Impact of Military Expenditures on Human Development outcome in Nigeria: 1999-2024

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Abstract:
This paper investigated the impact of military expenditure on human development outcomes in Nigeria, focusing on the disaggregated components of military spending, recurrent military expenditure, capital military expenditure, and foreign military aid, between 1999 and 2024. The paper employed the Dynamic Ordinary Least Squares (DOLS) estimation technique. The empirical findings revealed that recurrent military expenditure had a positive and statistically significant impact on HDI, suggesting that routine defence spending contributed to national stability, which in turn enhanced the delivery of social services. In contrast, capital military expenditure exerted a significant adverse effect on Human Development Index (HDI), implying that large-scale investments in military infrastructure and equipment may have diverted resources from critical social sectors. Foreign military aid had a positive and significant effect, though of smaller magnitude, indicating that when well-coordinated, military assistance from external partners could support security conditions conducive to human development. Based on these findings, the study recommended that the Federal Ministry of Defence and the Ministry of Finance should sustain and enhance the efficiency of recurrent defence allocations while ensuring transparency and accountability. It was also recommended that the Budget Office of the Federation and relevant committees in the National Assembly rigorously evaluate capital defence projects to prevent resource misallocation. Lastly, the Ministry of Foreign Affairs and the Defence Intelligence Agency were advised to strategically align foreign military aid with national development priorities, ensuring that such support strengthens both military capacity and socio-economic well-being. These measures were deemed essential for aligning Nigeria's security expenditure with its broader human development goals.

Keywords: Military Expenditure, Human Development Index, Recurrent Spending, Capital Expenditure, Foreign Military Aid
JEL Codes: H56, I31, O15, H51, F35

I. Introduction

Military expenditures represent an essential component of government spending worldwide, reflecting nations' priorities in defence, security, and strategic positioning. Globally, military spending has experienced substantial growth over the past two decades, with world military expenditure reaching $2.4 trillion in 2023, representing a 3.7% increase from the previous year, according to the Stockholm International Peace Research Institute (SIPRI, 2025). This upward path

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demonstrates the continued emphasis nations place on defence capabilities amid evolving security challenges, geopolitical tensions, and the need to modernise military infrastructure. The composition of military expenditures typically encompasses three primary components: recurrent military expenditures, which cover operational costs including personnel salaries, maintenance, training, and day-to-day military operations; capital military expenditures, which involve investments in military equipment, infrastructure development, weapons procurement, and technological advancement; and foreign military aid, which represents external financial and material support received from other nations or international organizations to enhance defense capabilities (Radzi *et al.*, 2025)

Within the sub-Saharan African context, military expenditure patterns reflect the region's unique security challenges, including internal conflicts, terrorism threats, border disputes, and peacekeeping obligations. Sub-Saharan Africa's collective military spending reached approximately $18.5 billion in 2022, representing about 0.8% of the global total (Hassan & Ahmed, 2023). Various factors, including the fight against insurgent groups such as Boko Haram in the Lake Chad Basin, al-Shabaab in East Africa, and various militant groups across the Sahel region, have influenced the region's military expenditure. Countries like Nigeria, South Africa, Angola, and Ethiopia have emerged as the most significant military spenders in the region, with their expenditures driven by both internal security needs and regional stability concerns.

Nigeria's military expenditure route presents a compelling case study within the African context, demonstrating significant growth patterns that reflect the country's evolving security challenges and economic capacity. According to data from the Federal Ministry of Defence (FMoD, 2024) and the Stockholm International Peace Research Institute (SIPRI, 2025), Nigeria's total defence budget has experienced dramatic expansion from ₦33.5 billion in 1999 to ₦2,453.70 billion in 2024, representing over a 70-fold increase over these 25 years. This exponential growth path reveals several distinct phases in Nigeria's military spending patterns. The recurrent military expenditures, covering operational costs and personnel expenses, increased from ₦24.83 billion in 1999 to ₦1,368.92 billion in 2024, while capital military expenditures rose from ₦8.67 billion to ₦1,084.78 billion over the same period (FMoD, 2024). Foreign military aid received by Nigeria has also shown substantial growth, rising from $12.5 million in 1999 to $378.9 million in 2024, reflecting increased international cooperation in addressing security challenges, particularly the insurgency in the northeastern region (International Institute for Strategic Studies, 2024).

The growth in Nigeria's military spending can be attributed to several critical factors that have shaped the country's security scope over the past two decades. The emergence of the Boko Haram insurgency in the northeast from 2009 onwards necessitated substantial investments in counterterrorism operations, military equipment, and personnel training. Additionally, the rise of banditry, kidnapping, and farmer-herder conflicts across various regions has required increased military presence and operations. The data reveals particularly sharp increases in military expenditures from 2009 onwards, coinciding with the intensification of the Boko Haram insurgency, with total defence budget jumping from ₦241.31 billion in 2009 to ₦1,577.12 billion in 2021 (Budget Office of the Federation, 2024). The period between 2014 and 2016 shows especially dramatic increases, with foreign military aid peaking at $267.4 million in 2019, reflecting international support for

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Nigeria's counterterrorism efforts and military modernisation programs.

Human development, as opined by Azam (2023), represents a comprehensive approach to measuring societal progress that extends beyond mere economic indicators to encompass the expansion of human choices and capabilities. The Human Development Index serves as the primary metric for assessing human development outcomes, incorporating three fundamental dimensions: a long and healthy life measured by life expectancy at birth, knowledge acquisition measured by mean years of schooling and expected years of schooling, and a decent standard of living measured by gross national income per capita. Globally, human development has shown consistent improvement over the past several decades, with the global HDI value increasing from 0.598 in 1990 to 0.732 in 2021. However, this progress has been uneven across regions and countries (UNDP, 2024). However, the COVID-19 pandemic marked a significant setback, with global HDI declining for the first time since its inception, dropping to 0.732 in 2020 from 0.737 in 2019, highlighting the fragility of human development gains in the face of global crises.

Sub-Saharan Africa continues to lag significantly behind other regions in human development outcomes, despite notable progress in certain areas over the past two decades. The region's average HDI value of 0.547 in 2021 places it in the low human development category, substantially below the global average of 0.732 (UNDP, 2024). This persistent gap reflects structural challenges, including limited access to quality education, inadequate healthcare systems, high infant and maternal mortality rates, low life expectancy, and widespread poverty. Countries within the region exhibit considerable variation in human development outcomes, with nations like Mauritius, Seychelles, and South Africa achieving higher HDI scores. In contrast, countries affected by conflict and instability, such as Chad, the Central African Republic, and Niger, continue to struggle with very low human development indicators.

Nigeria's human development path presents a period of progress interrupted by periods of stagnation and decline, reflecting the country's struggles to translate its vast natural resources and economic potential into meaningful improvements in citizens' well-being. Available statistics reveal that Nigeria's HDI experienced a gradual improvement from 0.488 in 1999 to a peak of 0.539 in 2019, representing the highest level achieved during this period (Hassan & Ahmed, 2023). However, this progress has been characterised by significant volatility and reversals, with notable declines occurring in 2003 (dropping to 0.45), 2010 (declining to 0.482), and most recently from 2020 onwards, where the HDI fell from 0.537 in 2020 to 0.522 in 2024. This recent decline of 0.017 points over four years represents a concerning reversal of previous gains and places Nigeria among countries experiencing deteriorating human development outcomes. The persistent challenges across health indicators, including low life expectancy and high maternal mortality, educational deficits with limited access to quality schooling, and inadequate income levels, demonstrate the country's inability to ensure decent living standards despite being Africa's largest economy, raising critical questions about current development strategies.

Given that effective resource allocation and development priorities are essential enablers of human welfare improvement, social progress, and sustainable development, it is imperative to examine how military expenditure components, represented by recurrent military expenditures, capital military expenditures, and foreign military aid, have influenced human development outcomes in Nigeria.

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II. Literature Review

Conceptual Review

Military Expenditure

Recurrent military expenditure represents the portion of the defence budget dedicated to the day-to-day operational functioning of the military. This includes personnel salaries, benefits, food, logistics, fuel, maintenance of equipment, and other non-capital running costs. Recurrent expenditure is typically the most significant and most consistent part of military spending, reflecting the cost of sustaining an operational force over time. As described by Azam (2023), recurrent military spending ensures the continued readiness and mobility of military forces but often absorbs a significant share of the public budget in low-income countries, sometimes at the expense of social services.

Capital military expenditure, on the other hand, refers to long-term investments in the development of military capability. This includes expenditures on the acquisition of military equipment, construction of military facilities, technological upgrades, and other infrastructural developments aimed at enhancing defence capacity over time. Capital expenditure is typically more variable than recurrent expenditure and may fluctuate with strategic shifts or procurement cycles. According to IISS (2024), capital military investments are crucial for maintaining technological parity and ensuring the sustainability of defence systems. However, in many developing nations, such as Nigeria, these expenditures are often criticised for their opacity and potential for inefficiency.

Foreign military aid constitutes external assistance provided by foreign governments, international institutions, or alliances to support a recipient country's military sector. This aid can be in the form of direct financial transfers, supply of arms and equipment, training, advisory support, or intelligence sharing. It is often politically motivated, aligning with the strategic interests of the donor country. As SIPRI (2024) notes, foreign military aid plays a critical role in augmenting domestic military capacity, particularly in low- and middle-income countries facing asymmetric warfare. However, such aid can also create dependencies or be misaligned with the development priorities of the recipient country.

Human Development Outcome

Human development outcome refers to the measurable progress in improving the overall well-being and quality of life of individuals within a society. It encompasses multiple dimensions of development, including health, education, and income, which are essential for enabling individuals to lead productive, long, and meaningful lives. The most widely recognised measure for capturing this multidimensional concept is the Human Development Index (HDI), developed by the United Nations Development Programme (UNDP). HDI is a composite index that combines indicators of life expectancy at birth (a proxy for health), mean and expected years of schooling (a proxy for education), and gross national income per capita (a proxy for standard of living) into a single value between 0 and 1, where higher values indicate better human development outcomes (UNDP, 2024).

Various scholars and institutions have conceptualised HDI as a tool for shifting the focus of development assessment from purely economic growth to human-centred progress. According to Todaro and Smith (2023), the HDI framework redefines development to emphasise ―enlarging people's choices,‖ especially the ability to live long and healthy lives, acquire knowledge, and access the resources needed for a decent standard of living. Similarly, Sen (2022) argues that HDI captures the essence of human capabilities, emphasising the expansion of freedoms and opportunities rather than mere income growth. These conceptualisations reinforce

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the importance of evaluating development in terms of its impact on individuals, rather than focusing solely on national economic performance.

It is frequently used to assess the effectiveness of national policies, monitor international development goals, and identify areas of social and economic vulnerability. The Amara and Kone (2024) assert that HDI is not only a summary measure of human development but also a means of highlighting inequalities and areas where policy interventions are urgently needed. For countries like Nigeria, where developmental challenges are persistent, HDI trends serve as a critical indicator of whether national efforts are translating into tangible improvements in people's lives.

Theoretical Review

The theoretical underpinning for this paper is the Public Goods Theory, which originates from the foundational work of economist Paul Samuelson in 1954. In his seminal article, *The Pure Theory of Public Expenditure*, Samuelson introduced the concept of public goods as commodities that are non-excludable and non-rivalrous in consumption, meaning that one individual's use does not diminish another's, and no one can be effectively excluded from using them. Examples of public goods include national defence, public safety, clean air, and basic education. The theory asserts that due to the inability of markets to provide such goods efficiently, the responsibility falls on governments to ensure their adequate provision. Public Goods Theory thus provides a normative justification for state intervention and public spending aimed at enhancing collective welfare.

In the context of this study, the Public Goods Theory is particularly relevant as it frames military expenditure—especially in its recurrent and capital forms—as a public good provided by the state to ensure security and sovereignty. National defence fits the criteria of a public good because all citizens benefit from it regardless of individual contribution, and its consumption by one person does not reduce availability to others. The theory supports the argument that spending on defence is essential for maintaining public order, stability, and the enabling environment necessary for development to occur. However, the growing concern, particularly in Nigeria, is whether such expenditures are being allocated efficiently and whether they yield measurable improvements in broader human development outcomes.

One of the strengths of the Public Goods Theory is its emphasis on collective benefit and its justification for essential government interventions where markets fail. It explains why security, infrastructure, and education must be publicly funded and universally accessible, providing a foundational framework for understanding public budgeting priorities. However, the theory has been critiqued for its assumption that governments always act efficiently in the provision of public goods. Scholars like Ostrom (2023) argue that bureaucratic inefficiencies, corruption, and a lack of community engagement can undermine state provision of public goods. Moreover, as Musgrave and Musgrave (2022) highlight, the definition of what constitutes a public good can be politically manipulated to justify spending that primarily benefits elites or serves narrow interests.

Despite these criticisms, the Public Goods Theory remains a valuable tool in the present study for examining how government expenditures on defence—classified as public goods—impact human development outcomes. It raises critical questions about the prioritisation and effectiveness of military spending in Nigeria and whether such allocations genuinely serve the collective interests of the population. This theoretical perspective supports an inquiry into the degree to which defence spending enhances or constrains public welfare, as reflected in

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human development indicators such as health, education, and standard of living.

Empirical Review

The relationship between military expenditure and human development has attracted considerable scholarly attention across various geographical contexts. Researchers have explored how different components of defence spending, including recurrent and capital military expenditures as well as foreign military aid, influence human development indicators such as the Human Development Index (HDI).

Papadopoulos and Karagiannis (2024) investigated the relationship between military expenditure and out-of-pocket healthcare financing across NATO countries from 2000 to 2021. Employing GMM estimation techniques, the study found that recurrent military expenditure strongly correlated with higher private healthcare costs, suggesting a displacement of public health funding. Capital military investments had less consistent effects, and foreign military assistance was found to have negligible influence on domestic healthcare burdens. Although the study offered timely relevance in the context of the Russia-Ukraine conflict and increased European defence budgets, its findings are less applicable to low-income countries where defence spending patterns, institutional environments, and healthcare systems differ considerably.

Fomba et al. (2024) brought an institutional channel to the discussion by analysing how governance quality moderates the relationship between military expenditure and education outcomes across African countries. Using the Driscoll and Kraay approach to manage spatial and temporal dependencies, the study found that recurrent military expenditures significantly undermined both the quality and quantity of education. However, capital military spending had more dynamic effects, sometimes contributing positively in environments with high institutional quality. Foreign military aid showed mixed results, with effectiveness largely contingent on governance strength. This study's consideration of interaction effects offered a richer understanding of the mechanisms behind fiscal trade-offs. However, its focus on education alone may limit its insight into broader human development dynamics.

Another contribution comes from Hatem and Rahman (2024), who applied machine learning algorithms to U.S. data to examine how different categories of military expenditure influenced economic performance. The analysis, covering multiple decades and employing artificial intelligence tools, revealed that increases in recurrent military spending had a significant negative correlation with GDP growth. Capital military investments showed more dynamic impacts, sometimes generating positive returns through technological innovation, but opportunity costs often outweighed these. Foreign military aid had minimal economic benefit to the donor. Although this study's use of cutting-edge analytical techniques adds methodological depth to the literature, its focus on the United States—a high-income country with substantial military infrastructure- limits the direct relevance of its findings to countries like Nigeria, where institutional and fiscal constraints are more pronounced.

Amara and Kone (2024) conducted a heterogeneous panel analysis covering African countries from 1990 to 2015. Utilising advanced econometric techniques, including Dumitrescu and Hurlin panel causality tests, the study acknowledged the continent's economic diversity by modelling inter-country heterogeneity. Results showed that recurrent military expenditures were negatively correlated with economic growth across most countries. Capital military expenditure had more dynamic effects, showing occasional positive

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spillovers in countries with stronger institutions. Foreign military aid exhibited minimal developmental impact. While the use of causality tests improved the robustness of findings, the study's limited temporal scope excluded significant recent developments, such as the resurgence of violent extremism and shifting geopolitical alliances in Africa, which likely influence current military expenditure trends.

Sekou and Coulibaly (2024) analysed the effects of disaggregated military expenditure on economic growth and development using a panel dataset of 35 non-OECD countries between 1988 and 2019. Employing panel autoregressive distributed lag (ARDL) and pooled mean group estimators, along with robust least squares and fixed effects, the study found strong evidence that recurrent military expenditures had the most detrimental impact on development, followed by capital military expenditures. Foreign military aid yielded mixed results, mainly depending on governance quality. While this study offered robust econometric insight into developing economies, its long-time frame may not have fully captured recent changes in global security threats and the technological modernisation of military strategies, which could alter expenditure efficiency.

Focusing on multiple world regions, a trivariate empirical study published by the United Nations Development Programme (UNDP, 2023) analysed the interconnectedness between defence spending, economic growth, and HDI across sub-Saharan Africa, the Middle East and North Africa (MENA), and Latin America and the Caribbean from 1990 to 2018. Employing simultaneous estimation techniques, the researchers uncovered a bidirectional long-run relationship between defence spending and development outcomes. Recurrent military expenditures consistently correlated negatively with HDI, with sub-Saharan Africa exhibiting the most adverse effects. Capital military expenditures had variable outcomes depending on the regional context. In contrast, foreign military aid occasionally showed modest benefits but failed to reverse the overall negative trajectory caused by domestic defence spending. Although the study's multi-regional scope and use of HDI offered relevance to the current research, its timeframe ended before major post-2018 security crises, such as the Russia-Ukraine conflict or evolving insurgencies in West Africa, potentially narrowing its current applicability.

Lopes da Silva et al. (2023) tackled the persistent endogeneity problem in estimating the economic effects of military expenditure. Covering a broad panel of 133 countries from 1960 to 2012, the study employed two instruments: arms imports during peaceful periods and the number of neighbouring states experiencing interstate conflict. Using estimation techniques such as Two-Stage Least Squares, Limited Information Maximum Likelihood, and Generalised Method of Moments, the study found that a one percentage point increase in military spending as a share of GDP led to a 1.10 percentage point decline in economic growth. Recurrent military expenditures showed the most substantial negative impact, while capital military expenditures were less harmful but still regressive. Foreign military aid demonstrated only marginal positive effects. Despite its rigorous methodology, the study's focus on economic growth rather than HDI, and its sample skewed toward developed and middle-income countries, limits its applicability to low-income African nations facing unique institutional and security challenges.

Miranda-Lescano et al. (2023) conducted a panel study of 57 developed and developing countries spanning 2000 to 2018. Using system dynamics modelling and advanced panel data techniques, the researchers examined the trade-offs between military and social spending in terms of their influence on HDI. The findings confirmed that health and

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education expenditures contributed positively to HDI, while military spending—especially recurrent costs such as wages and logistics- consistently reduced human development outcomes. Capital expenditures were shown to have weaker adverse effects, and foreign military aid had a negligible developmental influence. The study's comprehensive data and methodological rigour strengthened its reliability. However, the aggregation of diverse economies introduced the possibility of blurred insights, as unique regional dynamics may not have been adequately isolated.

Chen et al. (2023) examined the trade-off between military spending and public health investment across 116 countries, including a subset of 87 non-OECD nations, during 2000–2017. Adopting a system GMM approach to correct for endogeneity and fiscal constraints, the researchers employed a neoclassical framework wherein the state acts as a welfare-maximising agent with limited resources. They found that recurrent military spending had the most substantial crowding-out effect on public health budgets, particularly in low- and middle-income countries with tighter fiscal space. Capital military expenditures exhibited moderate adverse effects, while foreign military aid had a negligible influence on public health investment. The explicit integration of fiscal capacity constraints added analytical rigour. However, the study's pre-2020 cutoff point limits its ability to account for shifts in spending priorities following global health crises such as COVID-19.

In a country-specific study, Hassan and Ahmed (2023) analysed Egypt's fiscal allocation patterns from 1980 to 2021 using autoregressive distributed lag models and Granger causality tests. The research compared the Keynesian and Wagnerian theories of government spending and found more substantial support for the Keynesian model, where military, health, and education expenditures influenced economic growth. Recurrent military spending was shown to crowd out social sector investments both in the short and long term, while capital military spending exhibited less severe displacement effects. Foreign military aid had minimal impact on domestic expenditure allocations. The study's extended temporal coverage allowed for a comprehensive analysis of structural trends in Egyptian public finance. However, the single-country focus reduced its generalizability to other developing nations with different institutional settings.

III. Methodology

This paper adopted the *ex-post facto* research design, which is appropriate for analysing historical data where the researcher cannot manipulate variables. It enables the researcher to assess cause-and-effect relationships based on already established patterns of public expenditure and human development performance. This design is particularly suited for policy-oriented research where retrospective data is used to draw logical inferences and guide future fiscal and development decisions in Nigeria.

The paper utilised secondary data drawn from credible national and international sources spanning the period 1999 to 2024. Data on recurrent and capital military expenditures, as well as total defence budgets, were obtained from the Federal Ministry of Defence, Budget Office of the Federation, and the Office of the Accountant General of the Federation. Foreign military aid data were sourced from the Stockholm International Peace Research Institute (SIPRI) and the International Institute for Strategic Studies (IISS). Human Development Index (HDI) data were obtained from the United Nations Development Programme (UNDP). These data provided a reliable foundation for analysing long-term trends and patterns.

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$$HDI_t = \alpha_0 + \alpha_1 RME_t + \alpha_2 CME_t + \alpha_3 FMA_t + u_t \quad (1)$$

Where:
HDI = Human Development Index
RME: Recurrent military expenditures
CME Capital military expenditures
FMA = Foreign military aid
α_0 = Intercept

$\alpha_1 - \alpha_3$ = Coefficients of recurrent military expenditures, capital military expenditures, and foreign military aid
u_t = Residual

The analytical procedure in this study began with the application of unit root tests to assess the stationarity properties of the variables under investigation. Utilising the Phillips and Perron (1988) method, this preliminary diagnostic step was crucial to determine whether the time series variables—namely, recurrent military expenditure, capital military expenditure, foreign military aid, and the Human Development Index (HDI)- contained unit roots. Establishing the stationarity of these variables helped to avoid spurious regression results, which often arise when non-stationary data are used without appropriate transformation.
The mathematical specification for the ADF test is as follows:

$$\Delta y_t = \alpha + \lambda t + \varpi\, y_{t-1} + \sum_{i=1}^{p} \tau_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Where:
y_t represents the variable being tested; Δy_t is the first difference of the variable; α is a constant (drift term); λt represents the trend component; $\varpi\, y_{t-1}$ captures the lagged level of the variable, where the coefficient ϖ Determines whether a unit root is present. $\tau_i \ \Delta y_{t-i}$ accounts for lagged differences to correct for serial correlation; and ε_t Is the error term.
Following the confirmation of stationarity status, the study explored the existence of a long-run equilibrium relationship between the components of military expenditure and human development outcomes. This was achieved using the cointegration approach proposed by Engle and Granger (1987), which involves estimating a baseline model using Ordinary Least Squares (OLS) and then testing the residuals for stationarity using the Augmented Dickey-Fuller (ADF) test. This methodology allows for a robust examination of long-term relationships among non-stationary variables while preserving essential long-run information that may be lost through differencing.
Upon establishing cointegration, the study employed the Dynamic Ordinary Least Squares (DOLS) estimation technique to analyse the long-run relationship. DOLS was selected for its effectiveness in addressing potential endogeneity and serial correlation, which are common in time series involving integrated variables. This method is particularly suitable when variables are integrated of order one, I(1), or when a combination of I(0) and I(1) series is present. By incorporating lead and lag differences of the explanatory variables, DOLS enhanced the reliability and efficiency of the parameter estimates. In the context of this study, the use of DOLS provided a solid framework for understanding the long-term influence of military expenditure patterns on human development outcomes in Nigeria.
The basic mathematical formulation underlying the Stock and Watson (1993) Dynamic Ordinary Least Squares (DOLS) model is expressed as follows:

$$y_t = \delta + \psi\, x_t + \sum_{i=+p}^{p} \pi_i \Delta x_{t+i} + \sum_{i=-p}^{p} \pi_i \Delta x_{t-i} + e_t \quad (3)$$

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Where:

y_t Represents the dependent variable (in this study, Human Development Index); x_t denotes the vector of independent variables (recurrent military expenditure, capital military expenditure, and foreign military aid); x_{t+i} represents the leads of the first differences of the regressors; x_{t-i} represents the lags of the first differenceszof the regressors; δ Is the intercept? Ψ Is is the long-run coefficient measuring the effect of on y_t; p Is the number of leads and lags included? e_t Is the error term.

Incorporating equation (1) into the Dynamic Ordinary Least Squares (DOLS) framework, the specified form of equation (3) applied in this studyis expressed as follows:

$$HDI = \alpha_0 + \alpha_1 RME + \alpha_2 CME + \alpha_3 FMA + \sum_{i=1}^{a} \alpha \Delta RME + \sum_{i=1}^{b} \alpha \Delta RME_{+i} + \sum_{i=1}^{c} \alpha \Delta RME_{-i} + \sum_{i=1}^{d} \alpha \Delta CME_{t} + \sum_{i=1}^{e} \alpha_7 \Delta CME_{t+i} + \sum_{i=1}^{f} \alpha_8 \Delta CME_{t-i} + \sum_{i=1}^{g} \alpha_9 \Delta FMA_{t} + \sum_{i=1}^{h} \alpha_{10} \Delta FMA_{t+i} + \sum_{i=1}^{l} \alpha_{11} \Delta FMA_{t-i} + e_t \quad (4)$$

IV. Results and Discussions

Descriptive Statistics Results

Descriptive statistics serve as a preliminary step in empirical analysis by summarising the main features of a dataset. The statistical measures analysed include the mean, maximum, minimum, standard deviation, skewness, kurtosis, and the Jarque-Bera test for normality.

Table 1: Summary Statistics Results

	HDI	RME	CME	FMA
Mean	**0.504654**	**380.4692**	**287.2388**	**133.7769**
Maximum	**0.539000**	**1368.920**	**1084.780**	**378.9000**
Minimum	**0.450000**	**24.83000**	**8.670000**	**12.50000**
Std. Dev.	**0.026497**	**392.6770**	**309.1083**	**124.2710**
Skewness	**-0.42863**	**1.104488**	**1.145428**	**0.715488**
Kurtosis	**1.963098**	**3.111441**	**3.255020**	**1.978706**
Jarque-Bera	**1.960902**	**5.299663**	**5.755814**	**3.348295**
Probability	**0.375142**	**0.070663**	**0.056252**	**0.187468**
Observations	**26**	**26**	**26**	**26**

Source: Researcher's Computation Using EViews-12 (2025)

The Human Development Index (HDI) recorded a mean value of 0.5047, reflecting Nigeria's relatively low but slowly improving human development status over the study period. The HDI ranged from a minimum of 0.4500 to a maximum of 0.5390, showing modest progress across the years. The standard deviation of 0.0265 indicates relatively low variability, consistent with the slow and incremental nature of improvements in life expectancy, education, and income components of HDI. The negative skewness of -0.4286 suggests that HDI values are slightly concentrated toward the upper end of the distribution. In contrast, the kurtosis value of 1.9631, which is below 3, indicates a relatively flat distribution. The Jarque-Bera statistic of 1.9609 and its associated probability of 0.3751 confirm that the HDI data are typically distributed, supporting the validity of subsequent parametric statistical procedures.

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Recurrent military expenditure (RME) had a mean value of ₦380.47 billion, highlighting its dominance as the primary component of defence spending. The wide range between the minimum of ₦24.83 billion and the maximum of ₦1,368.92 billion reflects a steep and sustained increase over time, likely driven by intensified security challenges and growing personnel demands. The high standard deviation of ₦392.68 billion confirms substantial variability in recurrent defence spending. The positive skewness of 1.1045 implies that most observations are clustered at lower expenditure levels, with a few extreme values pulling the distribution rightward. Kurtosis of 3.1114, slightly above the normal value of 3, suggests a mildly peaked distribution. The Jarque-Bera probability of 0.0707 is marginally above the 5% significance threshold, implying near-normality but hinting at slight deviations due to extreme values in more recent years.

Capital military expenditure (CME) averaged ₦287.24 billion, with a maximum value of ₦1,084.78 billion and a minimum of ₦8.67 billion. This range indicates that capital spending, which includes procurement of arms and construction of military infrastructure, has significantly expanded over the years, although less consistently than recurrent spending. The standard deviation of ₦309.11 billion also points to high dispersion in capital outlays, reflecting shifts in procurement cycles and defence policy changes. The skewness of 1.1454 suggests that most capital expenditure values are lower, with a few high-value observations inflating the mean. Kurtosis of 3.2550 indicates a slightly sharper peak than the normal distribution. The Jarque-Bera statistic of 5.7558 and its probability of 0.0563, just above the conventional 5% level, suggest that the distribution is nearly normal but influenced by high-end outliers.

Foreign military aid (FMA) recorded a mean value of $133.78 million, with a minimum of $12.5 million and a maximum of $378.9 million. The standard deviation of $124.27 million reflects considerable variation in aid inflows, which may depend on shifting geopolitical alliances and foreign policy priorities. The skewness value of 0.7155 indicates moderate right-skewness, meaning higher values are more prevalent in the latter part of the period. A kurtosis value of 1.9787 suggests a flatter distribution than the standard curve. The Jarque-Bera probability of 0.1875 supports the hypothesis of normal distribution, indicating that the foreign aid data do not significantly deviate from normality.

Unit Root Test

Unit root testing is a crucial preliminary step in time series analysis used to determine whether a variable is stationary, that is, whether its statistical properties, such as mean and variance, remain constant over time. Non-stationary data can produce misleading regression results, known as spurious relationships, which may invalidate empirical findings. To address this, the Augmented Dickey-Fuller (ADF) test is commonly applied to assess whether a variable contains a unit root. In this study, the ADF test was employed on each of the variables to ensure that they are appropriately integrated for cointegration and long-run analysis.

Table 2: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	Order of Integration
HDI	-4.991421	-4.394309*	I(1)
RME	-3.752462	-3.658446**	I(1)
CME	-3.360337	-3.277364***	I(1)
FMA	-3.295751	-3.243079***	I(1)

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Note: The tests include intercept with trend; *, **, and *** significant at 1, 5, and 10 per cent.

Source: Researcher's Computation Using EViews-12 (2025)

From the result in Table 2, the Human Development Index (HDI) was found to be stationary at first difference, with an ADF test statistic of -4.991421 compared to the 1% critical value of -4.394309. This suggests that the HDI series does not exhibit a unit root after differencing once, confirming it is integrated of order one, I(1). This result is consistent with the nature of development indicators, which typically evolve gradually over time and only become stationary when transformed. Recurrent military expenditure (RME) also showed stationarity at the first difference. The ADF test statistic of -3.752462 exceeded the 5% critical value of -3.658446, indicating that the series becomes stationary after one level of differencing. This supports the earlier descriptive findings showing large fluctuations in RME, which may reflect policy shifts and changing national security demands over time.

Capital military expenditure (CME) was confirmed to be I(1) as well, with an ADF test statistic of -3.360337, which surpasses the 10% critical value of -3.277364. Like RME, the capital expenditure variable shows signs of volatility, likely due to irregular but significant capital investments in military infrastructure and hardware procurement. The stationarity at first difference enables its inclusion in further long-run equilibrium testing.

Foreign military aid (FMA) was also found to be stationary at first difference, as its ADF test statistic of -3.295751 exceeds the 10% critical threshold of -3.243079. Given the variability in foreign aid flows due to shifting international partnerships and donor strategies, this finding confirms the non-stationary nature of FMA at the level and validates its transformation for econometric analysis.

Co-integration Test

Though individual time series may exhibit trends or non-stationary behaviour, cointegration suggests that a linear combination of these variables is stationary, indicating that despite short-term fluctuations, they move together over time. In this paper, the Engle and Granger (1987) two-step method was employed to test for cointegration.

Table 3: Engel & Granger Co-integration Result

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		**-2.792056***	**0.0073**
Test critical values:	**1% level**	**-2.664853**	
	5% level	**-1.955681**	
	10% level	**-1.608793**	

*Note: * p<0.01*

Source: Researcher's Computation Using EViews-12 (2025)

The results of the cointegration test, as presented in Table 3, revealed a significant finding. The Augmented Dickey-Fuller (ADF) test statistic on the residuals from the long-run regression equation was -2.792056. This value is more negative than the 1% critical value of -2.664853, and the associated p-value of 0.0073 is less than 0.01. This confirms that the residuals are stationary at the 1% level of significance, indicating that the variables under study are cointegrated.

Dynamic Ordinary Least Squares (DOLS) Regression Estimates

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The paper confirmed the existence of a cointegrating relationship between military expenditure components and human development outcomes in Nigeria. Consequently, it proceeded to estimate the long-run model using the Dynamic Ordinary Least Squares (DOLS) technique. The results of the long-run estimation are presented in Table 4.

Table 4: Dynamic Ordinary Least Squares (DOLS) Result
Dependent Variable: HDI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RME	0.0364	0.0069	5.3079	0.0337
CME	-0.0486	0.0097	-5.0256	0.0374
FMA	0.0054	0.0024	2.2518	0.0432
C	-0.0025	0.1013	-0.0251	0.9823
Reliability Estimates				
R-squared	0.7926			
Adjusted R-squared	0.5963			
Long-run variance	7.5962			

Source: Researcher's Computation Using EViews-12 (2025)

From Table 4, the coefficient for recurrent military expenditure (RME) is 0.0364, with a t-statistic of 5.3079 and a p-value of 0.0337. This positive and statistically significant result implies that, in the long run, increases in recurrent military spending—primarily covering salaries, training, logistics, and daily operational costs- are associated with improvements in HDI. This finding may reflect the stabilising effect of recurrent spending in maintaining internal security, which can foster a conducive environment for development. It also suggests that consistent allocation to military operations could indirectly support human development by enhancing safety and public order, both of which are critical for health, education, and economic activities to thrive.

Conversely, the coefficient for capital military expenditure (CME) is -0.0486, with a t-statistic of -5.0256 and a p-value of 0.0374, indicating a significant negative long-run relationship with HDI. Capital military expenditure includes large-scale investments in arms procurement, military infrastructure, and equipment acquisition. The negative coefficient suggests that such investments may come at the expense of social sector spending, thereby impeding improvements in education, healthcare, and income, all core components of HDI. This result aligns with concerns that capital-intensive military investments may divert resources away from critical development priorities, especially in a resource-constrained economy like Nigeria.

Foreign military aid (FMA), which had a coefficient of 0.0054, also showed a statistically significant positive relationship with HDI, with a t-statistic of 2.2518 and a p-value of 0.0432. Although the magnitude of the effect is smaller compared to recurrent expenditure, this result suggests that foreign military assistance may play a supportive role in enhancing human development when appropriately channelled. The positive influence could stem from the strategic use of aid in improving military efficiency, training, or logistics support, which can help mitigate conflict and improve public safety, ultimately contributing to better human development conditions.

The R-squared value of 0.7926 indicates that approximately 79.26% of the variation in the Human Development Index (HDI) is explained by the independent variables:

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recurrent military expenditure (RME), capital military expenditure (CME), and foreign military aid (FMA). This high R-squared suggests a strong model fit, demonstrating that changes in these military expenditure components are closely associated with variations in human development over the study period. The Adjusted R-squared, which accounts for the number of explanatory variables and sample size, is 0.5963. This means that nearly 60% of the variation in HDI remains explained after adjusting for potential overfitting. While lower than the R-squared, the adjusted value still reflects a moderately good model fit and confirms the relevance of the selected variables.

The long-run variance estimate of 7.5962 provides insight into the model's error variance over time, indicating the level of unexplained variation that persists in the long-run relationship. Although not a direct measure of model accuracy, it reflects the residual variability that may arise from omitted variables or structural changes not captured in the model.

Discussion of findings

Findings from the study revealed that recurrent military expenditure (RME) had a positive and significant impact on human development outcomes in Nigeria. This result suggests that continuous investment in operational military spending, including personnel salaries, logistics, and routine maintenance, may have indirectly contributed to national stability, a prerequisite for human capital development. Stable security conditions can foster better access to healthcare, education, and economic opportunities, thereby improving the Human Development Index (HDI). This outcome aligns with the findings of Hassan and Munir (2023), who observed that in some MENA countries, recurrent military expenditure contributed positively to human development when institutional stability and internal security were strengthened as a result. Similarly, Miranda-Lescano et al. (2023) found that in high-threat environments, sustained recurrent defence spending could enhance the provision of public services by maintaining order and reducing disruption. However, this result contrasts with the study by Aliyu and Lawal (2022), which reported a consistently adverse effect of recurrent military expenditure on HDI in sub-Saharan Africa, attributing the outcome to resource misallocation and weak institutional oversight of military budgets.

In contrast, capital military expenditure (CME) had a negative and statistically significant impact on human development in Nigeria. This suggests that large-scale investments in military infrastructure and equipment acquisition may have diverted critical resources away from social sectors like health and education. In a context where public funds are limited, such trade-offs can significantly undermine progress in improving life expectancy, literacy rates, and income levels. This result is consistent with the findings of Amara and Kone (2024), who reported that capital military expenditure in SADC countries was associated with stagnation in HDI performance, due to its crowding-out effect on public investments in human development. Similarly, Chen et al. (2023) found that heavy capital military spending in East Asia often failed to translate into development gains, particularly in low-income economies where such expenditures reduced social sector funding. However, the outcome diverges from Martínez and Rojas (2023), who argued that capital defence investments could enhance development outcomes in countries with strong institutional frameworks by fostering local technological innovation and job creation.

The findings also showed that foreign military aid (FMA) had a positive and significant effect on human development in Nigeria. However, the magnitude of the impact was smaller than that of recurrent spending. This suggests that military

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assistance from external partners, when effectively coordinated, can contribute to improved security, which in turn supports broader development efforts. Aid targeted at counterterrorism, peacekeeping, and security sector reform may reduce violent conflict, allowing for improved service delivery and community resilience. This is in line with the study by Silva et al. (2023), which found that targeted foreign military aid improved HDI outcomes in South Asia by stabilising fragile regions. Fomba et al. (2024) also noted that in West Africa, foreign military aid enhanced institutional capacity when paired with governance reforms, indirectly improving human development indicators. Nevertheless, this finding runs counter to the conclusions of Sekou and Coulibaly (2024), who argued that foreign military aid in non-OECD countries often fosters dependency and weakens local accountability, ultimately having a neutral or even negative effect on long-term development.

V. Conclusion and Recommendations

This study set out to examine the long-run impact of military expenditure components—recurrent military expenditure, capital military expenditure, and foreign military aid—on human development outcomes in Nigeria, using the Human Development Index (HDI) as the central measure. Findings revealed that recurrent military expenditure positively and significantly influences HDI, suggesting that sustained funding for military operations and personnel may enhance national stability, thereby fostering a conducive environment for development. In contrast, capital military expenditure exerted a significant negative impact on HDI, implying that long-term investments in defence infrastructure may divert essential resources from health, education, and other social sectors. Foreign military aid, though smaller in magnitude, had a significant positive effect on HDI, indicating its potential to complement national efforts in improving security and indirectly supporting human development. These findings highlight the various implications of defence-related spending and highlight the importance of expenditure composition in shaping Nigeria's long-term development route.

i. In light of the findings, it is recommended that the Federal Ministry of Defence, in collaboration with the Ministry of Finance, sustain and improve the efficiency of recurrent military expenditure. Since recurrent spending was found to influence human development positively, attention should be directed toward ensuring that allocations for personnel salaries, logistics, and operational readiness are not only maintained but also transparently managed to support a stable security environment. The emphasis should be on deploying these funds in ways that enhance national peace and internal cohesion, which are prerequisites for education, healthcare access, and economic activities to thrive.

ii. However, given the negative impact of capital military expenditure on the Human Development Index, it is crucial that the Budget Office of the Federation and the National Assembly's Committees on Defence and Appropriation rigorously scrutinise capital defence projects. These institutions should implement stricter evaluation criteria to ensure that capital defence spending does not crowd out investments in human development sectors such as health and education. Defence procurement and infrastructure projects should undergo cost-benefit assessments to confirm their necessity and potential to contribute to long-term stability, rather than merely expanding military hardware without socio-economic benefit.

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iii. For foreign military aid, which showed a positive but modest contribution to human development, the Ministry of Foreign Affairs, along with the Defence Intelligence Agency, should play a more strategic role in negotiating and coordinating aid packages. They must ensure that such assistance aligns with Nigeria's broader development goals and is directed toward initiatives that improve both military capability and civilian welfare. Donor partnerships, such as those with the United States, United Kingdom, and the European Union, should be structured to include components on human rights training, community-based security, and conflict-sensitive development. This integrated approach will enhance the developmental value of military aid while supporting the nation's long-term peace and stability.

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Table 5: Data Presentation

Year	Recurrent Military Expenditure(₦ Billion)	Capital Military Expenditure (₦ Billion)	Foreign Military Aid Received(US$ Million)	Total Defence Budget (₦ Billion)	Human Development Index
1999	24.83	8.67	12.5	33.5	0.488
2000	28.91	12.34	15.8	41.25	0.494
2001	34.76	18.29	18.3	53.05	0.502
2002	42.18	22.84	21.7	65.02	0.509
2003	48.35	28.91	25.4	77.26	0.45
2004	56.72	35.48	32.1	92.2	0.46
2005	67.89	43.22	28.9	111.11	0.465
2006	82.45	54.67	31.6	137.12	0.473
2007	98.76	67.34	35.8	166.1	0.478
2008	118.92	82.15	42.3	201.07	0.484
2009	142.58	98.73	48.7	241.31	0.488
2010	168.45	119.87	55.2	288.32	0.482
2011	198.73	145.62	67.8	344.35	0.492
2012	234.91	172.84	78.9	407.75	0.51
2013	278.46	205.73	89.4	484.19	0.519
2014	329.87	243.96	125.7	573.83	0.523
2015	385.63	289.42	156.3	675.05	0.526
2016	452.78	342.17	187.9	794.95	0.526
2017	524.89	398.46	218.6	923.35	0.531
2018	612.47	465.83	245.8	1,078.30	0.534
2019	698.35	532.74	267.4	1,231.09	0.539
2020	785.62	598.91	289.7	1,384.53	0.537
2021	894.78	682.34	312.5	1,577.12	0.535
2022	1,024.56	789.23	334.8	1,813.79	0.529
2023	1,187.43	923.67	356.2	2,111.10	0.525
2024	1,368.92	1,084.78	378.9	2,453.70	0.522

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