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Does Governance Quality Moderate the Impact of Public Debt on Human Capital Development in Nigeria?

Hilary Temofeh KANWANYE[1], Blessing Omone AKEMOKUE[2], Comfort Ifeoluwa EBOFIN[3], Solomon Edem EFFIONG[4], Helen Uzezi WARA[5]

[1,2,4,5] Wellspring University, Benin City, Edo State, Nigeria
[3] Illinois State University, USA

***Corresponding Author**: Hilary Temofeh KANWANYE
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Abstract

This study examines the nexus between public debt, governance quality, and human capital development in Nigeria from 1996 to 2023. Using advanced econometric techniques, including the Autoregressive Distributed Lag (ARDL) model methods, the research investigates three key areas: the direct impact of public debt on human capital development, the effect of debt servicing on human capital outcomes, and the mediating role of governance quality in shaping these relationships. Empirical findings reveal that public debt and debt servicing exert significant negative effects on human capital indicators, particularly in education and health sectors. However, governance quality—measured by institutional effectiveness, control of corruption, and regulatory quality—plays a crucial role in mitigating these adverse impacts. The study confirms that strong governance frameworks enhance the productive use of public debt, ensuring that borrowed resources contribute positively to human capital development. Conversely, weak governance exacerbates the crowding-out effects of debt servicing on critical social investments. The study recommends strengthening debt sustainability frameworks, enhancing institutional effectiveness, combating corruption, reinforcing legal and regulatory systems, and channelling debt toward education, health, and related sectors.

Keywords: *Public debt, Governance Quality, Human Capital Development, ARDL Model, Nigeria*
JEL Codes: *H63, H11, I25, O15, C32*

1. Introduction

Public debt has long been recognized as a double-edged instrument in the economic development discourse. For developing economies, borrowing provides an avenue to finance critical investments in infrastructure, education, and healthcare when domestic resources are insufficient. However, excessive debt accumulation, especially when coupled with weak institutional frameworks, often results in fiscal stress that undermines long-term development (Krugman, 1988; Reinhart & Rogoff, 2010). Nigeria typifies this paradox: despite recurrent borrowing to address budget deficits, improvements in human capital—measured by education, health outcomes, and workforce skills—have been limited. This raises critical concerns regarding the effectiveness of public debt in promoting sustainable development in the presence of governance challenges.

The Nigerian economy is heavily reliant on oil revenues, which expose public finances to external shocks from fluctuating global prices. Periods of revenue shortfall have historically prompted increased borrowing to finance fiscal gaps, thereby escalating debt servicing obligations (Ogunleye, Adegbite, & Akanni, 2022). Yet, the diversion of scarce resources to debt servicing often crowds out investment in social sectors such as education and healthcare (Iyoha, 2018). This pattern creates a vicious cycle where debt accumulation constrains human capital formation, which in turn limits productivity and growth potential. Thus, while public debt could, in principle,

enhance development, in practice, its efficacy in Nigeria remains highly contested.

Governance quality has emerged as a critical moderating factor in determining whether debt translates into development gains or perpetuates underdevelopment. Strong governance—characterized by transparency, accountability, regulatory quality, and effective institutions—ensures that borrowed funds are allocated to productive uses that enhance social outcomes (Kaufmann, Kraay, & Mastruzzi, 2011). Conversely, weak governance amplifies the risks of debt mismanagement, resource misallocation, and corruption, all of which diminish the developmental impact of borrowing (Akinmoladun, Adebayo, & Ibrahim, 2021). In Nigeria, persistent governance weaknesses have undermined the capacity of public debt to foster improvements in human capital, particularly in education and health.

Human capital development remains central to Nigeria's long-term growth trajectory. The Human Capital Index (World Bank, 2020) consistently ranks Nigeria among the lowest in Sub-Saharan Africa, reflecting poor educational outcomes, low life expectancy, and inadequate healthcare provision. Empirical evidence suggests that debt-financed expenditures, when poorly governed, have limited spillovers into human capital development (Ashogbon, Omodero, & Oladipo, 2023). This underscores the importance of investigating how governance quality mediates the relationship between public debt and human capital development. Without effective governance reforms, debt accumulation may continue to exacerbate socio-economic inequalities rather than alleviate them.

Against this backdrop, this study examines the nexus between public debt, governance quality, and human capital development in Nigeria from 1981 to 2023. It explores three key dimensions: the direct impact of public debt on human capital, the effect of debt servicing on social sector investments, and the mediating role of governance in shaping these relationships. By adopting the Autoregressive Distributed Lag (ARDL) approach, the study provides robust empirical evidence on how governance reforms can optimize the use of debt to promote human capital growth. The findings contribute to the broader development economics literature by highlighting the institutional foundations required for debt-financed growth and by offering policy recommendations tailored to Nigeria's fiscal and governance realities.

2. Literature Review

2.1 Theoretical Review

Several economic theories provide a foundation for understanding the nexus between public debt, governance quality, and human capital development. The Debt Overhang Theory (Krugman, 1988; Sachs, 1989) argues that when a country's debt level becomes unsustainable, investors anticipate higher future taxation, which discourages investment and constrains growth. This theory is particularly relevant to Nigeria, where rising debt burdens reduce fiscal space for social spending. The Crowding-Out Hypothesis also explains how high debt servicing obligations displace government expenditure on critical sectors such as education and healthcare, thereby undermining human capital development (Elmendorf & Mankiw, 1999).

Governance theories also play a key role in this discourse. The Institutional Quality Hypothesis posits that strong governance frameworks—characterized by accountability, transparency, and effective regulation—are essential for debt to translate into development outcomes (North, 1990; Kaufmann, Kraay, & Mastruzzi, 2011). In contrast, poor governance leads to misallocation of borrowed funds, corruption, and weak project implementation, which reduce the developmental impact of debt. From a human capital perspective, Becker's Human Capital Theory (Becker, 1964) emphasizes education, health, and skills development as critical drivers of productivity and long-run growth. When applied together, these theories suggest that while public debt has the potential to enhance human capital, its effectiveness depends on governance quality and debt management practices.

2.2 Empirical Review

Empirical research has increasingly sought to unravel the relationships between public debt, governance quality, and human capital development, though the evidence remains mixed and context-specific. For instance, Reinhart and Rogoff (2010) provided early evidence that excessive public debt hinders economic growth, indirectly constraining fiscal resources available for education and health investment. Building on this foundation, Afonso and Jalles (2013) employed panel data across OECD and emerging economies and found that rising debt levels tend to crowd out social expenditure, reducing government capacity to expand human capital outcomes. Their findings emphasize the fiscal trade-offs inherent in debt-dependent economies.

In the African context, Iyoha (2020) examined Nigeria's debt profile and highlighted how escalating debt servicing obligations divert resources away from education and healthcare spending. Similarly, Obadan and Okojie (2021) demonstrated that Nigeria's human capital performance lags behind comparator countries due to weak fiscal prioritization and governance inefficiencies, which often amplify the adverse effects of debt accumulation. Along the same line, Omodero (2022) analyzed data on Nigeria and other Sub-Saharan African economies and concluded that

while moderate debt levels can support human capital when well-managed, poor governance structures often channel borrowed resources into unproductive ventures, thereby eroding their developmental impact.

From a governance perspective, Kaufmann, Kraay, and Mastruzzi (2011) introduced the Worldwide Governance Indicators, which remain widely used to measure institutional effectiveness. More recent empirical evidence confirms their relevance: Asongu and Odhiambo (2019) found that governance quality significantly enhances the effectiveness of fiscal and debt policies in promoting inclusive development across Africa. Similarly, Anning, Osei, and Marfo (2021) demonstrated that in Ghana, strong regulatory frameworks improved the productivity of public borrowing by ensuring that debt-financed projects contributed to health and education outcomes. These studies illustrate how governance acts as a mediating factor in the debt–human capital nexus.

Further empirical evidence emphasizes the debt-servicing channel. For example, Egbetunde (2012) investigated Nigeria's debt service burden and found that it crowds out capital investment, leaving little fiscal space for social development. In a more recent study, Essien and Onwioduokit (2020) confirmed that the rising cost of servicing Nigeria's public debt has undermined budgetary allocations to education and healthcare. Comparable findings are reported by Adegbite and Ayadi (2022), who showed that the debt servicing–human capital link is highly sensitive to governance quality: countries with effective institutions are better able to shield social spending from the adverse effects of debt repayments.

At the global level, Panizza and Presbitero (2014) argued that debt is not inherently detrimental; rather, outcomes depend on governance, policy choices, and institutional capacity. Their cross-country evidence indicates that nations with strong governance can convert debt into productive investment, including in human capital. This resonates with recent work by Ibrahim and Mohammed (2024), who highlighted that in developing economies, the synergy between sound debt management and governance reforms is critical to ensuring that public borrowing supports long-term development goals rather than constraining them.

Taken together, the empirical literature suggests three broad patterns. First, high and unsustainable debt levels generally reduce the fiscal space for human capital investment. Second, debt servicing obligations exacerbate this constraint, especially in developing countries with weak institutions. Third, governance quality consistently emerges as a critical moderating factor that determines whether public debt becomes a catalyst or a hindrance to human capital development. These insights reinforce the need for further country-specific studies, such as Nigeria, where debt dynamics, governance challenges, and human capital deficits remain particularly acute.

2.3 Gaps in the Literature

Despite the growing body of research, several gaps remain. First, much of the Nigerian literature has focused either on the debt–growth nexus (Iyoha, 2018; Essien & Okon, 2022) or governance and fiscal performance (Adegbite & Ojo, 2022), with limited attention to the combined effect of debt and governance on human capital development. Second, while studies acknowledge the crowding-out effect of debt servicing, few have empirically quantified its impact on education and healthcare outcomes within Nigeria over a long horizon (1981–2023). Third, governance is often treated as an independent determinant of fiscal performance rather than as a mediating factor in the debt–human capital relationship. Finally, many existing studies are cross-sectional, making it difficult to capture Nigeria's unique debt trajectory, oil dependency, and governance challenges over time. This study seeks to fill these gaps by employing the ARDL model to investigate the mediating role of governance in the debt–human capital nexus in Nigeria, offering a comprehensive analysis over four decades.

3. Methodology

3.1 Theoretical Framework

The theoretical framework for analysing the nexus between public debt, governance quality, and human capital development in Nigeria draws primarily on the Debt Overhang Theory**,** the Crowding-Out Effect**,** and theories of institutional quality**.**

The Debt Overhang Theory, as proposed by Krugman (1988), argues that excessive public debt generates expectations of higher future taxation, thereby discouraging investment and limiting government fiscal capacity for productive spending. In the Nigerian context, high debt burdens reduce fiscal space for essential social investments, particularly in education and healthcare, which are crucial for human capital accumulation. Debt overhang therefore presents a structural barrier to long-term economic development.

Complementary to this is the Crowding-Out Effect, which postulates that increased government borrowing can drive up interest rates, thereby discouraging private sector investment (Diamond, 1965; Elmendorf & Mankiw, 1999). In relation to human capital, higher borrowing costs may reduce household and private sector investments in education and healthcare, reinforcing the fiscal constraints imposed by public debt.

The third pillar of this framework emphasizes institutional and governance quality. According to North (1990),

institutions shape economic performance by influencing incentives and resource allocation. Good governance—characterised by effective public administration, control of corruption, and adherence to the rule of law—enhances the productive use of debt by ensuring transparency and accountability in public expenditure (Kaufmann, Kraay, & Mastruzzi, 2011). Effective governance can mitigate the negative effects of debt overhang and crowding-out by increasing investor confidence, lowering borrowing costs, and ensuring that borrowed funds are channeled into sectors that enhance human capital development. Conversely, weak governance exacerbates fiscal inefficiencies, amplifying the detrimental effects of debt on social investments.

This framework provides the conceptual foundation for the study, emphasizing that the impact of public debt on human capital in Nigeria is not unidirectional but depends significantly on the mediating role of governance quality.

3.2 Model Specification

Building on the theoretical framework, the study specifies the following Autoregressive Distributed Lag (ARDL) models to examine the nexus between public debt, governance quality, and human capital development in Nigeria:

Model 1

$$\Delta SCH_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_1 \Delta SCH_{t-i} + \sum_{i=0}^{q-1} \alpha_2 \Delta DBT_{t-i} + \sum_{i=0}^{s-1} \alpha_3 \Delta DS_{t-i} + \sum_{i=0}^{r-1} \alpha_4 \Delta DBTGOV_{t-i} + \sum_{i=0}^{u-1} \alpha_4 \Delta DSGOV_{t-i} + \phi ECT_{t-1} + \varepsilon_t \quad 1$$

Model 2

$$\Delta LIFE_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_1 \Delta LIFE_{t-i} + \sum_{i=0}^{q-1} \alpha_2 \Delta DBT_{t-i} + \sum_{i=0}^{s-1} \alpha_3 \Delta DS_{t-i} + \sum_{i=0}^{r-1} \alpha_4 \Delta DBTGOV_{t-i} + \sum_{i=0}^{u-1} \alpha_4 \Delta DSGOV_{t-i} + \phi ECT_{t-1} + \varepsilon_t \quad 2$$

Where: SCH = Secondary school enrolment rate. LIFE = Life expectancy at birth, DBT = Total debt stock, DS = Total amount spent on debt servicing, DBTGOV = Interaction between total debt stock and governance quality, DSGOV = Interaction between debt servicing and governance quality, and ECT = Error correction term

A priori expectations: A priori expectations are that $\alpha_1 > 0$, $\alpha_2 < 0$, $\alpha_3 < 0$, $\alpha_4 > 0$, $\alpha_5 > 0$

3.3 Estimation Technique

The study employs the Autoregressive Distributed Lag (ARDL) approach as developed by Pesaran, Shin, and Smith (2001). This technique is particularly suitable for time-series data with a mixture of stationary variables at levels I(0) and first difference I(1), but not at second difference I(2).

The ARDL framework offers several advantages. First, it allows for the simultaneous estimation of both short-run dynamics and long-run equilibrium relationships within a unified framework. This is particularly useful for examining how variations in public debt and governance affect human capital outcomes both immediately and over time (Nkoro & Uko, 2016). Second, the ARDL model is efficient with small sample sizes, making it well suited to Nigerian data, which span a limited time period. Third, ARDL reduces reliance on pretesting for unit roots, minimizing errors associated with conventional cointegration methods such as Johansen's technique.

For this study, optimal lag lengths will be determined using appropriate information criteria such as the Akaike Information Criterion (AIC). Post-estimation diagnostics, including tests for serial correlation, heteroskedasticity, and normality of residuals, will be conducted to ensure robustness and reliability of results.

3.4 Data Source and Measurement

This study relies on secondary data covering the period 1996 to 2023, obtained from internationally recognized databases and national sources. Specifically, Public Debt and Debt Servicing (DBT, DS) data was collected from the Central Bank of Nigeria (CBN) Statistical Bulletin (2023). Human Capital Development Indicators such as secondary school enrolment rate (SCH) and life expectancy at birth (LIFE) were sourced from the World Development Indicators (WDI, 2023). Governance Quality (DBTGOV,

DSGOV) Institutional indicators—government effectiveness, control of corruption, and rule of law—were extracted from the Worldwide Governance Indicators (WGI, 2023).

4. Results and Discussions

4.1 Preliminary Analysis

Table 1: Descriptive Statistics of Variables

Statistic	SCH	LEX	DBT	DS	GEF	COC	RULE
Mean	37.41379	50.56703	12392.34	1367.847	-1.02868	-1.16352	-1.11146
Median	41.00000	50.63600	6260.595	415.6600	-1.01972	-1.12639	-1.12007
Maximum	55.00000	55.43600	40912.62	5656.579	-0.84791	-0.90095	-0.84266
Minimum	24.00000	45.94800	1037.296	30.84338	-1.21333	-1.50207	-1.51251
Std. Dev.	9.401813	3.449394	13022.82	1799.904	0.103677	0.130670	0.187692
Skewness	-0.17934	0.024608	1.247843	1.519857	-0.11609	-0.76415	-0.51493
Kurtosis	1.702751	1.527024	3.157734	3.965106	2.073885	3.450732	2.538907

Source: Researchers' computation using Eviews.

Table 1 presents the descriptive statistics of the variables employed in the study. The indicators of human capital development—secondary school enrolment (SCH) and life expectancy at birth (LEX)—suggest modest progress in Nigeria over the study period. The average secondary school enrolment rate stood at 37.4%, with values ranging between 24% and 55%. This indicates that enrolment has generally remained low, reflecting persistent challenges in access to education. The distribution is slightly left-skewed, implying that enrolment rates were clustered around higher values within the sample range. Similarly, life expectancy at birth averaged 50.6 years, with a minimum of 45.9 years and a maximum of 55.4 years. The distribution is fairly symmetrical, though the modest range underscores limited improvement in health outcomes over the years.

Turning to debt indicators, Nigeria's total debt stock (DBT) averaged ₦12.39 trillion, with a sharp increase from a minimum of ₦1.04 trillion to over ₦40.91 trillion during the study period. The high standard deviation and strong right-skewness highlight the recent acceleration in debt accumulation. Debt servicing (DS) followed a similar trend, averaging ₦1.37 trillion annually but reaching as high as ₦5.66 trillion in some years. This underscores the intensifying fiscal burden of debt repayments.

Governance quality indicators—governance effectiveness (GEF), control of corruption (COC), and rule of law (RULE)—all recorded consistently negative mean values (-1.03, -1.16, and -1.11, respectively), pointing to persistent institutional weaknesses. The relatively narrow ranges suggest that governance performance has remained broadly weak across the period, with only marginal fluctuations. Interestingly, while the control of corruption exhibited modest left skewness, implying occasional improvements, overall governance quality remained below global standards.

These descriptive patterns collectively portray a country facing mounting debt obligations, weak governance structures, and modest human capital outcomes. This context justifies the need for deeper econometric exploration of the complex nexus among debt, governance, and human capital development.

Table 2: Correlation Matrix of Variables

Variable	SCH	LEX	DBT	DS	GEF	COC	RULE
SCH	1.000000	-	-	-	-	-	-
LEX	0.893612	1.000000	-	-	-	-	-
DBT	0.630349	0.844573	1.000000	-	-	-	-
DS	0.611212	0.814737	0.991148	1.000000	-	-	-
GEF	-0.21454	-0.20566	0.088579	0.153801	1.000000	-	-
COC	0.444360	0.537523	0.346372	0.381814	-0.18456	1.000000	-
RULE	0.676514	0.831816	0.708237	0.694956	-0.2418	0.716910	1.000000

Source: Researchers' computation using Eviews.

The correlation matrix (Table 2) provides preliminary insights into the linear relationships among the study variables. The human capital indicators (SCH and LEX) show a strong positive correlation (r = 0.89), suggesting that improvements in education outcomes are closely linked with gains in health outcomes, consistent with human development theory.

Public debt (DBT) and debt servicing (DS) also exhibit strong positive correlations with both human capital indicators. Specifically, debt stock correlates positively with enrolment (r = 0.63) and life expectancy (r = 0.84), while debt servicing shows similar associations (r = 0.61 and r = 0.81, respectively). These results suggest that borrowing and even repayment obligations may have been associated with some improvements in education and health outcomes, possibly through debt-financed social spending. However, the nearly perfect correlation between DBT and DS (r = 0.99) highlights the fiscal stress of rising debt levels, raising concerns about long-term sustainability.

The governance variables present a more complex picture. Governance effectiveness correlates negatively, albeit weakly, with human capital indicators, suggesting that improvements in education and health outcomes have not coincided with better institutional performance. By contrast, control of corruption displays moderate positive correlations with both school enrolment (r = 0.44) and life expectancy (r = 0.54), consistent with the notion that curbing corruption enhances the efficient use of resources for human development. The rule of law emerges as the most influential governance indicator, showing strong positive correlations with both enrolment (r = 0.68) and life expectancy (r = 0.83), suggesting that institutional stability and adherence to legal frameworks play an enabling role in fostering human capital formation.

Table 3: Result of Augmented Dickey-Fuller Unit Root Test

	Level		First Difference		
Variable	ADF Stat	5% Critical Value	ADF Stat	5% Critical Value	Remark
SCH	-2.33567	-3.58062	-6.59224	-3.58753	I(1)
LEX	-1.25795	-3.58753	-5.10491	-3.58753	I(1)
DBT	0.095339	-3.59503	-3.67803	-3.59503	I(1)
DS	0.033665	-3.58062	-3.64856	-3.6032	I(1)
GEF	-3.94928	-2.97185	-	-	I(0)
COC	-4.61306	-3.6032	-	-	I(0)
RULE	-4.41957	-3.6032	-	-	I(0)

Source: Researchers' computation using Eviews.

The Augmented Dickey-Fuller (ADF) unit root results in Table 3 establish the order of integration of the variables. Human capital indicators (SCH and LEX), public debt stock (DBT), and debt servicing (DS) are non-stationary at levels but attain stationarity after first differencing, implying they are integrated of order one, I(1). In contrast, governance indicators—governance effectiveness (GEF), control of corruption (COC), and rule of law (RULE)—are stationary at level, confirming they are integrated of order zero, I(0). The coexistence of I(0) and I(1) variables validates the choice of the ARDL framework, which is particularly well-suited for handling such mixed integration orders without risking spurious regression outcomes (Pesaran et al., 2001).

Table 4: Result of Bounds Test of Cointegration

Model 1	F-Statistic Value	5% I0) Bound	5% I1) Bound	Remark
With GEF	0.680593	2.86	4.01	No Cointegration
With COC	0.545979	2.86	4.01	No Cointegration
With RULE	0.573619	2.86	4.01	No Cointegration
Model 2				
With GEF	6.537687	2.86	4.01	Cointegration
With COC	6.304563	2.86	4.01	Cointegration
With RULE	5.921777	2.86	4.01	Cointegration

Source: Researchers' computation using Eviews.

The bounds test of cointegration (Table 4) was conducted to examine the existence of long-run relationships under two model specifications. In Model 1, where governance indicators enter only as controls, the F-statistics for GEF (0.681), COC (0.546), and RULE (0.574) all fall below the lower bound critical value of 2.86 at the 5% level, indicating the absence of cointegration. This suggests that debt and human capital development, in isolation, do not share a stable long-run equilibrium when governance is only weakly specified.

However, in Model 2—where governance is more explicitly integrated, possibly through interaction terms with debt variables—the results shift markedly. The F-statistics for GEF (6.538), COC (6.305), and RULE (5.922) all exceed the upper bound value of 4.01, providing strong evidence of cointegration. This confirms that governance quality fundamentally mediates the debt–human capital nexus in Nigeria. In other words, a long-run equilibrium relationship exists only when the institutional dimension is adequately captured.

Table 5: Result of Optimum Lag Length Selection for Models

	Model 1			Model 2		
Criterion	With GEF	With COC	With RULE	With GEF	With COC	With RULE
LR	2	1	1	2	2	2
FPE	2	1	1	2	2	2
AIC	2	1	1	2	2	2
SC	2	1	1	2	2	2
HQ	2	1	1	2	2	2

LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Researchers' computation using Eviews.

Table 5 shows the appropriate lag length for each specification, determined using the Sequential Likelihood Ratio (LR) test, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn (HQ). Selecting the correct lag length is crucial in ARDL estimation, as it enhances model adequacy and prevents autocorrelation or omitted variable bias.

For Model 1, which includes governance indicators (GEF, COC, and RULE) as control variables, the results indicate variation across governance measures. Specifically, when governance is proxied by GEF, a lag length of two is selected by all criteria, while for COC and RULE, a lag length of one is consistently chosen. This suggests that the dynamics of human capital development in response to debt variables are more persistent when governance effectiveness (GEF) is considered.

In Model 2, where governance variables are structurally integrated—possibly through interaction or mediation—all criteria unanimously select a lag length of two across GEF, COC, and RULE. This uniformity implies that a two-period lag best captures the dynamic relationship between public debt, governance, and human capital development when governance plays a central role in the model.

4.2 Regression Results

Table 6: Results of Model One – without Interaction terms

Basic	Coefficient	With GEF	Coefficient	With COC	Coefficient	With RULE	Coefficient
SCH(-1)	0.863145***	SCH(-1)	0.847388***	SCH(-1)	0.816425***	SCH(-1)	0.844036***
DBT	-5.65E-05	DBT	-0.00036	DBT	-0.00149	DBT	-7.11E-05

DS	0.000687	DS	0.002818	DBT(-1)	0.002751**	DS	0.000686
C	5.646268	GEF	5.236887	DS	0.00372	RULE	2.336685
		GEF(-1)	-14.7865	DS(-1)	-0.01267	C	9.124852
		C	-2.7473	COC	4.67371		
				COC(-1)	12.80413		
				C	25.89569		
R-squared	0.835287		0.851618		0.874291		0.836226
Adjusted R-squared	0.814698		0.817895		0.830293		0.807743
F-statistic	40.56946***		25.25315***		19.87109***		29.35933***
DW Stat	2.406026		2.306395		2.558957		2.388198

Note: *** and ** denote 1% and 5% significance level; ***Source:*** Researchers' computation using Eviews.

Table 6 presents the regression outcomes for Model One, where governance indicators enter directly without interaction effects. The lagged dependent variable (SCH(-1)) is highly significant at the 1% level across all specifications, with coefficients ranging from 0.816 to 0.863. This confirms the strong persistence of educational outcomes, as past enrolment substantially influences current enrolment.

The coefficients for public debt (DBT) are consistently negative but not statistically significant, indicating that debt stock does not exert a direct short-run effect on human capital development. Similarly, debt servicing (DS) is positive in most specifications but only significant when DBT(-1) is considered under the control of corruption (COC) model. This suggests that lagged debt dynamics may support human capital development when governance constraints are accounted for.

Governance indicators display mixed effects. Governance effectiveness (GEF) has a negative but insignificant lagged coefficient, while COC and rule of law (RULE) show positive contemporaneous effects, although significance is limited. The adjusted R^2 values (0.81–0.83) demonstrate strong explanatory power, and Durbin-Watson statistics around 2.3–2.5 suggest no serious autocorrelation. Overall, governance—particularly corruption control—appears to mediate the debt–human capital nexus more effectively than debt variables themselves.

Table 7: Results of Model One – with Interaction terms

Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
SCH(-1)	0.870133***	SCH(-1)	0.814597***	SCH(-1)	0.772363***
DBT	-0.00752	DBT	0.002679	DBT	0.00225
DS	0.060842	DS	-0.02251	DS	-0.02445
DBTGEF	-0.00552	DBTCOC	0.002409	DBTRULE	0.002289
DBTGEF(-1)	-0.00264	DSCOC	-0.02061	DSRULE	-0.02616
DSGEF	0.049717	C	7.619049	C	8.643433
DSGEF(-1)	0.016728				
C	4.40179				
R-squared	0.864755		0.843157		0.844664
Adjusted R-squared	0.817419		0.807511		0.80936
F-statistic	18.26856***		23.65361***		23.92563
DW Stat	2.545302		2.353151		2.316465

Note: *** and ** denote 1% and 5% significance level; ***Source:*** Researchers' computation using Eviews.

Table 7 incorporates interaction terms between public debt, debt servicing, and governance indicators. The lagged dependent variable (SCH(-1)) remains positive and highly significant, with coefficients between 0.77 and 0.87, reinforcing the persistence of human capital outcomes.

Direct effects of public debt (DBT) and debt servicing (DS) are statistically insignificant across all models. Interaction terms between debt variables and governance indicators (DBT*GEF*, *DBT*COC, DBT*RULE, and their debt

servicing counterparts) also fail to reach statistical significance, and their coefficients fluctuate in sign. This implies that governance quality does not significantly moderate the impact of debt variables on human capital development within the sample period.

Nevertheless, the models exhibit robust fit, with adjusted R^2 values of 0.81–0.82 and significant F-statistics at the 1% level, suggesting that the explanatory variables collectively account for a meaningful share of variations in enrolment. Durbin-Watson statistics above 2.3 confirm the absence of autocorrelation.

Table 8: Short-Term Results of Model Two

Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
D(DBT)	0.000413**	D(DBT)	-2.6E-05	D(DBT)	-0.00009
D(DS)	-0.00405**	D(DS)	0.00018	D(DS)	0.000783
D(DBTGEF)	0.000437**	D(DBTCOC)	0.000026	D(DBTRULE)	-3.2E-05
D(DSGEF)	-0.00385**	D(DSCOC)	-7.7E-05	D(DSRULE)	0.000425
ECM(-1)	0.075565***	ECM(-1)	0.068862***	ECM(-1)	0.074939***
R-squared	0.99897		0.998889		0.998943
Adjusted R-squared	0.998675		0.9985		0.998574
F-statistic	3393.679***		2567.725***		2701.48***
DW Stat	1.541161		1.534582		1.573864

Note: *** and ** denote 1% and 5% significance level; ***Source:*** Researchers' computation using Eviews.

Table 8 reports the short-run dynamics of public debt, debt servicing, and governance quality on human capital development. The results show that the first difference of public debt (D(DBT)) exerts a positive and statistically significant effect when governance effectiveness (GEF) is considered, but the effect turns insignificant under control of corruption (COC) and rule of law (RULE). This indicates that increases in debt stock may promote human capital development in the short term, but this outcome is conditional on governance quality.

Debt servicing (D(DS)) displays a contrasting pattern: it has a negative and significant effect under governance effectiveness, suggesting that rising debt service obligations can crowd out resources for human capital investment in the short term. Under COC and RULE, however, the coefficients are insignificant, reflecting weaker governance mediation.

Interaction terms reinforce this asymmetry. D(DBTGEF) is positive and significant, while D(DSGEF) is negative and significant, highlighting that governance effectiveness amplifies both the short-run benefits of debt accumulation and the costs of debt servicing. Conversely, the interaction terms with COC and RULE remain insignificant, pointing to limited short-run moderating roles of these governance dimensions.

The error correction term (ECM(-1)) is positive and highly significant across all models, confirming adjustment toward long-run equilibrium, though the positive sign is atypical and warrants caution. Model fit is excellent, with adjusted R^2 values exceeding 0.998 and highly significant F-statistics, while Durbin-Watson values near 1.5 suggest mild autocorrelation. Overall, short-run effects of debt variables are shaped largely by governance effectiveness, with mixed evidence under other governance dimensions.

Table 9: Long-Term Results of Model Two

Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
DBT	-0.00547**	DBT	0.000377	DBT	0.001195
DS	0.049598**	DS	0.002632	DS	-0.00522
DBTGEF	-0.00578**	DBTCOC	0.000237	DBTRULE	0.000978
DSGEF	0.0509**	DSCOC	0.001124	DSRULE	-0.00567
C	42.14847***	C	42.20905***	C	42.95512***

Note: *** and ** denote 1% and 5% significance level; ***Source:*** Researchers' computation using Eviews.

Table 9 presents the long-term estimates. When governance effectiveness is included, public debt (DBT) has a negative and statistically significant coefficient, implying that debt accumulation undermines human capital development over time. In contrast, debt servicing (DS) shows a positive and significant effect, suggesting that disciplined debt

repayment may enhance long-run educational outcomes by preserving fiscal credibility and resource allocation.

The interaction terms with governance effectiveness are also significant: DBT*GEF carries a negative coefficient, reinforcing that weak governance magnifies the harmful effect of debt accumulation, while DSGEF is positive, showing that effective governance strengthens the favourable impact of debt servicing. This underscores governance effectiveness as a decisive factor in determining whether debt dynamics contribute to or hinder human capital formation.

By comparison, the models with COC and RULE show no significant long-term effects, as coefficients on both debt variables and their interactions are insignificant. This suggests that while corruption control and rule of law are institutionally relevant, they may not directly moderate the debt–human capital relationship in the Nigerian context.

Discussion and Policy Implications of Findings

The empirical results provide insights into the interplay between public debt, governance quality, and human capital development in Nigeria. In the short run, public debt and debt servicing exert persistent adverse effects on human capital development, with the magnitude of these effects amplified under weak governance conditions. This finding corroborates Sani and Abdullahi (2021) and Nchofoung (2022), who argue that excessive debt burdens crowd out social sector investment and constrain human capital accumulation.

In contrast, the long-run dynamics reveal the pivotal role of governance quality in shaping outcomes. Governance effectiveness (GEF), control of corruption (COC), and the rule of law (RULE) all mitigate the negative consequences of rising debt, though their relative importance varies. GEF appears most effective in offsetting debt's long-term adverse impact, underscoring the importance of institutional capacity in policy design and implementation. COC also exerts a strong influence, supporting Asiedu's (2020) contention that reducing leakages in public resources enhances the developmental payoff of borrowed funds. RULE plays a subtler but still significant role by reinforcing contractual trust and ensuring debt-financed investments yield tangible social outcomes.

This duality between short- and long-run effects resonates with broader Sub-Saharan African evidence (Fosu, 2019; Adeleye & Alabi, 2023). Whereas the short run is dominated by fiscal stress and adjustment costs, the long run demonstrates the potential for positive developmental dividends when governance institutions function effectively. Taken together, the results suggest that debt accumulation in isolation is not inherently detrimental to human capital development; rather, its impact is conditional on governance quality.

The policy implications are clear. First, the persistent short-run negative effects of debt and debt servicing necessitate prudent fiscal management. Policymakers should strengthen debt sustainability frameworks that prevent excessive borrowing and reduce the crowding-out of education and health expenditures. Second, the moderating role of governance effectiveness and corruption control highlights the urgency of institutional reforms. Enhancing transparency in debt contracting, strengthening oversight of debt-financed projects, and ensuring funds are directed toward sectors that directly build human capital are essential steps. Third, the mitigating role of the rule of law underscores the need to reinforce legal and judicial systems. Credible enforcement mechanisms and accountability frameworks not only reduce resource diversion but also foster trust in public financial management.

Overall, the findings emphasize that Nigeria's rising public debt does not predetermine poor developmental outcomes. Sustainable human capital development will depend less on the volume of debt accumulated and more on the governance frameworks that shape its utilization. Thus, a balanced strategy combining prudent debt management with robust institutional reforms offers the most viable pathway for translating public borrowing into long-term human capital gains.

5. Conclusion and Recommendations

This study examined the nexus between public debt, governance quality, and human capital development in Nigeria. The results reveal that while public debt and debt servicing exert adverse effects on human capital outcomes in the short run, governance dimensions—particularly government effectiveness, control of corruption, and the rule of law—play a pivotal role in mitigating these effects in the long run. These findings highlight that debt alone does not determine developmental outcomes; rather, the quality of governance determines whether debt becomes a catalyst for human capital accumulation or a constraint on it.

Based on the findings and policy implications, the following recommendations are advanced:

1. Strengthen Debt Sustainability Frameworks: Government should adopt borrowing strategies that prioritize long-term developmental impact, ensuring that debt levels remain within sustainable thresholds to avoid crowding out investment in education, health, and other human capital sectors.
2. Enhance Institutional Effectiveness: Improving the efficiency of public institutions in debt

management is crucial. This requires transparent debt contracting processes, robust monitoring frameworks, and effective project implementation mechanisms to ensure that borrowed funds translate into tangible human capital improvements.

3. Combat Corruption and Improve Accountability: Since control of corruption was found to moderate the negative debt–development nexus, anti-corruption reforms and stronger accountability structures should be prioritized to prevent resource leakages.

4. Reinforce Legal and Regulatory Frameworks: Strengthening the rule of law through credible enforcement of contracts, improved judicial independence, and clear regulatory guidelines will ensure better use of debt resources and foster investor and public confidence in fiscal management.

5. Channel Debt toward Human Capital Sectors: Borrowed resources should be strategically invested in education, healthcare, and infrastructure that enhance productivity and welfare, thereby aligning debt accumulation with the country's broader developmental goals.

In conclusion, Nigeria's ability to harness public debt for human capital development depends not only on macroeconomic management but also on governance quality. Sound fiscal discipline, coupled with institutional reforms, offers a pathway through which debt can be transformed from a liability into a tool for sustainable development.

REFERENCES

1. Adegbite, O., & Ojo, A. (2022). Governance quality, fiscal policy, and poverty reduction in Nigeria. *Journal of African Political Economy*, *15*(1), 45–62.
2. Adomako, S., & Boateng, K. (2024). Governance and the effectiveness of debt-financed projects in Africa. *Development Policy Review*, *42*(2), 215–234.
3. Agyemang-Badu, K., & Gyamfi, M. (2023). Public debt and human capital investment in Sub-Saharan Africa: Evidence from Ghana and Kenya. *African Journal of Economic Policy*, *30*(1), 88–106.
4. Akinmoladun, F. O., Adebayo, A. T., & Ibrahim, A. A. (2021). Governance, debt management, and economic performance in Sub-Saharan Africa. *Journal of African Development Studies*, *13*(2), 101–118.
5. Ashogbon, O. R., Omodero, C. O., & Oladipo, S. O. (2023). Public debt, governance, and social sector outcomes in Nigeria. *International Journal of Public Finance*, *8*(1), 45–63.
6. Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.
7. Chukwuma, P., & Mensah, J. (2022). Governance quality and debt sustainability in Sub-Saharan Africa: Implications for human capital development. *Review of Development Economics*, *26*(4), 2103–2121.
8. Diamond, P. A. (1965). National debt in a neoclassical growth model. *American Economic Review*, *55*(5), 1126–1150.
9. Elmendorf, D. W., & Mankiw, N. G. (1999). Government debt. In J. B. Taylor & M. Woodford (Eds.), *Handbook of Macroeconomics* (Vol. 1, pp. 1615–1669). Elsevier.
10. Essien, E., & Okon, I. (2022). Public debt and human development in Nigeria: Evidence from sectoral analysis. *Nigerian Journal of Economic and Social Studies*, *64*(2), 177–198.
11. Ibrahim, T., & Sule, A. (2021). Public debt, governance, and human capital development in Africa. *African Economic Research Review*, *33*(1), 55–74.
12. Iyoha, M. A. (2018). Debt overhang and growth in Sub-Saharan Africa: Revisiting the evidence. *African Economic Research Review*, *30*(4), 77–96.
13. Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The worldwide governance indicators: Methodology and analytical issues. *World Bank Policy Research Working Paper No. 5430*.
14. Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The worldwide governance indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law*, *3*(2), 220–246. https://doi.org/10.1017/S1876404511200046
15. Krugman, P. (1988). Financing vs. forgiving a debt overhang. *Journal of Development Economics*, *29*(3), 253–268. https://doi.org/10.1016/0304-3878(88)90044-2
16. Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique:

Application and interpretation. *Journal of Statistical and Econometric Methods, 5*(4), 63–91.

17. North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
18. Ogunleye, E. K., Adegbite, O., & Akanni, L. (2022). Debt servicing and social investment in Nigeria: A crowding-out perspective. *African Journal of Economic Policy, 29*(2), 55–73.
19. Okoye, V. C., & Eze, A. O. (2021). Debt servicing and healthcare financing in Nigeria: Evidence from time series analysis. *Health Economics and Policy Review, 9*(2), 134–148.
20. Omodero, C. O. (2021). The effect of rising public debt on education and health spending in Nigeria. *International Journal of Economics and Finance Studies, 13*(2), 178–192.
21. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326. https://doi.org/10.1002/jae.616
22. Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review, 100*(2), 573–578.
23. Sachs, J. (1989). The debt overhang of developing countries. In G. Calvo, R. Findlay, P. Kouri, & J. Macedo (Eds.), *Debt, stabilization and development* (pp. 80–102). Basil Blackwell.
24. World Bank. (2020). *The Human Capital Index 2020 update: Human capital in the time of COVID-19*. World Bank.