HEALTH INEQUALITY AND ECONOMIC GROWTH IN NIGERIA

Callistus Ogu

Department of Economics, Imo State University, Owerri, Nigeria.

callistuogu@imsu.edu.ng

ABSTRACT: This study examined the impact of health inequality on Nigeria's economic growth from 1990 to 2021. the call to close the gap in health inequality in developing countries, especially Nigeria has become inevitable to encourage economic growth and development in the country. This study made use of Autoregressive Distributed Lag in ascertaining the short and long-run relationship between the components of health inequality and economic growth in Nigeria. the variables used are; Gross Domestic Growth Rate, as the dependent variable and also a proxy for economic growth, life expectancy at birth, infant mortality, maternal mortality, and health expenditure formed the independent variables. In any case from the findings, it was identified that only life expectancy at birth was positively significant to economic growth in Nigeria while the reverse was the case in the other three independent variables. It was concluded that budget allocation on health should be improved upon to close the gap in health inequality in Nigeria.

Keywords: Health Inequality, Economic Growth, Life Expectancy at Birth, Infant Mortality Rate, Health Expenditure, Maternal Mortality Rate

INTRODUCTION

According to World Health Organization, (2022), Health disparities are the unfair and avoidable differences in people's health both within and across different population groupings. This inequality includes; life expectancy, avoidable mortality, health conditions and mental ill health. Nigeria in particular has worse health outcomes than the rest of Sub-Saharan Africa and the world as a whole (Sede & Ohemeng, 2015). The life expectancy on this continent is also lower than on others. Life expectancies in these countries continue to decline as a result of HIV/AIDS, malaria, famine, floods, drought, or civil unrest (Lawanson & Umar, 2021). This region's status as the poorest region—where more than half of people earn less than $1 a day— is not a coincidence. In this region, which includes Nigeria, the most contagious diseases are most common, including as HIV and AIDS, malaria, and tuberculosis, Toluwani et al. (2022). The CSDH analysis finds that this region serves as a compelling example of the persistent and unfair health outcomes inequities that exist both within and between countries based on socioeconomic status (CSDH, 2008). One of the lowest life expectancy rates in the world is found in Nigeria. This is an essential statistic for evaluating the state of any country. It is frequently a reflection of the programs and regulations put in place to address the underlying causes of health issues, such as joblessness, economic disparity, and poverty, among several others.

According to Ese et al. (2020), the existing social inequalities, Nigeria's morbidity and mortality rates vary; this variance in health outcomes has been connected to variables like

economic characteristics status, income, education, accessibility to healthy food, wellbeing of the citizenry, and healthy environment. Therefore, the life expectancy may vary, either surpassing or falling short of the national average of 54.5 years, contingent upon both geographical location within Nigeria and individual income levels. This is because those in Nigeria who survive on less than $1 a day are also less likely to have access to clean water, efficient transportation systems, reliable electricity, or even high-quality healthcare. In many remote and difficult-to-reach areas of Nigeria, people have limited access to the fundamental services that are offered everywhere in the major towns.

However, the figures below illustrate the trends in health inequalities components in Nigeria from 1981 to 2021

Figure 1.1 Health Inequalities Components and Economic Growth

RELATIONSHIP BETWEEN HEALTH INEQUALITIES COMPONENTS AND ECONOMIC GROWTH IN NIGERIA 1981-2021
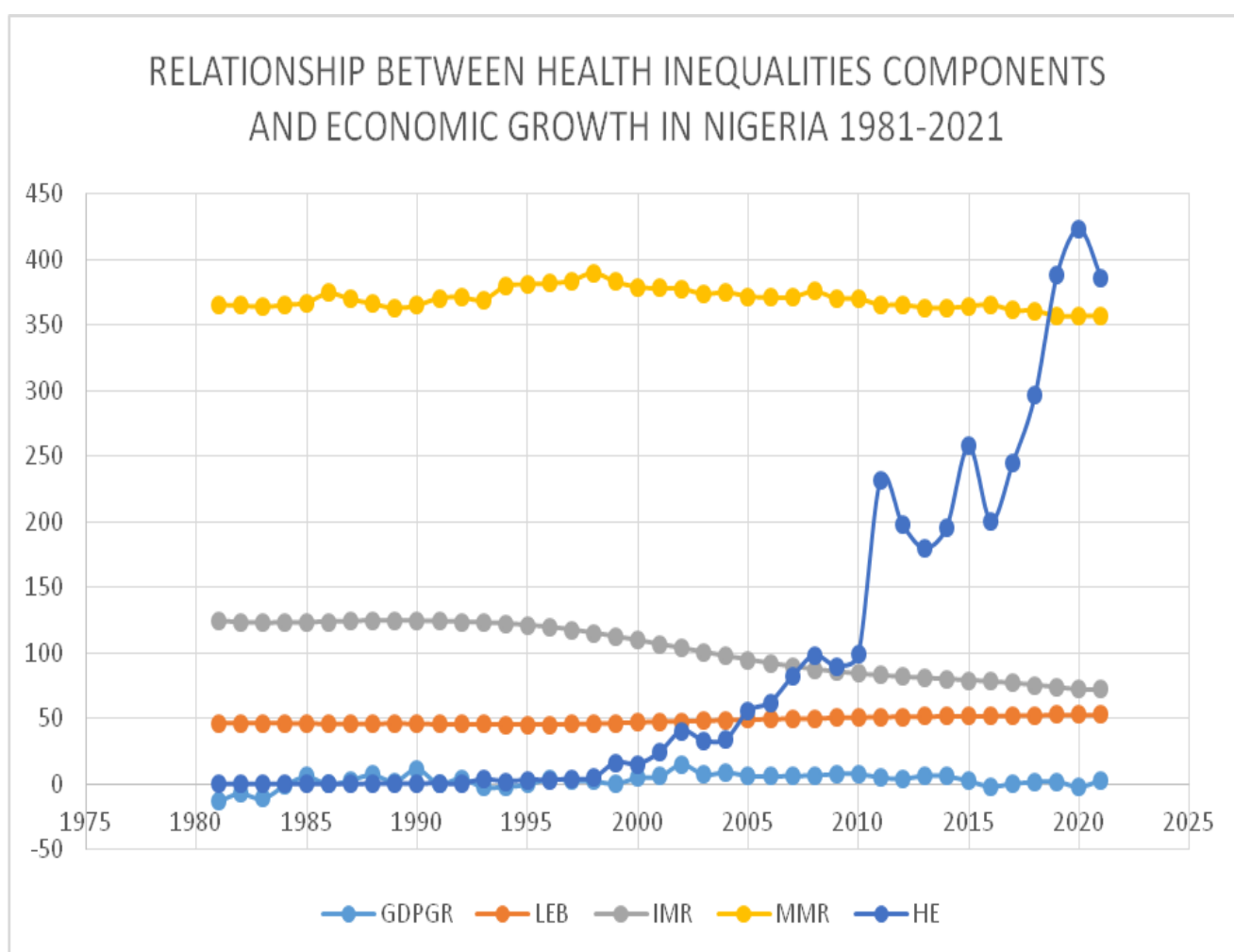
Source: CBN (2021) and WDI (2021)

Figure 1.2 Health Inequalities Components and Economic Growth 1990 to 2021
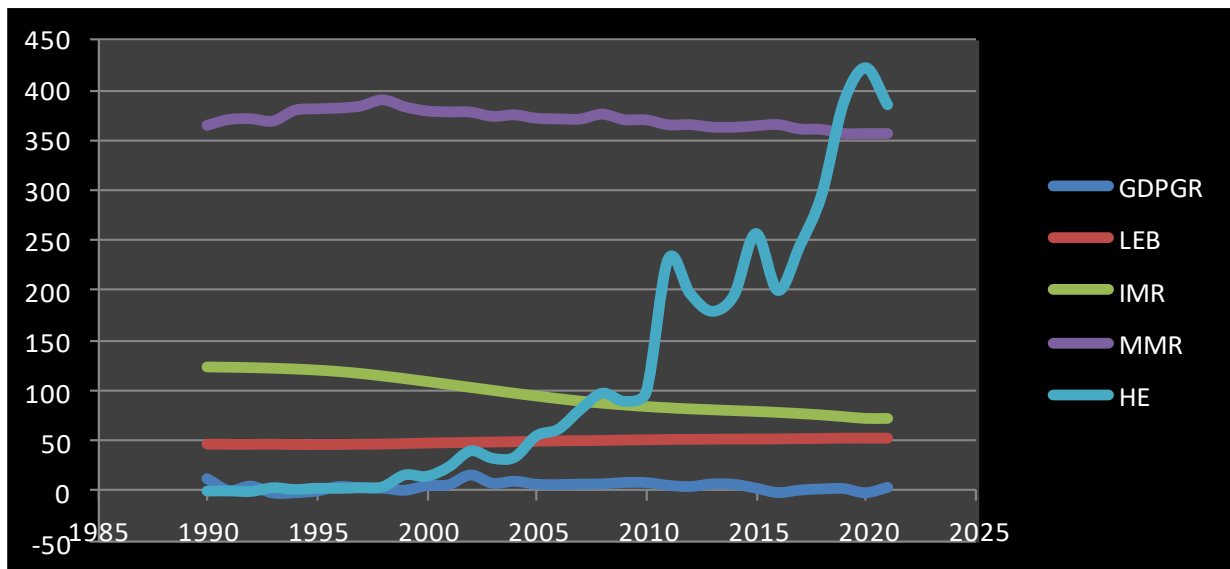
Source: CBN (2021) and WDI (2021)

From the above two figures, we can be able to deduced that from 1981 till date, government expenditure on health have been relatively volatile, which buttressed emergence of high rate of health inequalities in the country which have led to mother and newborn mortality rates being both high. One can also observe from the figures that, the nation Gross Domestic Product growth rate have been hovering on the margin which does not illustrate good performance in the economy. This also can be linked to low productivity in the country due to health inequalities; because a healthy nation is linked to improved economic growth. From the above insinuations, the quest to research on how health inequalities effect economic growth becomes imperative hence this study.

REVIEW OF RELATED EMPIRICAL STUDIES

Ese et al. (2020) looked at a moderated mediation model of Nigerian economic development, air pollution, and health effects. The goal of the study is to clarify how air pollution, health outcomes, and economic growth are related. However, the study found a substantial link between air pollution, government investment on health, and economic growth in Nigeria.

Atobatele, Omeje, Ayodeji, Oisagbai, and, Sampson, (2022), examined, exploratory Study of Access to Necessary Healthcare Services in Nigeria: Implications for Trans Sectoral Policy Considerations in Addressing Health Inequities. The findings indicated that access to the majority of maternal and paediatric health care services was frequently skewed toward the southern zones. This could be a result of the presence of more healthcare professionals who provide these services in combination with higher access to maternal care, leading to a higher uptake and utilization of maternal care services. Additionally, compared to children in other zones, children in the northern zones had lower odds of receiving basic and age-appropriate vaccinations, which could be attributed to supply-side disparities between the northern and southern zones.

Using a qualitative and thorough literature review, Toluwani et al. (2022) examined Nigeria's growing oral health inequality and the COVID-19 pandemic. The results show that the main factors contributing to the disparity in access to oral health care in Nigeria are a lack of skilled healthcare professionals, an uneven distribution of oral health facilities, a lack of awareness of oral health, and the challenge of paying out-of-pocket.

Musah, and, Danjin, (2018), examined Inequalities in health and socio-demographic factors influencing health in Nigeria. the result identified that inequalities in health have a strong relationship between socio-demographic factors in Nigeria.

In Lawanson and Umar's (2021) study of the relationship between economic growth and life expectancy in Nigeria and the role of poverty reduction, the fully modified ordinary least square method was used to assess the relationship between life expectancy, poverty incidence, and economic growth based on the endogenous growth theoretical approach. The results demonstrated that economic growth is improved in Nigeria with life expectancy while the negative effects of poverty have been decreased.

Research Objective

The purpose of this study is to determine how health inequality affects economic development in Nigeria, especially;

i. to investigate the connection between economic growth and life expectancy
ii. to establish the connection between the newborn mortality rate and economic expansion
iii. to investigate the connection between the rate of maternal mortality and economic expansion
iv. to examine the connection between health costs and economic expansion.

METHODOLOGY

Theoretical Framework

New endogenous growth models have been developed recently to illustrate how health influences economic growth. With special relevance to health disparities and economic growth, the Solow growth model has been enhanced with the Solow human capital growth model. In Solow's initial model, human capital was not particularly mentioned. 1992 saw the creation of the expanded Solow model by Mankiw, Romer, and Weil. As a result of workers' varying levels of education, health, and capacities, labour in the production process is not homogeneous within a country or across nations, which is the reason for including human capital in the model. It is now simpler to adapt this model to the Nigerian context thanks to this improvement. The underlying concept of this strategy is that increased output will result from improved worker and citizen health. Following is an explanation of Solow's improved model:

$$Q = AK^{\alpha}(hL)^{\alpha} \quad \text{...(3.1)}$$

Where, h = Level of Health Accessibility; Q = Level of Output or Economic Growth; K = Stock of Physical Capital; L = Labor, measured by the number of Workers; A is the level of total

factor productivity, which is the elasticity of capital input to output and $\alpha =$ is the elasticity of labour input to output. The model is described in terms of economics as follows:

$$Q = AK^{\alpha}(hL)^{\alpha}U \quad\text{..}(3.2)$$

When transformed into a log-linear form, we have,

$$\log Q = \alpha_0 + \alpha_0 \log K + \beta \log(hL) + W \quad\text{...}(3.3)$$

Where $\begin{aligned}\alpha_0 &= \log A \\ W &= \log U\end{aligned}$

The augmented Solow health-growth model will be changed with the following factors in order to produce a solid outcome in the context of the Nigerian environment. In equation 3.4 below, the expanded model is presented;

Model Specification

$$GDPGR = \alpha_0 + \alpha_1 LEB + \alpha_2 IMR + \alpha_3 MMR + \alpha_4 HE + \varepsilon \quad\text{.......................................}(3.4)$$

Where:

GDPGR, (Gross Domestic Product Growth Rate);, LEB; (Life Expectancy at birth);, IMR, (Infant Mortality Rate);, MMR (Maternal Mortality Rate);, and HE, (Health Expenditure)

Additionally, the research aimed to develop an Autoregressive Distributed Lag (ARDL) model of the association between several aspects of Nigeria's health inequalities and economic growth. As stated in the ARDL (p, q) model:

$$\Delta GDPGR_t = \sum_{i=1}^{p}\alpha_i \Delta GDPGR_{t\text{-}i} + \sum_{i=0}^{q}\alpha_i \Delta LEB_{t-i} + \sum_{i=0}^{q}\alpha_i \Delta IMR_{t-i} + \sum_{i=0}^{q}\alpha_i \Delta MMR_{t-i} + \sum_{i=0}^{q}\alpha_i \Delta HE_{t-i} +$$

$$\sum_{i=1}^{p}\beta_i GDPGR_{t\text{-}i} + \sum_{i=0}^{q}\beta_i LEB_{t-i} + \sum_{i=0}^{q}\beta_i IMR_{t-i} + \sum_{i=0}^{q}\beta_i MMR_{t-i} + \sum_{i=0}^{q}\beta_i HE_{t-i} + \phi ECT + \varepsilon_t \quad\text{............}(3.5)$$

Where $ECT_t = Y_t - \alpha_0 - \sum_{i=1}^{p}\gamma_1 \Delta Y_{t-i} - \sum_{i=0}^{p}\beta_i \Delta X_{t-i}$ and $\phi = 1 - \sum_{i=1}^{p}\gamma_1 \Delta Y_{t-i}$ ....(3.6)

The Bound test procedure used equations 3.3 and 3.4 into 3.5 as:

$$\Delta Y_t = -\sum_{i=1}^{p-1}\gamma_1 Y * \Delta Y_{t-i} + \sum_{i=0}^{p}\beta_i \Delta X_{t-i} - \rho Y_{t-1} - \alpha - \sum_{i=0}^{p}\delta X_{t-i} + \mu_{it} \quad\text{................}(3.7)$$

Then we test the existence of level relationship as $\rho = 0$ and $\delta_1 = \delta_2 = ... = \delta_k = 0$

where Δ = difference operator, α = the short-term coefficient, β = the long run coefficients μ = white noise error term.

Rational for the Model

The Autoregressive distributed lag testing process is preferred because it captures the long-run and short run dynamics of a model at the same time, unlike other relationship models. First off, unlike Johansen's method requires a large sample size for validity, the ARDL effectively identifies the cointegrating connection in cases with small samples (Ghatak & Siddiki, 2001; Tang, 2003). The Autoregressive distributed lag method can be applied whether the regressors are I(1) and I(0) or mutually cointegrated, whereas other methods demand that the variables be integrated in the same order before the cointegration test, can be applied.

Pre-estimation

Augmented Dicker Fuller Test (Unit Root Test)

To completely investigate the data generation process, we first used the Augmented Dickey-Fuller test to look at the time series characteristics of the model variables. These are the ADF test regression equations for constants:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \sum_{j=1}^{k} a_j \ \Delta Y_{T-1} + \varepsilon_T ... \tag{3.8}$$

where Δ is the initial difference operator, T is the iid random error term, k = the number of lag differences, and Y is the variable. After that, the unit root test is performed with the null hypothesis of $\alpha = 0$ and the alternative hypothesis of $\alpha < 0$

$$ADF_\tau = \frac{\hat{\alpha}}{SE(\alpha)} ....(3.9)$$

After calculating a value for the test statistics, we will compare it to the pertinent critical value for the Dickey-Fuller test. The null hypothesis of = 0 is rejected and there is no unit root present if the test statistic exceeds the critical value (in absolute value) at the 5% or 1% level of significance. The model must have co-integration if the variables are non-stationary at level form and integrated of the same order.

Sources of Data

The data for this study was sourced from Central Bank of Nigeria Statistical Bulletin of various issues (2021) and WDI (2022) for the period of 1990 to 2021. the table below summarized the source

Figure 3.1 Variables links
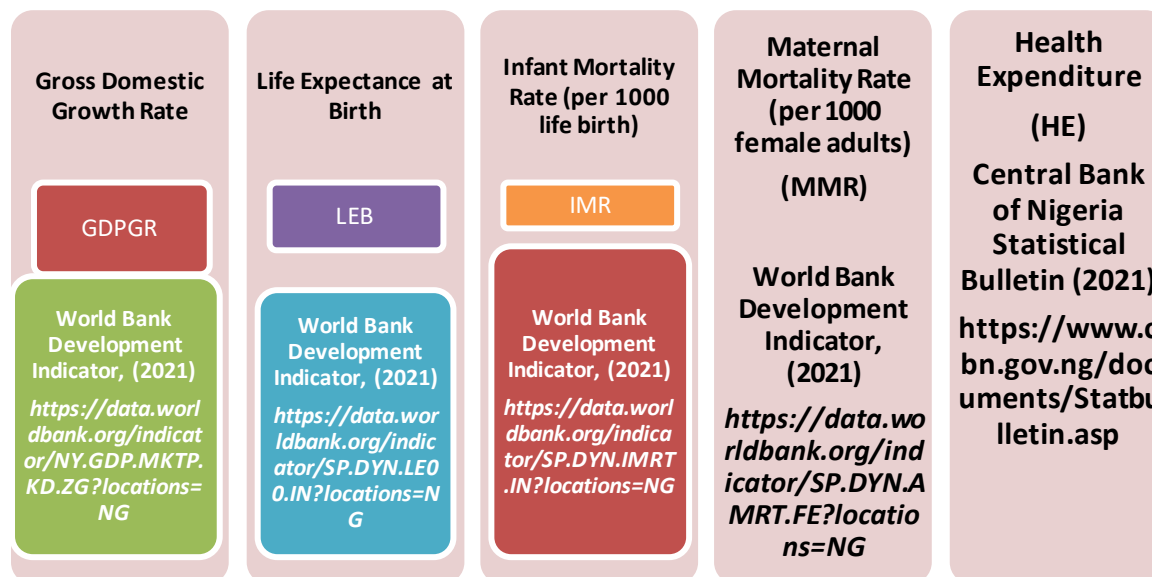
DATA ANALYSIS AND INTERPRETATION

For this study, the following variables were used: Gross Domestic Product Growth Rate, Life Expectancy at Birth, Child Mortality, Maternal Mortality Rate, and Expenditure On health.

Augmented Dicker Fuller Test (Unit Root Test)

Table 4.1: Analyses of Augmented Dicker Fuller Test using 0.05 significant value

Parameters	*Unit Root Test using Augmented Dicker Fuller Test*	*Significant Level 5%*	*Integration Order*	*Conclusion Rules*
GDPGR	-3.611756	-2.960411	i (0)	Ho Rejected
LEB	-3.410574	-2.963972	i (1)	Ho Rejected
IMR	-3.016218	-2.963972	i (0)	Ho Rejected
MMR	-3.194863	-2.981038	i (1)	Ho Rejected
HE	-5.748254	-2.963972	i (1)	Ho Rejected

Source, Result Output, 2023

Infant Mortality Rate (IMR) and Gross Domestic Product Growth Rate (GDPGR) from Table 4.1 above were stationary at level. While Life Expectancy at Birth (LEB), Maternal Mortality Rate (MMR), and Health Expenditure (HE) weren't stable at level form, they did become stationary after the first difference. This suggests that the variables (LEB, MMR, and HE) were

integrated of order one (I (1)) when they were measured. We reject H0 and come to the conclusion that the variables are stationary based on the fact that the ADF statistics is bigger than the ADF critical values at 5%. Since none of the variables are integrated beyond orders one and zero, the variables are all of this order. The ARDL bound co-integration test is therefore used.

Bound Test for Auto Regressive Distributed Lag Co-integration

Each variable must be integrated to either order one, zero, or both as a prerequisite for testing the ARDL bound co-integrating test (Pesaran, Shin and Smith, 2001). We went on to estimate the ARDL bound test because all of the variables are integrated to orders one and zero. The Autoregressive distributed lag bound co-integration null hypothesis holds that the variables are not cointegrated, contrary to the alternative that they are. The decision rule states that the null hypothesis must be rejected if the F-statistic is greater than the upper bound critical values at the chosen critical level

The F-statistics for the model was 8.100716 *from the appendix*, which is higher than the upper bound of 4.01 at 5% critical value; we accept the alternative hypothesis and come to the conclusion that economic growth and health inequality in Nigeria are related over the long term; hence we estimate the ARDL analysis.

A Short-Term Relationship Test

Once it has been established that economic growth and health inequality coexist in Nigeria, it is necessary to determine how they interact in the short term.

Table 4.2: Health Inequality and Economic Growth in Nigeria: a Parsimonious Short Run Relationship Analysis

Cointegration Features				
Parameters	Coefficient,	Std. Error,	t-Statistic,	Prob.,
D(DLEB)	2.736077	5.542128	0.493687	0.6278
D(DLEB(-1))	-4.796608	3.284357	-1.460441	0.1624
D(DLEB(-2))	-12.750166	3.579229	-3.562266	0.0024
D(IMR)	0.082670	0.041358	1.998891	0.0619
D(DMMR)	0.093570	0.246721	0.379253	0.7092
D(DHE)	0.006862	0.013991	0.490424	0.6301
CointEq(-1)	-0.926806	0.167412	-5.536069	0.0000
Cointeq = GDPGR - (14.1680*DLEB + 0.0892*IMR -0.3858*DMMR -0.0328				
*DHE -6.9208)				

Source: Result Ouput 2023

The coefficient of the error correcting term (cointEQ) in table 4.2 above demonstrates that there is a short-term correlation between health inequality and Nigerian economy, and is statistically relevant, and has the predicted negative sign at the 5% level of significance. The rate of

adjustment is -0.926806, or 93% of the adjustment to the equilibrium of the rate of economic growth is anticipated to take place in the short run.

Evaluation of Long-Term Relationship

Table, 4.3: Economic growth and health inequality in Nigeria: a Summary of Long-Term Relationships

Coefficients of the Long Run Equation				
Parameters	*Variable Coefficient*	*Std. Error of the coefficients*	*t-Statistic, of the coefficients*	*Prob. of the cofficients*
DLEB	14.168002	4.429108	3.198839	0.0053
IMR	0.089199	0.046437	1.920878	0.0717
DMMR	-0.385840	0.397354	-0.971025	0.3451
DHE	-0.032777	0.023428	-1.399077	0.1798
C	-6.920831	4.233686	-1.634706	0.1205

Source: Result Output 2023

Analysis of the Long Run ARDL Results

GDPGR = - 6.920831 + 14.168002LEB + 0.089199IMR – 0.385840MMR – 0.032777HE

The constant values of the model which was identified as – 6.92 percent shows that all the independent variables are held constant, Nigerian economy will be negatively affected in the tone of – 6.92 percent.

With a coefficient value of 14.17 percent, *Life Expectancy at Birth (LEB)* was found to have a significant positive relationship with Nigeria's economic growth. This means that over time, as LEB rises by 1%, Nigeria's economic growth will rise by 14.17 %.

With a coefficient value of 0.09 percent, *infant mortality rate (IMR)* with economic expansion in Nigeria had a positive but minor correlation. This meant that over time, for every one percent increase in infant mortality rate (IMR), Nigeria's economy would develop by 0.09 percent more.

With a coefficient value of -0.3858%, the *Maternal Mortality Rate (MMR)* had a weakly negative relationship with Nigeria's economic growth. This means that over the long term, for every 1% increase in the MMR, Nigeria's economic growth will decline by -0.39%.

With a coefficient value of -0.0328 percent, *health expenditure (HE)* had a weakly negative relationship with the Nigerian economy. This means that over the long term, if HE grows by one percent, economic growth in Nigeria declines by 0.03 percent.

DISCUSSION OF RESULTS

The investigation looked at health disparities and Nigerian economy, from 1990 to 2021. However, the analysis revealed a substantial positive association between Nigeria's economic growth and life expectancy at birth. The aforementioned finding was in agreement with a study by Lawanson and Umar (2021), which concluded that increased life expectancy, boosts economic growth and lowers poverty. Even though the newborn mortality rate was positive, the other factors—infant mortality rate, maternal mortality rate, and health expenditure—have no discernible association with economic growth. Result by Ese et al. (2020) and Atobatele et al. (2022), concluded that health spending has a major impact on economic growth, did not match those of this study. The low government budget allocations in the health sector over the years may, however, be linked to the low impact of health spending, which has extended to a high rate of health inequality in the nation.

Concluding Remarks and Implications

In this study, the impact of health disparities on Nigeria's economic growth from 1990 to 2021 was investigated. According to the research, the country's problems with health inequalities have permeated the system deeply, leaving many individuals without access to even the most basic medical care. This inaccessibility of basic health care was made possible through low budget allocation in the health sector over the years. The above statement agreed with the findings of this study where inadequate funding of the health sector increased infant mortality rate, and maternal mortality rates thereby affecting long-term increase of the nation's economy. However, based on the findings, this study recommends adequate funding and provision of basic health care in every community of the nation because in so doing, it reduces the inequalities in health witnessed across the country today.

REFERENCES

Atobatele, S., Omeje, O., Ayodeji, O., Oisagbai, F. and Sampson, S. (2022) Situational Analysis of Access to Essential Healthcare Services in Nigeria: Implication for Trans-Sectorial Policy Considerations in Addressing Health Inequities. Health, 14, 553-575. https://doi.org/10.4236/health.2022.145041

Central Bank of Nigeria Statistical Bulletin (2021). https://www.cbn.gov.ng/documents/Statbulletin.asp

Ese U, Adesola A, Adedeji A, Oluwatoyin, M, Romanus O & Olabanji E (2020) Economic growth, air pollution and health outcomes in Nigeria: A moderated mediation model, Cogent Social Sciences, 6:1, 1719570, DOI: 10.1080/23311886.2020.1719570

Ghatak, S., Siddiki, J., (2001), The use of ARDL approach in estimating virtual exchange rates in India Journal of Applied Statistics, 11 (2001), pp. 573-583

Lawanson, O. I., and Umar, D.I., (2021), The life expectancy–economic growth nexus in Nigeria: the role of poverty reduction; SN Bus Econ (2021) 1:127 https://doi.org/10.1007/s43546-021-00119-9

Musah, K.T., and, Danjin, M., (2018), Health Inequities and Socio-demographic Determinants of Health in Nigeria. *J of Afr Inst of Pub Health Prof.* 2018; 1 (1): 33 – 43.
https://www.researchgate.net/publication/350123782_Health_Inequities_and_Socio-demographic_Determinants_of_Health_in_Nigeria

Pesaran, M.H., Shin, Y. and Smith, R. (2001) Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16, 289-326
https://doi.org/10.1002/jae.616

Sede, P.I., Ohemeng, W. (2015), Socio-economic determinants of life expectancy in Nigeria (1980 – 2011). *Health Econ Rev* 5, 2 (2015). https://doi.org/10.1186/s13561-014-0037-z

Tang, T.C. (2003), Japanese aggregate import demand function: Reassessment from 'bound' testing approach Japan and the World Economy, 15 (4) (2003), pp. 419-436

Toluwani, I. O., Oluwapelumi M. O., Morenike O. F, (2022), COVID-19 pandemic and the widening oral health inequality in Nigeria. Pan African Medical Journal. 2022;41(40). 10.11604/pamj.2022.41.40.26549

World Bank Development Indicator, (2021).
https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=NG

World Bank Development Indicator, (2021).
https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Bank Development Indicator, (2021).
https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=NG

World Bank Development Indicator, (2021).
https://data.worldbank.org/indicator/SP.DYN.AMRT.FE?locations=NG