

MODERATING EFFECT OF CORRUPTION ON THE NEXUS BETWEEN TAX REVENUE AND HUMAN DEVELOPMENT INDEX OF WEST AFRICAN COMMONWEALTH COUNTRIES

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ABSTRACT

Effective tax administration should generate substantial revenue for the government and contribute to economic development except when disrupted by factors such as corruption. This study explored the disruptive role of corruption in weakening the link between tax revenue and human development index (HDI) in West African Commonwealth countries. Built upon the altruistic behavior theory of taxation, the study argued that the conversion of tax revenue to human development can encourage greater tax compliance in developing economies such as The Gambia, Ghana, Nigeria and Sierra Leone. Secondary data on tax revenue, human development index, corruption perception index and four control variables were collected from 2003 to 2022. Based on the outcomes of the preliminary diagnostics analysis, Westerlund co-integration and panel fixed effect regression with Driscoll-Kraay standard errors was estimated for the long-run relationships and short-run dynamics respectively. Findings suggested absence of significant long-run relationships as the group and panel statistics yielded probabilities of above 5%, but tax revenue had significant effect on the HDI of the sampled countries in the short run. In addition, corruption was found to have significant negative interaction on the link between tax revenue and HDI. Therefore, the study concluded that corruption is a major impediment to the growth and development of West African commonwealth nations which must be urgently addressed to enhance the region's progress. It was recommended that the region should tackle corruption decisively to boost government revenue through taxation, and ensure effective channeling of economic resources to development instead of increasing tax rates.

Keywords: tax revenue, human development, corruption, West Africa, tax compliance

1.0 INTRODUCTION

Developmental progress has become a burning issue of interest especially in the 21st century where certain international indicators that track economic success of countries has become popular. The Human Development Index (HDI), which captures essential indicators of progress such as life expectancy, income levels, and education, offers a broader measure of human development than Gross Domestic Product alone. It is a ranking tool that categorizes countries based on the quality of life led in their respective countries on three bases of health, education and income. According to Sherwani, et al (2017), HDI is not only a significant measure of economic development but is

also sensitive to changes in tax policies and revenue. This can be linked to its approach of combining three qualitative factors in measuring living standards. Amate-Fortes et al (2017) opined that HDI is a comprehensive measure of development which respond to social and institutional factors of a given country even more than economic factors. Furthermore, Kizilkaya, et al (2015) submitted that developed economies often boost their economic development and revenue by harnessing the benefits of taxation through income redistribution and other welfare programmes. Bawono et al (2018) also submitted that HDI is influenced by strategic government spending on education and health. It is therefore evident that achieving higher human development index for any country can be predicted by economic resources at the disposal of the government. But effective harnessing of resources by the government should be consistent with economic development except where other factors such as corruption sabotages the process.

Corruption was defined by Nana Djomo et al (2024) as the misapplication of public office for private gain that diminishes societal culture and reduces a nation's international credibility (Omodero, 2019). It disrupts legal frameworks and democratic governance, impeding the self-emancipation of developing countries. Tunc, et al (2023) linked low tax revenues in European Union transition economies to rising corruption, noting that collusion between tax officials and taxpayers facilitates tax evasion. In developing countries like Nigeria and Ghana, corruption extends beyond the tax office, preventing the benefits of collected revenues from reaching citizens (Spyromitros & Panagiotidis, 2022). Its consequences include higher prices, reduced government revenue, decreased innovation, lower investment, currency depreciation, and an overall failure to achieve both economic and social development (Akçay, 2006). The need for developing countries to boost their tax revenues possibly through voluntary compliance offers a lasting panacea to inadequate government funding; however, this possibility is linked to the general perception of government's responsiveness to citizen's welfare. This condition also suggests a possible linkage between tax revenue and economic performance of the countries, creating a cycle of benefits for the two phenomena which corruption has a tendency to distort by interrupting the cycle.

Tax administration is expected to facilitate effective implementation of government fiscal policies by financing capital expenditures aimed at providing basic infrastructure and social amenities. When these expenditures are executed properly to ensure value for money, they tend to stimulate further capital investments and improve citizens' quality of life. However, in many developing countries, a heavy reliance on recurrent spending and revenues from natural resources undermines this process. For example, Odusola (2006) noted that Nigeria, despite being a developing Commonwealth nation, depends on taxation for only about 30% of its budget, with the remainder derived from oil revenues. This imbalance suggests that tax revenue alone may not translate into enhanced welfare, a gap that Omodero (2019) attributes to corruption and the prevalence of a large shadow economy.

Tax is a compulsory levy paid to the government by the citizens which attracts no direct compensation from the government but is paid rather to adhere to the relevant laws of the land. Thus tax revenues are incomes accruing to the government from the imposition of various taxes on incomes, consumption and properties of its people. Ortiz-Ospina and Roser (2019) opined that the methods of governments' revenues generation and spending have a substantial impact on the economic and social development of nations. This position underscores the critical relevance of tax revenue to the economic and social welfare of nations since taxation is one of the chief sources of government revenues generation in the world. Ideally, taxation as part of government fiscal policy thrusts in every nation is applied by the government in the direction of the economy towards achieving its social and economic objectives. This is because government's fiscal policy entails managing the economy through the manipulation of its income and spending power to actualize some desired macroeconomic objectives. Bhartia (2009) and Ola (2007) believe that taxation's major role for developing economies borders on enabling the financing of basic infrastructures targeted to improve the welfare of the masses thereby leading to economic development of the country.

So it is important for African countries such as Nigeria, Ghana, Sierra and Gambia to properly harness tax revenues through formulation of tax policies that are strategically linked to sustainable human capital and infrastructural development. However the menace of corruption is known to slow down developmental efforts (Chizema et al, 2025). Corruption is capable of sabotaging policy effects so it also becomes essential to strengthen anti-corruption frameworks especially in the revenue generation and expenditure arms of government administrations. Overtime, available tax revenues are often inadequate to tackle issues of governance (Dordevic & Maftai, 2025) thereby crystallizing the need to adopt policies that will truly elicit voluntary tax compliance from well-meaning citizens at the least. If an average citizen or resident of West African Commonwealth countries perceives the government as being responsive and transparent in its administration, complying with tax becomes a way of investing in consistent general welfare. Furthermore, formulation of tax policies are often embarked on, without proper benchmarking against economic welfare and development (Tingkes et al, 2024) leading to the policy gap which is often the case for developing African countries. This calls for alignment of tax policy to broader human development strategy. It also created a knowledge gap on the influence of tax revenue on HDI of West African Commonwealth countries as well as the role corruption adopts in the possible linkage.

So this study explored the effect of tax revenues on human development index as a combined measure of health, wealth and literacy while considering the moderating influence of corruption in the relationship. The specific objectives of the study are to;

- i. Assess the impact of tax revenues on human development index of West African Commonwealth countries

- ii. Analyze the moderating effect of corruption on the link between tax revenues and human development index of West African Commonwealth countries.

2.0 LITERATURE REVIEW

Tax revenue and human development index

Recently, academic research on economic growth has shifted its focus to the Human Development Index (HDI), which is regarded as a better proxy for per capita welfare. This shift is likely because the HDI encapsulates the most essential dimensions of individuals' advancement such as health, education, and economic power. Adesola (2024) contends that human development is a crucial measure of successful progress, arguing that the HDI captures key developmental aspects better than Gross Domestic Product, which measures only economic output. The HDI was developed by Dr. Mahbub-ul-Haq and is published annually by the United Nations Development Programme as a means of assessing the quality of life in different territories (Onyekachi & Anaeme, 2021). Tax revenue is one of the major sources through which governments finance public services, so a direct statistical relationship between tax revenue and development might be expected. However, empirical evidence from developing economies paints a different picture. For instance, Adesola (2024) found that tax revenue has no significant linkage with Nigeria's HDI. In contrast, Awa and Ibeanu (2020) emphasized that direct taxes are more beneficial to Nigeria's human development than indirect taxes. The implication is that achieving tax compliance, and thus boosting government revenue to improve human welfare remains challenging. Unlike direct taxes, which are often deducted at the source, indirect taxes are remitted by authorized agents who frequently interact with tax officials, potentially creating opportunities for collusion and corruption. Value Added Tax (VAT), as an indirect tax imposed in Nigeria and other African countries, has a wide tax base and should ordinarily contribute significantly to human development if its impact is not curtailed by other factors. Odogu et al (2021) stressed the importance of fiscal discipline for self-employed persons in Nigeria, whose taxes are not withheld at the source, since empirical evidence indicates that tax revenue is critical to development. Likewise, Ibadin and Oluwatuyi (2021) reported a positive influence of tax revenue on Nigeria's HDI. In contrast, Ananta et al. (2023) found that public spending on education and health is negatively related to human development in low-income countries; the unexpected result was attributed to corruption. Ogbeta (2023) reported that tax revenue has a statistically significant impact on development of The Gambia though the study did not model HDI but used primary data instead. Bosomtwe et al (2025) opined that tax revenue enhances economic growth in the short-run but gets weakened by inflation in the long-run. Onyekachi and Anaeme (2021) submitted that direct tax revenue supports HDI of West African Commonwealth countries.

Existing literature reveals mixed outcomes regarding the influence of tax revenue on human development in Ghana, Nigeria and West African countries (Akinbode et al, 2020). Some studies report non-significant relationships, while others find significant interactions between the

variables (Akoto et al, 2021; Okere et al, 2022; Bosomtwe et al, 2025; Egbunike et al, 2023; Onyekachi & Anaeme, 2021). Notably, other studies concluded that tax revenue collection in developing countries must overcome significant obstacles among which corruption is a primary barrier (Ajaz & Ahmad, 2010; Boly et al., 2021).

Corruption, tax revenue and human development

Tax revenue has traditionally served as a primary source of income for most African countries (Boly et al., 2021), even for a nation like Nigeria, which has historically relied on its natural resources to finance government activities. Hardi et al. (2023) found that corruption significantly undermines taxation efficiency in many countries, including those in Africa. Interestingly, their study revealed that while corruption does not have a direct causal effect on development, there exists a causal link between tax revenue and the Human Development Index. This finding suggests that although some scholars have posited that corruption might benefit developing economies (Omodero, 2019), it does not yield sustainable developmental improvements. In contrast, the statistical relationship between increased tax revenue and human development appears robust, whereas corruption merely distorts this relationship.

Tunc et al (2023) identified a bidirectional relationship between tax revenue and corruption in eleven transition economies of the European Union. Their empirical analysis demonstrated that corruption adversely affects both economic growth and tax revenue, indicating that even well-organized economies within the European Union are not immune to its disruptive effects. Similarly, Imam and Jacobs (2007) reported that corruption contributes significantly to the low-income status of certain Middle Eastern countries by influencing tax revenue outcomes, particularly in tax categories involving direct interactions between tax officials and taxpayers. Complementary to these findings, Baum et al. (2017) argued that the establishment of large tax offices across countries could improve compliance by mitigating the perception of corruption among taxpayers and officials. However, this approach may only be effective in the short term and primarily for small and medium-scale enterprises; multinational companies that engage in tax avoidance may still influence local tax officials through substantial bribes.

Human development has been reported to respond to changes in both tax revenue and corruption (Orji, 2024). Empirical studies have demonstrated that tax revenue positively influences human development in Nigeria (Umobong, 2024) as well as in other low-income African countries (Onyekachi & Anaeme, 2021). Nonetheless, the reasons these countries have yet to fully exploit the benefits of fiscal policy remain a subject for further empirical investigation.

Ananta et al. (2023) contend that government investment of tax revenues in public goods substantially improves human development, reinforcing the notion that tax revenue should positively influence human development outcomes. This position is further supported by Ogonda et al. (2023) and Bosomtwe et al (2025) whose empirical findings indicate that tax revenue elicits significant improvements in human development in Nigeria and Ghana respectively. The studies argued that consistent and proper allocation of tax revenues is essential for addressing the nation's economic challenges. Similarly, Umobong (2024), Olaoye et al. (2023), Olayode and Omodero

(2021), and Awa and Ibeanu (2020) have established a significant positive relationship between tax revenue and the Human Development Index. Lestari (2024) also demonstrated, in a multi-country study sampling Indonesia, Malaysia, the Philippines, Thailand, Myanmar, Cambodia, and Vietnam; that tax revenue has a direct impact on the human development index, which served as a proxy for economic growth in the study. Evidence from 52 African nations also suggested that taxation has significant influence on human development (Adegboye et al, 2025). So the authors concluded that tax policies combined with good governance initiatives will lead to improved living standards for African countries. Contrastingly, Singoro (2021) argue that economic growth among the populace leads to higher tax revenue, noting that taxation, based on income and consumption, ultimately reflects the overall economic emancipation of a society. This reciprocal relationship creates a cycle in which government revenue through taxation and improvements in the human development mutually reinforce one another.

Nevertheless, corruption remains a key disruptor in this cycle. Baum et al. (2017) assert that corruption undermines tax compliance and remittance, while Akcay (2006) implies that corruption can reduce a country's human development even when tax revenue remains high. By sampling over sixty countries, Akcay (2006) concluded that corruption has serious negative implications for human development. Additionally, Boly et al. (2021) found that corruption in governance, especially within the president's office, adversely affects individual taxpayers' attitudes toward compliance, suggesting that governmental efficiency, or its lack, can either promote or hinder adequate revenue collection.

Furthermore, Hardi et al. (2023) observed that while corruption does not directly impact the Human Development Index, its interplay with fiscal factors such as government expenditure and debt moderates their effect. On the interrelationship between tax revenue, corruption, and human development, Orji (2024) submits that corruption exerts a significant negative moderating influence on the positive relationship between tax revenue and human development in both Ghana and Nigeria. This finding underscores the detrimental impact of corruption on human development and national wealth, particularly in resource-rich countries where tax revenues should ideally complement natural resource income in promoting the welfare of the populace. Consequently, there is a clear need for further empirical investigation into the disruptive role of corruption on the linkage between tax revenue and economic development in African countries.

Theoretical framework and hypotheses formulation

The impact of tax revenue on the Human Development Index (HDI) and the distortive influence of corruption are well captured by the altruistic behavioral theory of taxation. This theory was promoted by Becker (1974) in his work on social interactions, evident in taxpayer responses, which suggests an inherent role for altruism. Tran-Nam and Walpole (2012) further argued that taxpayers can be rational, honest, and responsible citizens if they trust the government's efficiency in managing their tax contributions.

This theory originates from the fiscal psychology model, which explained tax compliance through the attitudes of taxpayers toward government revenue collection. According to Tran-Nam and Walpole (2012), later fiscal psychology scholars view taxpayers as willing to sacrifice self-interest for the collective good, not merely out of charity, but as a rational investment in benefits they also receive as community members. They posited that taxpayers' attitudes are both expectant and consistent over time, and that governments can harness these dispositions to achieve high compliance by being accountable, meeting social needs, and wisely applying tax revenues for public benefit.

One of the fundamental justifications for taxation is to provide basic social amenities and infrastructure, thereby linking tax revenue to development (Onyekachi et al., 2018). However, the observed lack of a proportional increase in the HDI as tax revenue rises raises questions about the enduring compliance with fiscal demands. Hence, this study hypothesizes that:

H01: Tax revenues of West African Commonwealth countries have no significant influence on their Human Development Index.

Moreover, corruption is a key factor that disrupts the positive cycle between tax revenue and human development in African countries (Orji, 2024; Omodero, 2019). As highlighted in resource curse theory, many African countries endowed with natural resources struggle with economic emancipation because corruption undermines sound economic and social policies. In this context, even the government's efforts to harness taxpayers' altruistic attitudes can be thwarted by corrupt public officials. Therefore, the study further hypothesizes that:

H02: Corruption has no significant moderating effect on the nexus between tax revenue and the Human Development Index of West African Commonwealth countries.

Gap in Literature

Human development index has become a better measure of economic development (Adesola, 2024) but nevertheless it is yet to receive commensurate attention especially with respect to assessing its responsiveness to tax policies in African countries. On single country level, empirical literature evidences on influence of tax revenue on human development index abound in Nigeria (Ibadin & Oluwatuyi, 2021) but this is not exactly the same for Ghana, The Gambia and Sierra Leone. Some studies that focused on Ghana such as Bosomtwe et al (2025) operationalized GDP as dependent variable, whereas Pomoyie and Djokoto (2023) identified inflation and population growth as correlates of HDI without including tax revenue in the study. Few studies on tax and HDI attempted to cover selected African countries as a panel (Adegboye et al, 2025). These studies tend to crowd out the peculiar realities of the West African sub-region by seeking larger cross-sections. Kessy and Sukartini (2023) studied 21 African countries with GDP as the measure of economic development whereas Osinowo et al (2024) utilized sustainable economic development rather than human development index as the dependent variable. Also, these studies have not explored the possible interaction effect of corruption on the nexus they sought to assess between tax revenue and human development index (Onyekachi & Anaeme, 2021). Orji (2024) attempted to fill this gap but utilized GDP as measure of economic success while studying Ghana and Nigeria

only. This paper has attempted to advance empirical literature in this direction by estimating the moderating power of corruption on the influence of tax revenue on human development of the four West African Commonwealth countries; The Gambia, Ghana, Nigeria and Sierra Leone.

3.0 METHODOLOGY

This research is built on a positivist philosophical paradigm which reflects the commitment to measurable and objective analysis. It employed the use of quantitative secondary data from reputable sources including; the United Nations Development Programme (UNDP), World Bank online Database, International Monetary Fund through International Center for Tax and Development (ICTD) and Transparency International. It sought to uncover generalizable causal relationships between tax revenue and human development index (HDI), while also exploring how corruption moderates this relationship. To achieve this, panel cointegration using Westerlund (2007) ECM-based tests were employed in addition to fixed effect regression model with Driscoll-Kraay standard errors to account for serial correlation, heteroskedasticity, and cross-sectional dependence in the short-run dynamics. Driscoll-Kraay standard errors approach to fixed effect panel regression is particularly suitable given the small cross-sectional dimension and relatively long time span of the panel, and allows for consistent and robust estimation of short-run relationships between tax revenue, corruption, and human development. Also the choice of fixed over random effect is based on the need to control for unobserved time-invariant heterogeneity for macroeconomic data panels where country-related variables may correlate with explanatory variables. Annual data of the four West African commonwealth countries; Gambia, Ghana, Nigeria and Sierra Leone were collected electronically over a twenty years period (2003 – 2022). The length of years covered is limited by corruption index data availability as Transparency International started releasing indices of corruption for the four countries of interest, as at 2003. Both Eviews 13 and Stata 13.0 softwares were deployed for the data analyses.

Model specification

This model (Eq. 1) was adapted from Orji (2024);

$$GDP = f(TOTAX, CPI) \quad (1)$$

Where GDP is gross domestic product

TOTAX is total tax revenue

CPI is corruption perception index

Then the was model was modified to reflect human development index and the interaction term as consistent with established objectives of this study;

$$HDI = f(TAXREV, TAXREV * CPI) \quad (2)$$

Where HDI is human development index

TAXREV is total tax revenue

CPI is corruption perception index

The econometric form of the model is stated below as follows;

$$LNHDI_{it} = \beta_0 + \beta_1 LNTAXREV_{it} + \beta_2 (LNTAXREV_{it} * CPI_{it}) + \beta_3 LNINFR_{it} + \beta_4 LNUNEMR_{it} + \beta_5 LNHEXP_{it} + \beta_6 LNGDPpc_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

Where HDI_{it} is human development index of each country and at each particular year of study

TAXREV_{it} is total tax revenue

CPI_{it} is corruption perception index

TAXREV*CPI is interaction term

Control variables introduced into the model includes; INFR which is the inflation rate; UNEMR is unemployment rate, HEXP is annual health expenditure and GDPpc is the gross domestic product per capita.

β₀ is the intercept.

β₁, β₂, β₃ are the coefficients for the independent variable, moderator, and interaction term, respectively. α_i captures the unobserved individual-specific effects. While ε_{it} represents the idiosyncratic error term.

The short-run effects were computed using fixed effects panel regression model with Driscoll-Kraay standard errors specified as follows;

$$\begin{aligned} \Delta \text{LNHDI}_{it} = & \alpha_i + \beta_1 \text{LNTAXREV}_{it} + \beta_2 (\text{LNTAXREV}_{it} * \text{LNCPI}_{it}) + \beta_3 \text{LNINFR}_{it} \\ & + \beta_4 \Delta \text{LNUNEMR}_{it} + \beta_5 \Delta \text{LNHEXP}_{it} + \beta_6 \Delta \text{LNGDPpc}_{it} + \sum_{t=2}^T \gamma_t D_t \\ & + \varepsilon_{it} \end{aligned} \quad (4)$$

Where α_i is country specific effects, D_t is the year dummies included to account for common shocks across the countries overtime.

Table 1: Specification of research variables

Variable	Source	Description
Human development index (HDI)	United Nations Development Programme (UNDP) Dataset electronic publication latest edition (2023).	Annual composite scores for education, per capita income and health ranging between 0 – 1, computed and compiled by UNDP as an authority. This variable was logged prior to estimation and served as the dependent variable.
Tax revenue (TAXREV)	International Monetary Fund through International Center for Tax and Development (ICTD) latest edition (2024)	Tax revenue represents total tax collected and reported by individual countries as a percentage of their GDP compiled by IMF's ICTD as an authority in Taxation. This variable was also logged before the main estimation. It served as one of the independent variables.
Corruption perception index (CPI)	Transparency International electronic dataset publication of several years.	Number scores given to countries as corruption perceived for the country in a given year. This depends on several factors considered and verified by Transparency International as an authority in Corruption rating for countries. This data was also logged and it served as one of the independent variables.
Interaction term (TAXREV*CPI)	Derived by the author	Calculated as tax revenue multiplied by corruption index in a given and for each cross-section. Each of the variable were logged before they were multiplied to get the interaction data, it is the moderating variable but served as one of the independent variables within the model.
Inflation rate (INFR)	World Bank database	The inflation rate for each country in a given were retrieved as published by World Bank. They were

Unemployment rate (UNEMR)	World Bank database	logged prior to estimation. Employed as one of the control variables.
Government expenditure on health (HEXP)	World Bank database	This is a control variable reflecting the rate of unemployment existing in a given country at a particular year. This logged values were used for data estimation.
Gross domestic product per capita (GDPpc)	World Bank database	Government expenditure on health given as percentage of the GDP. This variable was logged before estimation was performed. It is one of the control variables
		Gross domestic product per capita in dollars represent the average annual income productivity of a person in a given selected country. It also served as one of the control variables which was logged prior to data estimation.

Source: Research review 2025

4.0 RESULTS AND DISCUSSIONS

Some preliminary tests conducted prior to testing of the hypotheses formulated in this study include descriptive statistics, cross-section dependence, unit-root, multicollinearity and Westerlund cointegration tests. The results of descriptive statistics are presented on table 2;

Table 2: Results of descriptive analyses of variables

	HDI	TAX_REV	CPI	TAXREVCPI	INFR	UEMR	GDPPC	HEXP
Mean	0.488200	0.083366	19.56250	1.849495	11.60700	5.238288	1295.643	0.055241
Median	0.480500	0.091519	25.50000	0.944094	11.29138	4.457000	895.9187	0.041886
Maximum	0.602000	0.131162	48.00000	5.639984	31.25590	10.42800	3189.813	0.196900
Minimum	0.355000	0.029936	1.400000	0.062847	2.056503	2.173000	308.7191	0.022962
Std. Dev.	0.063307	0.029946	16.20896	1.886339	5.834987	2.223391	789.2914	0.034478
Skewness	0.120822	-0.526113	0.113250	0.645054	1.123054	1.268786	0.797569	2.259028
Kurtosis	2.258233	1.964506	1.416801	1.886613	4.611975	3.390922	2.326023	8.749643
Jarque-Bera	2.028698	7.264760	8.526070	9.680036	25.47821	21.97364	9.995704	178.2374
Probability	0.362639	0.026453	0.014080	0.007907	0.000003	0.000017	0.006752	0.000000
Observations	80	80	80	80	80	80	80	80

Source: Author's Computation (2025)

Table 2 presents the descriptive statistics of the variables taken in their raw forms to reflect their true flow before converting to the natural log. HDI has a mean value of 0.488, indicating a moderate level of human development across the sampled countries over the study period. The standard deviation of 0.063 suggests low level of dispersion in HDI outcomes, implying broadly comparable development conditions. The minimum and maximum values 0.355 and 0.602 respectively further supports the implication of its standard deviation as they indicate moderate cross-country and temporal variation. The Jarque–Bera test fails to reject normality for HDI, suggesting a symmetric distribution.

Tax revenue (TAX_REV) yielded a mean value of 0.083, with moderate variability of 0.030 approximately as shown by its standard deviation. The distribution is slightly negatively skewed, indicating a higher frequency of relatively larger tax-to-GDP ratios. The observations ranged from 2.9% to 13.1% across the four countries with most of them leaning towards the maximum value.

However, the Jarque–Bera statistic rejects normality, reflecting heterogeneity in tax mobilization capacity across the sampled countries.

The corruption perception index (CPI) has a mean of 19.56, with a wide range (1.40–48.00) and high dispersion (16.21), indicating substantial corruption index volatility over the twenty years period covered in the study. This suggests that while some countries or periods had relatively improved governance, others still showed extremely high perceived corruption. This fact implies that corruption dynamics are not uniform, reinforcing the relevance of panel-based estimation techniques that account for country-specific effects.

The interaction term TAXREVCPI, capturing the corruption index-adjusted effect of tax revenue, has a mean of 1.85 and a standard deviation of 1.89, suggesting considerable variation across countries and over time. The positive skewness and rejection of normality indicate heterogeneous corruption–tax interactions within the panel. It also imply that the interaction of corruption on fiscal revenue mobilization may differ among the four countries or within the study period.

Considering the control variables, inflation rate (INFR) averages 11.61, with values ranging from 2.06 to 31.26, reflecting uneven inflationary tendencies across the countries or overtime. The leptokurtic distribution and significant Jarque–Bera statistic suggest the presence of extreme observations, likely driven by country-specific investment patterns. The unemployment rate (UEMR) has a mean of 5.24% and exhibits moderate dispersion (2.22). The strong positive skewness and non-normality indicate that unemployment is generally low but subject to episodic increases. GDP per capita (GDPPC) in dollar denomination, has an average value of 1,295.64, with substantial dispersion (789.29), highlighting pronounced income differentials across the sample. The positively skewed and non-normal distribution reflects the concentration of higher income levels in a small number of observations. This inequality in income levels as one of the issues that should be addressed by fiscal policies serves as a highlight to criticality of the policy gap in the region. Health expenditure (HEXP) has a mean of 0.055, with low level of dispersion (standard deviation = 0.034). The high kurtosis and strong rejection of normality indicate infrequent but substantial increases in health spending during some specific periods.

In summary, the descriptions of the variables show evidences of non-normality except for human development index, thus revealing the need for robust panel estimation techniques in the subsequent empirical analysis.

Pre-estimation tests

The cross section dependence and unit root tests of the variables are shown table 3;

Table 3: Cross-section dependence and unit root test results

Test Criteria	LNHDI	LNTAX_ REV	LNCPI	TAXRE VCPI	LNINFR	LNUEM R	LNHEX P	LNGDP pc
Breusch-Pagan LM	0.0502	0.0000	0.0000	0.1024	0.0280	0.1180	0.1972	0.0018
Pesaran scaled LM	0.0576	0.0000	0.0000	0.0000	0.0187	0.2297	0.4524	0.0000
Bias-corrected scaled LM	0.0738	0.0000	0.0000	0.0000	0.0246	0.2757	0.5220	0.0000
Pesaran CD	0.0020	0.0098	0.0000	0.0000	0.0006	0.0450	0.6153	0.0004
Decision on unit root generation	1 st Generati on	2 nd Generati on	2 nd Genera tion	2 nd Generati on	2 nd Generati on	1 st Generati on	1 st Generati on	2 nd Generati on
P-value level		<0.01	<0.05	<0.01	<0.01			
p-value first differencing	0.0034					0.0006	0.0000	<0.01
Method of Unit root	LLC	CIPS	CIPS	CIPS	CIPS	LLC	LLC	CIPS
Unit Root Result	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)	I(1)

Source: Author's Computation (2025)

The results from panel cross-section dependence tests showed that HDI unemployment rate has three criteria probabilities to be more than 5% suggesting that both variables are cross-sectionally independent. Health expenditure series also has cross-sectionally independent variables because the all the four criteria presented probability values of more than 5% for each case. But logged values of tax revenue, corruption perception index, the interaction term (TAXREVCPI), inflation rate and GDP per capita all showed probability values of less than 5% suggesting that the variables have cross-section dependence.

Based on the outcomes of the cross-section dependence, the study proceeded to conduct the stationarity tests of LNHDI, LNUEMR and LNHEXP with Levin, Lu Chu t* as one of first generation unit root methods. But the rest of the variables were tested with Cross-sectionally Augmented IPS (CIPS) test which is a second generation unit root method. This decision was made because CIPS remains valid even when common shocks persist. It avoids the size distortions that arise when first-generation tests are used on differenced data with cross-dependence.

The results of the unit root tests indicated that LNTAXREV, LNCPI, LNTAXREVCPI and LNINFR yielded probability values of less than 5% at level suggesting that they are integrated at the order of 0. However, the LNHDI, LNUEMR, LNHEXP and LNGDPpc only became stationary at first differencing so it was concluded that the variables are integrated at mixed order.

Furthermore, correlations of the variables were computed to check for case of multicollinearity because high correlations among the independent variables suggests the existence of multicollinearity. The results obtained and presented on table 4 indicated a case of near perfect multicollinearity to exist between LNCPI and LNTAXREVCPI due to the correlation coefficient of 98.7%. This is after some allowable precautions like mean centering of the LNTAREVCPI which is the interaction have been taken. All other predictor and control variables have acceptable correlation coefficient as their values ranged from 2.59% to 45.33% in absolute terms.

Table 4: Multi-collinearity tests for independent variables

Observations	LNTA XREV	LNCPI	LNTAX REVCPI	LNINF R	LNUE MR	LNHEX P	LNGDP pc
LNCPI	0.2956						
LNTAXRE VCPI	-0.2698	0.9874					
LNINFR	-0.1417	0.0325	-0.0259				
LNUEMR	0.1104	-0.2289	0.1751	-0.4317			
LNHEXP	0.1945	-0.1166	0.1121	-0.0747	-0.1762		
LNGDPpc	-0.4393	0.3976	-0.3894	0.1311	-0.4533	-0.3395	

Source: Author's Computation (2025)

Based on the correlation coefficients, the corruption perception index (LNCPI) was excluded from the baseline specification owing to the near perfect multicollinearity with the interaction term (LNTAXREVCPI). Consistent with the study's objective of assessing the conditional effectiveness of tax revenue, corruption perception index is therefore modelled as a moderating variable rather than as an independent determinant of human development in this study. Also, it was concluded that the independent variables are not strongly correlated with each other and there is no further multicollinearity issue.

Empirical results

Table 5: Panel Co-integration results showing long-run effects of tax revenue and moderation of corruption perception index on human development index of WA commonwealth countries

Test Statistics	Value	Z-value	P-value	Robust P-value
Group t-statistics (Gt)	-2.628	0.433	0.667	0.268
Group a-statistics (Ga)	-3.457	3.060	0.999	0.343
Panel t-statistics (Pt)	-4.126	0.954	0.830	0.355
Panel a-statistics (Pa)	-4.215	2.022	0.978	0.198

Source: Author's Computation (2025)

The results of long-run relationship between the human development index and its predictors are shown on Table 5. The co-integration test was estimated with using the Westerlund (2007) panel co-integration technique with the objective of establishing possible long-run equilibrium relationship between HDI and its regressors. This technique was deemed to be most appropriate for estimating long-run relationship in this study because it utilized robust p-values to adjust for cross-sectional dependence which is evident in most of the variables. The findings obtained suggested absence of long-run relationship among the variables at both the country and panel level. The probabilities of both group and panel t-statistics, and a-statistics were above 0.05 which implied that the variables do not form a stable long-run relationship over the study period.

The findings underscores the need for fiscal strategy that promotes national development and economic progress for the West African Commonwealth countries. It is essential to note that Adesola (2023) and Oyegun (2025) had similar findings though they collected country-specific data for Nigeria. Oyegun (2025) opined that weak policy implementation and other fiscal issues could account for why tax revenue predictors of HDI became insignificant at the long-run. Furthermore, Onyekachi and Anaeme (2021) submitted evidence of insignificant impact of

indirect tax revenue on HDI of West African Commonwealth countries suggesting that the outcome of non-significant relationship has been obtained in previous studies though the study disaggregated between direct and indirect tax revenues

Given that there is no evidence of co-integration in the variables, the study concentrated its empirical analysis on short-run dynamics using a fixed effect panel regression model with Driscoll-Kraay standard errors to correct for heteroskedasticity, serial correlation and cross-section dependence. With the absence of a stable long-run equilibrium relationship, employing panel error-correction or panel ARDL estimators is inappropriate hence the study focused on short-run dynamics by estimating a fixed-effects panel model in which non-stationary variables at level were expressed in first differences, while I(0) variables are retained in levels (Vogelsang, 2012). This approach allowed for reliable inference based on short-run effects though absence of long-run equilibrium has been acknowledged. The results of the regression with Driscoll-Kraay standard errors are presented on Table 6.

Table 6: Panel fixed effect model estimation with Driscoll-Kraay of HDI and predictors

Test Statistics	Coefficient	DK std.error	T-statistics	P-values
LNTAXREV	0.2450	0.0775	3.16	0.005
LNTAXREVCPI	-0.2238	0.0080	-2.80	0.012
LNINFR	0.0010	0.0033	0.32	0.753
D_LNUEMR	0.0049	0.0040	1.23	0.236
D_LNHEXP	0.0211	0.0041	5.21	0.000
D_LNGDPpc	0.0086	0.0055	1.57	0.134
yd2004	-0.0503	0.0218	-2.31	0.033
yd2005	-0.0566	0.0222	-2.55	0.020
yd2006	-0.0602	0.0217	-2.78	0.012
yd2007	-0.0452	0.0223	-2.03	0.057
yd2008	-0.0518	0.0221	-2.34	0.031
yd2009	-0.0551	0.0216	-2.55	0.020
yd2010	-0.0567	.020144	-2.82	0.011
yd2011	-0.0547	0.0194	-2.81	0.011
yd2012	Omitted			
yd2013	-0.0013	0.0009	1.36	0.191
yd2014	-0.0089	0.013	-7.09	0.000
yd2015	-0.0113	0.0016	-6.88	0.000
yd2016	-0.0001	0.0020	-0.07	0.948
yd2017	-0.0045	0.0024	-1.89	0.075
yd2018	-0.0007	0.0012	-0.63	0.534
yd2019	-0.0009	0.0024	-0.36	0.720
yd2020	-0.0157	0.0023	-6.76	0.000
yd2021	-0.0097	0.0017	-5.64	0.000
yd2022	-0.0050	0.0035	-1.44	0.167
Constant	0.0933	0.0174	5.36	0.000
R-squared	0.53			
F-statistic	8.71			0.000
Durbin-Watson	2.16			

Source: Author's Computation (2025)

The panel fixed effect model on Table 6 estimated the short-run relationship between HDI and the explanatory variables using panel data from the four West African Commonwealth countries: Gambia, Ghana, Nigeria, and Sierra Leone. The regression model which included time dummies to control for common shocks is credible as indicated by the F-statistics probability of less than 1% and R-squared of 53%, implying that the explanatory variables sufficiently account for variations in the HDI so the study adopted these results for testing its hypotheses.

The results on Table 6 show that tax revenue is significantly associated with variations in the Human Development Index in the region. A unit increase in tax revenue is linked to a 0.245 positive change in the HDI, implying that tax revenue contributes significantly to development in these countries. This finding aligns with previous researches (Orji, 2024; Lestari, 2024; Ogbeta, 2023; Olaoye et al., 2023; Ogonda et al., 2023; Abu et al., 2022; Odogu et al., 2021); however, it is important to note that none of these studies utilized a panel data approach for the region as was done in this study. Although empirical evidences suggest that tax revenues in all West African countries are positively and significantly associated with human development (Adegboye et al., 2025), Onyekachi and Anaeme (2021) contend that while direct tax revenue impacts the Human Development Index of West African Commonwealth countries significantly and positively, indirect tax revenue has the opposite effect by impacting it negatively and significantly. These findings have serious implications for accountability in governance, as citizens' compliance with taxation is ordinarily linked to the government's capacity to provide effectively for them; hence, Ogbeta (2023) and Odogu et al. (2021) implored the governments of Gambia and Nigeria, respectively, to ensure that the provision of general goods matches the substantial tax incomes recorded each year. So the first hypothesis is rejected based on the t-statistics and p-value of tax revenue hence the study concludes that tax revenue has a significant short-run influence on the Human Development Index of the four West African Commonwealth countries.

Regarding the moderating effect of corruption, the interaction term (LNTAXREVCPI) exerts a significant and negative effect on the development of the selected countries. The beta coefficient for the corruption interaction term is -0.22, implying that each unit of corruption interacting with tax revenue reduces composite human development in the region, at a 5% level of statistical significance. This finding aligns with Orji (2024), whose empirical results for Ghana and Nigeria on individual basis, confirmed that corruption negatively moderates the relationship between tax revenue and the Human Development Index in the long run. Similarly, Adegboye et al (2025), in a study of 52 African countries which includes the four West African Commonwealth nations, found that taxation in Africa only significantly impacts human development when combined with good governance. Furthermore, Akinbode et al (2020) and found that the interaction between corruption and government effectiveness negatively influences human development in 37 Sub-Saharan African countries, including all the West African Commonwealth nations with the exception of Gambia. In addition, Boly et al. (2020), in a study of 36 African countries, also concluded that reducing corruption would improve tax morale in the region. The findings in this study and supportive studies highlighted so far, underscore the urgent need for governments in the

Sub-Saharan African region to devise effective strategies for combating corruption in order to enhance both human development and government revenue from taxation.

The study also found that among the control variables, only government expenditure on health (LNHEXP) had significant effect on HDI on the short-run and this is consistent with expectation because government direct expenditure on health should ordinarily, improve living conditions of people. Finally the year dummies included in the model accounted for the shocks that affected the region at certain times. Some periods, particularly 2004–2011, 2014–2015, and 2020–2021, stand out with significantly lower HDI growth compared to the base year, indicating that development slowed during these years even after controlling for other factors. In contrast, years like 2013 and 2016–2019 show little deviation, suggesting that HDI growth was closer to typical levels during those periods. The results show that short-term changes in human development are shaped not only by tax revenue, its interaction with corruption, and health expenditure, but also by country-specific characteristics and broader global (financial crisis and COVID coinciding with 2007–2008 and 2020 respectively) or regional events (Ebola pandemic in West Africa, 2014) captured by the year dummies.

Policy implication of the findings

This study has advanced research on the nexus between tax revenue and economic growth in The Gambia, Ghana, Nigeria and Sierra Leone. By taking sample of the four West African Commonwealth nations, it portrayed the tax policy performance and experience of four countries with similar public administrative foundation. Also, by linking tax revenue to human development index as a composite measure of economic, health and social emancipation of persons in the region, the study tackled the burning issue of interests in Africa. Then, by considering the disruptive effects of corruption on the link, it attempted to tackle the root cause of prevalent tax avoidance cum evasion, non-compliance to tax policies and poor revenue generation from taxation. The study also contributed to policy-making by providing evidence that justifies critical reassessment of governance structures and decisive anti-corruption policy implementations to properly harness tax revenue. This will aid the growth of government revenue in line with IMF recommendations to the region instead of increasing tax rate. The results obtained in the study on the moderation effect of corruption reflect possible policy gaps especially in governance and anti-corruption guidelines and creates need to either overhaul these policies or review them to align with current trends.

5.0 CONCLUSION AND RECOMMENDATIONS

Tax revenue provides a strategic avenue for the West African commonwealth countries to source government revenue and provide other benefits to their citizens. But the interaction of corruption on tax revenue has been found to negatively and significantly influence human development. Thus, it was concluded that corruption especially in governance is detrimental to the growth and development of African countries because its interaction with tax revenue continues to worsen composite development (HDI) in the region.

In the light of the findings, the study suggests for the governments of Gambia, Ghana, Nigeria and Sierra Leone to take drastic and strategic actions to address the issue of corruption as it portends to break the cycle of benefits that exist between tax revenue and human development (Singoro, 2021). The study also recommends for the government administration at every tier to pursue meaningful capital projects that enables its people to feel the dividends of democratic leadership as such dispositions only guarantees the support of the people, making activities of tax evasion more unpopular as implied by the altruistic behavior theory of taxation. The study also recommends for policymakers of West African Commonwealth countries to always compare general prevalent economic progress (such as HDI) of their respective nations against their fiscal policies overtime to determine its impact and on the welfare of the masses because taxes may be perceived as even more burdensome in the face of economic hardships. Severe punitive measures should be adopted by African countries to combat corruption especially in public offices which includes tax offices as that will ensure proper channeling of funds towards economic emancipation of the citizens and also improve tax revenue generation for government administration.

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