

Health Care Expenditure, Health Outcomes and Economic Growth in Selected West African Countries: Evidence from Panel Data

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ABSTRACT

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This study used panel analysis to examine the effects of healthcare expenditure on economic growth in selected West African countries from 1990 to 2024. We outlined three specific objectives in a bid to achieve the broad objective of the study, which include, to examine the effect of healthcare expenditure on economic growth in selected West African countries, to investigate the impact of per capita health expenditure on some selected health outcomes (life expectancy, infant and maternal mortality rates) and to investigate for any causal relationship between health expenditure and economic growth in selected West African countries. Data employed for the study were sourced from the World Bank Databank and World Development Indicators (WDI). The study used the Pooled Mean Group Auto-Regressive Distributed Lag (PMG-ARDL) to estimate the model, given that the annual data used for the model estimations were integrated of order I(1) and I(0). Our ARDL long-run estimation revealed that both healthcare expenditure and life expectancy have positive and significant effects on economic growth. We found no short-run relationship amongst our variables and a uni-directional causality relationship between economic growth and healthcare expenditure. This study establishes that in general, healthcare expenditure has both positive and significant long-run effects on economic growth in West Africa. In view of the above, the study recommends that governments in West Africa should prioritize increases and sustained investments in the healthcare sector as a long-term economic development strategy. Keywords: Health care expenditure, Life expectancy, Infant mortality rate, maternal mortality rate, Economic growth

Keywords: healthcare expenditure; life expectancy; infant mortality rate; maternal mortality rate; economic growth; West Africa

INTRODUCTION

Health services in Sub-Saharan Africa, which includes West Africa, have long been beset by a double burden of communicable and non-communicable diseases. The region is still falling behind in terms of health advancements despite global improvements. The life expectancy differential between the African region and other parts of the world is at least ten years. Weak healthcare systems contribute to this in part. While there was a 44% decrease in the global maternal mortality rate between 1990 and 2015, over 66% of cases are reported in West Africa and other sub-Saharan African nations, accounting for 99% of the global maternal mortality rate today. While the global under-five mortality rate has drastically decreased (59% from 1990 to 2019), the statistic is not very encouraging in sub-Saharan Africa, as the region has the highest under-five mortality rates. (Van Teutem, 2025). The infant and under-five mortality rates are also comparable. In the area, one in thirteen youngsters passes away before turning five. Additionally, the HIV epidemic is still disproportionately affecting the area, with low antiretroviral therapy and consequences from AIDS significantly contributing to lower life expectancy and infant mortality. (You, D., et al, 2015).

The West African countries are still facing high out-of-pocket healthcare costs despite years of investments and focused efforts by the government and private insurance companies and Out-of-pocket payment has driven many people below the poverty line. The region's governments have never needed to be more dedicated to achieving global objectives and raising the standard of healthcare for their citizens, yet the amount of work being done in this regard is still shamefully low. There are multiple reasons why the government of West Africa should give priority to healthcare. To begin with, everyone in every nation has the right to health care as it is a fundamental human right. Second, physical well-being is a need for both national economic growth and development, which is the main issue discussed in this dissertation. Third, West African national health systems lack the necessary funding and personnel to function effectively.

Healthcare is a necessity, not a luxury, and the West African countries are severely impacted by the crucial underfunding of health, which is correlated with low life expectancy and slow economic growth. The lack of healthcare workers inadequately equipped primary healthcare facilities, constant brain drain, political upheaval, drug shortages, widespread use of counterfeit drugs, high rates of maternal and infant mortality, the burden of infectious diseases, poverty, and a low standard of living are just a few of the health issues that these regions face. All these results from a lack of funding for health care, which is made worse by the wasteful use of already-existing resources, the absence of a social safety net to guarantee that healthcare is distributed fairly, the glaring incompetence of national policy implementation, nepotism, and inadequate political will. Nwafor, E.C. & Clement, C. (2024). The health expenditure in West African countries as a percentage of GDP is low while the Out-of-Pocket expenditure is high. Table 1 presents the respective percentages of some African countries' health spending.

Table 1: Spending and Health Expenditure as a percentage of GDP

Country	OOP spending (% of total spending)	Health expenditure (% of GDP)
Nigeria	76.24%	4.8%
Ghana	27.25%	4.15%
Liberia	24.68%	16.62%
Benin	48.63%	10.35%
Niger	42.53%	5.81%
Cote d'Ivoire	32.34%	3.13%
Burkina Faso	34.65%	3.19
Guinea	53.47%	3.76%
Togo	69%	5.56%
Mali	34.09%	4.47%

Source; Author, World Bank data bank (2024)

Africa accounts for up to 24% of the world's diseases, but just 3% of the workforce is qualified to deliver healthcare, according to World Bank data. Although West African governments are improving and investing in their economies, as well as their healthcare sectors, an interesting development over the past ten years has shown an upward trend in healthcare spending. It is regrettable that life expectancy rates in the region are still low. West Africa is home to 16 countries with a combined population of 450 million people, 230 million of whom live in Nigeria, Africa's most populous nation. (Database. Earth, 2024). Many of the issues that Nigeria faces also influence the health of the population in neighboring West African nations. When compared to other countries, Nigeria has historically invested little in health care, and access to care has been hampered by high out-of-pocket expenses. Gross domestic product (GDP) of Nigeria is the highest in Africa. But despite the tremendous population expansion, the economy has not

grown steadily enough to catch up, and since 2015, per capita income has decreased to 824\$ from 3222\$. (AFDB, 2025). Primary health care is still in its infancy, and factors like severe poverty, absenteeism and shortages of medical personnel, the so-called brain drain, and the unequal distribution of highly qualified medical professionals exacerbate these problems by further limiting access to care and degrading its quality for vast swaths of the population. West Africa is highly susceptible to the rapid spread of infections due to its unfavorable climate and environmental conditions, as well as the high mobility between Nigeria and its neighboring countries. In recent decades, the region has experienced persistent outbreaks of meningitis, Lassa fever, monkey pox, and Ebola (along with COVID-19). All of these result in the West African countries high maternal mortality rate and infant mortality rate. The maternal mortality rate in West Africa is among the highest in the world, with statistics frequently topping 500 fatalities per 100,000 live births in countries such as Niger and Mali. Child mortality rates remain high, with countries such as Nigeria and Chad reporting under-five mortality rates of more than 100 fatalities per 1,000 live births (UNICEF, 2023)

This study focuses on the West African region during the period of 1990-2024, utilizing data from the World Bank's World Development Indicators. The research aims to analyze the effect of health expenditure on economic growth, determine the impact of health expenditure on some health outcomes, and examine for causal relationships between health expenditure and economic growth within the context of West Africa. The study includes a sample of 15 West African countries, selected based on the region's ongoing challenges such as poor health outcomes, low healthcare expenditure, and slow economic growth in comparison to other regions. By narrowing the study to this specific region and timeframe, the research provides a detailed understanding of the intricate relationships between health expenditure, health outcomes, and economic growth in West Africa.

OBJECTIVES

The study focuses on three specific objectives:

1. To examine the effect of healthcare expenditure on economic growth in selected West African countries.
2. To investigate the impact of per capita health expenditure on key health outcomes, including life expectancy, infant mortality, and maternal mortality rates.
3. To determine whether a causal relationship exists between healthcare expenditure and economic growth within the region.

Empirical Review

Health care expenditure plays an important role in shaping the economic trajectory of nations, particularly in developing regions where health systems often face limited resources. In West Africa, the link between health spending, health outcomes, and economic growth has become a subject of growing interest among scholars and policymakers. This is because health is not merely a social good but a fundamental driver of productivity and human capital development. A healthy population contributes to a more efficient Labor force and enhances overall economic performance. Conversely, inadequate investment in health care can perpetuate cycles of poverty, disease burden, and low economic growth.

The theoretical foundation for this relationship is rooted in endogenous growth models, which emphasize the role of human capital, including health, in sustaining long-term economic growth. Empirical studies across different regions have consistently shown that health expenditure can have a positive and significant impact on economic indicators such as GDP per capita, life expectancy, maternal mortality rate and infant mortality rate. However, the magnitude and direction of this effect vary depending on factors such as governance quality, demographic structure, and the efficiency of resource allocation within health systems. In the context of West Africa, where health challenges such as high maternal mortality, infectious diseases, and limited access to quality care persist, understanding this dynamic is crucial for designing effective policies.

This literature review explores existing research on the interplay between health care expenditure, health outcomes, and economic growth, drawing evidence from various analyses and country-specific studies. It highlights methodological approaches, key findings, and policy recommendations from diverse contexts including Nigeria,

CEMAC countries, Asian economies, and global perspectives, to provide a comprehensive understanding of how health investment influences economic performance. By synthesizing these insights, the review aims to inform strategies that can strengthen health systems and promote sustainable growth in West African countries.

Moradeke, I. D., & ABAZIE, O. H. (2023) investigates the impact of public health expenditure on economic growth in Nigeria. OLS methodology was employed to analysis the time series data sourced from CBN statistical bulletin in the course of the study ranges from 1981-2015. The result reveals that Health spending has positive and significant effect on economic growth in Nigeria with coefficient of determination of 98%. Recommendation was made that recognition of the fact that increase in government spending enhances the growth of the economy. This necessitate that there should be an increase in funding of the health sectors; more so concerted efforts should still be committed to funding crucial projects that will culminate to evident outcomes in the health sectors.

Piabuo, S. M., & Tieguhong, J. C. (2017) examined the relationship between health expenditure and economic growth in CEMAC (Cameroon, Chad, Central African Republic, Equatorial Guinea, Gabon and Republic of Congo) countries. This analysis compares the impact of health expenditure in CEMAC countries and five other African countries that have signed the Abuja Declaration. This study analyzed data from the World Development Indicators (2016) database using panel ordinary least square (OLS), completely modified ordinary least square (FMOLS), and dynamic ordinary least square (DOLS) econometric techniques. Both samples demonstrated a strong positive impact of health expenditure on economic growth. A change in health expenditure can raise GDP per capita by 0.38 and 0.3 units in five other African nations that meet the Abuja objective and CEMAC countries, respectively.

Khan, M. A., & Ul Husnain, M. I. (2019) investigates long run relationship between health care expenditure and real income in fifteen selected Asian countries over the period 1995–2014. Using the panel cointegration tests and controlling for cross-sectional dependence through unobserved common correlated factors (UCFs). The results show that health care expenditure and income are cointegrated. It is found that the income elasticity scales down when UCFs are controlled, which implies that ignoring UCFs produces biased and inconsistent estimates. Two broad policy implications can be drawn. Firstly, the presence of regional variation in HCE and its determinants in Asian countries needs due consideration when formulating health policy. Furthermore, health care being a necessity good requires more redistribution of health resources and more active health policy. There is also need to overcome the “financing gap” and the “provision gap” as suggested by Cotlear et al. (2015). Secondly, positive relationship between HCE and share of government spending in health care expenditure suggests that increasing public provisions for health care can increase the scope of redistribution of health care resources

Ramesh, B., & Nishant, J. (2004) present analysis of public expenditures on health using state level public health expenditure data to provide preliminary analysis on these issues. The analysis also suggests that elasticity of health expenditure when SGDP changes in only 0.68 which suggest that for every one percent increase in state per capita income the per capita public healthcare expenditure has increased by around 0.68 per cent. The study reveals that a spending of less than 1 per cent of the GDP on public health is not only dismally low but most of the expenditure is on staff salaries leaving little or nothing for facilities, drugs and other consumables. The large existing network of public primary care facilities can and should be used more effectively with the help of private partnerships to enable better delivery. Building better forward and backward linkages through a superior referral system would cause the secondary and tertiary care facilities to be more manageable and prevent them from being overburdened.

Bagadeem, S. A., & Ahmad, M. U. (2020) studies the relationship between economic variables and healthcare variables will enable a better policy framework for a country. This study focuses on GDP, healthcare expenditures and Out of Pocket expenses using an annual data from Saudi Arabian economy. The study uses statistical techniques such as unit root test, co-integration, linear regressions, Vector Auto Regressions and mediation technique for analysis. The research found that healthcare expenditure and GDP are correlated and co-integrated in long term and that the GDP can be best explained at a lag of 3 years by healthcare expenditure. Mediation analysis revealed that private health expenses mediate the relationship between government health expenditure and national income. The study further emphasizes the importance and need of private investment in the healthcare sector in the country which will further boost national income through private consumption of healthcare services

Joseph Ndengeye (2021) investigates Health and long run Economic Growth in African Union Countries: Panel data Analysis from 1995-2018. The core objective of this study is to explore the link between GDP per capita income and health in African Union countries. The study uses the linear regression, and every result indicates that fertility rate affects economic growth. The study further recommends that Common policy mobilizing funds for all government resources and effective use of available resources by involving other partners and increase ownership, transparency, and integrity of African countries authorities, Common African government policy to increase education expenditure to allow everyone child to enroll for school and Common policy related to fertility and mobilization on use of contraceptive methods among men and women of reproductive age.

Khindi,, Kripa, & Shestani, K. (2020) studied the Causality between Economic Growth and Health Expenditure: A time series analysis from 1996 till 2017 in Albania. The methods used are the ARDL Bounds testing approach for co-integration and the Granger causality test. The main results are: the variables per capita GDP and per capita HCE are not cointegrated. The ARDL model estimation points out the positive relationship between the two variables. The study confirms the existence of joint causality between per capita GDP and per capita HCE.

Awais, M., Khan, A., & Ahmad, M. S. (2021) studied Determinants of health expenditure from global perspective using a panel data analysis. The main goal of the present study is to investigate the worldwide, and income-based categorized countries (developed, developing, and transitional countries) macroeconomic determinants of health expenditure. The aim is to estimate the health expenditures, and its impact on demographic, economic, and environmental determinants. The results of the study concluded that macroeconomic variables significantly affect health expenditures. Moreover, personal remittances have a dual effect on health expenditure, i.e., a positive impact on transitional economies, while a negative impact on developing economies. In the same way, CO2 emission has a negative impact on worldwide, developed countries.

METHODOLOGY

This study employs the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model for data analysis, a versatile and effective econometric technique particularly suited for examining both short-run and long-run relationships between variables. The PMG-ARDL model is chosen due to its flexibility in handling variables of different integration orders, whether I(0) or I(1), without the need for pre-testing for unit roots, making it a reliable choice for the given panel dataset.

The panel model can be specified in a general linear form as follows:

$$\Delta GDPPC_{it} = \alpha_0 + \sum_{j=1}^p \alpha_1 \Delta GDPPC_{it-j} + \sum_{j=0}^q \alpha_2 \Delta HE_{it-j} + \sum_{j=0}^q \alpha_3 \Delta LE_{it-j} + \sum_{j=0}^q \alpha_4 \Delta IMR_{it-j} + \sum_{j=0}^q \alpha_5 \Delta MMR_{it-j} + \lambda_1 GDPPC_{it-1} + \lambda_2 HE_{it-1} + \lambda_3 LE_{it-1} + \lambda_4 IMR_{it-1} + \lambda_5 MMR_{it-1} + \mu t \tag{i}$$

Where:

Δ represents the first difference of the variables, used to capture short-term fluctuations.

$GDPPC_{it}$: Gross Domestic Product per Capita for country i at time t , serving as the dependent variable representing economic growth.

HE_{it} : Healthcare Expenditure for country i at time t , an independent variable reflecting public and private spending on health services.

LE_{it} : Life Expectancy for country i at time t , another independent variable indicating the average number of years a person is expected to live.

IMR_{it} : Infant Mortality Rate for country i at time t , an independent variable measuring the number of infant deaths per 1,000 live births.

MMR_{it} : Maternal Mortality Rate for country i at time t , an independent variable capturing the number of maternal deaths per 100,000 live births.

α_0 : The intercept term, representing the constant component of the model.

α_1 to α_5 : Short-run coefficients showing the immediate effect of changes in the independent variables on GDPPC.

λ_1 to λ_5 : Long-run coefficients measuring the sustained impact of the independent variables on GDP over time.

μ is the error term, capturing the unobserved factors affecting GDP for country i at time.

RESULTS, ANALYSIS AND DISCUSSION

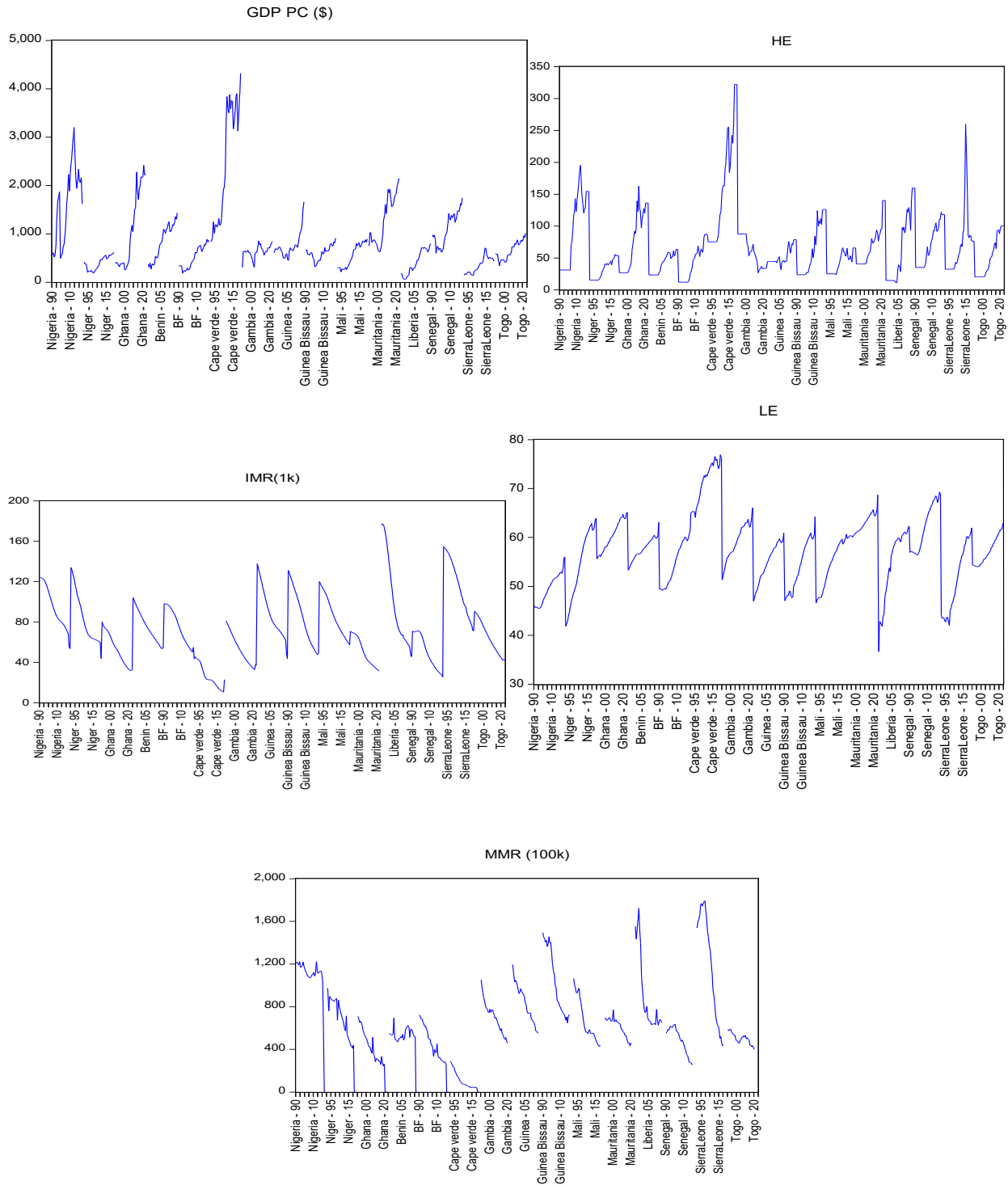


Table 2: Descriptive Statistics

	GDPPC	HE	IMR	LE	MMR
Mean	862.0526	62.09715	76.01461	56.62329	671.5618
Median	653.6185	653.6185	71.00000	56.96700	615.0000
Maximum	3903.050	260.2381	177.3000	76.59300	1792.000
Minimum	62.20597	10.96704	11.50000	36.68800	0.000000
Std. Dev.	711.8523	45.74882	31.77357	6.886655	364.9329
Skewness	2.136956	1.734662	0.612196	0.178762	0.743604
Kurtosis	8.023303	6.572726	3.334689	3.290849	3.734916
Jarque-Bera	864.5603	492.9116	32.02165	4.221788	54.69377
Probability	0.000000	0.000000	0.000000	0.121130	0.000000
Sum	411199.1	29620.34	36258.97	27009.31	320335.0
Sum Sq. Dev	2.41E+08	996246.5	480550.5	22574.79	63391781
observations	477	477	477	477	477

Source: Author (2025) using Eviews 12

Table 2 provides an overview of the key variables used in this panel data study, including GDP per capita (GDPPC), Healthcare Expenditure (HE), Infant Mortality Rate (IMR), Life Expectancy (LE), and Maternal Mortality Rate (MMR) across multiple countries over time. With 477 observations per variable, the summary statistics capture both cross-sectional and temporal variations, offering insights into the economic and healthcare dynamics of the region.

Stationarity Test

Table 3 presents the stationarity tests results which involve conducting a unit root test, which is the first step in the estimation process.

Table 3: Stationarity Test Results

VARIABLE	TEST	T STAT	PROB	SL
GDPPC	ADF - Fisher Chi-square	133.960	0.0000	I(1)
	ADF - Choi Z-stat	-8.62561	0.0000	I(1)
HE	ADF - Fisher Chi-square	162.827	0.0000	I(1)
	ADF - Choi Z-stat	-9.56804	0.0000	I(1)
IMR	ADF - Fisher Chi-square	48.6498	0.0171	I(0)
	ADF - Choi Z-stat	3.27093	0.9995	I(1)
LE	ADF - Fisher Chi-square	76.9294	0.0000	I(1)
	ADF - Choi Z-stat	-3.79536	0.0001	I(1)
MMR	ADF - Fisher Chi-square	130.465	0.0000	I(1)
	ADF - Choi Z-stat	-7.34773	0.0000	I(1)

Source: Author 2025

The results in Table 3 suggests GDPPC is non-stationary at levels but becomes stationary after first difference across countries in the panel. Healthcare spending follows a non-stationary process at levels but attains stationarity once

differenced, supporting the need for differencing when modeling HE in the ARDL framework. Infant Mortality Rate (IMR) presents mixed results. Given these conflicting results, IMR exhibits properties of either I(0) or I(1). Life Expectancy tests confirm non-stationarity at levels but stationarity at first differences. Finally, Maternal Mortality Rate are non-stationary at levels but become stationary after first differencing.

Table 4: Panel Cointegration Results

	Stat	Prob	W.Stat	Prob
Panel v-Statistic	-1.024642	0.8472	-2.495333	0.9937
Panel rho-Statistic	3.690791	0.9999	3.287710	0.9995
Panel PP-Statistic	0.460512	0.6774	-1.101047	0.1354
Panel ADF-Statistic	-3.224401	0.0006	-4.57507	0.0000
Group rho-Statistic	3.902002	1.0000		
Group PP-Statistic	-2.593107	0.0048		
Group ADF-Statistic	-3.054914	0.0011		

Source: Author (2025) using Eviews 10

Table 4 presents the panel cointegration results. The Panel v-Statistic shows a test statistic of -1.024642 with a p-value of 0.8472. The negative value further suggests a lack of evidence for a long-run relationship. The Panel rho-Statistic also supports the conclusion of no cointegration. The positive rho value indicates persistent deviations from equilibrium rather than convergence, implying the absence of a stable long-run relationship. The Panel PP-Statistic produces a test statistic of 0.460512 and a p-value of 0.6774 and also reinforces the result of no cointegration between the panel variables. The Panel ADF-Statistic reports a test statistic of -3.224401 and a p-value of 0.0006. This result is statistically significant at the 1% level, leading to the rejection of the null hypothesis and indicating the presence of cointegration. This suggests some evidence of a long-run relationship among the variables. The Group PP-Statistic shows the presence of cointegration at the group level. Finally, the Group ADF-Statistic has a test statistic of -3.054914 with a p-value of 0.0011 also supports the presence of cointegration. While most rho and PP statistics fail to detect cointegration, the ADF statistics both panel and group provide strong evidence of a long-run relationship between the variables.

Table 5: Granger Causality Results

Null Hypothesis	Observations	F-stat	Prob
HE does not Granger Cause GDPPC GDPPC does not Granger Cause HE	481	6.89241	0.1178 0.0011
IMR does not Granger Cause HE HE does not Granger Cause IMR	492	3.15911 0.72946	0.0433 0.4827
LE does not Granger Cause HE HE does not Granger Cause LE	495	3.82330 0.68010	0.0225 0.507
MMR does not Granger Cause HE	447	1.32409	0.2671

HE does not Granger Cause MMR	0.71159	0.4914
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The results in Table 5 indicates that past values of GDPPC significantly predict HE. This suggests that as countries' economic output grows, healthcare expenditure tends to increase, reflecting the tendency of wealthier nations to invest more in public health services. However, the reverse relationship whether HE Granger causes GDPPC is not statistically significant, implying that healthcare spending does not directly predict future economic growth in the short run within the panel data context. IMR Granger causes HE, suggesting that worsening infant mortality rates may drive increased healthcare spending, possibly as governments respond to public health crises. However, HE does not Granger cause IMR, meaning healthcare expenditure does not show an immediate impact on infant mortality rates in the short term. A similar pattern emerges for LE and HE, with LE Granger causing HE indicating that rising life expectancy influences future healthcare spending, but the reverse relationship (HE causing LE) is not statistically significant. Additionally, there is no causal relationship between MMR and HE in either direction, suggesting that healthcare expenditure does not directly respond to or influence maternal mortality in the short term across countries and time periods.

Table 6: Long run ARDL Results

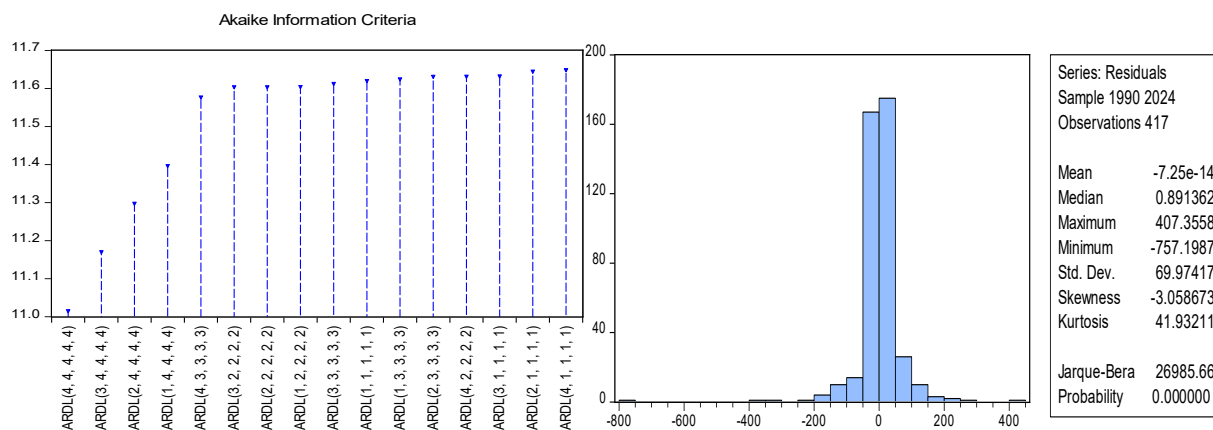
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
HE	3.435268	0.298165	11.52138	0.0000
IMR	10.10195	1.416609	7.131082	0.0000
LE	88.10365	5.957966	14.78754	0.0000
MMR	0.55191	0.082616	6.680414	0.0000

Source: Author, 2025

For HE, the coefficient is 3.4353 with a standard error of 0.2982 and a t-statistic of 11.5214, statistically significant at the 1%. This implies that, on average, a one-unit increase in healthcare expenditure is associated with a 3.44-unit rise in GDP per capita across the panel of West African countries. The positive and significant relationship suggests that sustained investments in healthcare bolster human capital by improving worker productivity and reducing disease burden, ultimately fostering long-run economic growth. For IMR, the positive coefficient indicates that a one-unit increase in IMR corresponds to a 10.10-unit rise in GDP per capita across the panel. While this result contradicts theoretical expectations as higher infant mortality typically signals poor health outcomes that should hinder economic growth it may reflect the unique structural dynamics within West Africa. For instance, the economic gains observed could be driven by sectors not directly linked to improvements in child health, or there could be unobserved factors like high fertility rates offsetting the negative effects of infant mortality.

Regarding Life Expectancy, a one-unit increase in life expectancy leads to an 88.10-unit rise in GDP per capita across countries. The strong positive relationship aligns with the human capital theory, emphasizing that longer life expectancy enhances the quality and productivity of the labor force. This is particularly relevant in a panel context, as countries with increasing life expectancy may experience compounding economic benefits over time, reinforcing the health-growth nexus. Finally, for Maternal Mortality Rate, The positive relationship, where a one-unit increase in MMR corresponds to a 0.55-unit rise in GDP per capita, is counterintuitive. In theory, higher maternal mortality should signal weak healthcare systems and declining economic productivity. However, this result may point to underlying structural factors across the panel, such as the concentration of economic growth in non-health-related sectors or omitted variables affecting both maternal health and economic output.

4.7 Criteria Graph



Source; Author 2025

The Akaike Information Criteria (AIC) plot displays the goodness of fit for various ARDL model specifications, with each model denoted by different lag structures, such as ARDL (4,4,4,4) and ARDL (1,1,1,1). The AIC values are used to compare these models, with lower values indicating a better model fit. From the graph, ARDL (4, 4, 4, and 4) has the lowest AIC value, suggesting it is the most suitable model among the options considered.

The study findings offer a deeper look at how healthcare spending, health outcomes, and economic growth interplay in West Africa. The descriptive statistics show wide differences among countries. Some have much higher GDP per capita, better health spending, and lower mortality rates than others. These gaps highlight long-standing structural differences in the region and suggest that each country needs its own targeted policies rather than one blanket solution. The fact that many variables are not normally distributed also shows that West Africa’s economic and health patterns are complex and require models that can handle these irregularities.

The correlation results support what economic theory already suggests. Countries with higher GDP per capita tend to spend more on healthcare and have higher life expectancy, while also recording lower infant and maternal mortality rates. This reinforces the idea that economic growth improves health outcomes, and better health in turn supports economic progress. The strong links between the health indicators themselves for example, the negative relationship between infant mortality and life expectancy, or the positive relationship between infant and maternal mortality, show how interconnected public health outcomes are.

The Granger causality tests help clarify these relationships by showing their direction. Economic growth was found to lead to increased healthcare spending, which means that when countries grow, they invest more in health. On the other hand, high infant and maternal mortality were found to cause lower GDP per capita, showing how poor health can slow economic performance. These results emphasize that health is not just a social concern but a key driver of the economy. The two-way causality between some health indicators also highlights the tight linkages within health systems.

The panel ARDL model confirmed that healthcare spending and life expectancy have positive long-run impacts on GDP per capita, supporting the human capital theory that healthy populations are more productive. However, the unexpected positive long-run coefficients for infant and maternal mortality challenge typical expectations. These unusual results may be linked to unique structural features of West African economies such as heavy dependence on natural resource sectors that may grow regardless of health conditions. This suggests that future research should include additional factors or qualitative explanations.

In the short run, the effects of health on economic growth were generally weak. Healthcare spending showed only a mild short-term impact, implying that the economic benefits of health investments take time to materialize. The negative and significant error correction term shows that the system moves back toward long-run equilibrium, confirming the reliability of the results.

The country specific analysis also revealed large differences. Countries like Niger, Burkina Faso, and The Gambia showed stronger adjustment speeds and more active interactions between health and growth. Ghana, however,

displayed unusual patterns such as a positive cointegration term, suggesting structural challenges in its long-run relationships. Maternal mortality emerged as a particularly important factor, showing strong negative short-run effects on GDP per capita in several countries.

Overall, the study demonstrates that health and economic growth are closely linked in West Africa, especially in the long run. While improving health systems may not boost economic growth immediately, the long-term benefits are significant. These results support the need for sustained, equitable investment in healthcare, positioning health not only as a social priority but also as a key foundation for inclusive and resilient economic development across the region.

CONCLUSION AND POLICY RECOMMENDATIONS

The descriptive statistics highlighted significant disparities in healthcare spending and health outcomes across the region, painting a clear picture of structural and developmental asymmetries. The non-normal distribution of key variables, coupled with wide standard deviations, pointed to the need for policy differentiation across countries rather than a one-size-fits-all approach. These preliminary insights set the stage for a more robust econometric investigation, revealing that countries within the region are at different stages of health system development and economic maturity. Correlation analysis demonstrated strong and intuitive associations between economic growth and health indicators. GDP per capita was positively linked with healthcare expenditure and life expectancy, while it was negatively correlated with infant and maternal mortality rates. These findings reaffirm conventional economic theory, which posits that improved health conditions can drive labor productivity and economic output, and that wealthier nations are better positioned to fund robust healthcare systems.

Granger causality tests provided insights into the directionality of relationships. The evidence of unidirectional causality from GDP per capita to healthcare expenditure suggested that economic expansion leads to increased investment in the health sector, consistent with the idea that governments tend to allocate more resources to public goods as fiscal space widens. Unit root tests confirmed that the variables are mostly integrated of order one, while trend analyses identified strong deterministic patterns, with GDP, healthcare expenditure, and life expectancy rising steadily over time, and infant and maternal mortality rates trending downward. These findings reflect progress in public health and economic development in the region, though the pace and consistency of improvement vary significantly between countries. The cointegration results, though somewhat mixed across testing methods, generally supported the existence of long-run relationships, providing a solid foundation for the use of the panel ARDL approach.

The long-run estimates from the ARDL model confirmed the significance of healthcare expenditure and life expectancy in promoting economic growth across the panel. These findings are aligned with human capital theory and support the argument that health is not merely a social goal but a driver of economic performance. However, the unexpected positive coefficients for infant and maternal mortality rates, contrary to theoretical expectations, suggest the presence of deeper structural complexities or possible omitted variable bias. It is possible that economic growth in some countries is driven by resource sectors or other dynamics that are not immediately sensitive to health indicators.

The study recommends the following:

1. Governments in West Africa should prioritize increased and sustained investment in the healthcare sector as a long-term economic development strategy. The study found that healthcare expenditure has a significant positive effect on GDP per capita in the long run. Therefore, allocating a higher percentage of national budgets to health, particularly in infrastructure, workforce development, and service delivery, can stimulate economic growth by improving population productivity and reducing the disease burden.
2. Policy efforts should target increased per capita health spending toward improving life expectancy and reducing infant and maternal mortality. The study showed that although per capita health expenditure is linked to better health outcomes, outcomes vary significantly across countries. Governments should ensure that health funds are directed toward high-impact areas such as maternal and child healthcare, access to essential medicines, immunization, and primary healthcare services, especially in underserved regions.

3. Given the unidirectional causality from economic growth to healthcare expenditure, economic growth strategies should be designed to reinforce and finance health sector improvements. As national income increases, governments should commit to translating economic gains into higher health investment. This requires embedding health priorities within broader national development plans and using economic growth to widen fiscal space for public health funding, ensuring that improvements in economic performance are matched with proportional increases in health spending

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