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THE EFFECT OF REMITTANCES AND HEALTH EXPENDITURE ON ECONOMIC GROWTH

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Abstract

The research investigates how remittances and public health expenditure affect economic growth in Nigeria by analyzing annual time-series data from 1992 to 2023. The study depends on Endogenous Growth Theory to investigate how internal factors, including remittance capital inflows and health expenditure investments in human capital, drive short- and long-term economic development. The research uses Autoregressive Distributed Lag (ARDL) modeling to analyze dynamic relationships among variables with different degrees of integration. The diagnostic tests validate the model while demonstrating its strong performance as a reliable testing tool. The results demonstrate that remittances have a positive long-term effect on economic growth by providing a consistent external funding for households and the economy. Government health expenditure has negative long-term economic effects because the sector suffers from both wasteful spending and operational flaws, yet it provides short-term benefits to the economy. Control of corruption as a governance proxy demonstrates short-term economic benefits through its positive relationship with growth, which shows the crucial role that institutional quality plays in converting financial investments into economic progress. The study recommends that sustainable economic growth can be achieved through a coordinated policy approach that combines remittance investment development with the efficient use of public health spending.

Keywords: Remittances, Government Health Expenditure, Economic Growth

Introduction

Economic growth still remains an important goal for developing countries, since they are characterized by persistent poverty, health challenges, and economic vulnerabilities (Arize, Kalu,

Lubiani, & Udemezue, 2024). In the discussions on global growth and development, three important components, namely remittances, health expenditure, and economic growth, have emerged as major interlinked variables that can be used to achieve growth and development, especially in developing economies. Two important factors influencing economic growth in developing countries, among others, are remittances and health expenditure (HE).

Remittances, defined as financial transfers from migrant workers to their home countries, have been a significant source of external finance, often surpassing foreign direct investment (FDI) in many developing countries in recent years (World Bank, 2021). Over the past two decades, remittances have become increasingly relevant as a source of external finance for developing economies. According to the World Bank (2023), global remittance inflows to low- and middle-income countries reached US$528 billion in 2019 and rose sharply to over US$831 billion in 2022, surpassing foreign direct investment (FDI) and official development assistance in several regions (World Bank, 2023).

Remittances in the present-day world have reached their current significance because international labour migration has intensified, financial transfer systems have become more efficient, and diaspora connections have developed stronger ties with their home countries. Remittance flows retain their value because they increase during periods of economic or political unrest in recipient countries (Adams & Cuecuecha, 2013). The COVID-19 pandemic saw global declines in FDI and exports, yet remittance flows either remained stable or increased in some places. Remittances serve as a buffer against consumption shocks and, at the same time, help recipients to escape poverty (Kpodar, Mlachila, Quayyum, & Gammadigbe, 2021).

Public health spending is another key element in achieving sustainable development goals, particularly for countries seeking to build their human capital base and improve workforce productivity. The economy benefits from a healthy population because healthier individuals achieve higher productivity levels and longer lifespans, which can lead to increased economic output (Bloom, Canning, & Canning, 2000). Multiple regions, including CEMAC countries in Central Africa, have examined the relationship between public health spending and economic development, showing that increased health spending can lead to positive economic outcomes over time (Piabuo & Tieguhong, 2017). Enhanced healthcare access leads to better disease management, boosts workforce participation, and reduces mortality rates, thereby creating conditions for sustained economic expansion and societal advancement.

However, public health spending achieves its objectives only when governance systems and institutional standards function effectively, particularly in countries with developing economies. Increased public expenditure may fail to produce better health outcomes and stronger economic growth where transparency and accountability systems are weak and corruption levels remain high (World Health Organization [WHO], 2010). Health investment therefore requires public financial management reforms, results-based budgeting systems, and effective anti-corruption controls (Agbo, 2024).

The combination of remittances and public health spending creates beneficial opportunities to establish policy connections that enhance growth and development. Households use remittances to pay for healthcare expenses because public systems lack sufficient resources in many developing areas (Amuedo-Dorantes & Pozo, 2011). Research conducted in Mexico and Nigeria shows that households that receive remittances spend more on health services and have better health outcomes than households without remittance income (Adams & Cuecuecha, 2013; World Bank, 2022).

Remittances may also help reduce households' dependence on public health subsidies and social safety nets, while contributing to national development. Remittances that enter the country through formal financial channels may raise domestic savings and investment, thereby broadening the tax base that supports increased government spending on health and infrastructure projects.

The combination of remittances and public health expenditure has important implications for growth and sustainable development in Nigeria. Firstly, it plays a complementary role: when public investments create a favourable business climate and reliable infrastructure, remittance recipients are more likely to channel funds into productive ventures. Secondly, in weak-governance contexts, households may rely on remittances to substitute for poor public services, especially in health, education, and security. Thirdly, while remittances benefit recipient households, public spending on health, if well-targeted, can help reduce regional inequalities and foster inclusive development (Igbinedion, 2023). These possibilities highlight the importance of examining remittances and public health expenditure within a common framework to understand their implications for economic growth.

The Nigerian economy depends on thousands of members of its diaspora who send remittances (United Nations, 2022), as well as government investments in health, education, and infrastructure development to achieve economic progress and national development (Mbadiwe & Egesimba, 2024). The Nigerian diaspora contributes to household welfare and the flow of external resources, while public-sector investment helps deliver essential services to support development when government revenue fails to meet the country's needs.
In 2021, Nigeria was the top remittance recipient in sub-Saharan Africa (SSA), receiving US$19.2 billion, equivalent to 4.3% of its GDP (World Bank, 2022). According to the World Bank (2023), Nigeria received over US$20 billion in personal remittances in 2022, accounting for approximately 4% of its GDP. Remittances to Nigeria come primarily from the United States, the United Kingdom, and other OECD countries, and are driven by a vast and growing diaspora population (World Bank, 2023). At the household level, remittances in Nigeria are most often used to finance education and health services, as well as housing and microenterprise activities (Raji, 2024).

On the other hand, Nigeria's public expenditure, particularly in health, education, and infrastructure, plays a crucial role in shaping economic growth. However, Onoghware and Olele (2024) observed that the relationship has been inconsistent due to governance inefficiencies, corruption, and policy volatility. According to the Central Bank of Nigeria (CBN), total government expenditure as a share of GDP averaged 12.3% from 2010 to 2020, well below the sub-Saharan African average. The health and education sectors have historically received less than 6% and 8% of the national budget, respectively, which falls short of international benchmarks such as the Abuja Declaration, which calls for a 15% allocation to health (Development Research and Projects Centre [DRPC], 2025).

Despite the substantial inflow of remittances into Nigeria, questions remain about their contribution to national economic development. What, then, is the problem at hand? Nigeria remains the largest remittance recipient in sub-Saharan Africa according to the World Bank (2024), yet public spending on vital areas such as health, education, and infrastructure development continues to face constraints, while the nation experiences economic stagnation, increasing poverty, rising unemployment, and poor human development outcomes (World Bank, 2025). Households may experience better economic conditions through remittances, which also provide stability during

economic downturns. However, their effect on national economic development remains uncertain (Chami, Fullenkamp, & Jahjah, 2005).

Similarly, public health spending has not consistently yielded the expected development outcomes because of operational problems that may result in the misallocation of financial resources and the failure of governance systems (Arize, Kalu, Lubiani, & Udemezue, 2024). Research findings about how remittances interact with health spending and development in Nigeria reveal mixed outcomes. Some researchers found that remittances and public spending help the economy grow, while others found that these factors may constrain growth through their relationships with institutional quality and financial infrastructure. The extent to which remittances and public health expenditure interact and jointly influence Nigeria's economic growth therefore remains an important empirical question.

The situation raises essential questions about the effectiveness and efficiency of remittances and public health expenditure and their ability to work together to promote economic growth. This study was designed to examine how remittances and health expenditure relate to Nigeria's economic growth amid the country's economic challenges, including high debt levels, inflation, and revenue fluctuations. A clearer understanding of these relationships can help inform policies aimed at aligning remittance inflows and public health expenditure with national development goals.

The study, therefore, investigates how remittances and public health expenditure affect Nigeria's economic growth. Specifically, it evaluates how remittance inflows and health expenditure separately affect Nigeria's economic growth.

Review of Literature

Remittances and Economic Growth

The relationship between international remittances and economic growth remains contested in the empirical literature. Although remittances provide recipient households with additional financial resources, their contribution to aggregate economic growth depends partly on how these funds are allocated, the extent to which they support productive activities, and the institutional and financial conditions within recipient economies. The contrasting findings across countries suggest that remittance inflows should not automatically be interpreted as a catalyst for economic expansion.

Evidence from Nigeria and other African economies illustrates this ambiguity. Anetor (2019), using an autoregressive distributed lag (ARDL) model for Nigeria from 1981 to 2017, found that remittances had a negative and statistically significant effect on economic growth in both the short and long run. Similarly, Ikwuagwu, Onyele, and Onyele (2024), examining Nigeria over the period 1981–2019, established a long-run relationship between remittances and economic growth but reported negative and statistically significant effects in both the short and long run, even after controlling for foreign direct investment, gross fixed capital formation, inflation, and exchange rate changes. These findings challenge the assumption that remittance inflows necessarily translate into higher domestic output. However, the negative coefficients do not, on their own, establish that remittances reduce growth because the observed relationships may also reflect the allocation of remittances, macroeconomic instability, or other structural characteristics of the Nigerian economy.

A similar pattern was reported by Samuel and Pierre (2020), whose ARDL analysis of Senegal from 1980 to 2018 found a negative association between remittances and economic growth, with no statistically significant long-run effect. The consistency of these findings across Nigeria and Senegal suggests that remittances may not generate substantial growth dividends in some African economies. Nevertheless, differences in country characteristics and model specifications limit the extent to which these results can be generalised across the region.

In contrast, Ssozi and Asongu (2016), using a production-function approach for sub-Saharan African countries over 1970–2010, found that remittances positively affected output per worker, partly through the alleviation of credit constraints and support for investment. Chand and Singh (2024) similarly reported that remittances contributed positively to sustainable economic development across 52 developing and emerging economies. Tabash et al. (2023) also identified a positive contribution of remittances to economic growth through consumption, income, and investment channels, although their findings indicated that remittances could also discourage labour-force participation. These results imply that remittances may generate both productive and potentially adverse economic effects, depending on household decisions and the wider economic environment. The broader evidence reinforces the need for caution when interpreting these relationships. Cazachevici, Havranek, and Horvath (2020), in a meta-analysis of 95 studies, found that approximately 40% of reported estimates indicated a statistically significant positive relationship between remittances and growth, 20% were negative, and 40% were statistically insignificant. This distribution demonstrates that the growth effects of remittances are not uniform. It also suggests that differences in empirical methods, country characteristics, institutional conditions, and the measurement of growth may contribute to the mixed findings.

Overall, the literature establishes neither a consistently positive nor a universally negative effect of remittances on economic growth. Rather, it points to the importance of the conditions under which remittance inflows are received and utilised. For Nigeria, where previous studies have predominantly reported negative growth effects, a relevant question is whether other public-sector interventions, particularly government expenditure on health, influence the extent to which remittance inflows translate into improved economic performance.

Public Health Expenditure and Economic Growth

Public health expenditure represents a potential channel through which government policy can influence economic growth. Government spending on health services, infrastructure, disease prevention, and other health-related programmes may improve population health, labour productivity, and the accumulation of human capital. However, the economic contribution of such expenditure depends not only on its size but also on its composition, efficiency, allocation, and the quality of public institutions responsible for delivering health services. Consequently, the empirical relationship between public health expenditure and economic growth remains inconclusive.

Evidence from Nigeria suggests that the growth effects of government expenditure differ across expenditure categories. Akpokerere and Ighoroje (2013), using disaggregated government expenditure data for Nigeria from 1977 to 2009, found that expenditure on health, transport, and communication contributed positively to economic growth, whereas capital expenditure, recurrent expenditure, and spending on education and power had negative effects. The positive health expenditure result suggests that sector-specific public spending may be more informative than aggregate government expenditure when assessing the growth implications of fiscal policy. Nevertheless, the study's findings do not establish whether the positive relationship resulted from improvements in health outcomes, greater labour productivity, or other transmission mechanisms.

Evidence from other countries also indicates that the relationship is context-dependent. Hussain and Zafar (2017), examining Pakistan from 1972 to 2015 using the ARDL bounds-testing and error-correction approaches, found no evidence of a long-run relationship between health expenditure and economic growth. Similarly, Alam, Singh, and Singh (2022), in their analysis of Saudi Arabia from 1985 to 2018, reported a negative long-run effect of government health expenditure on GDP growth, despite finding positive effects for investment, exports, and education expenditure. These results

caution against assuming that increased public health spending automatically produces higher output. However, a negative estimated coefficient should not be interpreted as proof that health expenditure is inherently unproductive, since the findings may reflect spending inefficiencies, fiscal constraints, the timing of health investments, or differences in the specification of the empirical models.

In contrast, Piabuo and Tieguhong (2017), examining sub-Saharan African countries in relation to the Abuja Declaration's 15% public health expenditure target, found that a 1% increase in public health expenditure was associated with a 0.38% increase in GDP per capita. Their findings support the argument that health spending can contribute to economic performance through improvements in health outcomes. Arize et al. (2024), using an ARDL framework for 45 sub-Saharan African countries over 1960–2022, also reported a positive long-run relationship involving public health expenditure, governance, and health outcomes, while identifying public-sector inefficiencies as a constraint on the impact of spending. Taken together, these studies suggest that the effectiveness of public health expenditure may depend on governance and the capacity to convert financial allocations into meaningful health and economic outcomes.

Neelam (2024), through a qualitative review of public healthcare expenditure in India, similarly highlighted the complex relationship between health spending and economic development. The study associated public health expenditure with improvements in education and academic outcomes and better health, but also reported adverse implications for economic growth and total factor productivity. Given the qualitative nature of the study, its findings are not directly comparable with econometric estimates of the growth effects of health expenditure. Nevertheless, they reinforce the need to distinguish the social benefits of public health spending from its measured effects on aggregate economic output.

The evidence on public health expenditure therefore reveals an important distinction between the economic value of improved health and the observed contribution of government spending to GDP growth. While health expenditure may strengthen human capital and labour productivity, these benefits may not translate into higher measured output where spending is inefficient or where other structural constraints persist. This inconsistency provides a rationale for examining health expenditure alongside other sources of household and national resources, including international remittances, rather than treating public health expenditure as an isolated determinant of growth.

The Combined Relationship between Remittances, Public Health Expenditure, and Economic Growth

Although remittances and public health expenditure have each been examined extensively in relation to economic growth, fewer studies in the reviewed literature directly investigate how the two operate jointly within the same economic framework. This distinction is important because remittances primarily provide additional resources to recipient households, whereas public health expenditure represents a government intervention intended to finance health-related goods and services. Their effects may therefore be complementary, independent, or constrained by the broader economic environment.

Olayungbo and Quadri (2019) examined remittances, financial development, and economic growth across 20 sub-Saharan African countries and found that remittances and financial development positively affected growth. Their findings demonstrate the importance of considering the institutional and financial channels through which remittances may influence economic performance. However, the study's principal focus on financial development does not, based on the

information available, establish the specific contribution of government health expenditure to the remittance–growth relationship.

More directly relevant is the study by Igbinedion and Mogbolu (2023), which examined public health funding and remittance flows in relation to inclusive economic development in Nigeria and Mozambique using fully modified ordinary least squares (FMOLS). For Nigeria, total government health expenditure had a negative and statistically significant effect on real GDP, whereas personal remittances, per capita income, and health-oriented official development assistance positively contributed to inclusive growth. In Mozambique, government health expenditure had a positive and statistically significant effect on inclusive growth, while personal remittances and per capita income also exerted positive effects. The contrasting results between the two countries highlight the importance of national context in determining the economic implications of public health expenditure and remittance inflows.

Although Igbinedion and Mogbolu (2023) provide important evidence on the variables of interest, their reported findings distinguish between the effects of individual explanatory variables and the broader relationship between these variables and inclusive growth. The available account does not establish whether the study formally tested an interaction between remittances and public health expenditure or whether the combined effect of these variables on economic growth was explicitly estimated. Furthermore, inclusive growth and aggregate economic growth are related but distinct outcomes. Findings concerning inclusive growth should therefore not be assumed to apply directly to GDP growth without considering the differences in measurement and interpretation.

Paul and Omeje (2022) provide complementary evidence by examining remittance flows, health outcomes, and economic growth in Nigeria over 1980–2019. Using VAR-based Granger causality and impulse-response analysis, they found that personal remittances Granger-caused out-of-pocket health expenditure. Their results also indicated that shocks to life expectancy positively affected economic growth, while shocks to personal remittances had a negative effect on growth. These findings suggest that remittances may influence economic performance through health-related household spending, although out-of-pocket health expenditure is conceptually different from government-financed public health expenditure. Consequently, the study supports the relevance of the remittance–health–growth nexus but does not directly resolve whether public health expenditure strengthens or weakens the growth effect of remittances.

The evidence reviewed thus far points to three unresolved issues. First, remittances have produced positive, negative, and statistically insignificant growth effects across different countries and empirical specifications. Second, the growth implications of public health expenditure remain mixed, with some studies identifying positive effects and others reporting negative or insignificant relationships. Third, studies examining remittances and health expenditure together do not, on the evidence reported in the reviewed literature, conclusively establish whether their combined relationship produces a distinct effect on Nigeria's economic growth. These issues suggest that analysing the variables independently may be insufficient to understand their joint implications for economic performance.

A combined empirical framework is therefore useful for determining whether remittances and public health expenditure are independently associated with economic growth and whether their simultaneous inclusion changes the estimated relationship. If the study intends to test whether public health expenditure moderates the relationship between remittances and growth, this must be specified and estimated explicitly through an interaction term; evidence that both variables individually affect growth does not, by itself, establish a moderation effect. Alternatively, if the

objective is simply to estimate their separate contributions within the same model, the analysis should be framed as a joint-effects investigation rather than a moderation analysis.

Critical Synthesis and Research Gap

The reviewed empirical literature provides substantial evidence that remittances and public health expenditure are relevant to economic performance, but it does not produce a consistent conclusion about the direction or magnitude of their effects. Studies on remittances report both positive and negative relationships with growth, while research on public health expenditure similarly identifies positive, negative, and statistically insignificant effects. These inconsistencies indicate that the economic consequences of the two variables may depend on country-specific conditions, the efficiency of public spending, the use of remittance inflows, and the empirical approaches employed.

A central limitation of the reviewed evidence is that studies often examine remittances and public health expenditure separately or focus on related but different outcomes, such as health outcomes, inclusive growth, or sustainable economic development. Although Igbinedion and Mogbolu (2023) examine public health funding and remittance flows in relation to inclusive economic development in Nigeria and Mozambique, and Paul and Omeje (2022) investigate remittances, health outcomes, and economic growth in Nigeria, the available descriptions do not establish that the interaction between remittances and government health expenditure has been directly tested as a determinant of Nigerian economic growth. The research gap should therefore be stated narrowly and cautiously rather than claiming that no previous study has examined these variables together.

In addition, differences in research periods, country coverage, estimation techniques, explanatory variables, and outcome measures complicate comparisons across existing studies. For example, findings from multi-country panels may conceal national differences, while evidence on inclusive growth cannot be treated as equivalent to evidence on aggregate GDP growth. Likewise, the relationship between remittances and out-of-pocket health expenditure does not directly establish the relationship between remittances and government health spending. These distinctions highlight the need for a country-specific investigation that clearly defines its variables and aligns its empirical specification with the research question.

Against this background, the present study examines the relationship between remittances, public health expenditure, and economic growth in Nigeria. By considering the variables within a common empirical framework, the study seeks to provide additional evidence on their respective contributions to economic performance and clarify whether the mixed findings in the existing literature are also evident in the Nigerian context. Its contribution lies in addressing the specific empirical relationship investigated, rather than presuming in advance that remittances or public health expenditure necessarily promotes or constrains growth.

Methodology

To examining the effect of remittances and health expenditure on economic growth, this study will be anchored on the endogenous growth theory propounded by Romer (1986) & Lucas (1988). The theory lays emphasis on internal factors as the main drivers of economic growth rather than external factors. It explains that investment in human capital, knowledge and innovation enhances overall economic development of a country. The theory further combines government policies, capital

inflows in the form of remittances as well as public spending (health expenditure in this instance) in boosting growth and development.

Health expenditure is regarded in this context as a variable of human capital investment to enhance production and labour productivity while remittance (capital inflow) serves as alternative source of income or finance which could improve consumption of the household, savings and also investment. These factors work through an internal economic mechanism to positively improve growth in the country.

Model Specification

Based on the endogenous growth theory, the simplified production function which is captured as the economic output is given below as;

$$\boldsymbol{Y = AK^{\alpha}H^{1-\alpha}} \quad - \quad - \quad - \quad \boldsymbol{(1)}$$

Where:

Y = Output
A = level of Technology
K = physical Capital
H = Human Capital
α = Output Elasticity of Capital

In linear form, equation (1) could be expressed as follows:

$$\boldsymbol{lnY = lnA + \alpha lnK + (\alpha - 1) lnH} \quad - \quad - \quad - \quad - \quad \boldsymbol{(2)}$$

Health expenditure as well as remittances according to the framework is considered as internal factor driving growth by accumulate capital and improving productivity. Specifically, human capital will be increased through public health expenditure while remittances will serve as financial injections which improves investment as well as consumption.

Based on the theoretical framework of the endogenous growth theory upon which this study is anchored as explained in equations (1) and (2) above, empirical model specification for the study is given below as;

$$\boldsymbol{GDPG = f(FDI, HEXP, REM, INF, SCH, CTRLCORR)} \quad - \quad - \quad - \quad - \quad - \quad \boldsymbol{(3)}$$

Drawing from equation 3 above, and given our objective to be; the effect of remittances and health expenditure on growth and development, equation (3) can be re-specified to capture the econometric model for this study as follows;

$$\boldsymbol{GDPG_t = \beta_0 + \beta_1 FDI_t + \beta_2 GFCF_t + \beta_3 HEXP_t + \beta_4 REM_t + \beta_5 INF_t + \beta_5 SCH_t + \beta_5 GOVTEFF_t + \beta_5 DEBT_t + \varepsilon_t} \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad \boldsymbol{(4)}$$

Given the nature of the data set to be used the model as obtained from the unit root test result using ADF test statistics and Phillips-Perron statistics, an Auto Regressive Distributed Lag Model is most appropriate for analysis. This model is therefore stated below as:

$$GDPG_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i GDPG_{t-i} + \sum_{j=0}^{q_1} \beta_{1j} FDI_{i-j} + \sum_{k=0}^{q_2} \beta_{2k} REM_{i-k} + \sum_{l=0}^{q_3} \beta_{3l} GHE_{i-l} + \sum_{m=0}^{q_4} \beta_{4m} INF_{i-m} + \sum_{n=0}^{q_5} \beta_{5n} SCH_{i-n} + \sum_{r=0}^{q_6} \beta_{6r} GOVTEFF_{i-r} + \sum_{s=0}^{q_7} \beta_{7s} DEBT_{i-s} \quad (5)$$

Where:

- GDPG = the real gross domestic product (a proxy for economic growth and a measure of health outcome),
- $HEXP_t$ = Health Expenditure at time t (proxy for human capital 'H')
- REM_t = Remittances at time t (proxy for capital inflow)
- FDI_t = Foreign Direct Investment
- INF = inflation rate.
- SCH = Secondary School Enrolment (proxy for
- GOVTEFF = Government Effectiveness (Proxy for Institutional Capital)
- DEBT = Federal Government Domestic Debt
- β_0 = Intercept (constant)
- $\beta_1 - \beta_7$ are the parameters to be estimated
- φ = Coefficient of adjustment term
- ε = error term.

Data and Source

This study will utilise annual time series data from 1992 to 2023 for Nigeria. The data will be obtained from the World Bank's World Development Indicators (WBWDI). This sample was chosen because of the extent of data availability.

Estimation Techniques

To empirically examine the relationship between the dependent and independent variables, the estimation technique is as follows;

The stationarity (unit root test) of each of the time series variable will be tested by using Augmented Dickey-Fuller (ADF) Test and further confirmed by Phillips-Perron test. Correlation analysis will also be carried out on the variables to inspect for multicollinearity. Auto Regressive Distributed Lag (ARDL) Model will be used for analysis based on its capability to incorporate variables of diverse orders of integration as well as assess the short and long-run dynamics of remittances and health expenditure and their effect on economic growth. Also, diagnostic tests will be carried out to test for the normality, serial correlation and heteroscedasticity of the variables.

Results

Presentation of results will start from describing the variables using a table of descriptive analysis, this will be followed by a pre-estimation procedure to understand the variables and their behavior as well as to decide on the most suitable model to adopt. Estimation result will be presented, analysis and interpretation will be done.

Descriptive Statistics

Table 1: Descriptive statistics of the variables

Variables	Observations	Mean	SD	Variance	Skewness	Kurtosis
GDP	32	1647.419	751.8554	565286.6	-0.1322	2.0110
FDI	32	1.3046	0.8687	0.7546	0.1312	1.778
GHE	32	143.2163	150.1271	22538.15	0.8510	2.4155
REM	32	1.2100	9.6200	9.2600	-0.2895	1.2138
INTR	32	18.3501	3.9514	15.6134	1.1940	5.4832
OIL	32	3521.934	2533.626	6419260	0.1855	2.0336
INF	31	19.216	16.3346	266.818	2.0687	6.269
CTRLCORR	25	-1.1620	0.1345	0.0180	-0.8159	3.5205
GFCF	32	14979.17	19382.98	3.7600	1.9946	5.9299

The table 1 above presents descriptive statistics which describe study variables by showing their central tendencies and their range of values and their distribution characteristics. The GDP average 1,647.42 displays extensive fluctuations which demonstrate the economic cycles of the country. Government health expenditure averages 143.22 but is highly volatile, indicating irregular fiscal commitment to the sector. The average remittance value stands at 1.21 which represents a small amount but exhibits extreme fluctuations, while interest rates demonstrate stable patterns except for the times when monetary authorities implement tightening measures. Oil revenue represents the most significant source of income which experiences the most extreme changes because its value depends on the unpredictable nature of international oil prices.

The average control of corruption score stands at -1.16, which indicates that institutional quality remains weak throughout the country. The macroeconomic environment of the study area displays characteristics of economic fluctuations combined with unpredictable fiscal conditions and fundamental weaknesses in governance systems. The economy grows steadily, yet its external and fiscal growth sources remain vulnerable due to remittance instability, oil revenue fluctuations, and government health expenditure changes. The continuation of poor governance practices indicates that institutional quality will determine how economic and financial factors develop into long-term development outcomes.

Unit Root Test

The Augmented Dickey-Fuller test is employed to evaluate whether the variables showed stable time series characteristics which were necessary for their time series analysis. Table 2 shows the test results which were obtained from both level measurements and first derivative measurements together with critical value thresholds for both the 5 percent and 10 percent significance levels.

Table 2: ADF Test statistics for unit root

Variables	ADF Statistics		Test Statistics		Order of Integration
	Level	1st Difference	5%	10%	
GDP	-1.509	-4.495***	-3.580	-3.228	I(1)
FDI	-2.520	-8.32***	-3.588	-3.233	I(1)
GFCF	6.580**		-2.989	-2.625	I(0)
GHE	-1.787	-6.682***	-3.580	-3.228	I(1)
REM	-1.319	-4.657***	-3.580	-3.228	I(1)

INTR	-3.675		-3.576	-3.226	I(0)
INF	-1.804	-5.183***	-3.592	-3.235	I(1)
OIL	-2.219	-5.545***	-3.580	-3.228	I(1)
CTRLCORR	-2.207	-4.159	-3.600	-3.240	I(1)

****** = **Stationary at I(0)**, ******* = **Stationary at I(1).**

The analysis shows that between the different variables there exists multiple patterns of integration. The Gross Domestic Product (GDP) exhibits non-stationarity at its level (–1.509) which changes to a stationary state after the first differencing operation (–4.495) thus establishing its classification as I(1) integrated series. The Foreign Direct Investment (FDI), Government Health Expenditure (GHE), Remittances (REM), Inflation (INF), and Oil Revenue (OIL) all reach stationarity after first differencing demonstrates that these variables belong to the I(1) category. The pattern demonstrates that these macroeconomic indicators follow stochastic trends which need unit root removal through differencing before their analysis can proceed.

The Gross Fixed Capital Formation (GFCF) exhibits a stationary state at its level (ADF statistic = 6.580, which shows significance at 5% level) thus it qualifies as an I(0) series. The Interest Rate (INTR) demonstrates a stationary state at its level (–3.675) which indicates that it requires no further differencing operations. The results reveal that both variables demonstrate mean-reverting behavior while they maintain stability during short-term periods. The variable Control of Corruption (CTRLCORR) operates as an I(1) series because it achieves stationarity only after the first differencing operation (ADF statistic = –4.159).

The study demonstrates that institutional quality exhibits continuous macroeconomic variables which need differencing to obtain stable results because they undergo permanent shocks and maintain long-term patterns. The ADF results reveal that the dataset comprises both I(0) variables and I(1) variables. The variables GDP FDI GHE REM INF OIL and CTRLCORR belong to I(1) integrated order while GFCF and INTR belong to I(0) integrated order. The variables all exist at I(0) status which makes the Autoregressive Distributed Lag (ARDL) bounds testing method suitable for cointegration testing in this analysis. The research shows that capital formation and interest rates maintain short-term stability while GDP FDI health expenditure remittances and inflation follow long-term stochastic patterns. The model uses ARDL framework because it needs to handle both temporary changes that occur between variables and permanent relationships that link different variables.

Test for Correlation

Table 3: Correlation Matrix

VAR.	**GDPC**	**GHE**	**REM**	**INTR**	**OIL**	**CTRLCORR**
GDP	1.0000					
GHE	0.6241	1.0000				
REM	0.7838	0.7638	1.0000			
INTRL	-0.7775	-0.6973	-0.7474	1.0000		
OIL	0.6948	0.5613	0.8190	-0.6373	1.0000	
CTRLCORR	0.4380	0.3747	0.5045	-0.4781	0.4226	1.0000

The correlation matrix in Table 3 provides preliminary insights into the linear relationships among the key variables. The results demonstrate that GDP displays a positive relationship with

Government Health Expenditure at 0.6241 and Remittances at 0.7838 and Oil Revenue at 0.6948 and Control of Corruption at 0.4380 while showing a strong negative relationship with Interest Rate at -0.7775. The findings of the study reveal that countries which spend more on healthcare and receive more remittances and generate more oil revenue and practice better governance tend to achieve higher levels of economic production while increased interest rates usually restrict economic progress.

Government Health Expenditure (GHE) shows strong positive correlations with Remittances (0.7638) and Oil Revenue (0.5613), indicating that increased fiscal resources whether from external inflows or oil revenues often coincide with higher health sector spending. The Interest Rate (–0.6973) shows a negative relationship with this variable because tighter monetary conditions result in reduced public health spending. The remittance system (REM) demonstrates solid positive relationships with GDP (0.7838) and GHE (0.7638) and Oil Revenue (0.8190) because periods of greater remittance inflows correspond with better economic conditions and increased capacity to fund healthcare services.

The correlation analysis demonstrates concordance with macroeconomic assumptions. Positive relationships among GDP health expenditure and remittances and oil revenues demonstrate that financial inflows and fiscal commitments serve as essential factors for economic advancement. The negative correlations with interest rates highlight the restrictive effect of monetary tightening while the positive link between governance and growth-related factors indicates that institutional quality can enhance the benefits of both domestic and external resources.

The results show multicollinearity problems because Remittances and Oil Revenue (0.8190) have a strong correlation with each other. The strength of these correlations causes the two variables to share explanatory power which results in inaccurate regression coefficient estimates and decreased statistical reliability. To reduce multicollinearity between these variables one of the variables will be removed from the analysis that follows.

ARDL MODEL

The study used an Autoregressive Distributed Lag (ARDL) model to assess how government health spending and remittances and interest rates and corruption control affect per capita GDP in both short-term and long-term periods. The model selection procedure produced an ARDL (1,1,1,0,2) specification which used a maximum of two lags. The results appear in Table 1 which follows this sentence.

Table 4: ARDL regression result

Variables		Coefficient	SE	T-Stats	Prob
Adjustment Term					
	L1.GDP	**-0.3347**	**0.1104**	**-3.03*** **	**0.007**
Long-Run Estimates					
	GHE	**-12.5708**	**4.9241**	**-2.55*** **	**0.019**
	REM	**1.2600**	**3.5900**	**3.52*** **	**0.002**
	INTRL	**-427.16**	**165.0357**	**-2.59*** **	**0.018**
	CTRLCORR	**-2872.422**	**2067.259**	**-1.39**	**0.180**
Short-Run Dynamics					
	D1.GHE	**4.5535**	**1.5316**	**2.97*** **	**0.008**
	D1.REM	**-5.7600**	**2.2100**	**-2.61*** **	**0.017**
	CTRLCORR				
	D1.	**2852.234**	**784.8175**	**3.63*** **	**0.002**

	LD.	**2322.363**	**618.8096**	**3.75*** **	**0.001**
	CONSTANT	**2017.351**	**805.5966**	**2.50*** **	**0.021**

*** = Statistically Significant Table = *(Authors Computation)*

- **R^2** = 0.7297 **Adj. R^2** = 0.6081 Dependent Var = GDP
- **Root MSE** = 236.2247 **Sample:** 1994 – 2023

The model shows acceptable performance because its R-squared value of 0.73 and adjusted R-squared value of 0.61 demonstrate that 61 to 73 percent of GDP per capita variation is accounted for by the examined factors.

Long-run Effects

The long-run estimates provide important insights into the structural relationships between economic growth and the explanatory variables. The Government Health Expenditure (GHE) has a statistically significant long-term effect which creates a negative relationship with its coefficient of –12.57 at $p < 0.05$. The results indicate that health spending increases lead to decreasing per capita GDP values during the long-term period. The finding which appears to contradict expectations may actually arise from health sector spending inefficiencies and poor targeting practices and the economic impact of non-productive fiscal expenditures. The long-run relationship between remittances (REM) and the economy shows a positive impact which reaches statistical significance at 1.26e-07 with $p < 0.01$. The remittance inflows show a positive impact on economic performance because they finance consumption and education and investment although their actual effect appears minimal due to scaling. The Interest Rate (INTR) shows a negative and significant long-run coefficient (–427.16, with $p < 0.05$). The high interest rates create an ongoing barrier to economic growth because they increase borrowing costs which prevents private sector investment and decreases overall demand.

Short-Run Dynamics

The short-run coefficients reveal important transitional effects among the variables. Health Expenditure (ΔGHE) has a positive and significant short-run impact (4.55, $p < 0.01$). The finding shows that health spending increases cause immediate economic activity because they use service delivery and employment and household welfare through multiplier effects.

Remittances (ΔREM) show a negative and significant short-run effect (–5.76e-08, $p < 0.05$) which conflicts with their positive long-term impact. The remittances initially fund consumption purposes yet produce minimal productivity advantages because their total economic impact increases over time.

Control of Corruption (ΔCTRLCORR) exhibits a positive and significant short-run impact both contemporaneously (2852.23, $p < 0.01$) and with a one-period lag (2322.36, $p < 0.01$). The research shows that better governance and anti-corruption efforts during the initial period will increase economic growth through improved investor confidence and resource distribution and enhanced institutional trustworthiness. The positive results from this process show a tendency to fade away during the extended time period.

Error Correction Term (ECT)

The coefficient of the error correction term (–0.335) is negative and statistically significant at the 1% level, confirming the existence of a valid long-run relationship among the variables. The negative sign shows that the system will return to its long-term equilibrium state after all disruptions while the measurement shows how fast the system will make this correction. The system resolves 33.5% of its per capita GDP disequilibrium within one year because the system reaches its

permanent state more quickly after experiencing disturbances. The investigation demonstrates strong evidence of cointegration which provides validation for the ARDL model specification. The analysis of economic growth relationships with health expenditure and remittances and interest rates and governance needs researchers to examine both short-term economic movements and long-term economic stability.

ARDL Bound Test

The ARDL bound test was carried out and the result is presented in the table below.

Table 5: ARDL Bound test

Test Stat	Value	5%I(0)	5%I(1)	5%I(0)	5%I(1)	P-I(0)	P-I(1)	Decision
F	9.894	3.407	4.980	5.052	7.160	0.000	0.002	Reject Ho
t	-3.031	-2.907	-4.101	-3.713	-5.061	0.039	0.223	Inconclusive

H_0: No levels relationship

Decision rule: Reject H_0 if F-statistics and t-statistics are extreme than critical values for I(1) variables.

The study applied the bounds testing method from Pesaran, Shin, and Smith (2001) to verify whether the variables maintained a long-term equilibrium state. The results show that the F-statistic reaches 9.894 according to Table 4, which surpasses the critical value limits for the 10% level (4.108) and 5% level (4.980) and 1% level (7.160) thresholds. The p-value of 0.002 at I(1) shows strong statistical significance. The evidence strongly supports the rejection of the null hypothesis which states no level relationship exists between the variables, thus proving cointegration between GDP per capita and government health expenditure and remittances and interest rates and control of corruption.

The t-statistic (–3.031) also lies between the lower (–2.907) and upper (–4.101) bounds at the 5% level, which renders it somewhat inconclusive. The F-statistic serves as the main testing standard for ARDL bounds testing, and its high significance level provides strong evidence that the tested variables have established a lasting stable relationship. The confirmation of cointegration implies that the explanatory variables collectively determine the long-run trajectory of economic growth, even though their short-run effects may differ in magnitude or direction. Together with the negative and significant error correction term (–0.335), the bounds test provides strong evidence that short-run fluctuations in growth adjust back towards a long-run equilibrium driven by health expenditure, remittances, interest rate, and governance quality.

Diagnostic Testing.

To assess the reliability and validity of the estimated ARDL model, post-estimation diagnostic tests were conducted. The summary of all the diagnostics tests are shown in the table while their explanation follows;

Table 6: Table of Diagnostics Tests statistics.

Test	Statistic	P-Value	Decision
Normality (Skewness/Kurt.)	0.50	0.7771	Residuals are normal
Serial Correlation (D/W)	2.564	-----	No Autocorrelation
Heteroscedasticity (BP)	2.77	0.0958	No Heteroscedasticity

(DW =Durbin -Watson; BP = Breusch-Pagan test) Table = *(Authors Computation)*

Normality Test

The skewness–kurtosis test (sktest) was applied to the model residuals. Results show a joint Chi-square value of 0.50 with a probability of 0.7771. Since the probability exceeds the conventional significance levels (1%, 5%, or 10%), the null hypothesis of normally distributed residuals cannot be rejected. This indicates that the error terms in the model are well-behaved and approximately normal, supporting the validity of subsequent inferences.

Serial Correlation Test:

The Durbin-Watson statistic produced a result of 2.564 which establishes acceptable limits that extend from 2. The data shows no first-order autocorrelation present in the residuals. The disturbances show no pattern of relationship which operates through time intervals and this strengthens the stability of the estimated coefficients.

Heteroscedasticity Test

The Breusch-Pagan/Cook-Weisberg test for heteroscedasticity produced a Chi-square statistic of 2.77 with a probability value of 0.0958. The p-value exceeds the 5 percent significance level which leads us to maintain our belief in the null hypothesis that states homoscedasticity exists. The constant error variance across observations indicates that the model does not experience heteroscedasticity issues. The estimated coefficients remain efficient while standard errors maintain their unbiased status because there is no presence of heteroscedasticity. This situation boosts statistical inference reliability for the ARDL model.

The diagnostic checks show that the ARDL model meets the three important requirements of normally distributed residuals and no serial correlation and constant error variance across all observations. The results provide stronger evidence for short-run dynamics and long-run equilibrium relationships which the model establishes through its bounds test and error correction term.

Discussion of Findings

This study set out to examine the relationship between government health expenditure, remittances, and economic growth in Nigeria, while accounting for key macroeconomic and institutional variables. The findings provide important insights into how public health investment, diaspora financial transfers, governance quality, and macroeconomic conditions relate to the country's economic performance. Overall, the results suggest that government health expenditure and remittances have positive relationships with GDP, although the potential contributions of these variables may be constrained by fiscal instability, institutional weaknesses, and broader macroeconomic challenges.

The findings indicate that government health expenditure has a positive relationship with GDP, as reflected in the descriptive statistics and correlation results. This suggests that public investment in health may support economic growth by improving human capital development, labour productivity, and overall public health. The finding is consistent with Piabuo and Tieguhong (2017), who found that health expenditure contributes to long-term economic growth in sub-Saharan Africa. However, the descriptive statistics reveal considerable fluctuations in Nigeria's health spending over time, including periods of reduced funding. Despite the country's commitment to the 2001 Abuja Declaration, which calls for the allocation of at least 15% of the national budget to health, health

expenditure has historically remained below 5–6% of the national budget. This pattern may restrict the government's capacity to finance sustained improvements in healthcare delivery and population health. Although the National Health Act of 2014 and the National Health Insurance Authority (NHIA) Act of 2022 were introduced to strengthen health financing and expand insurance coverage, fiscal instability and challenges in policy implementation may continue to limit the economic benefits of public health expenditure in Nigeria.

Similarly, the findings reveal a strong positive relationship between remittances and GDP, suggesting that financial transfers from Nigerians living abroad contribute to economic activity by increasing household income and purchasing power. These transfers can support consumption, education, healthcare, and other household needs, thereby stimulating demand within the domestic economy. This finding is consistent with Chand and Singh (2024), who identified remittances as an important contributor to sustainable economic growth in developing countries. Nevertheless, the descriptive analysis indicates negative skewness in remittance inflows, suggesting an asymmetric distribution in which relatively high inflows occur in some years. This pattern raises questions about the consistency of remittance flows and their capacity to support sustained economic growth. Furthermore, Anetor (2019) and Ikwuagwu et al. (2024) reported negative effects of remittances on Nigerian economic growth, suggesting that the contribution of remittances may depend on how recipients allocate the funds and the extent to which they support productive activities. The positive relationship identified in the present study therefore differs from these earlier findings and highlights the importance of considering differences in study periods, model specifications, and estimation methods when interpreting the remittance–growth relationship. Remittances may also support household healthcare expenditure, particularly where public health services are inadequate, but their broader contribution to economic development may depend on the prevailing institutional and policy environment.

Beyond health expenditure and remittances, the findings highlight the relevance of governance and institutional quality to Nigeria's economic performance. The positive relationship between control of corruption and GDP suggests that improvements in institutional quality may support economic growth by strengthening the management of public resources and improving the environment in which private financial transfers are utilised. Conversely, weaknesses in corruption control may contribute to resource leakage and mismanagement, limiting the effectiveness of both government expenditure and remittance inflows. This interpretation is consistent with the broader argument that the growth effects of remittances depend partly on the institutional and financial conditions within recipient economies, as reflected in the literature reviewed by Cazachevici et al. (2020). In Nigeria, policy frameworks such as the Economic Recovery and Growth Plan (ERGP) and the Medium-Term Expenditure Framework (MTEF) have sought to strengthen economic planning and fiscal management. However, the extent to which these frameworks produce the intended outcomes depends on effective implementation, accountability, and enforcement. Thus, the positive relationship between control of corruption and GDP reinforces the importance of institutional quality in creating an environment where public health expenditure and remittances can contribute more effectively to economic growth.

The findings also reveal that interest rates have a negative correlation with GDP, indicating that higher borrowing costs may be associated with weaker economic activity. High interest rates can increase the cost of credit, constrain private-sector borrowing, and discourage investment, thereby potentially limiting output growth. This relationship is particularly relevant in an economy where

businesses may depend on external financing to expand production and employment. In addition, Nigeria's dependence on oil revenues exposes public finances and overall economic performance to fluctuations in international oil prices. Such fluctuations may affect government revenue, budget execution, and the availability of resources for health and other development-related expenditure. Consequently, macroeconomic instability may constrain the capacity of both public spending and private financial inflows to generate sustained economic growth.

Taken together, the findings suggest that government health expenditure and remittances are positively related to economic growth in Nigeria, while governance quality and macroeconomic conditions remain important considerations in understanding these relationships. The findings can be interpreted within the framework of Grossman's (1972) human capital model, which treats health as a form of capital that can improve individual productivity and economic performance. From this perspective, public health expenditure may contribute to growth by supporting better health outcomes and strengthening the productive capacity of the population. Remittances, in turn, can supplement household resources and support consumption, education, and healthcare. However, these potential benefits should not be assumed to occur automatically, as their magnitude may depend on the efficiency of public expenditure, the allocation of remittance income, and the quality of institutions. The study therefore underscores the importance of improving the effectiveness of health financing, strengthening governance and accountability, and maintaining a stable macroeconomic environment to enhance the contribution of remittances and public health expenditure to Nigeria's economic growth.

Conclusion and Policy Recommendations

This study examined the relationship between government health expenditure, remittances, and economic growth in Nigeria, while accounting for key macroeconomic and institutional variables. The findings revealed positive relationships between government health expenditure and GDP, as well as between remittances and GDP, suggesting that public investment in healthcare and financial transfers from Nigerians living abroad are important components of the country's economic development process. Government health expenditure has the potential to improve human capital, population health, and labour productivity, while remittances provide additional household resources for consumption, healthcare, education, and other economic activities. These findings are consistent with the view that investment in health and external household financial resources can contribute to improved economic performance.

Overall, the study concludes that government health expenditure and remittances are positively associated with economic growth in Nigeria, but their potential contributions must be considered alongside the quality of governance, the effectiveness of public financial management, and prevailing macroeconomic conditions. Improving the allocation and utilisation of health-sector resources, strengthening institutional accountability, encouraging productive uses of remittances, and maintaining macroeconomic stability are therefore important considerations for promoting sustainable economic growth in Nigeria.

The study therefore recommends that the government should strengthen public health financing and improve budget implementation**.** public financial management and accountability in the health sector should be strengthened. Relevant government agencies should strengthen procurement monitoring, expenditure tracking, independent audits, transparent reporting, and sanctions for the misuse of health funds. the government and financial institutions should improve access to affordable, secure, and transparent remittance-transfer services.

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