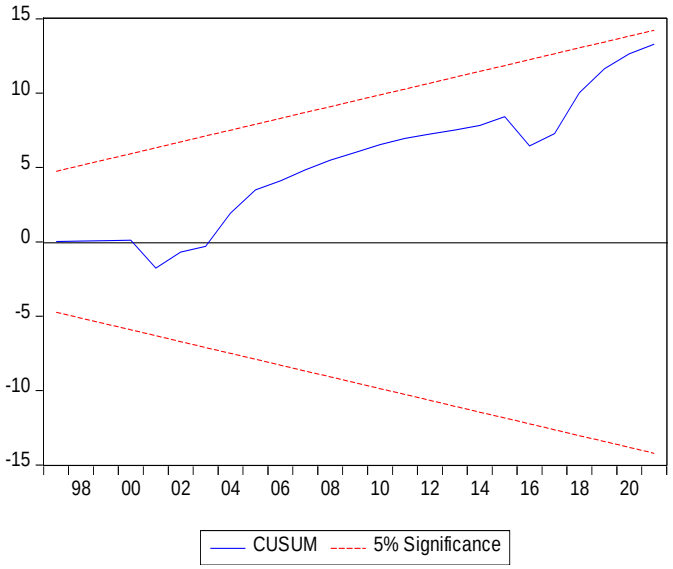

Figure 1: Cumulative Sum (CUSUM) Result
Source: Extracted from E-views 10 Output

6. Conclusion and Future Scope

The study's conclusions demonstrate that the risk of global health issues considerably impedes Nigeria's economic growth over the long and short terms. In the same way, government spending on health care has a negligible but long-term negative influence on the expansion of the Nigerian economy, while little but considerable government spending on literacy has a long-term positive benefit but a short-term negative impact. It can therefore be recommended that government, non-governmental organizations (NGOs) and private individuals should increase advocacy program on preventive measures against global disease outbreaks to minimize the risk factor associated with spread of such diseases. Also, government should ensure pragmatic investment in the health sector both in the area of personnel training and provision of standard medical facilities to guarantee quality health service delivery. Government and relevant stakeholders (NGOs and individuals) should ensure provision of qualitative education as well as increase investment in education in order to increase the productivity of workers since enrolment alone does not translate to productivity, hence to ensure rapid growth of Nigerian economy.

Data Availability

The data for these variables are available. See 3.1

Conflict of Interest

There is no conflict of interest.

Funding Source

None

Authors' Contributions

Adofu, I. and Ogiri, A. I are academic mentors to Ijuo, O. A. They initiated the need for the study and provided procedural guide/protocol development, including modeling and analytical guide. Ijuo, O. A researched literature and conducted data analysis and wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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