Impact of Deficit Financing on Power Infrastructural Development in Nigeria

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ABSTRACT

This paper examined the impact of deficit financing on power infrastructural development in Nigeria, against the backdrop of persistent electricity access challenges despite various government reforms, investment programmes, and policy interventions aimed at improving the power sector. Specifically, the paper examined the impact of external debt stock, domestic debt stock, and budget deficit on access to electricity in Nigeria. Ex-post facto research design was adopted; while the empirical analysis was carried out using the Fully Modified Ordinary Least Squares (FMOLS). The results showed that external debt stock had a positive and statistically significant impact on access to electricity, indicating that external borrowing contributed to improvements in power infrastructure. Budget deficit also exerted a positive and significant impact on access to electricity, suggesting that deficit-financed public expenditure supported electricity infrastructure expansion. However, domestic debt stock had a negative but statistically insignificant impact on access to electricity, implying that domestic borrowing has not significantly contributed to improving electricity access during the paper period. It therefore recommended that the Federal Ministry of Finance and the Debt Management Office should prioritise concessionary external borrowing for electricity infrastructure projects, the Budget Office of the Federation should ensure that deficit-financed expenditure was increasingly allocated to productive power-sector investments, and the Central Bank of Nigeria and the Debt Management Office should promote long-term domestic infrastructure financing instruments dedicated to electricity generation, transmission, and distribution projects.

Keywords: Deficit financing, External debt stock, Domestic debt stock, Budget deficit, Power infrastructural development

INTRODUCTION

Power infrastructure development represents a fundamental pillar of economic growth and social development globally, serving as the backbone for industrialization, technological advancement, and improved quality of life. Advanced economies have achieved near-universal electricity access through comprehensive infrastructure development programs that incorporate diverse energy sources, smart grid technologies, and robust regulatory frameworks (Benayed et al., 2025). The global power sector has witnessed transformative changes in recent years, characterized by increasing integration of renewable energy sources, digitalization of grid systems, and enhanced cross-border electricity trade, which collectively contribute to more resilient and sustainable power systems (Kushawaha & Jain, 2024). These developments have been facilitated by substantial capital investments, technological innovations, and supportive policy environments that prioritize energy security and sustainability as key components of national development strategies (Ezie et al., 2025).

In Sub-Saharan Africa, however, the narrative of power infrastructure development shows a stark contrast to global trends, as the region continues to grapple with significant electricity access deficits that constrain economic development and perpetuate poverty cycles. The African Development Bank (2024) reports that Sub-Saharan Africa accounts for approximately 75% of the global population without access to electricity, with an estimated 600 million people living without reliable power supply. Regional power infrastructure is characterized by inadequate generation capacity, aging transmission networks, high technical and commercial losses, and limited rural electrification coverage (Auteri et al., 2025).

Nigeria's power infrastructure development pattern captures the challenges facing Africa's largest economy, where despite abundant energy resources and economic potential, electricity access and reliability remain persistently problematic. insufficient considering the growing population and expanding economic activities (World Bank, 2025). The Nigerian power sector has undergone significant reforms, most notably the 2013 privatization of generation and distribution companies, which aimed to attract private capital and improve operational efficiency, though implementation challenges have limited the expected outcomes (Haruna et al., 2024). Analysis of the data reveals that electricity access experienced fluctuations and relatively slow growth during the 1990s and early 2000s, with access rates hovering between 27.30% in 1990 and 50.3% in 2008, before showing more consistent improvement in recent years, reaching 61.2% in 2023 and 62.5% in 2025. These improvements notwithstanding, Nigeria's power infrastructure continues to suffer from chronic underinvestment, manifested in frequent grid collapses, estimated aggregate technical and commercial losses exceeding 40%, and widespread reliance on expensive and polluting diesel generators by households and businesses (World Bank, 2024). The power sector's challenges are compounded by issues of tariff inadequacy, regulatory uncertainty, gas supply constraints to thermal plants, and transmission network bottlenecks that collectively undermine the financial viability of electricity companies and discourage further investment (Obomeghie & Ojutomori, 2025).

Globally, deficit financing has emerged as a critical fiscal instrument employed by governments to bridge the gap between public expenditure requirements and revenue generation, particularly for infrastructure development that demands substantial upfront capital investments with long-term return horizons. Advanced economies have historically utilized deficit financing strategically to fund transformative infrastructure projects, with countries like the United States, United Kingdom, and Japan running substantial fiscal deficits during critical development phases while maintaining sustainable debt trajectories through robust economic growth and credible fiscal frameworks (Tajudeen & Gold, 2025).

In Nigeria's context, deficit financing has been a persistent feature of fiscal management, reflecting the structural imbalance between government revenues heavily dependent on volatile oil prices and expanding expenditure commitments across various sectors including infrastructure, security, education, and healthcare. Nigeria’s budget deficit as a percentage of GDP fluctuated significantly over the review period, moving from a rare surplus of 0.78% in 1996 to severe deficits such as -8.57% in 1993 and -5.28% in 2023. In recent years, the deficit trend has remained high, with -4.61% in 2022, -5.28% in 2023, and -3.88% in 2024. This suggests persistent fiscal imbalance and rising dependence on deficit financing to support government expenditure.

External debt stock also showed major shifts. It rose to 83.55% of GDP in 2001 but fell sharply to 2.41% in 2006 following the Paris Club debt relief. This debt relief created fiscal space and marked a major reset in Nigeria’s debt profile. However, from 2015 onward, Nigeria returned increasingly to external borrowing through Eurobonds, multilateral loans, bilateral loans, and infrastructure related financing. By 2024, external debt had risen to 43.11% of GDP, raising concerns about exchange rate risk, foreign currency debt servicing, and fiscal vulnerability. Domestic debt followed a different pattern. It declined from 23.04% of GDP in 1994 to 5.77% in 2006, before rising steadily to 19.13% in 2025 (Tajudeen & Gold, 2025). This reflects Nigeria’s growing reliance on local borrowing through treasury bills, bonds, pension funds, banks, and other domestic sources. While domestic debt reduces exchange rate exposure and supports local capital market development, it may crowd out private sector credit, raise interest rates, and limit lending to productive sectors such as power infrastructure.

The relationship between deficit financing and power infrastructure development embodies composite dynamics involving resource mobilization, allocation efficiency, macroeconomic stability, and institutional effectiveness in translating financial resources into physical infrastructure assets. Theoretical frameworks suggest that deficit financing can accelerate infrastructure development by relaxing immediate budget constraints, enabling governments to undertake capital-intensive projects with long gestation periods that might otherwise be impossible within balanced budget constraints (Obomeghie & Ojutomori, 2025). This is particularly relevant for power infrastructure which requires massive upfront investments in generation plants, transmission networks, and distribution systems, but generates returns over extended periods through improved productive capacity, industrial development, and enhanced quality of life.

Therefore, given that deficit financing constitutes an important fiscal mechanism through which governments mobilize additional resources beyond current revenue to fund capital expenditure and close infrastructure gaps, it is imperative to examine how its key components, have influenced power infrastructural development in Nigeria.

The paper raised and addressed the following pertinent questions:

- What impact does external debt stock has on power infrastructural development in Nigeria?
- What is the impact of domestic debt stock on power infrastructural development in Nigeria?
- How has budget deficit influenced power infrastructural development in Nigeria?

LITERATURE REVIEW

Conceptual Clarifications

Power Infrastructural Development

Power infrastructural development constituted a multidimensional concept encompassing the establishment, expansion, and enhancement of electricity generation, transmission, and distribution systems necessary for reliable and sustainable energy supply to support economic activities and social welfare. Okoro and Chikuni (2024) conceptualized power infrastructural development as the comprehensive process of building and upgrading physical assets, institutional frameworks, and technological capabilities required for efficient electricity production, transmission, and delivery to end-users across residential, commercial, and industrial sectors. Similarly, Adenuga et al. (2023) defined power infrastructural development as the systematic investment in energy infrastructure including generation plants, transmission networks, distribution systems, and supporting facilities aimed at increasing electricity supply capacity, improving service reliability, and expanding access to underserved populations. Musa and Ibrahim (2025) characterized power infrastructural development as encompassing both the quantitative expansion of electricity infrastructure and qualitative improvements in service delivery, system efficiency, and technological sophistication necessary for meeting growing energy demands and supporting economic transformation.

Access to electricity, as the operational measure of power infrastructural development, was defined by Nwokocha and Iloeje (2024) as the proportion of population with household connections to electricity grid systems or reliable off-grid solutions capable of providing minimum threshold power supply for basic lighting, communication, and productive activities. Ezema and Ogujiuba (2025) conceptualized access to electricity as representing both physical availability of electrical infrastructure within proximity of households and communities, and the actual utilization of electricity services reflecting affordability, reliability, and quality dimensions beyond mere connection availability. Adewuyi and Awodumi (2023) defined electricity access as a multidimensional indicator capturing not only the percentage of population with electrical connections but also the adequacy, reliability, and affordability of power supply, distinguishing between nominal access through grid connectivity and effective access ensuring consistent service delivery.

The conceptualization by Ajayi and Olutola (2024) emphasized that electricity access represented both an infrastructure development outcome and a developmental enabler, serving as prerequisite for industrialization, technological advancement, and achievement of broader sustainable development goals. Ogundipe et al. (2025) defined access to electricity as the primary indicator of power sector performance and infrastructure adequacy, measured through household electrification rates, grid connectivity statistics, and per capita electricity consumption patterns that collectively reflected the effectiveness of power infrastructure investments and policy interventions. Usman and Abbasoglu (2023) conceptualized electricity access as encompassing multiple dimensions including availability of physical connections, affordability of electricity tariffs, reliability of supply measured through outage frequency and duration, and quality of service reflected in voltage stability and power factor consistency.

For this paper, power infrastructural development was operationally defined as the progressive enhancement of electricity sector assets, systems, and capabilities to expand energy service delivery, measured through

access to electricity representing the percentage of population with connections to electrical power supply systems, reflecting the tangible outcome of infrastructure investments, policy interventions, and sector reforms in translating physical infrastructure into accessible energy services for economic productivity and social development.

Deficit Financing

Deficit financing represented a critical fiscal instrument through which governments bridged the gap between public expenditure requirements and revenue generation capacity, particularly in developing economies where infrastructure needs exceeded available resources. Okonkwo and Eze (2024) conceptualized deficit financing as the deliberate creation of budgetary imbalances whereby government spending surpassed current revenues, necessitating resource mobilization through borrowing from domestic and external sources or monetary expansion. Similarly, Adeyemi et al. (2023) defined deficit financing as a fiscal policy strategy employed by governments to fund developmental projects and recurrent expenditures by utilizing debt instruments when tax revenues and other income sources proved insufficient to meet budgetary obligations. Mahmoud and Ibrahim (2025) characterized deficit financing as encompassing all mechanisms through which governments financed expenditure gaps, including external borrowing from international financial institutions and foreign creditors, domestic borrowing from local financial markets through various debt instruments, and budget deficits representing the actual fiscal shortfall requiring financing. The conceptualization by Ogundipe and Aworinde (2024) emphasized that deficit financing reflected both a symptom of fiscal imbalance and a strategic choice for accelerating development, particularly in capital-intensive sectors requiring substantial upfront investments with long-term return horizons.

External debt stock, as a component of deficit financing, was conceptualized by Nwankwo et al. (2024) as the total outstanding financial obligations owed by a government to foreign creditors, including multilateral institutions, bilateral partners, commercial banks, and international bondholders, typically denominated in foreign currencies and subject to international legal frameworks. Okafor and Chukwu (2025) defined external debt stock as accumulated borrowings from non-resident creditors that generated future repayment obligations in foreign exchange, creating both opportunities for capital mobilization and risks associated with currency fluctuations and external payment pressures. Domestic debt stock was defined by Aliyu and Mohammed (2023) as government borrowing from residents through financial instruments such as treasury bills, bonds, and development stocks issued in local currency and traded within domestic capital markets. Usman and Yakubu (2026) conceptualized domestic debt stock as internal government obligations to domestic creditors including commercial banks, pension funds, insurance companies, and individual investors, representing claims on future government revenues without foreign exchange implications. Budget deficit was characterized by Emenike and Alisi (2024) as the excess of total government expenditure over total revenue within a fiscal period, serving as the fundamental fiscal imbalance measure that necessitated deficit financing through borrowing or asset drawdown.

For this paper, deficit financing was operationally defined as government's utilization of debt instruments and fiscal imbalances to fund expenditures exceeding current revenues, measured through external debt stock representing foreign currency obligations to non-resident creditors, domestic debt stock capturing local currency borrowings from resident creditors, and budget deficit indicating the annual fiscal gap requiring financing, all examined as determinants of power infrastructure development outcomes.

THEORETICAL REVIEW

The theoretical underpinning for this paper was Keynes's Theory of Public Expenditure as advanced by the Keynesian school of thought. The Keynesian theory of public expenditure maintained that government spending constituted an important instrument for stimulating aggregate demand, correcting market imperfections, and supporting economic development, particularly in situations where private investment remained inadequate. In The General Theory of Employment, Interest and Money, Keynes (1936) argued that the economy could settle below full employment equilibrium, thereby making deliberate government intervention necessary through increased public expenditure, even where such spending required deficit financing. The Keynesian school of thought therefore believed that borrowing and fiscal deficits could serve

as legitimate policy tools for financing productive investments capable of expanding output, employment, and welfare. In this regard, scholars such as Musgrave and Musgrave (1989) explained that deficit financing could be justified where government expenditure was directed toward capital projects with long-term social and economic returns. Applied to the present study, the theory suggested that external debt stock, domestic debt stock, and budget deficit could provide the fiscal means through which government financed power infrastructure and, by extension, improved access to electricity. The relevance of this theory to the paper lay in its explanation of how deficit financing could enlarge the resource base available for strategic infrastructural development in an economy with pressing electricity deficits such as Nigeria. However, critics remained unconvinced by the Keynesian confidence in deficit-financed expenditure. Buchanan and Wagner (1977) argued that persistent reliance on fiscal deficits weakened budgetary discipline and encouraged excessive government borrowing, while Barro (1974) contended that deficit spending might not always generate the expected expansionary effects if economic agents anticipated future tax burdens. These criticisms broadened the debate and suggested that although Keynesian theory provided a useful foundation for linking deficit financing with power infrastructural development, the actual relationship required empirical verification.

Empirical Review

Deficit financing had remained a major fiscal instrument through which governments attempted to address infrastructure gaps, especially in developing economies where internally generated revenue was often insufficient to finance capital projects. In relation to power infrastructural development, recent empirical studies had assessed deficit financing through proxies such as fiscal deficit, external debt, domestic debt, public debt, debt servicing and debt burden, while infrastructure outcomes had been captured through access to electricity, capital expenditure, public infrastructure investment and energy poverty indicators.

Tajudeen and Gold (2025) examined the relationship between fiscal deficit, economic infrastructure and social infrastructure in Nigeria, covering the period 1986 to 2021. The paper employed annual time series data and used the Autoregressive Distributed Lag (ARDL) model to estimate both short run and long run relationships. Fiscal deficit was captured as overall fiscal deficit, while infrastructural development was proxied with access to electricity, computer and communication services, air transport passenger traffic, air transport freight, education expenditure and health expenditure. The findings showed that access to electricity was an important economic infrastructure variable, although its short run effect on fiscal deficit was negative and not statistically significant. In the long run, electricity-related infrastructure was found to increase the fiscal deficit, suggesting that power infrastructure investment exerted pressure on public finance when it was not matched with sustainable revenue expansion. However, the paper treated fiscal deficit largely as the dependent variable, which limited its direct usefulness for explaining how deficit financing caused power infrastructure development. It also combined electricity with transport, education and health, thereby reducing the sector-specific depth required for power infrastructure analysis.

Obomeghie and Ojutomori (2025) investigated the nexus between Nigeria's infrastructural deficit and external borrowing using data from 2003 to 2024. The paper adopted a Threshold Autoregressive (TAR) technique and sourced data from the Central Bank of Nigeria Statistical Bulletin and World Bank Development Indicators. External borrowing was used as the major proxy for deficit financing, while infrastructural deficit captured broad infrastructure shortfalls, including inadequate power supply, poor transportation networks and limited access to water and sanitation. The findings revealed that external debt significantly influenced Nigeria's infrastructure deficit, with a critical threshold of 46.669 percent of GDP. Below the threshold, external debt had a coefficient of 12.971, while above the threshold the coefficient increased to 23.6699, indicating that the effect of external borrowing intensified when debt exceeded the identified threshold. The paper was useful because it recognised power supply as a central component of Nigeria's infrastructure deficit. However, it used a broad infrastructural deficit measure rather than a direct power infrastructure proxy such as electricity generation, transmission capacity or access to electricity, making the result less specific to the power sector.

Kushawaha and Jain (2025) examined the effect of public debt on renewable energy investment in 71 developing countries over the period 2000 to 2020. The paper used Driscoll Kraay standard errors, Instrumental Variable Generalized Method of Moments and quantile regression to account for cross sectional dependence, endogeneity and distributional differences. Public debt served as the major proxy for deficit

financing, while public investment in renewable energy was used as the power infrastructure related outcome. The findings revealed an inverted U-shaped relationship, showing that public debt supported renewable energy investment up to a sustainable level, but excessive public debt weakened further investment. The result implied that moderate borrowing could finance energy infrastructure, whereas debt accumulation beyond manageable limits crowded out power sector investment. However, the paper focused on renewable energy investment rather than broader electricity infrastructure such as transmission networks, distribution capacity and grid reliability, which limited its direct application to total power infrastructure development.

Benayed et al. (2025) investigated the relationship between public debt and energy poverty in 27 Sub Saharan African countries, covering the period 2010 to 2021. The paper employed a panel threshold model, with dynamic panel threshold estimation used for robustness. Public debt and external public debt represented the deficit financing indicators, while energy poverty was proxied through access to clean cooking fuels and electricity related energy access indicators. The findings showed that public debt reduced energy poverty only when countries had achieved a minimum level of economic development and institutional quality. This meant that borrowing improved power infrastructure outcomes only where government capacity, income conditions and institutional arrangements supported efficient resource allocation. The paper also found that weak institutions and inequality reduced the ability of public debt to improve energy access. Although the paper captured electricity access and energy poverty, it did not measure physical power infrastructure directly through generation capacity, transmission lines or distribution investment.

Haruna et al. (2024) analysed the impact of public debt on infrastructural development in Nigeria from 1990 to 2023. The paper used the ARDL model and measured deficit financing through external debt, domestic debt and debt servicing, while infrastructural development was proxied by capital expenditure. The results revealed that external debt had a positive but statistically insignificant relationship with capital expenditure, implying that increases in external borrowing were associated with higher infrastructure spending, although the effect was not strong enough to be statistically relied upon. Domestic debt also had a positive but insignificant effect, suggesting that locally sourced borrowing contributed weakly to capital spending. Debt servicing had a negative and insignificant effect on capital expenditure, showing that repayment obligations reduced the fiscal space available for infrastructure financing. The paper was relevant because capital expenditure covered major infrastructure sectors, including energy and public facilities. However, the use of aggregate capital expenditure made it difficult to isolate the specific effect of deficit financing on power infrastructure, since spending on roads, water, buildings and other capital projects was combined with energy-related allocations.

Onyekachi-Onyele et al. (2024) studied the effect of debt burden on public infrastructure investment in Nigeria using annual data from 1981 to 2022. The paper adopted the ARDL model and measured debt burden through external debt as a percentage of GDP, domestic debt as a percentage of GDP and debt service as a percentage of government revenue, while public infrastructure investment served as the dependent variable. The findings revealed that external debt and domestic debt had positive long run effects on public infrastructure investment, suggesting that borrowed funds could support infrastructure expansion when channelled to productive capital projects. Conversely, debt service and exchange rate fluctuations had negative and statistically significant effects on public infrastructure investment, indicating that high repayment obligations and currency instability weakened the capacity of government to finance infrastructure. The paper was strong in its disaggregation of debt burden into external debt, domestic debt and debt service. However, it treated infrastructure investment in aggregate terms and did not separate power infrastructure from other public investment categories, thereby limiting its ability to explain electricity generation, transmission and distribution outcomes specifically.

Kushawaha and Jain (2024) assessed the role of debt financing in renewable energy capacity across 12 developing countries from 2000 to 2020. The paper adopted the Driscoll Kraay approach and measured deficit financing through debt financing, while renewable energy capacity served as the dependent variable for power infrastructural development. Other variables included financial market development, trade openness, GDP per capita, population size and political stability. The findings showed a U shaped relationship between debt financing and renewable energy capacity, indicating that debt initially constrained renewable energy deployment but later promoted renewable energy expansion after a certain level of financial development had been reached. This suggested that borrowing could become productive for power infrastructure when supported by stable financial markets and sound macroeconomic conditions. The paper was relevant because

renewable energy capacity directly reflected power generation infrastructure. However, its sample was limited to only 12 developing countries and did not separate the effects of domestic debt, external debt and debt servicing.

Auteri et al. (2024) explored the link between government debt and renewable energy consumption in G7 countries from 1990 to 2021. The paper employed Fully Modified Ordinary Least Squares, Dynamic Ordinary Least Squares, quantile regression and panel causality tests. Government debt was used as the major fiscal and deficit financing variable, while renewable energy consumption served as the energy infrastructure related outcome. The findings revealed bidirectional causality between government debt and renewable energy consumption, implying that debt conditions influenced renewable energy use, while renewable energy expansion also affected fiscal dynamics. The result suggested that rising government debt could restrict fiscal resources for renewable energy infrastructure, but well-planned renewable energy expansion could improve long run fiscal sustainability through lower dependence on fossil energy systems. The paper was useful because it focused on advanced economies with stronger energy institutions. However, its G7 scope made the findings less transferable to developing economies where power sector financing, debt sustainability and institutional quality differed substantially.

Okere et al. (2023) assessed whether public debt mattered for energy poverty in Sub-Saharan Africa. The paper developed a composite energy poverty index using principal component analysis and estimated the model with Instrumental Variable Generalized Method of Moments (IV-GMM). Public debt served as the key deficit financing variable, while energy-related outcomes included national electricity access, urban electrification, rural electrification, access to clean cooking fuels, renewable energy utilisation and renewable energy output. The results showed that public debt had a positive and significant linear effect on national electricity access, urban electrification, rural electrification and clean cooking access, implying that borrowing could improve household and national energy access when properly deployed. However, public debt reduced renewable energy production and utilisation, suggesting that debt-financed energy expansion did not automatically translate into sustainable power infrastructure. Although the paper provided strong regional evidence on electricity access and public debt, its Sub-Saharan African panel design meant that Nigeria-specific institutional, fiscal and power sector conditions were not fully isolated.

Onuoha et al. (2023) examined governance quality, public debt and renewable energy consumption in Sub Saharan Africa. The paper covered the period 1996 to 2020 and employed Feasible Generalized Least Squares. Public debt was used as the deficit financing proxy, while renewable energy consumption represented the energy infrastructure and transition outcome. The findings showed that public debt had a positive effect on renewable energy consumption, suggesting that debt resources could support renewable energy deployment when directed toward productive energy projects.

However, the interaction between governance quality and public debt impeded renewable energy consumption, meaning that the effectiveness of debt financed energy development depended strongly on how institutions managed borrowed resources. The paper contributed to the discussion by linking fiscal borrowing with renewable energy transition in a regional African context. Nevertheless, it used renewable energy consumption rather than installed power capacity or electricity access, and it did not disaggregate public debt into domestic debt, external debt and debt service burden.

MATERIALS AND METHODS

This paper adopted the ex-post facto research design because it relied on already existing macroeconomic time-series data. The design was considered appropriate since the variables under investigation had already occurred and could not be manipulated by the researcher. The ex-post facto design was therefore suitable for analysing cause-and-effect tendencies in a non-experimental setting, especially where policy-related and fiscal variables were involved. It also enabled the paper to draw empirical inferences from secondary data objectively and systematically.

The data used are quantitative in nature and were specifically selected to capture both the explanatory and outcome variables relevant to this paper. Data on external debt stock and domestic debt stock were sourced

from the Debt Management Office and the Central Bank of Nigeria Statistical Bulletin. Data on budget deficit were obtained from the Central Bank of Nigeria and complemented with fiscal publications from the Budget Office. Data on power infrastructural development, proxied by access to electricity as a percentage of the population, were sourced from the World Bank's World Development Indicators.

Anchored on Keynes's Theory of Public Expenditure, this paper adapted and modified the model specification employed by Haruna et al. (2024), who examined the impact of public debt on infrastructural development in Nigeria. In line with the objective of the present study, the model was adjusted to reflect the relationship between deficit financing and power infrastructural development in Nigeria, using external debt stock, domestic debt stock, and budget deficit as the explanatory variables, and access to electricity as the proxy for power infrastructural development. The functional model for the paper was therefore specified as follows:

$$ATE_t = \alpha_0 + \alpha_1 EDS_t + \alpha_2 DDS_t + \alpha_3 BDGR_t + e_t \quad (1)$$

Where:

ATE is Access to electricity

EDS is External Debt Stock

DDS is Domestic Debt Stock

BDGR is Budget Deficit to GDP Ratio

α_0 = Intercept

$\alpha_1 - \alpha_3$ = Coefficients of deficit financing

e_t = error term.

The empirical analysis began with a unit root test as a preliminary diagnostic procedure to determine the stationarity properties of the time series variables included in the paper. This step followed the Phillips and Perron (1988) methodology and was necessary to ascertain whether the variables contained stochastic trends that could require differencing before meaningful estimation. Carrying out this test was important because non-stationary data could produce misleading regression outcomes and unreliable statistical inferences. Unlike some alternative unit root procedures, the Phillips-Perron test corrected for serial correlation and heteroskedasticity in the disturbance term through non-parametric adjustments rather than by introducing additional lagged difference terms into the regression. In this paper, the test was therefore applied to establish the order of integration of external debt stock, domestic debt stock, budget deficit, and access to electricity before proceeding to further econometric estimation. The Phillips-Perron regression equation was expressed as:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \varepsilon_t \quad (2)$$

Where Y_t represented the variable under consideration, α denoted the intercept, βt captured the deterministic time trend, γ measured the presence of a unit root, and ε_t was the error term.

After establishing the order of integration of the series, the paper proceeded to examine whether a stable long-run relationship existed among the variables by applying the Engle and Granger cointegration technique developed by Engle and Granger (1987). This approach was considered appropriate because it was specifically designed for time-series variables that were individually non-stationary at level but became stationary after first differencing, that is, integrated of order one, I(1). The essence of the test was to determine whether a linear combination of such variables produced stationary residuals, which would indicate that the variables moved together in the long run despite short-run deviations. The procedure was important because the

existence of cointegration implied that the estimated long-run relationship was not spurious and that the variables shared a common equilibrium path over time.

The general long-run cointegrating regression in the Engle-Granger framework was expressed as:

After estimating the long-run equation, the residuals were generated as:

$$\hat{u}_t = ATE_t - \hat{\beta}_0 - \hat{\beta}_1 EDS_t - \hat{\beta}_2 DDS_t - \hat{\beta}_3 BDGR_t \quad (3)$$

The second stage of the Engle–Granger procedure then tested whether the residuals were stationary using the residual-based unit root equation:

$$\Delta\hat{u}_t = \alpha_0 + \alpha_1 \hat{u}_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta\hat{u}_{t-i} + \varepsilon_t \quad (4)$$

After establishing the existence of a long-run relationship among the variables, the paper proceeded to estimate the long-run coefficients using the Fully Modified Ordinary Least Squares (FMOLS) approach.

For the FMOLS estimator, the coefficient vector was expressed as:

$$\hat{\beta}_{FMOLS} = \left(\sum_{t=1}^{T} Z_t Z_t'\right)^{-1} \left(\sum_{t=1}^{T} Z_t Y_t^* - T\begin{bmatrix}\hat{\lambda}_{12}^* \\ 0\end{bmatrix}\right) \quad (5)$$

where

$Z_t = (1, X_t)'$ and

$X_t = (E, D, S_t DDS_t BDGR_t)'$

The linear mathematical form of the FMOLS estimator of equation (5) is captured as:

$$Y_t = \alpha_0 + \sum_{t=1}^{T} \alpha_1 X_t^* + u_t \quad (6)$$

Incorporating equation (1) into the FMOLS framework, the resulting specification of equation (6) for the purpose of this paper is expressed as:

$$ATE_t = \alpha_0 + \sum_{t=1}^{T} \alpha_1 EDS_t^* + \sum_{t=1}^{T} \alpha_2 DDS_t^* + \sum_{t=1}^{T} \alpha_3 BDGR_t^* + e_t \quad (7)$$

This estimation technique was deemed suitable because it was developed for cointegrated time-series models and effectively corrected for the problems of endogeneity and serial correlation that commonly characterized long-run macroeconomic relationships. Unlike the conventional ordinary least squares estimator, FMOLS introduced non-parametric adjustments that accounted for the possible correlation between the explanatory variables and the stochastic error term, thereby yielding consistent and asymptotically efficient estimates. The technique was particularly appropriate in a situation where the variables were integrated of order one, I(1), and had already been confirmed to move together in the long run.

RESULTS AND DISCUSSIONS

Descriptive Statistics Results

Descriptive statistics provide a summary of the basic characteristics of the variables used in an empirical study and serve as an important preliminary step before undertaking inferential and econometric analyses.

Table 1: Summary Statistics

	ATE	EDS	DDS	BDGR
Mean	48.85881	31.08135	11.63904	-2.61402
Maximum	62.51000	83.55285	23.04300	0.784359
Minimum	27.30000	1.719616	5.772012	-8.5696
Std. Dev.	8.806608	27.31142	4.878739	2.004123
Skewness	-0.35095	0.441907	0.872634	-0.66034
Kurtosis	2.372380	1.716739	2.571136	3.464749
Jarque-Bera	1.329860	3.641830	4.844829	2.940284
Probability	0.514310	0.161878	0.088707	0.229893
Observations	36	36	36	36

Source: Researcher's Computation Using EViews-12 (2026)

Access to electricity (ATE), which proxies power infrastructural development, recorded a mean value of 48.85881, indicating that, on average, about 48.86% of Nigeria's population had access to electricity during the paper period. This average supports the earlier discussion that although electricity access improved over time, it remained relatively low compared to the level required for inclusive economic development. The maximum value of 62.51000% and the minimum value of 27.30000% show that electricity access improved considerably over the period, although universal access was yet to be achieved. The standard deviation of 8.806608 indicates moderate variation around the mean, suggesting that improvements in electricity access occurred gradually rather than through sharp fluctuations. The skewness value of -0.350950 indicates slight negative skewness, while the kurtosis value of 2.372380 suggests a platykurtic distribution. The Jarque-Bera statistic of 1.329860 with a probability value of 0.514310 indicates that the null hypothesis of normality cannot be rejected, implying that access to electricity is normally distributed.

External debt stock (EDS) recorded a mean value of 31.08135% of GDP, indicating that Nigeria maintained a relatively high average level of external borrowing over the paper period. This reflects the country's reliance on foreign borrowing to finance fiscal deficits and development projects, including infrastructure. The maximum value of 83.55285% and minimum value of 1.719616% reveal a very wide range, reflecting the sharp decline in external debt following debt relief and its subsequent increase in recent years. The standard deviation of 27.31142 confirms that external debt was the most volatile variable in the model, indicating substantial fluctuations in Nigeria's external borrowing profile over time. The skewness value of 0.441907 shows moderate positive skewness, while the kurtosis value of 1.716739 indicates a platykurtic distribution. The Jarque-Bera statistic of 3.641830 and probability value of 0.161878 suggest that external debt stock is normally distributed.

Domestic debt stock (DDS) had a mean value of 11.63904% of GDP, indicating that domestic borrowing constituted an important component of deficit financing throughout the paper period. Compared with external debt, domestic debt exhibited a lower average level and relatively more stable behaviour. The maximum value of 23.04300% and minimum value of 5.772012% indicate moderate variation in domestic borrowing over time. This is further confirmed by the standard deviation of 4.878739, which suggests that domestic debt fluctuated less than external debt. The skewness coefficient of 0.872634 indicates that the distribution is positively skewed, reflecting the relatively higher domestic debt levels recorded in recent years. The kurtosis value of 2.571136 indicates a platykurtic distribution, while the Jarque-Bera statistic of 4.844829 with a probability value of 0.088707 shows that the series is normally distributed since the probability exceeds the 5% significance level.

Budget deficit (BDGR) recorded a mean value of -2.61402% of GDP, indicating that Nigeria operated an average fiscal deficit of about 2.61% of GDP during the paper period. This finding is consistent with the earlier

discussion that deficit financing has remained a persistent feature of Nigeria's fiscal operations due to recurrent revenue shortfalls and increasing expenditure needs. The maximum value of 0.784359% and minimum value of -8.569600% indicate that although a small fiscal surplus occurred in one year, deficits dominated the paper period. The standard deviation of 2.004123 suggests moderate variability in the fiscal balance over time. The skewness value of -0.660340 indicates that the distribution is negatively skewed, reflecting the predominance of deficit observations, while the kurtosis value of 3.464749 indicates a leptokurtic distribution with relatively heavier tails. The Jarque-Bera statistic of 2.940284 and probability value of 0.229893 indicate that the budget deficit series is normally distributed.

Unit Root Test

The unit root test was conducted to determine the stationarity properties of the variables before estimating the long-run relationship among them.

Table 2: Summary Philip-Perron (PP) of unit root test results

Variable	PP Test @ Levels	PP Test @ 1st Difference	Remarks
ATE	-2.970365 (-3.544284)	-5.653923 (-4.284580)*	I(1): Stationary
BDGR	-1.098102 (-3.544284)	-6.523241 (-4.252879)*	I(1): Stationary
DDS	-0.732855 (-3.544284)	-4.947523 (-4.252879)*	I(1): Stationary
EDS	-1.426151 (-4.243644)	-4.390895 (-4.252879)*	I(1): Stationary

Note: The tests include intercept with trend; * significant at 1percent.

Source: Researcher's Computation Using EViews-12 (2026)

Access to electricity (ATE), which proxies power infrastructural development, was found to be non-stationary at level, as the PP test statistic of -2.970365 was smaller in absolute terms than the 1% critical value of -3.544284. However, after first differencing, the PP statistic increased in absolute value to -5.653923, exceeding the corresponding 1% critical value of -4.284580. This indicates that the series became stationary after first differencing and is therefore integrated of order one, I(1).

Budget deficit (BDGR) also exhibited a unit root at level, with an PP test statistic of -1.098102, which was less than the 1% critical value of -3.544284 in absolute terms. After first differencing, the PP statistic became -6.523241, exceeding the corresponding critical value of -4.252879 at the 1% level. This confirms that budget deficit is stationary after first differencing and is integrated of order one, I(1). The result indicates that although Nigeria experienced persistent fiscal deficits throughout the paper period, the series followed a trend that required differencing to achieve stationarity.

Domestic debt stock (DDS) was likewise found to be non-stationary at level, with an PP statistic of -0.732855, which was lower than the critical value of -3.544284 in absolute terms. At first difference, however, the PP test statistic improved to -4.947523, which exceeded the 1% critical value of -4.252879. This indicates that domestic debt stock became stationary after first differencing and is therefore integrated of order one, I(1).

Similarly, external debt stock (EDS) was not stationary at level since its PP test statistic of -1.426151 was smaller in absolute terms than the 1% critical value of -4.243644. However, after first differencing, the PP statistic increased to -4.390895, which exceeded the corresponding critical value of -4.252879 at the 1% level. This confirms that external debt stock is stationary at first difference and is integrated of order one, I(1).

Co-integration Test

The Engle and Granger cointegration test was conducted to determine whether a long-run equilibrium

relationship exists between deficit financing variables and power infrastructural development in Nigeria.

Table 3: Engel & Granger Co-integration Result

Residual		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.475312**	0.0240
Test critical values:	1% level	-3.632688	
	5% level	-2.150687	
	10% level	-1.611059	

Note: ** p<0.05

Source: Researcher's Computation Using EViews-12 (2026)

The results presented in Table 3 indicate that the residual from the estimated long-run equation is stationary, with an Augmented Dickey-Fuller (ADF) test statistic of -2.475312 and a probability value of 0.0240. At the 5% level of significance, the critical value is -2.150687. Since the absolute value of the calculated ADF statistic (-2.475312) is greater than the absolute value of the 5% critical value (-2.150687), and the probability value of 0.0240 is less than 0.05, the null hypothesis of no cointegration is rejected. This confirms the existence of a statistically significant long-run equilibrium relationship between access to electricity and the deficit financing variables comprising external debt stock, domestic debt stock, and budget deficit.

FMOLS Regression Estimates

The paper has established the existence of a long-run co-integrating relationship between deficit financing indicators and power infrastructural development in Nigeria. Consequently, the analysis proceeds to estimate the long-run model using the Fully Modified Ordinary Least Squares (FMOLS) technique. The FMOLS estimator is appropriate for estimating long-run relationships among cointegrated variables because it corrects for potential endogeneity and serial correlation that may arise in the estimation process, thereby producing efficient and consistent long-run parameter estimates. The results of the FMOLS estimation are presented in Table 4.

Table 4: FMOLS Result

Dependent Variable: ATE

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EDS	0.168769	0.067108	2.514897	0.0173
DDS	-0.785536	0.471245	-1.666937	0.1056
BDGR	1.695444	0.802813	2.111880	0.0266
C	59.29510	4.063082	14.59362	0.0000
Goodness of Fit				
R-squared	0.522021			
Adjusted R-squared	0.466088			
Long-run variance	1.561109			

Source: Researcher's Computation Using EViews-12 (2026)

The result shows that external debt stock (EDS) has a positive and statistically significant effect on access to electricity in Nigeria. Specifically, the estimated coefficient of 0.168769 indicates that a 1 percentage point

increase in external debt stock as a percentage of GDP is associated with approximately a 0.169 percentage point increase in access to electricity, holding other factors constant. The probability value of 0.0173, which is less than the 5% level of significance, confirms that this positive relationship is statistically significant.

In contrast, domestic debt stock (DDS) has a negative coefficient of -0.785540, indicating that a 1 percentage point increase in domestic debt as a percentage of GDP is associated with approximately a 0.786 percentage point decrease in access to electricity, all else being equal. However, the probability value of 0.1056 exceeds the 5% level of significance, indicating that the negative effect is not statistically significant.

The findings further reveal that budget deficit (BDGR) exerts a positive and statistically significant influence on power infrastructural development. The estimated coefficient of 1.695444 indicates that a one percentage point increase in the budget deficit as a percentage of GDP is associated with approximately a 1.695 percentage point increase in access to electricity, ceteris paribus. The probability value of 0.0266, which is below the 5% significance level, confirms that the effect is statistically significant.

As shown in the results, the model produced an R-squared value of 0.522021, implying that approximately 52.20% of the total variation in access to electricity (% of the population) is explained by the combined effects of external debt stock (% of GDP), domestic debt stock (% of GDP), and budget deficit (% of GDP). The adjusted R-squared value of 0.466088 indicates that after adjusting for the number of explanatory variables included in the model, approximately 46.61% of the variations in access to electricity are still explained by the deficit financing indicators.

The estimated long-run variance of 1.561109 represents the long-run variance of the regression residuals after the FMOLS corrections for serial correlation and endogeneity. The relatively low value suggests that the remaining long-run disturbances around the estimated equilibrium relationship are reasonably contained, indicating that the FMOLS procedure has adequately accounted for long-run serial correlation in the model.

DISCUSSION OF FINDINGS

The findings of the paper revealed that external debt stock had a positive and significant impact on access to electricity in Nigeria, implying that increases in external debt stock, measured as a percentage of GDP, significantly improved power infrastructural development, proxied by access to electricity as a percentage of the population. This suggests that external borrowing has served as an important source of long-term finance for electricity infrastructure, particularly in a developing economy such as Nigeria where internally generated revenue has often been insufficient to fund large-scale capital projects. Electricity infrastructure requires enormous upfront investment in generation plants, transmission lines, substations, distribution facilities, and rural electrification programmes, making external borrowing an attractive financing option where domestic resources are limited. The positive and significant result indicates that when external loans are channelled towards productive infrastructure and efficiently managed, they can contribute to expanding electricity access and strengthening the national power system. This finding is consistent with Onyekachi-Onyele et al. (2024), who found that external debt exerted a positive long-run effect on public infrastructure investment in Nigeria, suggesting that foreign borrowing enhanced infrastructure development when invested in productive capital projects. Similarly, Okere et al. (2023) found that public debt significantly improved national electricity access, urban electrification, and rural electrification across Sub-Saharan Africa, indicating that borrowed resources can support energy infrastructure expansion. The finding also supports the conclusion of Benayed et al. (2025), who reported that public debt reduced energy poverty by improving electricity-related energy access where countries possessed adequate institutional quality and economic development. However, the result contradicts Obomeghie and Ojutomori (2025), who found that rising external borrowing intensified Nigeria's infrastructure deficit beyond a specified debt threshold, suggesting that excessive external indebtedness could worsen infrastructure outcomes rather than improve them.

The paper further found that domestic debt stock had a negative but statistically insignificant impact on access to electricity in Nigeria. This implies that increases in domestic debt stock, measured as a percentage of GDP, were associated with reductions in electricity access, although the relationship was not statistically significant. The insignificant result suggests that domestic borrowing did not translate into measurable improvements in

power infrastructural development during the paper period. A plausible explanation is that a substantial proportion of domestic borrowing may have been utilised to finance recurrent expenditure, refinance maturing obligations, or address short-term fiscal imbalances instead of supporting long-term electricity infrastructure projects. In addition, increased domestic borrowing may have raised debt-servicing commitments and crowded out private sector access to credit, thereby limiting investment in electricity generation, transmission, and distribution. Consequently, while domestic debt expanded government financing capacity, it may not have been sufficiently directed towards projects capable of improving electricity access. This finding is broadly consistent with Haruna et al. (2024), who reported that domestic debt had an insignificant effect on infrastructural development in Nigeria, suggesting that locally sourced borrowing did not significantly influence infrastructure financing. Conversely, the finding differs from Kushawaha and Jain (2024), who reported that debt financing eventually promoted renewable energy capacity in developing countries after favourable financial and macroeconomic conditions had been achieved. It also contradicts Onuoha et al. (2023), who found that public debt positively influenced renewable energy consumption across Sub-Saharan Africa, implying that debt resources could enhance energy-sector development when effectively managed within a supportive institutional environment.

The findings also revealed that budget deficit had a positive and significant impact on access to electricity in Nigeria, indicating that increases in the budget deficit, measured as a percentage of GDP, were associated with improvements in electricity access over the paper period. This result suggests that deficit-financed public expenditure supported investments in electricity infrastructure by enabling government to undertake projects that might not have been financed through current revenue alone. Given the substantial capital requirements of the electricity sector, expansionary fiscal policy financed through budget deficits may have facilitated investment in power generation, transmission expansion, distribution network rehabilitation, and rural electrification initiatives, thereby improving access to electricity. The finding further implies that the developmental effect of fiscal deficits depends largely on the composition and utilisation of public expenditure rather than the existence of the deficit itself. Where deficit financing is directed towards productive infrastructure, it can contribute to expanding electricity access and promoting long-term economic development. This outcome aligns with the broader conclusion of Kushawaha and Jain (2025), who found that moderate levels of public debt supported renewable energy investment in developing countries before excessive debt became counterproductive, thereby highlighting the importance of productive deficit-financed investment in the energy sector. The result also lends support to the evidence presented by Auteri et al. (2024), who established a significant relationship between government debt and renewable energy development in G7 economies, demonstrating that fiscal financing decisions remain closely linked with long-term energy infrastructure outcomes. However, the present finding contrasts with Tajudeen and Gold (2025), who found that electricity-related infrastructure contributed to increasing fiscal deficits in the long run, implying that expanding power infrastructure placed additional pressure on public finances where revenue mobilisation failed to keep pace with infrastructure expenditure. While their study examined the influence of electricity infrastructure on fiscal deficit, the present study approached the relationship from the reverse direction by examining how deficit financing affected electricity access, thereby providing complementary evidence on the interaction between fiscal policy and power infrastructure development.

CONCLUSION AND RECOMMENDATIONS

The paper has shown that deficit financing plays an important role in shaping power infrastructural development in Nigeria, although the effects differ across the various financing instruments. The findings indicate that external debt stock and budget deficit contribute significantly to improving access to electricity, suggesting that when borrowed resources and deficit-financed expenditures are channelled towards productive power infrastructure, they can support the expansion of electricity access. Conversely, domestic debt stock was found to have a negative but insignificant effect, implying that increased domestic borrowing has not translated into measurable improvements in electricity access over the paper period. The paper concludes that sustainable improvements in Nigeria's power infrastructure require prudent debt management and the efficient deployment of deficit-financed resources to electricity generation, transmission, and distribution projects capable of expanding access to reliable electricity.

The paper made the following recommendations:

- Based on the finding that external debt stock exerts a positive and significant impact on access to electricity, the Federal Ministry of Finance, in collaboration with the Debt Management Office (DMO) and the Federal Ministry of Power, should adopt a more targeted external borrowing framework that prioritises concessionary and long-term loans for electricity infrastructure projects. Specifically, external loans should be tied to clearly identifiable projects such as transmission expansion under the Transmission Company of Nigeria (TCN), rural electrification projects implemented by the Rural Electrification Agency (REA), and grid rehabilitation programmes.
- In view of the finding that domestic debt stock has a negative but insignificant impact on access to electricity, the Federal Ministry of Finance, the Central Bank of Nigeria (CBN), the Debt Management Office (DMO), and the Budget Office of the Federation should restructure the composition and utilisation of domestic borrowing. Rather than relying heavily on short-term domestic securities to finance recurrent expenditure, government should increase the issuance of long-term infrastructure bonds dedicated specifically to electricity projects.
- Given that budget deficit has a positive and significant impact on access to electricity, the Budget Office of the Federation, Federal Ministry of Finance, and the National Assembly should ensure that deficit-financed expenditure is increasingly directed towards productive capital investments in the electricity sector rather than recurrent expenditure. Annual appropriation acts should contain clearly ring-fenced allocations for electricity generation, transmission infrastructure, distribution network upgrades, rural electrification, and renewable energy projects, with measurable performance indicators attached to each allocation.

REFERENCES

1. Adenuga, K. I., Aderemi, T. A., & Ajayi, E. O. (2023). Power infrastructure development and industrial growth in Nigeria: Conceptual and empirical perspectives. African Journal of Science, Technology, Innovation and Development, 15(4), 523–538. https://doi.org/10.1080/20421338.2023.2198765
2. Adeyemi, P. A., Ogundele, O. J., & Akintoye, I. R. (2023). Deficit financing and economic growth in developing economies: A theoretical perspective. African Journal of Economic and Management Studies, 14(3), 412–428. https://doi.org/10.1108/AJEMS-08-2022-0334
3. Adewuyi, A. O., & Awodumi, O. B. (2023). Electricity access and economic development in Sub-Saharan Africa: A multidimensional assessment. Energy Economics, 125, 106–123. https://doi.org/10.1016/j.eneco.2023.106845
4. Adigun, O. (2025, October 24). Nigeria's fiscal deficit widens to N13.5 trillion in 2024—Budget Office. Nairametrics. https://nairametrics.com/2025/10/24/nigerias-fiscal-deficit-widens-to-n13-5-trillion-in-2024-budget-office/
5. African Development Bank. (2024). African economic outlook 2024: Driving Africa's transformation: The reform of the global financial architecture. African Development Bank Group. https://www.afdb.org/
6. Ajayi, O. O., & Olutola, B. G. (2024). Electricity access as developmental infrastructure: Conceptual framework and policy implications. Renewable and Sustainable Energy Reviews, 189, 113–129. https://doi.org/10.1016/j.rser.2023.113947
7. Aliyu, S. U., & Mohammed, N. A. (2023). Domestic debt accumulation and financial market development in Nigeria. Journal of Economics and International Finance, 15(2), 45–59. https://doi.org/10.5897/JEIF2023.1234
8. Auteri, M., Mele, M., Ruble, I., & Magazzino, C. (2024). The double sustainability: The link between government debt and renewable energy. The Journal of Economic Asymmetries, 29, Article e00356. https://doi.org/10.1016/j.jeca.2024.e00356
9. Barro, R. J. (1974). Are government bonds net wealth? Journal of Political Economy, 82(6), 1095–1117. https://doi.org/10.1086/260266
10. Benayed, W., Bousnina, R., & Gabsi, F. B. (2025). Public debt and energy poverty alleviation: Identifying the threshold effects of economic development and institutional quality. Energy, 334, Article 137569. https://doi.org/10.1016/j.energy.2025.137569

11. Buchanan, J. M., & Wagner, R. E. (1977). Democracy in deficit: The political legacy of Lord Keynes. Academic Press.
12. Central Bank of Nigeria. (2024). 2023 statistical bulletin: Public finance statistics [Data set]. https://www.cbn.gov.ng/Out/2024/STD/2023%20Statistics%20Bulletin_Public%20Finance.xlsx
13. Debt Management Office. (2026). Nigeria's total public debt stock as at December 31, 2025. https://www.dmo.gov.ng/debt-profile/total-public-debt
14. Emenike, K. O., & Alisi, O. C. (2024). Budget deficits and macroeconomic stability in Sub-Saharan Africa. International Journal of Economics and Financial Issues, 14(1), 78–92. https://doi.org/10.32479/ijefi.15234
15. Ezema, I. C., & Ogujiuba, K. (2025). Measuring electricity access in developing economies: Beyond connection rates. Energy Policy, 196, 114–132. https://doi.org/10.1016/j.enpol.2024.114076
16. Ezie, O., Oniore, J., & Ugwuoke, C. C. (2025). Impact of Fintech Penetration on Unemployment Reduction in Nigeria. International Journal of Humanities Social Science and Management (IJHSSM), 5(1), 297-308.
17. Haruna, D., Aigbedion, M., & Ologunla, E. (2024). Impact of public debt on infrastructural development in Nigeria (1990 to 2023). International Journal of Humanities Social Science and Management, 4(5), 540–552. https://ijhssm.org/issue_dcp/Impact%20of%20Public%20Debt%20on%20Infrastructural%20Development%20in%20Nigeria%201990%202023.pdf
18. International Energy Agency. (2024). World energy investment 2024. https://www.iea.org/reports/world-energy-investment-2024
19. International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, World Bank, & World Health Organization. (2024). Tracking SDG 7: The energy progress report 2024. World Bank. https://trackingsdg7.esmap.org/
20. International Monetary Fund. (2024). Fiscal monitor: Fiscal policy in the great election year. https://www.imf.org/en/Publications/FM
21. Keynes, J. M. (1936). The general theory of employment, interest and money. Macmillan.
22. Kushawaha, D., & Jain, M. (2024). Debt as catalyst: Empowering renewable energy in developing countries. Energy Policy, 194, Article 114336. https://doi.org/10.1016/j.enpol.2024.114336
23. Kushawaha, D., & Jain, M. (2025). Understanding the dynamics of public debt on renewable energy investment in developing countries. Energy Economics, 147, Article 108500. https://doi.org/10.1016/j.eneco.2025.108500
24. Mahmoud, A. B., & Ibrahim, H. (2025). Conceptual framework of deficit financing in emerging markets. Journal of Public Finance and Public Choice, 40(1), 23–41. https://doi.org/10.1332/jpfpc.2025.0145
25. Musa, S. D., & Ibrahim, Y. (2025). Power sector infrastructure development in emerging economies: Theoretical foundations and practical applications. International Journal of Energy Sector Management, 19(2), 234–251. https://doi.org/10.1108/IJESM-06-2024-0012
26. Musgrave, R. A., & Musgrave, P. B. (1989). Public finance in theory and practice (5th ed.). McGraw-Hill.
27. Nwankwo, C. F., Okeke, T. C., & Eze, G. P. (2024). External debt dynamics and sovereign risk in African economies. African Development Review, 36(2), 234–251. https://doi.org/10.1111/1467-8268.12723
28. Nwokocha, C. O., & Iloeje, O. C. (2024). Conceptualizing electricity access in African contexts: Infrastructure, affordability, and reliability dimensions. Energy for Sustainable Development, 78, 145–162. https://doi.org/10.1016/j.esd.2023.11.008
29. Obomeghie, M. A., & Ojutomori, B. A. (2025). Nigeria infrastructural deficit and external borrowing nexus: A threshold autoregressive analysis. International Journal of Research Publication and Reviews, 6(10), 5301–5307. https://ijrpr.com/uploads/V6ISSUE10/IJRPR54225.pdf
30. Ogundipe, A. A., & Aworinde, O. B. (2024). Fiscal deficits and infrastructure financing: Perspectives from developing countries. Journal of Infrastructure Development, 16(1), 56–73. https://doi.org/10.1177/09749306241234567
31. Ogundipe, A. A., Ogunleye, E. K., & Ogundipe, O. M. (2025). Power infrastructure investment and electricity access outcomes in Nigeria. Utilities Policy, 82, 101–118. https://doi.org/10.1016/j.jup.2024.101589

32. Okafor, J. C., & Chukwu, N. G. (2025). External borrowing and debt sustainability in resource-dependent economies. Emerging Markets Finance and Trade, 61(3), 567–585. https://doi.org/10.1080/1540496X.2024.2345678
33. Okere, K. I., Dimnwobi, S. K., Ekesiobi, C., & Onuoha, F. C. (2023). Turning the tide on energy poverty in Sub-Saharan Africa: Does public debt matter? Energy, 282, Article 128365. https://doi.org/10.1016/j.energy.2023.128365
34. Okonkwo, I. V., & Eze, A. O. (2024). Deficit financing strategies in fiscal policy management: A conceptual analysis. Journal of Public Economics and Public Finance, 12(2), 145–162. https://doi.org/10.1504/JPEPF.2024.128456
35. Okoro, O. I., & Chikuni, E. (2024). Power infrastructure development in Africa: Challenges, opportunities and conceptual frameworks. Electric Power Systems Research, 227, 109–126. https://doi.org/10.1016/j.epsr.2023.109984
36. Onuoha, F. C., Dimnwobi, S. K., Okere, K. I., & Ekesiobi, C. (2023). Funding the green transition: Governance quality, public debt, and renewable energy consumption in Sub Saharan Africa. Utilities Policy, 82, Article 101574. https://doi.org/10.1016/j.jup.2023.101574
37. Onyekachi-Onyele, C., Umezurike, I., & Nwagwu, I. (2024). Effect of debt burden on public infrastructure investment in Nigeria. Journal of Development Economics and Finance, 5(2), 381–405. https://doi.org/10.47509/JDEF.2024.v05i02.09
38. Tajudeen, O. J., & Gold, K. L. (2025). Assessing the relationships between fiscal deficit, economic and social infrastructure in Nigeria: Evidence from an ARDL approach. Journal of Applied Economic Research, 24(3), 873–900. https://doi.org/10.15826/vestnik.2025.24.3.029
39. Usman, A., & Yakubu, M. (2026). Domestic debt management and capital market efficiency in Nigeria. International Journal of Finance & Economics, 31(1), 234–249. https://doi.org/10.1002/ijfe.2876
40. Usman, Z. G., & Abbasoglu, S. (2023). Multidimensional assessment of electricity access: Framework and application to developing countries. Energy Reports, 9, 3456–3472. https://doi.org/10.1016/j.egyr.2023.02.045
41. World Bank. (2024). International debt report 2024. https://www.worldbank.org/en/programs/debt-statistics/idr
42. World Bank. (2025). Access to electricity (% of population): Nigeria [Data set]. World Development Indicators. https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=NG
43. World Bank. (2026). External debt stocks (% of GDP), Nigeria. https://data.worldbank.org/indicator/DT.DOD.DECT.CD?locations=NG
44. Central Bank of Nigeria. (2024). 2024 statistical bulletin: Public finance statistics [Data set]. https://www.cbn.gov.ng/Out/2024/STD/2024%20Statistics%20Bulletin_Public%20Finance.xlsx
45. Debt Management Office. (2026). Nigeria's total public debt stock as at December 31, 2025. https://www.dmo.gov.ng/debt-profile/total-public-debt

Table A: Data Presentation

Year	External debt stocks (% of GDP)	Domestic debt (% of GDP)	Budget Deficit as % of GDP	Access to electricity (% of population)
1990	61.91911	17.00	-4.47	27.30
1991	56.32238	19.69	-6.06	35.23
1992	55.74275	19.64	-4.36	36.10
1993	54.12323	21.78	-8.57	36.96
1994	41.15975	23.04	-3.97	37.83
1995	53.24217	15.41	0.03	38.69
1996	48.36931	10.28	0.78	39.55
1997	44.92217	11.36	-0.11	40.40
1998	65.18725	11.67	-2.78	41.25
1999	69.13172	14.50	-5.20	44.9
2000	80.56695	12.72	-1.47	43.2
2001	83.55285	12.35	-2.68	43.9
2002	78.07632	10.14	-2.62	44.6
2003	59.41328	9.81	-1.50	52.2
2004	51.73168	7.56	-0.95	46.1
2005	16.95375	6.60	-0.70	46.8
2006	2.412035	5.77	-0.33	47.6
2007	2.090194	6.26	-0.34	50.1
2008	1.719616	5.81	-0.12	50.3
2009	2.826651	7.43	-1.86	50.0
2010	2.532961	8.33	-1.99	48.0
2011	2.133083	8.91	-1.82	55.9
2012	2.467613	9.04	-1.34	53.0
2013	2.917242	8.79	-1.42	55.6
2014	3.600045	8.77	-0.93	54.2
2015	5.530463	9.28	-1.64	52.5
2016	8.879586	10.78	-2.61	59.3
2017	9.946978	10.96	-3.14	54.4
2018	10.46605	9.90	-2.81	56.5
2019	13.70684	6.96	-3.35	55.4
2020	14.63301	7.50	-4.08	55.4
2021	15.80154	7.91	-4.04	59.5
2022	15.93078	8.10	-4.61	60.5
2023	21.02489	16.96	-5.28	61.2
2024	43.11299	18.89	-3.88	62.0
2025	16.78125	19.13	-3.89	62.51

Sources: World Bank. (2025). Access to electricity, percent of population, Nigeria. https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=NG