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SECTORAL IMPACT OF PUBLIC EXPENDITURES ON ECONOMIC GROWTH IN SELECTED WEST AFRICA COUNTRIES: 2000-2023

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Abstract

Public expenditures are vital for growth, influencing income distribution, resource allocation, and national income composition. Significant segments of these expenditures include health, education, agriculture, and military. However, the sluggish economic growth rates in the region raises key questions on the efficacy of public expenditures in promoting economic growth. Thus, this study examined the sectoral impact of public expenditures on economic growth in 12 selected West African countries from 2000 to 2023. This study used panel regression techniques. Results revealed that there will be a 0.04% increase in growth for every percentage increase in health expenditures in the long-run. Similarly, a 1% increase in education expenditure would lead to a 0.14% increase in economic growth. Conversely, there will be an increase of 0.04% in economic growth in the case of a 1% increase in military expenditure as a share of GDP (percent). Furthermore, every 1% increase in agricultural expenditure will lead to a 0.18% increase in growth. This outcome aligns with the 2003 Malabo position that agricultural expenditure is expected to positively influence growth and validates the Keynesian proposition that government expenditure in the agricultural sector can stimulate economic growth. The estimated coefficient of inflation is negative and statistically significant. Additional results revealed that in the case of a 1% increase in foreign direct investment net inflows, there may be an increase of 0.09% in economic growth. Hence, this study recommends improving efficiency in health sector spending to reduce waste and corruption. This research also advocated for increased budgetary allocation to education, particularly at the primary and secondary levels, and expanded access to vocational and technical education to boost employability. Furthermore, this investigation recommended increasing transparency and accountability in defense budgets and prioritizing development-oriented expenditures over arms purchases. Additionally, this paper recommends prioritizing public investment in rural infrastructure (e.g., roads, storage, and irrigation), providing subsidies or low-interest credit to farmers to increase productivity, and supporting agricultural extension services and research to improve yield.

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1. Introduction

Globally, economic growth reflects how healthy or vulnerable an economy is to shocks, as well as the size and productive capacity of a country. Fiscal policy is one of the economic policies used by various governments worldwide for the realization of several macroeconomic targets (including economic growth) and economic stabilization is fiscal policy (Onifade *et al*., 2020), and public expenditure is one key fiscal policy tool. Public expenditure, as one of the fiscal policy tools, has been used by governments worldwide to regulate the economy through budgetary expansion or contraction that moderates private sector demand and expenditure (Ahuja & Pandit, 2020), maximizes economic wellbeing (Pula & Elshani, 2018), and ensures redistribution (Atkinson & Stiglitz, 2015), a perspective that is in line with the Keynes postulation on the relationship between government expenditure and economic growth.

Significant segments of these expenditures include health, education, agriculture, and military. Both health care and education are global pillars for sustainable economic growth, providing a healthy and skilled workforce that is necessary for elevating productivity. Military expenditure is a necessity for protecting the nation from external and internal aggressions. Similarly, agriculture expenditure promotes food production, a basic necessity for human existence.

Empirical studies on the impact of government expenditure on economic growth have revealed conflicting results. Some scholars have reported a positive effect (Saeed, 2025; Jide & Ogbodo, 2024; Azu & Agbobu, 2024; Adebayo & Akintunde, 2024; Okunlola *et al.*, 2024; Effiong & Inyang, 2020; Guandong & Muturi, 2016; Robinson, 1977; Ram, 1986; Yasin, 2011; Onifade, 2015; and Gukat, 2015). Others have reported a negative effect (Hu & Wang, 2024; Ayaga *et al*., 2024; Buthelezi, 2023; Megbowon *et al*., 2022; Landau, 1983; Basil, 2000; Afonso and Tovar, 2011; and King and Rebelo, 1990). Moreover, a third group of studies came up with no effect or inconclusive results (Ibrahim *et al*., 2024; Utari *et al*., 2024; Davis & Spain, 2024; Suwandaru *et al.*, 2021; and Olaoye *et al*., 2020).

One of the reasons for the observed negative effect is the presence of structural rigidities that characterize most economies in the West Africa sub-region (Udoka & Anyingang, 2015). The West African sub-region is categorized as developing; hence, the role of government expenditure in this sub-region should not be overemphasized. This agrees with the presumption of the Structuralist Hypothesis that the government plays a critical role in providing development financing at the early stage of economic development. The governments of West African countries have been spending significantly over the years, but the region is still wallowing in poverty, unemployment, inequality, and slow economic growth.

For example, West Africa's region average GDP growth decelerated to 3.8% in 2022 from 4.4% in 2021, implying that growth recovery from the 2020 downturn has slowed. On the demand side, growth is driven by household consumption and investment, and on the supply side by the services sector. Growth deceleration is attributable, among other causes, to successive shocks, e.g., the resurgence of COVID-19 in China, West Africa's major trade partner; Russia's invasion of Ukraine causing inflationary pressures in net food, fuel, and fertilizer in importing countries; monetary policy tightening in advanced economies, which caused global risk-averse sentiments, thereby contributing to exchange rate pressures; and lastly lingering security-related challenges. For example, Nigeria and some other countries in the sub-region are threatened by the Boko Haram terrorist group. Insurgency in the sub-region is a threat to investment, growth, and sustainability. Meanwhile, GDP growth decelerated in all countries in the region, except for Cabo Verde, The Gambia, Guinea, Mali, and Niger. Cabo Verde, a tourism-dependent economy, registered the region's fastest growth. It grew by 10.5% from 7% in 2021 (AfDB, 2023). The sluggish economic growth rates in the region raises key questions on the efficacy of government expenditure

in promoting economic growth in the region. Thus, this study examined the sectoral impact of public expenditures on economic growth in selected West African countries from 2000 to 2023.

2. Literature Review

Using yearly data from 1981 to 2021, Nwoye *et al*. (2024) investigated the relationship between security spending and the expansion of the Nigerian economy. Autoregressive Distributed Lag (ARDL) model technique was adopted for estimation. Result of the ARDL model revealed that government security capital expenditure has a positive and significant impact on the growth of the Nigerian economy both in the short-run and long-run, while government recurrent internal security expenditure has a negative and insignificant impact on the growth of the Nigerian economy in the short-run but a positive and insignificant impact on the growth of the Nigerian economy in the long-run. However, government recurrent defense expenditure has a negative and insignificant impact on the growth of the Nigerian economy both in the short-run and long-run. Therefore, the study recommended that the government should increase its security capital expenditure to adequately equip the Armed Forces of Nigeria and internal security agencies in the country to improve their effectiveness, enhance security, and promote economic growth.

The efficiency of investing in education in promoting economic growth was investigated by Qigege and Zimo (2024). Data sets for the least developed, developed, and developing nations in Asia from 1995 to 2015 are utilized to create a regression model using the panel Ordinary Least Squares (OLS) model, along with a case study on China and Malaysia. The regression model manifests public spending on education as having a simulative effect on economic growth in countries with a stable and relatively more developed economy. The case study investigated the relationships between six factors related to the government's expenditure in education and found that investment in secondary schools has a strong relationship with prominent economic returns. The study recommended that countries with a relatively weak economy should not invest heavily in the public educational sector as it may not be as effective as in developed countries.

Kamberaj and Kamberaj (2024) examined the intricate relationship between education expenditures, school enrollment rates, and educational attainment levels and the economic development of Western Balkan countries from 2010 to 2022. By employing a quantitative methodology that encompasses Ordinary Least Squares (OLS), Fixed Effects (FE), Random Effects (RE), and the Hausman and Taylor instrumental variable approach. The findings indicated that general government education expenditures do not statistically affect GDP per capita, suggesting that increasing education funding may not directly translate into economic benefits. In contrast, the analysis highlighted a worrying trend where high unemployment rates among individuals holding advanced degrees, such as PhDs and master's degrees, negatively impact GDP per capita. This underscores the importance of aligning educational outcomes with labor market needs. Additionally, the study revealed a positive correlation between per capita GDP and both school enrollment figures and overall academic achievement within the region. Therefore, countries should pay high attention to the correct management of public money and its reporting, because then the authors of the papers will draw more accurate results related to this issue.

Ayaga *et al*. (2024) investigated the impact of educational expenditure on economic growth in Nigeria using Autoregressive Distributed Lag (ARDL) methodology. The findings indicated that government expenditure on education has a negative and statistically insignificant impact on economic growth in the short and long run. In contrast, labor productivity exhibited a significant positive impact on economic growth in the short run but not in the long run. Additionally, gross fixed capital formation and household consumption expenditure showed positive effects on economic growth, although these are not statistically significant. Recommendations include focusing

on programs that enhance skills and productivity, investing in infrastructure, implementing policies to boost household consumption, and improving data collection and analysis.

Utari *et al*. (2024) determined the level of inclusiveness of economic growth in Indonesia to understand the impact of government spending in the agricultural sector on economic growth. The research method used in this study is panel data. The results of this study indicate that the economic growth in each province in Western Indonesia has been inclusive. Aspects of government spending in the agricultural sector that positively affect economic growth inclusiveness include fertilizer subsidies, irrigation infrastructure, and rural road infrastructure. No specific recommendations were offered.

Moges *et al*. (2024) delved into the complex relationship between sectorial government expenditure and economic growth in Ethiopia from 1980 to 2021. Using a modified endogenous growth model and the ARDL bound test model approach to co-integration, a long-run co-integrating relationship among the variables. In the long run, the study revealed significant positive impacts of government agriculture, health, education, road, water sector expenditures, consumer price index, and government tax revenue on economic growth. Conversely, expenditures on the defense sector and foreign aid exhibited significant negative impacts on long-run economic growth. The comprehensive short-run analysis offers additional insights, with expenditures in the agriculture, defense, and road sectors emerging as positive influencers of economic growth, while expenditures in the education sector, consumer price index, and foreign aid showcase significantly negative effects. Intriguingly, expenditures in the water sector emerge as a non-significant contributor to short-term economic growth. The study advocated for a paradigm shift toward increased expenditure on pro-poor government sectors, along with the implementation of a well-defined expenditure strategy and efficient budgetary resource management.

Saheed and Ayodeji (2024) considered the effect of defense spending on income growth in Nigeria using the Autoregressive Distributed Lag (ARDL) technique. The results showed that defense spending adversely affects short- and long-run income growth. Education spending, health spending, transport and communication service spending, internal security spending, and electric power consumption have short-run and long-run growth impacts on income in Nigeria. Additionally, the proportion of armed forces personnel in the labor force positively impacted income. Therefore, the government should allocate its resources to provide socio-economic and infrastructural facilities for sustainable income growth in Nigeria.

Indanazulfa and Irwandi (2022) analyzed the effect of government health expenditure on economic growth in the ASEAN-9 countries for the period 2000-2019. Empirical results found that health expenditure as a percentage of GDP has a positive effect on economic growth, while population out-of-pocket expenditure has a significant negative effect on economic growth. However, health expenditure per capita and government health expenditure have no significant effect on economic growth. This suggests that there is a need to increase the focus on investment and the speed of developing medical services and public health efficiency to improve public health and economic growth.

Awogbemi (2022) explored the impact of health expenditure on Nigeria's economic growth between 2000 and 2021 using the Error Correction Model. Descriptive analysis of the data revealed that the emphasis is on recurrent expenditure rather than capital expenditure. The empirical results did not find support for increasing health expenditure as it negatively affects economic growth in Nigeria in both the short- and long-run. It is concluded that although government expenditure on health is very vital, emphasis must be placed on capital expenditure to a reasonable extent. Therefore, the Nigerian government should intensify efforts to increase the Abuja declarations of allocating at least 13-15 percent of the annual budget to the health sector for effective funding and focus more on health outcomes and their impacts on economic growth in Nigeria.

Aluthge *et al*. (2021) investigated the impact of Nigerian government expenditure (disaggregated into capital and recurrent) on economic growth using time series data for the period 1970-2019. The study employed Autoregressive Distributed Lag (ARDL) model. To ensure the robustness of the results, structural breaks were considered in the unit root test and co-integration analysis. The key findings of the study are that capital expenditure has a positive and significant impact on economic growth both in the short and long run, while recurrent expenditure does not have a significant impact on economic growth in the short and long run. The study recommended that the government should increase the share of capital expenditure, especially on meaningful projects that have a direct bearing on the welfare of citizens.

Using annual time series data from 1981 to 2017, Ajala and Laniran (2021) examined the connection between Nigeria's military spending and economic growth. To achieve this objective, the study adopted a simple growth model that incorporates military expenditure as a share of government expenditure for the study period. The Autoregressive Distributed Lag (ARDL) estimation technique was used to test the relationship between the variables in the model. The results of this study showed a significant positive long-run relationship between military expenditure and economic growth. Increased military spending despite other competing needs to drive growth in the long-run.

Oche and Mah (2020) empirically examined the relationship between health expenditure and economic growth in member nations of the Economic Community of West African States (ECOWAS) from 1995 to 2014. The panel co-integration approach and Toda and Yamamoto causality tests were used as modeling techniques. There is a positive relationship between gross domestic product per capita, life expectancy, and population growth and health expenditure per capita, while a negative relationship exists between infant mortality rate and health expenditure per capita. Gross domestic product per capita is positive and statistically significant, whereas the infant mortality rate is negative and statistically significant. Although life expectancy and population growth are positive, they are insignificant. The outcome of the Toda and Yamamoto causality test showed that health expenditure and gross domestic product per capita have bidirectional causality. The study recommended that the governments of these countries invest more in their economic growth, as this will in turn stimulate investment in their health sectors.

Mohanty *et al*. (2020) investigated the relationship between India's economic growth and defense expenditure from 1970–1971 to 2015–2016. Using the Autoregressive Distributed Lag and Toda-Yamamoto Granger Causality approach, the empirical results revealed that India's defense expenditure has a positive and significant impact on economic growth. The study also found that capital defense expenditure has a positive and significant effect on economic growth, while revenue defense expenditure does not have any substantial influence on growth. The causality test confirmed a bidirectional causality between defense expenditure and economic growth, while it found a unidirectional causality that runs from capital defense expenditure to economic growth. The study suggested that defense spending, especially capital defense spending, should be encouraged to enhance economic growth in the Indian economy.

With a balanced panel of 34 African countries spanning 1990–2015, Saba and Ngepah (2019) investigated the relationship between military expenditure, state fragility, and economic growth in African countries' regional economic communities. The study utilized Panel Causality and Co-integration test; and the Generalized Method of Moments (GMM) estimation techniques. The causality results suggested a feedback relationship among our variables of interest, which justified the use of GMM. The analysis suggested that the effect of military expenditure on growth is negative at the African level, with significant regional economic level differences, and that this effect is influenced by state fragility. A cut in military expenditure and consideration of other means of

dealing with fragility issues as an alternative to joint regional militarized intervention of regional governments of African countries are recommended.

Akanbi *et al*. (2019) examined the effect of government agricultural expenditure on Nigeria's economic growth from 1981 to 2015. The vector error correction model was used for data analysis. The estimated VECM results showed that only the coefficient of government agricultural expenditure variable influenced economic growth in the long run. This influence was positive and statistically significant at the 5% level of probability. However, in the short run, the results showed that the coefficients of both the government agricultural expenditure variable and agricultural output were both positive and statistically significant in influencing the economic growth (GDP) at 5% probability level. Hence, the government should review upward agricultural expenditure to stimulate growth in the Nigerian economy.

Using secondary data from the World Bank (WB) development indicator for the period between 1990 and 2015, Weolebo (2018) examined the impact of agricultural expenditure on the economic growth of the sub-Saharan Africa region. The study employed the OLS regression and the panel fixed effect model. The findings revealed that expenditure on agriculture, health, and education has a positive and significant effect on GDP per capital of the region. Public spending on agriculture was strong in promoting economic growth in the SSA. Agriculture is a primary economic base for many African countries. Hence, the study recommended that the government should increase expenditure on agriculture, health, and education to promote economic growth.

3. Methods

This study relied on secondary data obtained from the World Development Indicators for the selected West African countries. It covers the period from 2000 to 2023. Panel series data on real GDP growth rate, health expenditure, education expenditure, military expenditure, agriculture expenditure, inflation rate, and foreign direct investment obtained from World Development Indicators (WDI) online database published by the World Bank.

The theoretical background of this research is the generalized Cobb-Douglas production function, which states that the aggregate output of an economy for a given time depends on capital formation, labor force, and TFP and can be presented by the following equation.

$$Y_t = AL_t^{\alpha} \mathrm{K}_t^{\beta} \quad (1)$$

Where, Y_t, L_t, K_t indicate total output, labor, and capital, respectively. A represents total factor productivity, and $\propto$ and β are the respective partial elasticities of labor and capital. However, this study extends this model following the literature by decomposing capital into health, education, military, and agricultural expenditures, as well as a set of control variables, such as inflation rate and foreign direct investment net flows, which are assumed to play a significant role in economic growth.

In addition, equation (1) was modified by including sectoral public expenditures and a set of control variables, such as inflation rate and foreign direct investment net flows, following Aboubacar and Xu (2017), Oche and Mah (2020), and Saeed (2025), Efayena *et al. (*2024), Iheonu and Ichoku (2022), Saba and Ngepah (2019), and Saeed (2023). Thus, the modified model is presented as follows:

$$GDPGR_{it} = \beta_0 + \beta_1 HEXP_{it} + \beta_2 EDEXP_{it} + \beta_3 MEXP_{it} + \beta_4 AGEXP_{it} + \beta_5 INFR_{it} + \beta_6 FDI_{it} + \varepsilon_{it} \quad (2)$$

Where,

Where $GDPGR_{\mathrm{it}}$ is proxied by the GDP growth rate of country i in period t; $HEXP_{it}$ = Health expenditure (% of total government spending) in country i at time t; $EDEXP_{it}$ = Education expenditure (% of total government spending) in country i at time t; $MEXP_{it}$ = Military expenditure (% of total government spending) in country i at

time t; $AGEXP_{it}$ = Agriculture expenditure (% of total government spending) in country i at time t; $INFR_{it}$ = Inflation rate in country i at time t; FDI_{it} = Foreign direct investment in country i at time t; ε_{it} is the error term and β_0 is the intercept. $\beta_1 to \beta_6$ are the coefficients of the explanatory variables. Theoretically, the coefficients of the four public expenditures and FDI are expected to have a positive impact on economic growth. The coefficient of inflation is expected to have an ambiguous impact on growth.

This study used a panel data model. According to (Baltagi, 2011), the panel data model equation is as follows:

$$y_{\text{it}} = \alpha_i + \beta x_{tt} + \mu_{it} \quad (3)$$

Owing to the necessity arising from the interconnected nature of modern economies, where public spending and economic developments in one country can influence or reflect similar trends in another, especially within a geographically and economically integrated region like West Africa countries., this study performed cross-sectional dependence tests on the data to ensure that the cross-section in the panel data analysis are independent for consistent coefficient estimates (Pesaran, 2004). Next, this study tested for unit root. Unit root tests of Levin *et al.* (2002), Im, Pesaran, and Shin (2003), Maddala and Wu (1999), and Choi (2001) are commonly used. The Levin, Li, and Chu tests allow constant, time-varying, residual variances and higher-order autocorrelation structures to vary freely from country to country (Yilgor, 2008). The Im, Pesaran, and Shin tests are separate unit root tests for the same length of time series for each country (Yilgor, 2008). Maddala and Wu tested heterogeneity alternatives. The Choi test is based on the probability values of the unit root test applied to the panel (Choi, 2001). However, Levin *et al.* (2002) adopted the homogeneous unit root procedure.

A panel co-integration test was applied after ensuring the variables were stationary. Here, the Pedroni (2001) co-integration approach is adopted. The Pedroni test allows for multiple explanatory variables. This allows the co-integration vector to vary along different parts of the panel. It also allows for fault heterogeneity along cross-sectional units (Asteriou & Hall, 2007). The Pedroni co-integration test is as follows:

$$Y_{\text{i,t}} = \alpha_i + \delta_i + \sum_m^M = 1 \beta_{mi} X_{mi,t} + \mu_{i,t} \quad (4)$$

Where, t=1 ,…T; i=1,…N; m=1,…M. Here, T is the total number of observations made over time, N is the total number of individual units in the panel, and M is the number of regression variables (Yilgor, 2008).

After reaching the co-integration result between the variables, this study employed the panel regression methodology. The panel data model can be estimated using the fixed and random effect models. The empirical model is estimated using the fixed and random effects estimation methods. In the fixed effects model, the individual-specific effect is a random variable that can be correlated with the explanatory variables. The fixed-effects model can be specified thus;

$$y_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \quad (5)$$

Where N = number of individuals or cross-section and T = the number of time periods.

In the random effects model, the individual-specific effect is a random variable because it is uncorrelated with the explanatory variables. In other words, the model assumes that the individual-specific effect is a random variable that is uncorrelated with the explanatory variables of the same individual's past, current, and future time periods. The random-effects model can be expressed as;

$$y_{it} = \alpha + \beta' X_{it} + u_i + \varepsilon_{it} \quad (6)$$

for i = 1, 2, ..., N and t = 1, 2, ..., T.

Where: N = number of individuals or cross-section

T = number of periods.

ε_{it} = residual (sum of cross-section and time series)

u_i = individual unit residual

For robustness of the empirical results, the Hausman test was performed to decide between the fixed-effect and random-effect models. This study employed the Hausman test, which tests whether the unique errors (ui) are correlated with the regressors. The choice between fixed and random effects can be decided by Hausman's tests, where the null hypothesis is that the preferred model is random effects against the alternative; the fixed effects (Greene, 2008). The choice is based on information about the individual specific components and the independent variables' exogeneity.

The use of Pesaran's (2004) Cross-Sectional Dependence (CD) test, the Levin *et al*. (2002) unit root test, the Pedroni cointegration test, and Panel Regressions Model was deliberately chosen for this research, thereby providing a comprehensive methodological approach that aligns with this paper's objective and the inherent characteristics of the data. For example, the Pesaran (2004) Cross-Sectional Dependence (CD) test offers a rigorous methodological approach in addressing the interconnected nature of modern economies, where public spending and economic developments in one country can influence or reflect similar trends in another, especially within a geographically and economically integrated region like West Africa.

The Levin *et al*. (2002) unit root test is highly appropriate for moderately sized heterogeneous panels with fixed effects and assumes a common unit root process. The Levin *et al*. (2002) unit root test allows constant, time-varying, residual variances and higher-order autocorrelation structures to vary freely from country to country (Yilgor, 2008). Additionally, the Pedroni cointegration test addresses the need to ascertain whether the observed relationships between sectoral public expenditures and economic growth are not spurious but indicate a genuine long-term equilibrium connection. Furthermore, the Pedroni test's ability to account for individual country characteristics ensures that the analysis is both robust and sensitive to the diverse economic contexts within the region. Furthermore, the use of the panel regression method in establishing the sectoral impact of public expenditures on economic growth in selected West African countries from 2000 to 2023 is justified because it minimizes the risk of spurious regression estimates and the likely existence of heterogeneity. Panel data regression takes heterogeneity into account (Baltagi, 2001). In addition, panel data provides more information, more variables, more degrees of freedom, and more efficiency (Gujarati & Porter, 2009).

Description and measurements of variables

Table 1 provides a specific summary of the variables and source of data.

Table 1: Variable Description and Measurements

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Variable	Acronym	Description	Measurement	Source
GDP growth rate	GDPGR	This measure the total value created in an economy in a given period.	Annual (%)	World Bank, 2024
Health expenditure	HEXP	This is the percentage of total government spending on health	Annual (% of GDP)	World Bank, 2024
Education expenditure	EDEXP	This is the percentage of total government spending on education.	Annual (% of GDP)	World Bank, 2024
Military expenditure	MEXP	This is the percentage of total government spending on defense.	Annual (% of GDP)	World Bank, 2024
Agriculture expenditure	AGEXP	This is the percentage of total government spending on agriculture.	Annual (% of GDP)	World Bank, 2024
Inflation rate	INFR	This shows the rate of price change in the overall economy.	Annual (%)	World Bank, 2024

FDI	FDI	Investment made into commercial interests situated in another country by a company or individual from one nation	Annual (% of GDP)	World Bank, 2024

Source: Compilation of Researchers, 2025

4. Results

4.1. Cross-Sectional Dependence Analysis

First, the tests of cross-sectional dependence on the study data must be performed to ensure that the cross-section in the panel data analysis is independent for consistent coefficient estimates (Pesaran, 2004). This study adopted the cross-section dependence (CD) that supports smaller cross-section (N) and larger time series (T) like this study with N = 12 and T = 24. The Pesaran CD procedures were employed to check for cross-sectional dependence in the dataset. The statistic value and p-value are presented in Table 4.3 to verify whether the statistics are significant.

Table 3 cross-sectional Dependence Tests

Tests	Statistic	P-value
Breusch-Pagan LM	9.170180	1.0000
Pesaran Scaled LM	-4.946401	0.0000
Pesaran CD	0.115057	0.9084

Source: Computation of the Authors, 2025 (Eviews-12)

According to the results of the cross-sectional dependence test, the model has a statistic value of 0.115057 and a p-value of 0.9084 under the Pesaran CD test technique. Given that the null hypothesis in these tests is that there is no presence of cross-sectional dependence in the panel units, the results showed that there is insufficient evidence to reject the null hypothesis, since the p-value is more than 0.1. (i.e. 10 percent significance level). The model has no cross-sectional dependence. Additionally, this study examined the stationarity of the variables as another form of pre-estimation tests.

4.2. Unit Root Test

The Levin *et al*. (2002) unit root test results are presented in Table 4.

Table 4 Levin-Lin-Chu Panel Unit Root Test

Variable	Method	Level Stat. (Prob.)	First Diff. Stat. (Prob.)
GDPGR	LLC	-3.39432** (0.0003)	-11.4945*(0.0000)
HEXP	LLC	-1.44917 (0.9264)	-4.23525*(0.0000)
EDEXP	LLC	-1.79724** (0.0361)	-7.0396*(0.0000)
MEXP	LLC	-0.33582 (0.3685)	-5.43507*(0.0000)
AGEXP	LLC	-1.45555 (0.9272)	-11.0135*(0.0000)
INFR	LLC	-0.86367 (0.1939)	-10.1627*(0.0001)
FDI	LLC	-1.52983 (0.0630)	-7.48567*(0.0000)

Note: *, &** denote significance at the 1% and 5% levels.

Source: Researcher's Computations using E-Views 12

The results of the unit root tests, as presented in Table 4 showed that Real Gross Domestic Product growth rate (RGDPGR) and education expenditure were stationary at level (that is I(0)). However, all other variables are

integrated of order 1 (I (1)). These outcomes reject stationarity in levels and support the presence of stationarity in the first difference. The selected variables across the selected West African countries do not contain a unit root and are therefore stable over time, making it appropriate for use in further panel regression analysis without differencing. This outcome implies a degree of stability in the selected variables across the selected West African countries during the review period.

4.3. Panel Co-integration Tests

Given that the variables under investigation have been identified as I(0) and I(1), examining whether these variables are cointegrated becomes essential. To achieve this objective, this study employs the Pedroni (1999; 2004) test. Hence, the result of the Pedroni cointegration test is presented in Table 5.

Table 5: Pedroni residual cointegration test results

	t-Statistic	Prob
Panel v-Statistic	-1.063981	0.8563
Panel rho-Statistic	-0.847183	0.1984
Panel PP-Statistic	-13.31999*	0.0000
Panel ADF-Statistic	-5.184937*	0.0000

Note: *Standard at the 1% level.

Source: Computations based on E-Views 12

The results of the Pedroni co-integration test (Table 5) revealed that the variables included in the model exhibit co-integration. This is supported by the significant values of the PP-Statistic and ADF-Statistic panels at the 1 percent level., thus clearing the way for the main data analysis.

4.4. Panel Regression Results

Table 6 shows the results summary for the Pooled OLS, fixed, and random effects estimates are shown in Table 6.

Table 6: Panel Regression Results

Variables	(1) Pooled OLS	(3) Fixed Effects	(3) Random Effects
Constant	3.162677*	0.067571	3.162677*
	[4.199439]	[0.041946]	[4.382819]
HEXP	-0.012824	0.046049	-0.012824
	[-0.151193]	[0.336909]	[-0.157796]
EDEXP	0.002432	0.136664	0.002432
	[0.049442]	[1.007318]	[0.051601]
MEXP	-0.144789	0.049154	-0.144789
	[-0.469135]	[0.124380]	[-0.489621]
AGEXP	0.085425*	0.179833*	0.085425*
	[4.059112]	[4.213213]	[4.236364]
INFR	-0.037325	-0.120009**	-0.037325
	[-1.148772]	[-2.814480]	[-1.198937]
FDI	0.052644**	0.085882**	0.052644**
	[2.641458]	[3.892943]	[2.756805]
Observations	288	288	288
R-squared	0.55	0.55	0.54
Adjusted R-squared	0.52	0.50	0.51

Hausman test	34.459
P-value	0.000

Note: *, & ** denote significance at the 1% and 5% levels. T-Statistic in parentheses, * p<0.1.

Source: Researcher Computation, 2025.

To decide between fixed effects or random effects, this paper employed a simple Hausman test (Hausman, 1978) where the null hypothesis is that the random-effects model is more efficient. Here, the null hypothesis was rejected, indicating that a fixed effects model better represents linked particular effects. The Pv is 0.00, according to the Hausman test summary P-value. This means that the effects are associated at a 1% level; otherwise, they are not. As a result, fixed-effects regression may provide a better fit than random-effects regression. Hence, the results were interpreted based on the fixed-effects regression estimation. However, this study reported findings for the pooled OLS, fixed, and random effects models for comparison and to allow for the robustness of results.

5. Discussion

Table 6 shows that health expenditure is positively related to economic growth in the long-run. This is in conformity with the theoretical prediction that health expenditure is expected to positively influence growth. More precisely, there will be a 0.04% increase in economic growth for every percentage increase in health expenditures in the long-run. This finding is consistent with previous studies, such as Indanazulfa and Irwandi (2022) and Oche and Mah (2020), which found that health expenditures are positively related to economic growth. However, this negates that of Awogbemi (2022), among others, who did not find support for increasing health expenditure as it negatively affects long-term economic growth in Nigeria.

Similarly, education expenditure is positively related to long-term economic growth. This is in conformity with the theoretical prediction that education expenditure is expected to positively influence growth. To be more precise, a 1% increase in education expenditure would lead to an approximately 0.14% increase in economic growth. This is consistent with theoretical predictions and prior studies, such as Qigege and Zimo (2024) and Aluthge *et al.* (2021), which concluded that public education spending has a simulative effect on economic growth. However, this finding contradicts the findings of Kamberaj and Kamberaj (2024) and Ayaga *et al*. (2024), who found a negative relationship between government expenditure on education and economic growth in the long run. However, the positive impact of educational spending on economic growth emphasizes the need for increased education funding. Policies should prioritize the improvement of educational infrastructure, teacher training, and access to quality education.

However, this study found that military expenditure as a share of GDP (percentage) is positively correlated with long-term economic growth. In other words, military expenditure as a share of GDP (percentage) increases economic growth. This can be interpreted as an increase of 0.04% in economic growth in the case of a 1% increase in military expenditure as a share of GDP (percent). This outcome is consistent with the a priori expectations of the investigation and prior studies, such as Nwoye *et al*. (2024) and Ajala and Laniran (2021), who all reported that military expenditure is positively related to economic growth, but these findings are contradictory to those of Saheed and Ayodeji (2024) and Saba and Ngepah (2019). The negative impact of military expenditure on economic growth suggests a potential reallocation of resources.

From the FEM model estimates, the coefficient of agriculture expenditure is positive and significant at the 1 percent level significant as expected. The positive impact of agriculture expenditure on economic growth is consistent with a prior expectation, given the immense contribution of the agricultural sector to economic growth in West Africa. In the long run, the coefficient of agricultural expenditure is positive and significant, implying that a 1% increase in agricultural expenditure will lead to a 0.18% increase in growth. Interestingly, the impact

of agricultural expenditure on economic growth is consistently positive and significant for all estimation techniques. These outcomes align with the 2003 Malabo position that agricultural expenditure is expected to positively influence growth. This finding is consistent with previous findings by Utari *et al*. (2024), Moges *et al*. (2024), Akanbi *et al*. (2019), and Weolebo (2018), who all established a positive and significant impact of agriculture expenditure on economic growth. This finding validates the Keynesian proposition that agricultural sector government expenditure can stimulate economic growth.

The estimated coefficient of inflation is negative and statistically significant. Specifically, a 1% increase in inflation in the selected West African countries dampens economic growth by approximately 0.12% in the long-run. These estimates support previous findings (Ndoricimpa, 2017; Alemu & Lee, 2015; and Efayena *et al.*, 2024). Additionally, the coefficient of inflation is negative and statistically significant across all estimation techniques, as presented in Table 4.6.

Furthermore, the results indicated that FDI positively and significantly affects economic growth in the long run. In the case of a 1% increase in foreign direct investment net inflows, an increase of 0.09% in economic growth is foreseen. This outcome is consistent with the theoretical prediction and study of Aboubacar and Xu (2017), who examined the nexus between health care expenditure and economic growth in Sub-Saharan Africa from 1995 to 2014. Specifically, Aboubacar and Xu (2017) employed FDI as a control variable, which appears as a key determinant of economic growth in the region. Therefore, it is necessary to create a better environment for FDI to foster economic growth in the selected West African countries.

The R-squared value of 0.55 implies that the model is a good fit as the explanatory variables explain over 55% variation in economic growth is explained by the explanatory variables. Even after removing the impact of insignificant estimators, the adjusted R-squared value of 0.52 implies that the model is still excellent. Therefore, this research conclusion can be relied upon for formulating policy recommendations.

6. Conclusion

This study used a combination of Descriptive Statistics, Cross Sectional Dependence, Unit Root Test, Panel Regressions techniques to examine the sectoral impact of public expenditures on economic growth in 12 selected West African countries from 2000 to 2023. Based on the fixed effects model, there will be a 0.04% increase in economic growth for every percentage increase in health expenditures in the long-run. Similarly, a 1% increase in education expenditure would lead to a 0.14% increase in economic growth. This is consistent with the theoretical prediction and prior studies that concluded that public education spending has a simulative effect on economic growth. Conversely, there will be an increase of 0.04% in economic growth in the case of a 1% increase in military expenditure as a share of GDP (percent).

Furthermore, every 1% increase in agricultural expenditure will lead to a 0.18% increase in growth. Interestingly, the impact of agricultural expenditure on economic growth is consistently positive and significant for all estimation techniques. The estimated coefficient of inflation is negative and statistically significant. Specifically, a 1% increase in inflation in the selected West African countries dampens economic growth by approximately 0.12% in the long-run. Additional results revealed that in the case of a 1% increase in foreign direct investment net inflows, there may be an increase of 0.09% in economic growth. Therefore, the following recommendations were made based on the research findings.

i. Improve efficiency in health sector spending to reduce waste and corruption, target spending toward basic health care infrastructure, maternal/child health, and disease prevention, and train and retain health care workers to improve service delivery outcomes.

ii. This paper advocated for increasing budgetary allocation to education, particularly at the primary and secondary levels, enhancing teacher training, curriculum development, and infrastructure, and access to vocational and technical education to boost employability.

iii. Limited military expenditure to meet essential national security needs, increased transparency and accountability in defense budgets, and prioritized development-oriented expenditures over arms purchases.

iv. Prioritizing public investment in rural infrastructure (e.g., roads, storage, and irrigation), providing subsidies or low-interest credit to farmers to increase productivity, and supporting agricultural extension services and research to improve yields.

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