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IMPACT OF GOVERNMENT EXPENDITURE ON HUMAN CAPITAL DEVELOPMENT IN NIGERIA

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ABSTRACT

In Nigeria, human capital has been persistently weak, as evidenced by a Human Capital Index (HCI) value of approximately 0.36, one of the lowest globally, reflecting chronic underperformance in education, health, and workforce productivity outcomes. This study examined the impact of government expenditure on human capital development in Nigeria over the period 1990 to 2024. Annual time-series data were sourced from the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS), and the World Bank, and analysed using the Autoregressive Distributed Lag (ARDL) bounds testing approach for integration. The long-run estimates showed that government expenditure on education, government expenditure on health, and gross fixed capital formation all exhibited positive relationships with the Human Capital Index, suggesting that increases in sectoral spending contribute positively to human capital development over time. In the short run, however, none of the expenditure variables exerted statistically significant effects on human capital development, with the error correction term also statistically insignificant, indicating weak adjustment from short-run disequilibrium to long-run equilibrium within the study period. It therefore recommends that Nigeria reorient education budgets toward direct service delivery inputs and strengthen primary healthcare systems through adequate funding and monitoring of the Basic Health Care Provision Fund, to improve the conversion of public spending into sustainable human capital outcomes.

Keywords: *Human capital Development, Government expenditure on education, Government expenditure on health, Government expenditure on infrastructure*

JEL Classification Codes: *J24, H50, H51, H52*

1.0. Introduction

A critical area where government expenditure occupies a pivotal position is shaping human capital outcomes. Human capital development (HCD) encompasses deliberate efforts to build knowledge, competencies, skills, and health of individuals to strengthen their productivity and contribution to economic activities (Schultz, 1961; Organisation for Economic Co-operation and Development [OECD], 2023). It is

increasingly viewed as both a process and an outcome. As a process, HCD involves deliberate and sustained investments in people through education, training, and healthcare, supported by good governance and institutional reforms. As an outcome, it is reflected in measurable measures including the Human Capital Index (HCI) and the Human Development Index (HDI), literacy rates, school completion, life expectancy, and productivity growth. Effective human capital development requires not only increased funding but also efficiency, equity, and quality in the delivery of social services. Scholars such as Fapohunda and Kuku (2023) argue that the quality of governance determines the degree to which investments in education and health are translated into tangible human development gains.

Government spending on social sectors, particularly education and health, directly influences the quality of human capital formation by broadening access to educational provisions and healthcare delivery. Through sustained investment, governments can build a workforce that is skilled, innovative, and resilient. The HCI, introduced by the World Bank (2020), serves as an all-encompassing tool for gauging this trajectory by evaluating the extent to which educational and health outputs determine the long-term productive capacity of a population. Despite sustained policy efforts by the Nigerian government and international organizations, human capital development outcomes in the country have remained persistently weak (National Bureau of Statistics [NBS], 2023; United Nations Development Programme [UNDP], 2022; World Bank, 2024).

Interventions such as the Universal Basic Education (UBE) scheme, the National Health Insurance Scheme (NHIS), the Tertiary Education Trust Fund (TETFund), and successive reforms under the National Policy on Education were all designed to expand access to and improve the quality of education and healthcare (World Bank, 2023; Federal Government of Nigeria [FGN], 2022). Government budgetary allocations and international development assistance have similarly been directed toward building human capacity; yet, between 2015 and 2023, education and health sectors received an average of below 10 percent and approximately 4–5 percent of the federal budget respectively, figures that fall critically short of the United Nations Educational, Scientific and Cultural Organization (UNESCO) 15–20 percent and Abuja Declaration 15 percent benchmarks (Budget Office of the Federation [BOF], 2023; UNESCO, 2021; World Health Organisation [WHO], 2023). Notwithstanding these concerted efforts, human capital development indicators continue to reflect significant underperformance, indicating that increased public spending has not been sufficient to translate into meaningful and measurable

outcomes (Pritchett, 2018; Rajkumar & Swaroop, 2008; World Bank, 2024).

The evidence of this underperformance is well documented. Nigeria's Human Capital Index (HCI) currently stands at 0.36, one of the lowest globally, meaning that a child born today would attain merely 36 percent of their full productive potential under prevailing conditions in education and health (World Bank, 2024). Public expenditure on education has persistently fallen beneath the UNESCO-recommended threshold of 15–20 percent of the national budget, while health sector allocations have remained short of the 15 percent target prescribed by the Abuja Declaration (UNESCO, 2024; WHO, 2025). Beyond these fiscal gaps, weak implementation capacity, infrastructural deficits, and inadequate deployment of human resources have collectively undermined effective service delivery (WHO, 2016). Gross fixed capital formation (GFCF), which ought to provide the physical infrastructure underpinning education and health services, has been inconsistently prioritized in capital budgets (WHO, 2016). Taken together, these structural deficiencies have contributed to persistently low literacy levels, high disease burdens, diminished life expectancy, and constrained long-run development prospects (UNESCO, 2024; WHO, 2016).

The nexus between public spending and human capital development has attracted considerable scholarly attention, yet important analytical gaps persist (Bassey et al., 2023; Olopade et al., 2023). Much of the existing literature examines individual expenditure components in isolation or relies on cross-country frameworks that do not adequately capture the institutional and fiscal specificities of the Nigerian context (Efuntade et al., 2021; Bassey et al., 2023). The simultaneous analysis of education expenditure, health spending, and gross fixed capital formation (GFCF) as simultaneous drivers of human capital development within a single country-specific model remains limited (Olopade et al., 2023). Furthermore, the Human Capital Index, despite its utility as a composite and internationally comparable measure of productivity potential, has been relatively underutilized as an outcome variable in Nigerian empirical studies (Agu et al., 2024). These gaps constrain the depth of evidence available to guide domestic fiscal policy toward more effective human capital investment. Notwithstanding the insights offered by existing studies, their analytical limitations particularly the tendency to examine expenditure components in isolation, rely on cross-country frameworks, and overlook the composite productivity dimension captured by the HCI render them insufficient to fully explain the persistence of poor human capital outcomes in Nigeria despite decades of public investment (Bassey et al., 2023; Agu et al., 2024). Against the backdrop of the concerns highlighted in the background and problem

statement, this study seeks to address the following research questions:

i. To what degree does government expenditure on education impact access to basic education and the literacy rate in Nigeria?

ii. What effect does government expenditure on health have on maternal and infant mortality rates and life expectancy in Nigeria?

iii. How does gross fixed capital formation influence access to education and health infrastructure in Nigeria?

2.0. Literature Review

2.1 Conceptual Issues

Government expenditure denotes the aggregate spending undertaken by the public sector in the discharge of its responsibilities, including the provision of goods and services, maintenance of public administration, infrastructure development, and the pursuit of redistributive and stabilization goals. In the macroeconomic literature, it is commonly decomposed into recurrent (consumption) and capital (investment) spending and further classified by economic, functional, and program classifications to enhance transparency and accountability (International Monetary Fund [IMF], 2014; OECD, 2015). The Government Finance Statistics (GFS) framework of the International Monetary Fund furnishes internationally harmonized definitions, while the UN's Classification of the Functions of Government (COFOG) specifies functional categories such as education, health, social protection, and economic affairs (IMF, 2014; United Nations [UN], 2018). The World Bank similarly defines public expenditure as the utilization of budgetary resources to deliver public goods and services aligned with development priorities (World Bank, 2021).

2.2 Theoretical Literature

Human Capital Theory, originally articulated by Schultz (1961) and rigorously developed by Becker (1964), with significant extensions by Mincer (1974) and subsequent contributions from the economic growth literature. The theory holds that investments in education, health, and training enhance the productive capacities of individuals, yielding returns in the form of higher output, improved wages, and sustained economic growth. Unlike physical capital, human capital is embedded in people and accumulates through deliberate, costly investment. The central proposition is that public spending on education, health, and enabling infrastructure constitutes a productive investment in people, and that the stock of human capital built through such investments ultimately determines the long-run productivity and developmental trajectory of a nation.

Human Capital Theory is directly relevant to this study in several important ways. First, the

theory provides an explicit rationale for government expenditure on education, health, and infrastructure as productive investments rather than mere consumption outlays, directly justifying the three explanatory variables examined in this study. Second, it emphasizes the dynamic and cumulative nature of human capital accumulation, aligning with this study's intent to capture both short-run adjustments and long-run equilibrium dynamics through the ARDL framework. Third, the theory highlights the role of quality and efficiency in investment, not just volume: returns to education spending depend on what is bought with the money, teachers, textbooks, learning environments, just as returns to health spending depend on the quality of primary care, drug supply chains, and health worker deployment. This insight directly informs the study's emphasis on expenditure effectiveness alongside expenditure levels.

2.3 Empirical Literature Review

Several studies have empirically investigated the relationship between government expenditure and human capital development; however, several of the studies that are most relevant are covered in this section.

In Nigeria, a study by Christopher, Akpan, and Ologunla (2025) explored the impact of government spending in education and health on economic growth, disaggregating expenditure into capital and recurrent components over the period 1986 to 2023. The ARDL model was applied using data sourced from the CBN Statistical Bulletin. The study revealed that government capital education expenditure has a complex short-run relationship with economic growth but becomes significantly positive in the long-run, while recurrent education expenditure significantly boosts GDP per capita in both the short and long run, underscoring the complementary roles of both spending components. Nwokocha et al. (2025), in implication of government health expenditure for human capital development in Nigeria from 1999 to 2023. A Vector Error Correction Model (VECM) was employed for estimation. The results demonstrated that government health expenditure significantly improved human capital development in the long run, while the short-run adjustments were captured by the error correction term, consistent with Nigeria-based evidence emphasizing the importance of health expenditure in enhancing human capital.

Nnamdi and Ngwu (2025), in their study on healthcare expenditure and development indices of health in Nigeria, investigated the effect of government health spending on human development indices. Using time-series data, the study adopting ARDL and causality testing. Results showed that public health expenditure increased life expectancy and reduced infant mortality, though no bidirectional causality was found, aligning with

Nigerian studies that confirm positive long-run effects of health spending on human capital.

The World Bank (2024) issued a Human Capital Public Expenditure and Institutional Review for Nigeria with the objective of examining how fiscal architecture and institutional conditions affect the translation of education spending into human capital outcomes. A descriptive and diagnostic analytical framework was employed rather than a formal causal model, which limits the study's ability to establish precise expenditure elasticities. The review empirically documented that low budget credibility, procurement bottlenecks, and payroll weaknesses significantly dilute the impact of education expenditure on human capital outcomes. Agu, Inyiama, and Ubesie (2024), in their work on the effect of government expenditure on human capital index in Nigeria. Multiple regression was employed for estimation and the results showed that government expenditure on health-related social services significantly improved the HCI, corroborating studies that use the HDI while strengthening the evidence base by directly engaging the HCI as the outcome measure. Using ARDL with causality tests, Joseph and Agada (2024) analysed the long-run relationship between government health spending and life expectancy spanning 1985 to 2022. The study found a long-run positive relationship between health expenditure and life expectancy, though causality tests revealed mixed or weak causal direction, supporting the broader consensus that health spending enhances human capital while highlighting the importance of governance in strengthening that link.

Onabote, Ohwofasa, and Ogunjumo (2023) examined the effect of government sectoral spending on human capital development in Nigeria over the period 1986 to 2021. The study employed ARDL to capture both short- and long-run dynamics. The findings showed that education expenditure is positively related to human development, though the magnitude and significance depend on macro-fiscal conditions and governance quality. Bassey et al. (2023) evaluated the impact of government expenditures on human capital development in Nigeria using data spanning 1981 to 2019. The ARDL bounds testing approach was adopted to capture long-run dynamics and the findings showed a long-run positive elasticity of human capital with respect to education spending and underscored the presence of significant lags before investment payoffs materialize. Akpan and Ihendinihu (2023) investigated how government expenditure on the education sector and total school enrolment should be used to boast human capital development in Nigeria. The ARDL technique was applied to time-series data from the CBN Statistical Bulletin spanning 1981 to 2023. Findings showed that aggregate government expenditure

on the education sector does not significantly impact total school enrolment in Nigeria, attributing this to inadequate funding and structural inefficiencies that prevent budgetary allocations from translating into actual improvements in access and enrolment. Awoyemi et al. (2023), in a time-series analysis of government expenditure and health outcomes in Nigeria, investigated how government health spending influences infant mortality and life expectancy between 1980 and 2020. The study applied cointegration and dynamic time-series techniques and it was revealed that increased health expenditure lowered infant mortality and raised life expectancy, both of which are core dimensions of human capital development, consistent with the view that fiscal investments in health improve human development outcomes. Bognet et al. (2023) assessed the impact of government expenditure on human capital development in Nigeria over the period 1990 to 2019. The study applied ARDL Model for the analysis, and the results revealed that Government Education Expenditure (GEE) showed significant positive impact on Human Development index (HDI), while Government Health Expenditure (GHE) showed insignificant positive impact on Human Development (HDI).

Oladosu and Olayiwola (2022), in their comparative work on the effect of public health expenditure on health outcomes in Nigeria and Ghana, analysed how government health spending affects infant and maternal mortality in both countries, though Nigeria remained the primary focus. Using a panel ARDL framework with country-specific results, the results indicated that in Nigeria, higher public health expenditure significantly reduced infant and maternal mortality rates, suggesting improved quality of life and stronger human capital outcomes, supporting earlier Nigerian research on the beneficial role of health expenditure.

Using annual time-series data from 1981 to 2018, Jibril (2020) examined the impact of public health expenditure on life expectancy in Nigeria. The Autoregressive Distributed Lag (ARDL) bounds testing approach was employed and it was revealed that public health expenditure had a significant positive effect on life expectancy in the long run, implying that increased government commitment to health promotes human capital accumulation through improved survival and longevity, consistent with human capital theories that stress the importance of healthcare investment for productivity growth.

2.4. Contribution to Knowledge

This study was undertaken with the primary objective of contributing to the existing body of knowledge on the relationship between government expenditure and human capital development in Nigeria over the period 1990 to 2024 . While previous studies have examined education or health expenditure in isolation,

this study provides a more integrated and comprehensive analysis by simultaneously incorporating government expenditure on education, government expenditure on health, and gross fixed capital formation (GFCF) within a single empirical framework. Also, the use of the Human Capital Index (HCI) as a proxy for human capital development. Unlike traditional measures such as literacy rates or school enrolment ratios, the HCI captures a broader and more holistic dimension of human capital, including survival rates, learning-adjusted years of schooling, and productivity potential. By adopting this composite indicator, the study offers a more robust evaluation of how public expenditure influences overall human capital outcomes in Nigeria. Furthermore, the inclusion of gross fixed capital formation as an explanatory variable represents an important value addition to the literature. Many prior studies focus strictly on recurrent social sector expenditure, overlooking the infrastructural base that enables effective service delivery. By integrating capital formation into the model, this study highlights the complementary role of infrastructure in strengthening education and health systems.

3.0. Methodology

3.1 Model Specification

The empirical model adopted in this study draws upon the Human Capital Theory framework presented in the preceding section. The theory emphasizes the central role of deliberate investment in education, health, and enabling infrastructure for accumulating human capital and sustaining long-run productivity growth. Guided by this theoretical foundation, the study establishes an empirical association between human capital development (measured by the Human Capital Index, HCI) and its key public-sector determinants in Nigeria. Drawing on established economic literature and the theoretical framework outlined above, the model is specified as follows:

$$HCI = f(GEE, GEH, GFCF, GEA, GEI) \quad 1$$

Where: HCI = Human Capital Index (composite measure of human capital development), GEE = Government expenditure on education; GEH = Government expenditure on health; GFCF = Gross fixed capital formation; GEA = Government expenditure on agriculture; GEI = Government expenditure on infrastructure.

To make the model suitable for empirical estimation, it is expressed in a linear econometric form as:

$$HCI_t=\beta_0+\beta_1 GEE_t+\beta_2 GEH_t+\beta_3 GFCF_t+\beta_4 GEAt+\beta_5 GEIt+\mu_t \quad 2$$

Where: β_0 = Constant term; $\beta_1 - \beta_5$ = Parameters to be estimated & μ_t = Error term capturing unobserved factors

Furthermore, since time series data are involved and there is potential for both long-run and short-run dynamics, the Autoregressive Distributed Lag (ARDL) model is employed. The ARDL representation of the model is stated as:

$$\Delta HCI_t = \alpha_0 + \Sigma\alpha_1 \Delta HCI_{\{t-i\}} + \Sigma\alpha_2 \Delta GEE_{\{t-i\}} + \Sigma\alpha_3 \Delta GEH_{\{t-i\}} + \Sigma\alpha_4 \Delta GFCF_{\{t-i)} + \Sigma\alpha_5 \Delta GEA_{\{t-i\}}$$

$$+ \Sigma\alpha_6 \Delta GEI_{\{t-i} + \lambda_1 HCI_{\{t-1\}} + \lambda_2 GEE_{\{t-1\}} + \lambda_3 GEH_{\{t-1\}} + \lambda_4 GFCF_{\{t-1\}} + \lambda_5 GEA_{\{t-1\}} + \lambda_6 GEI_{\{t-1\}} + \varepsilon_t$$

Where: Δ = First-difference operator; α_0 = Drift component; $\lambda_1 - \lambda_4$ = Long-run multipliers (from the error-correction component); α-coefficients = Short-run dynamic parameters on differenced regressors and lagged dependent variable & ε_t = Error term

3.2 Estimation Techniques and Procedure

The study employs the Autoregressive Distributed Lag (ARDL) model as the principal estimation technique, given its suitability for time-series data in which regressors may be integrated of different orders, I(0) and I(1). Developed by Pesaran and Shin (1999) and further extended by Pesaran, Shin and Smith (2001), the ARDL bounds-testing approach is particularly appropriate for small samples and mixed integration orders, a common feature in macroeconomic applications for Nigeria. The stationarity properties of each series are examined using Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests. Optimal lag lengths for the ARDL model are selected using information criteria primarily the Akaike Information Criterion (AIC), with the Schwarz Criterion (SIC) reported for robustness. The ARDL bounds test for cointegration is conducted to determine whether a level relationship exists among the variables. Upon establishing cointegration, the long-run coefficients are estimated and the associated short-run dynamics are obtained from the error-correction representation of the ARDL model. Diagnostic checks are then implemented to validate model adequacy: serial correlation is tested using the Breusch–Godfrey LM test; heteroskedasticity is assessed with White or Breusch–Pagan–Godfrey tests; functional-form stability is evaluated with the Ramsey RESET test; and residual normality is examined via the Jarque–Bera statistic. Parameter and model stability are further evaluated through the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) stability tests.

3.3 Nature and Sources of data

This study relies exclusively on secondary data sourced from credible national and international statistical repositories.

Table 3.1: Definition, Measurement and Data Sources

Variable	Definition & Measurement	Source
Human Capital Index (human capital development) (HCI)	The HCI is a composite indicator that captures the projected productivity of a child born today, given prevailing rates of survival, schooling, and health. It is measured in Index (0–1 scale)	World Bank Human Capital Index (HCI) Database; WDI 2023
Government expenditure on education (GEXEDU)	This refers to public allocations to the education sector and it is measured as a % of GDP or % of total government expenditure	CBN; Budget Office of the Federation; UNESCO Institute for Statistics (UIS); WDI, 2023
Government expenditure on health (GEXHEALTH)	This captures public spending on health services and programs. It is % of GDP or % of total government expenditure and it is measured in billions of naira	WHO ; World Bank (WDI); CBN Statistical Bulletin, 2023
Gross fixed capital formation (GFCF)	This represents investment in fixed physical assets including buildings, equipment, and infrastructure that support the delivery of services am dot is measured as % of GDP (or constant prices)	World Bank (WDI) National Accounts; CBN Statistical Bulletin, 2023
Government expenditure on agriculture (GEA)	This represents public allocations to the agricultural sector and it is expressed as a share of GDP or of total government expenditure.	WDI, 2023
Government expenditure on infrastructure (GEI)	This refers to government investment in physical and economic infrastructure such as transport networks, electricity, water supply, and communication systems. It is measured as a percentage of GDP or total capital outlay.	WDI, 2023

Researchers' computation, 2026

4.0. Results and Discussion of Findings

4.1 Unit Root Test

The unit root test is carried out to find out if the variables are stationary or not over time. The essence of stationarity is for the mean and the variance of the data to be fairly constant to help the predictability of the model.

Table 4.1 Unit Root Result using Augmented Dickey Fuller (ADF)

Variables	ADF Statistics	Critical Value @5%	Order of Integration	Remarks
LHCI	-5.775955	-2.954021	1(0)	Stationary
LGEH	-6.582844	-2.957110	1(1)	Stationary
LGEE	-6.252899	-2.954021	1(1)	Stationary
LGFCF	-4.580447	-2.957110	1(1)	Stationary
LGEA	-2.981038	-1.250581	1(1)	Stationary
LGEI	-3.825622	-2.954021	1(1)	Stationary

Source: Authors' Computation using E-Views 9

The results in Table 4.1 show that human capital index (HCI) is stationary at level using the ADF test, while the other variables are stationary only after differencing them once. We therefore have a mixture of both I(0) and I(1) order of integration. Based on the above results therefore we have to resort to testing for co-integration using Bounds testing under Autoregressive Distributed Lag (ARDL) model.

4.2 Optimal Lag Length Selection

To estimate the parameters of this model, lag length selection criteria is essential. VAR lag length selection in Table 4.2 displayed the outcome of this investigation.

Table 4.2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-164.0989	NA	0.001209	10.30903	10.58112	10.40058
1	-13.75509	236.9054	1.23e-06	3.379096*	5.283742*	4.019952*
2	32.29389	55.81694	8.42e-07*	2.770067	6.307267	3.960227

Source: Computed by Author using E-Views 9

We shall use lag 1 for the estimation of the long run model and it is based on AIC which has the lowest value.

4.3: Co-integration test (Bound Test)

Co-integration enables us to confirm if there is a long run relationship among the variables. This will help us determine the long run association among the variables for future forecast.

Table 4.3: Co-integration test using Bounds testing

Null Hypothesis: No Co-integration

F-Statistic	Level of Sig.	I(0)	I(1)
4.677292	10%	2.26	3.35
	5%	2.62	3.79
	2.5%	2.96	4.18
	1%	3.41	4.68

Source: Computed by Author using E-Views 9

From Table 4.3, F-statistic is larger than the upper bound value and that implies that there is co-integration among the variables. This implies that the variables are related and can be combined in a linear fashion. That is, even if there are shocks in the short run, which may affect movement in the individual series, they would converge with time in the long run. On this note, we would only need to estimate the long run model and interpret it.

4.4 Autoregressive Distributed Lag Model

Table 4.4 displays the outcome of ARDL model, as it is the most suitable approach for estimating the model's parameters, given the cointegration of the variables under investigation**.**

Table 4.4: Long run and Short run ARDL Results

Long-run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	55.88060	30.32533	1.842703	0.2067
LHCI(-1)	-2.012174	1.145958	-1.755887	0.2212
LGEH(-1)	-0.350608	0.245917	-1.425715	0.2900
LGEE(-1)	-0.428445	0.922142	-0.464620	0.6879
LGFCF(-1)	0.666875	0.617164	1.080548	0.3929
LGEA(-1)	0.714457	0.321889	2.219577	0.1566
LGEI(-1)	-1.755823	1.417845	-1.238374	0.3412

Short-run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.324765	1.673514	-0.791607	0.5737
D(LHCI(-1))	1.000000	2.703159	3.70E+14	0.0000
D(LGEH(-1))	2.144058	2.786546	0.769432	0.5825
D(LGEE(-1))	-1.420173	1.494651	-0.950171	0.5163
D(LGFCF(-1))	1.356248	2.312527	0.586479	0.6623
D(LGEA(-1))	-6.585174	7.051423	-0.933879	0.5218
D(LGER(-1))	-2.510644	3.559991	-0.705239	0.6090
ECT(-1)	0.895330	0.349593	-2.561064	0.0161
R-squared	0.923887			
F-statistic	2.860637			
Prob(F-statistic)	0.000000			
Durbin-Watson statistic	3.009606			

Source: Computed by Author using E-views 9

The long-run ARDL estimates result from Table 4.4 shows that all the explanatory variables have mixed effects on the dependent variable, LHCI, and statistically insignificant at the 5% level. The lagged dependent variable, LHCI(-1) coefficient is negative (-2.012174) and its probability value is 0.2212. This suggests that, a one-unit increase in LHCI is associated with an approximately 2.01-unit

reduction in the dependent variable in the long-run, while holding other factors constant.

Similarly, LGEH(-1) has a negative coefficient of -0.350608 and a probability value of 0.2900. This shows that in the long run, a one-unit increase in LGEH is related with approximately a 0.351-unit decline in the dependent variable. LGEE(-1) also exhibits a negative relationship, with a coefficient of -0.428445 and a probability value of 0.6879. This implies that a unit increase in LGEE is associated with a decrease in the dependent variable. However, the effect of these variables are statistically insignificant.

In contrast, in the long-run, LGFCF(-1) has a positive coefficient of 0.666875 and this suggest that a one-unit increase in LGFCF is associated with approximately a 0.667-unit increase in the dependent variable. However, its positive probability value of 0.3929 shows that this relationship is statistically insignificant. Also, LGEA(-1) has a positive coefficient of 0.714457, indicating that a one-unit increase in LGEA is approximately a 0.714-unit increase in the dependent variable. Finally, LGEI(-1) has a negative coefficient of -1.755823, suggesting an inverse long-run relationship with the dependent variable. However, the probability value of LGEA and LGEI (-1) are 0.3412 and 0.1566 respectively, showing that the relationship is statistically insignificant at 5% level.

On the short-run estimates, the ECM results indicate that the most important finding is the significant negative ECT coefficient of -0.895330 with p-value of 0.0161. This reveals that the model has a valid error-correction mechanism and that approximately 89.53% of short-run disequilibrium is corrected within one period. LHCI responds quickly to deviations from its long-run equilibrium path as suggested by the relatively high speed of adjustment. The significant ECT establishes that the system possesses a tendency to return to its long-run equilibrium following temporary shocks, although the individual short-run explanatory variables are largely insignificant.

The model also reports an R-squared of 0.923887, showing that roughly 92.39% of the variation in D(LHCI) is explained by the variables included in the ECM. The F-statistic of 2.860637 with a probability value of 0.0000 confirms that the explanatory variables are jointly statistically significant. The Durbin-Watson statistic of 3.009606 suggests that there may be some negative serial correlation, and this should ideally be examined using the appropriate residual diagnostic tests before making a definitive conclusion.

4.5 Post Estimation Tests

4.1.5: Residual Diagnostic tests

For any model to be useful for forecast, it is important that the assumptions underlying the Ordinary Least Square estimates be satisfied. This section presents the serial correlation test,

the normality test and the Stability test.

Table 4.5: Residual Diagnostic Tests

Residual Diagnostic tests	P-value
Breusch-Godfrey Serial Correlation LM Test	0.1682
Jarque-Bera	0.6461
Heteroskedasticity Test: Breusch-Pagan	0.4782

Source: Computed by Author using E-views 9

i) Breush-Godfrey Serial Correlation test result.

Table 4.5 gives the results for the Breusch-Godfrey Test of Serial correlation. The probability of 0.1682 which is greater than 0.05 indicates that the residuals of the variables are not serially correlated. It implies that there is no correlation between consecutive residuals or error term. Thus, the null hypothesis of no serial correlation is not rejected, which satisfies the assumption of no serial correlation. Consequently, the model shows a good precision, therefore could be used for forecasting.

ii) Breush-Pagan-Godfrey Heteroskedasticity test result.

Above table shows the result of Heteroskedasticity test by Breush-Pagan-Godfrey test. Given that the probability of 0.4782 is greater than 0.05 indicates that the residuals of the variables are homoscedastic. It implies that the error term is the same across all variables of the independent variable. Therefore, the coefficients of the variables are unbiased and could be used for forecasting.

iii) Normality test result.

The table above shows the result of normality test of Jarque-Bera test. The Jarque-Bera have a probability value of 0.6461 which is greater than 0.05, it indicates that the residuals of the variables are normally distributed which satisfies the normality assumption. In order words, it could be used for forecasting and policies.

4.1.6. Stability Tests

The stability test is necessary in a time series data to check whether the model is stable or not. This study used the Recursive CUSUM test to establish the stability status.

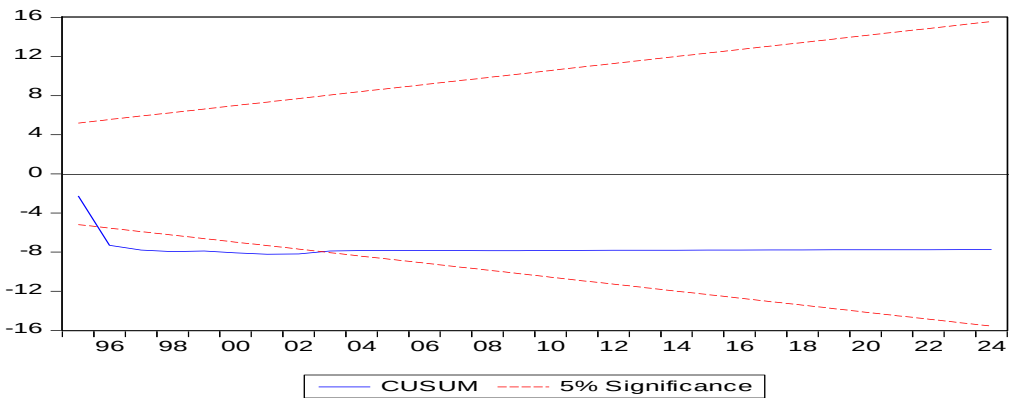

Figure 4.1: CUSUM Stability test
Source: Computed by author using E-Views 9

From the graph above using CUSUM of squares, it shows that the variables are stable. That means the model exhibits stability over time and this means it can be used for forecasting.

4.7. Discussion of Findings

The findings indicate that human capital development has a mixed relationship with the explanatory variables in Nigeria. While the short-run result supports the a priori expectation that improvements in human capital should enhance development, the long-run outcome does not provide the expected support. This suggests that improvements in Nigeria's human capital may not be sustained over time without improvements in the quality and effectiveness of human-capital investment. Government expenditure on health and education does not show the expected positive influence on human capital development, particularly in the long run. This is contrary to studies such as those carried out by Bassey et al. (2023), which revealed positive effects of investments in education and health sector on human capital development, but in agreement with the findings made in respect of Nigeria. It is also consistent with the results revealed by Onabote et al. (2023) in their study, which established that public spending and human development in Nigeria had no relationship. The positively insignificant effect of Gross Fixed Capital Formation is in line with the a priori expectations, despite the insignificance of the regression coefficients implying that physical capital may not be enough to enhance human capital. In summary, these results imply that the problem facing Nigeria is not just the issue of how much money the government spends, but rather how well the expenditure is made on certain sectors such as education, health, including human capital development.

5.0. Conclusion and Policy Recommendation

This study examined the impact of government expenditure on human capital development in Nigeria over the period 1990 to 2024, employing the Autoregressive Distributed Lag (ARDL) model to analyse both the short-run and long-run dynamics. The findings reveal that while the ARDL bounds test confirmed the existence of a long-run cointegrating relationship among the variables, the short-run estimates present a more nuanced picture. The short-run coefficient on education expenditure was negative and statistically insignificant, reflecting the recognition and implementation lags that characterize education spending in a structurally constrained environment. Government expenditure on health and gross fixed capital formation (GFCF) both yielded positive but statistically insignificant short-run coefficients, indicating that while the directional relationship is consistent with human capital theory, the magnitude of effect within the short-run window is insufficient to produce statistically measurable changes in

human capital outcomes. The error correction term, while correctly signed, was not statistically significant, suggesting that the pace of adjustment from short-run disequilibrium toward the long-run equilibrium path remains sluggish within the study period.

Despite the weak short-run magnitude and statistical significance of the individual variables, the overall explanatory capacity of the model is strong, with the R-squared value indicating that approximately 92.4 percent of the variation in the Human Capital Index is accounted for by the included regressors. The cointegration evidence further confirms the existence of a stable long-run relationship among the variables, implying that public spending decisions have enduring implications for Nigeria's human capital trajectory even where short-run effects are not immediately discernible.

5.3. Policy Recommendations

Based on the key findings of this study, the following policy recommendations are put forward:

i. Although public education expenditure did not produce a statistically significant short-run effect on access to basic education and the literacy rate in Nigeria, government should therefore not interpret this finding as justification for reducing education budgets. Rather, the implication is that increased allocations must be accompanied by a fundamental reorientation of spending toward direct service delivery inputs. Funds should be directed toward teacher training and welfare, curriculum modernization, provision of instructional materials, digital learning infrastructure, and rehabilitation of dilapidated school facilities.

ii. Government should prioritize investment in primary healthcare delivery, maternal and child health services, disease prevention initiatives, and equitable distribution of healthcare personnel across rural and urban areas. Government should strengthen public financial management systems.

iii. The Nigerian government should increase and protect capital expenditure directed at infrastructure that supports education and health delivery systems, recognizing that the returns accumulate over time.

iv. Moreover, the study underscores the importance of consistency and long-term planning in public expenditure. Therefore, fiscal authorities should ensure stability in budget implementation and avoid abrupt policy reversals that disrupt ongoing social sector projects. Timely release of funds and improved budget credibility are essential for sustaining long-run gains in human capital development.

v. Finally, government should integrate human capital development into its broader economic development strategy. Education, health, and infrastructure spending should not be treated as isolated policy areas but as interconnected components of national productivity and inclusive growth. By adopting a coordinated, transparent, and evidence-based fiscal framework, Nigeria can significantly enhance its Human Capital Index and secure sustainable long-term develop.

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