THE NEXUS BETWEEN HEALTH CARE SPENDING AND ECONOMIC GROWTH IN SELECTED COUNTRIES IN SUB-SAHARA AFRICA

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Abstract

The study investigates the relationship between healthcare spending and economic growth in six selected Sub-Saharan African countries: Nigeria, Ghana, Togo, Benin, Cameroon, and Ethiopia. The study employs the Autoregressive Distributed Lag (ARDL) model as an estimation technique to analyse the panel data which spans from 2000 to 2020. The research examines both the short- and long-run impacts of healthcare spending, population growth, and life expectancy on real GDP (a proxy for economic growth). Based on the ARDL panel results, it is stated that, in the short run, both healthcare spending and life expectancy exert a significant negative impact on real GDP. However, in the long run, real GDP is positively and significantly influenced by all the regressors, highlighting the crucial role of healthcare investment in driving economic development. Additionally, the Granger causality test reveals a bidirectional relationship between real GDP and per capita health spending, suggesting that enhancements in healthcare can stimulate economic growth, and economic growth, in turn, can lead to increased healthcare investments. The study strongly recommends that policymakers in these countries adhere to the Abuja Declaration by allocating 15% of their national budgets to the healthcare sector to bolster economic outcomes. These findings emphasize the critical importance of sustained healthcare investment as a catalyst for long-term economic growth in Sub-Saharan Africa.

Keywords: Health care spending, economic growth, panel data, GDP, life expectancy

Introduction

Human and physical capital are essential components for any nation's global expansion and development. In the words of Romer (1990), the development of human capital promotes economic growth. Educational achievement, health status, and training all contribute to the development of human capital. When the complexities of the endogenous growth hypothesis are investigated, spending on health and education is viewed as a means of increasing human capital, which would promote internal technological development and accelerate economic growth. How much financial resources a

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government devotes to health care from its aggregate resources is shown by the government spending on health care (GSH) as a percentage/ratio of GDP. This includes all current and capital healthcare expenditures across all levels of government (Qehaja, Qehaja, Hoti & Marovci, 2023). When discussing the health and income relationship, Sinha and Mbulawa (2023) pointed out that globally, sustainable development goals (SDGs) 3 and 8 which aim to ensure sound health and promote well-being for everyone at all ages underpin the need to comprehend the income and health relationship. They noted that healthy living/lifestyles support productivity and, as a result, future economic growth. High health spending is said to cut mortality and morbidity rates, increase the population's working age, and ultimately increase per capita earnings. The population's intellectual and physical development increases as the country's health does.

Sustainable development as opined by Ghaleno, Bayat, Esfandiari, and Dupuy (2023), is built on healthy people. As a result, spending on social security can increase labour productivity through the development of human capital, which helps to advance sustainable economic growth. Emphatically, Mushkin's health-led growth theory (Bedir, 2016), explained how healthcare expenditure can help boost the economy. This theory holds that since health is a form of capital, investing in it will boost earnings and promote general economic growth. The accumulation of human and physical capital is one way that health might influence economic growth (Elmi & Sadeghi, 2012). Growing national healthcare spending would tend to increase labour productivity, the standard of life, and overall welfare since healthcare is a crucial component of human capital investment. In addition to improving health outcomes, healthcare investment has been attributed to extending life expectancy and lowering newborn and morbidity mortality rates (Murthy & Okunade, 2009; Bedir, 2016). Therefore, having good health is an important aspect of having human capital, and a society's degree of health and its level of economic growth are closely related.

Over the years, economic expansion and health spending in Sub-Saharan African economies have varied greatly between and among nations. Precisely, health spending has gotten less attention in government budgets, particularly in some African countries (Nigeria, Ghana, Togo, Benin, Cameroon, & Ethiopia inclusive) and other regions of developing where resources are relatively low (See Aboubacar & Xu, 2017; World Development Indicator, 2021). Africa makes up 10% of the global population also for 3% of global health expenditure (Kiymaz, Akbulut, & Demir, 2006). In addition, the majority of countries in Sub-Saharan Africa, such as Nigeria, Ghana, Benin, Cameroon, and Ethiopia, remain behind in terms of consuming health care. This is because these countries have not been able to assign fifteen percent of their budgets to healthcare funding (except Togo), despite the Abuja Declaration of 2001, which stated that fifteen percent of the total budget should be allocated to the healthcare sector. Accordingly, in 2009, it was suggested that low-income countries should budget at least US$44 per person (WHO, 2013; Piabuo & Tieguhong, 2017), to cover the fundamental costs of healthcare services for the citizenry, but Togo, Benin, and Ethiopia have not implemented this recommendation. Other issues confronting the health sector in the survey economies include low-income levels of households, poor management of resources allotted to the sector, and inadequate healthcare systems.

Though several researches on the connection between expenditure on healthcare and the growth of the economy have been investigated in different nations, just a handful of these studies have concentrated on African nations. Even in cases when such research has been done, the results are not definitive. Additionally, several of the earlier research has a problematic methodology. To analyze the causative association between the chosen variables, for instance, several prior research has placed undue reliance on bivariate causality models, which are subject to the omission or absence-of-variable bias. To resolve these limitations of extant studies, this study further assesses the connection between healthcare spending and growing economies in selected African nations (Nigeria, Ghana, Togo, Benin, Cameroon, & Ethiopia), with low healthcare consumption. The study is crucial as it evaluates how spending on health care contributed to the expansion of these economies and, likewise, suggests ways, policymakers can develop the best possible policies to improve the health subsector in their respective nations. This study of writing is split into five different subsections. The introduction, literature review, and methodology are presented in sections one, two, and three. The result presentation and conclusions/recommendations are shown in sections four and five.

Literature Review

This section is divided into three parts: conceptual, theoretical, and empirical.

Conceptual Review

One of the reconciled definitions of health was ascribed to WHO in the year 1946 and it goes thus, as a state of total mental, physical, and social well-being and not simply the lack of illness or disability and the capacity to live an economically and socially productive life. Total health spending is the sum of all health spending by the entire government and all private spending in a particular year. The term "general government expenditure on health" refers to the direct costs incurred by the central/federal, state / provincial/regional, and local/municipal governments, extra-budgetary organizations, social security programs, and parastatals to improve the health status of the population and/or distribute medical care goods and services among the population. All of them may be paid for using either internal or external finances. The current cost of healthcare per capita in current US dollars is known as current healthcare costs per capita (current US$). In other words, the estimates of current health expenditures include the cost of healthcare tools and services used annually (World Bank, 2021).

Ologunwa and Sadibo (2016) define economic growth as a consistent rise in a nation's economic activity as shown by its gross domestic product (cited Adegbite *et al*., 2023). Thus, the economic expansion in a nation is a consequence of a boost number of goods and services being produced per population within a particular period. As soon as the factors that are responsible for economic expansion are identified, an economy that is growing is beginning to emerge. It has been demonstrated that economic progress is not possible anywhere in the world, particularly in countries located in Africa (Osho & Efuntade, 2019).

In research conducted by Pritzker, Arnold, and Moyer (2015), the gross domestic product (GDP) serves as an economic measure representing the value of goods and services produced within an economy during a defined period. GDP functions as a gauge of the economic scale, focusing on current production rather than sales figures. Consequently, GDP evaluates the economic performance in terms of economic growth, quantifying the total market value of all finished goods and services generated within a country over a specified duration.

Theoretical Reviews

The endogenous growth model (EGM) is one key model that analyzed growth-health connection. The EGMs incorporate the process that describes how public health investments impact economic growth and economic development. These models, in the opinion of Piabuo and Tieguhong (2017), emphasize the importance of human capital development to economic progress and growth. Neo-classical growth theories attribute economic expansion to population expansion and savings. Solow (1956) emphasized that, and every other thing remained the same, economies with larger savings would benefit from higher per capita income. Therefore, the key variables influencing per capita income across nations in Solow's model are population size and savings rate (Hashmati, 2001).

In 1965, Buchanan created a theoretical framework that urged government agencies to boost health spending regardless of need. This idea emphasizes that poor quality of treatment, such as congestion, infrastructure, and unequal staffing distribution, should be used to identify inefficient healthcare delivery rather than a shortage of supply (Cited in Piabuo & Tieguhong, 2017). The significance of human capital on growth was also underlined in the Mankiw, Romer, and Weil (1992) enhanced Solow model. In these endogenous models, human capital is not taken for granted. Instead, they are built on human capital's capacity to impact both short- and long-term growth.

The Grossman (1972, 2000) health production theory also explains how investing in health leads to better output and better health. Promoting good health involves how individuals utilize their resources, such as financial wealth to enhance their well-being. Therefore, social, environmental, and economic factors are treated as significant inputs to the production mechanism in Grossman's (1972, 2000) theoretical study. In his research, improving outcomes in both the non-market (home) and market (job) sectors requires investment in human capital (personal health and education). One of the elements of human capital, and one that is functionally related to economic growth and health spending, is highlighted by the theoretical studies addressed in this article.

Health Care Payments in Africa

From Table 1, the only country with a domestic general government spending on healthcare (GGHE) that is larger than 15% of the total general government spending (GGE) is Togo, though, with less than $44 per capita spent on overall health. Therefore, creating a strong system for funding healthcare is one of the most important ways to demonstrate a leader's political will, commitment, and capacity to deliver on those obligations.

Table - 1
Table Showing Level of attainment of Abuja Declaration and HLTF Targets

Health care spending in US$	GGHE/GGE more than 15%	GGHE/GGE less than 15%
In total, more than forty-four dollars are spent on health care for each individual.	Rwanda, Botswana and Zambia (Three nations)	Equatorial Guinea, Cameroon, Gabon, Ghana, Guinea-Bissau, Cape Verde, Lesotho, Mauritius, Congo, Namibia, Nigeria, Sao Tome and Príncipe, Côte d'Ivoire, Senegal, Seychelles, South Africa, Swaziland, and Uganda (20 countries).
Overall, the amount of money spent on health care is less than 44 dollars per person.	**Togo** and Madagascar (Two economies)	Other nations included are Benin, Burundi, Chad, DRC, Eritrea, Ethiopia, Burkina Faso, Gambia, Guinea, Kenya, Liberia, Malawi, Mali, Mauritania, Mozambique, Niger, Comoros, Sierra Leone, Tanzania, and the Central African Republic (20 nations).

Source: Piabuo and Tieguhong, (2024)

Countries with lower incomes should consequently allocate a minimum of $44 per individual as of the year 2009 to provide a basic range of health care services, as can be seen from the information shown above, which indicates that there is a high level of Commission on Innovative International Financing for Health Systems (HLTF). Despite this, the following African countries were excused from the rule: Botswana, Rwanda, and Zambia. As a result, the majority of the countries that were chosen came up short in this regard. On the other hand, it is of great significance that Equatorial Guinea has a substantial amount of money spent on health care per person, even though it was unable to meet the requirements of the Abuja statement, as stated by WHO (2013). At the same time, the Global Health Expenditure Database (2020) made the declaration that the almost average overall spending on health care in African regions was $135 per capita in the year 2010. This information was derived from the paper that González and Marino (2020) compiled. This constitutes 4.2% of the overall average amount of $3,150 that ought to be spent on health care for the nation that has a high level of income. The majority of African countries are scientifically characterized as either poor or medium, and they struggle to raise adequate cash to complete their commitment to providing high-quality medical care. This is because they are still in the process of developing their economies.

Empirical Literature

Lately, researchers have looked at the association between the expansion of the economy and well healthcare spending. Results are conflicting and vary owing to context, variable estimation, period, and analytic approach. Although some research has shown that there is no connection between the two, others are positive and others negative. For instance, Barro (1998) revealed a bit of rise in the life expectancy at birth raises the growth rate by 4% employing a sample of 100 nations spanning from 1960–1990 and average data every five years. Similar to this, using a somewhat distinct methodology, Bhargava, Dean, Lawrence, and Christopher (2001) showed that there is a correlation that is both positive and substantial between health and education and income, with a marginal impact of approximately 4%, controlling for endogeneity.

Gyimah-Brempong and Wilson (2004) used an expanded version of the Solow model that takes into consideration a combination of the stock and investments in healthcare to research the impact of health stock on the expansion of the economies of Sub-Saharan Africa and OECD nations. The authors discovered that having good physical and mental health had a favourable and considerable impact on economic growth, with a marginal impact on one's health on the growth of 11.1 percent for African regions and 2.18% for OECD nations.

In another study, by Wahab and Kefeli (2016), there was a different study conducted by Aguayo and Iris in the year 2005. In this study, OLS was utilized to investigate the relationship between health capital and economic growth for a total of thirteen European countries, twelve African countries, sixteen American countries, and eleven Asian countries between the years 1970 and 1980 and 1980 and 1990. In the aftermath, it was discovered that there is a positive and considerable impact between health care and economic growth, particularly when using a variable that incorporates all health determinants. This was particularly the case when the findings were analyzed. A study was carried out by Jamison, Lau, and Wang (2005) for 53 countries between the years 1965 and 1990. The data for this study was collected every five years. To estimate the model, the authors utilized the maximum likelihood technique. The results of the estimation showed that there is a consistent and positive association between health and economic growth which is both positive and large.

In a different study, Baltagi and Moscone (2010) use data from 20 OECD countries between 1971 and 2004 to estimate a regression equation for healthcare spending depending on GDP and other control variables. The authors conclude that spending on health care is more of a need than a luxury, with a low prediction by earlier studies. Additionally, Hartwig (2010) uses the panel Granger causality test to conduct causality testing for a group of 21 OECD nations from 1970 to 2005, and the author discovers that healthcare capital accumulation promotes long-term economic growth across all the OECD nations under consideration.

Sulku and Cancer (2011), for instance, looked at the correlation between the income per capita, the amount spent on health care per person, and the increase in population within

Turkey from 1984 to 2006 using time series data. The authors discover that the income elasticity of all health care costs is less than one using the approach of multivariate cointegration methods. This means that a 10% rise in total per capita results in an 8.7% increase in aggregate health expenditures per capita. On the other hand, the income elasticity of public healthcare spending was below one. The fact that private health care costs There is more than one, which shows that personal health care is now available in Turkey, this is more of a luxury than a need. Further research by Mehrare and Musai (2011a) utilizing cointegration techniques developed by Gregory Hensen (1996), which account for the structural discontinuities in data, to analyze the relationship between spending on healthcare and the growth of the economy for Iran for the period of 1979–2008. The long-term linkage between healthcare expenses and income elasticity of medical demand during the period under review as opined by the scholars. The findings also point to a one-way causal link between GDP and health spending, leading to the conclusion that health spending did not Granger influence economic growth.

With the aid of the Johansen cointegration technique and the error correction model (ECM), Aurangzeb (2001) also examines the interaction between spending on healthcare and economic output for Pakistan from 1973 to 2003 using an augmented Solow Growth model. The author discovers a significant and favorable relationship between GDP and health spending in both the short- and long-run. Additionally, some actual data came from Nigeria, to evaluate the effect of government spending on health on economic growth by Odior (2013), with the use of integrated sequential dynamic computable general equilibrium (CGE) model during the years 2004–2015. The results imply that a key factor in Nigeria's economic growth is the redistribution of government spending to the health sector.

Dauda (2011) employs descriptive statistics, the Johansen cointegration technique, and the error correction model (ECM) to investigate the relationship between medical expenses and economic performance in Nigeria from 1970 to 2009. The study indicates that health spending has a positive and statistically significant impact, while the coefficients for the second and third lags show negative significance. The ECM's results have an expected adverse relationship and statistical significance, and their coefficient of 40% suggests that the rate of adjustment is 40%.

Research published in the year 2012 by Kulindwa and Nerima used the OLS technique to examine the association between health spending and economic development in Uganda between 1980 and 2010. The influence of health investment on long-term economic growth in Uganda was demonstrated by the findings.

Mila and Sadeghi (2012) investigated the influence of health spending on economic growth using panel data spanning between 1990 to 2009. The study adopted VECM. There was no correlation between the sum of funds expended on health care and the short-term economic success, as demonstrated by the findings of the study. The long-term link between expenditure on health care and economic growth, on the other hand, was acknowledged. Conversely, starting from 1970 to 2009, Lago-Peas, Cantarero, and Blázquez (2012) investigated the relationship between gross domestic product and health

spending in each of the 31 countries that make up the OECD. According to the findings, the nations that were investigated experienced a significant increase in both their per capita income and their health spending over time.

Between 1990 and 2012, Omitogun (2014) empirically investigated the factors that affected Nigeria's public health spending. The goal of the study was to pinpoint the variables that may increase Nigerian health spending. Total government health spending was regressed on real GDP, population size, the share of health spending in total government spending (a proxy for government funding for the development of the health sector), the rate of unemployment, an econometric model that takes into account both the consumer price index, which serves as a proxy for health care prices, and political instability. According to the findings of the regression analysis, the real gross domestic product and the percentage of total government spending that is allocated to health care are both positively connected with total health spending. Furthermore, these correlations are statistically significant at the one percent and five percent levels of significance, respectively. The gross total health spending of the government is negatively correlated with both political unrest and unemployment, albeit this correlation is not statistically significant. Among other things, it was suggested that the government's financial allocation to the health sector be increased to the WHO-recommended level of 15% of the government's yearly budgetary allocation. As a result, government spending on health will significantly improve Nigeria's health condition and conform to WHO recommendations for fiscal support of the industry.

In a similar vein, Monterubbianesi, Grandes and Dabús, (2017) estimated better health status on long-run per capita income using a panel of 91 countries over the period 1960–2005 to measure the contribution of health to economic growth. The primary findings demonstrated that the marginal impact of a change in health status on long-term earnings ranges from 2.6% in growth accounting models to 8.3% in "a la Barro" estimated regression analyses. These outcomes are in line with the marginal impacts that the model quantifies using the preceding literature's point estimates for health growth.

Toda & Yamamoto (1969) cited by Bedir (2016) assessed the expenditures on health care on economic growth in emerging nations in Africa, Europe, the Middle East, and Asia from the period 1995 to 2013 and adopted a modified version of the Granger. It was revealed from the findings that income plays a crucial role with the explanation that healthcare costs vary across the selected regions. The research work concluded that riding in income level leads to health care costs in terms of encouragement in various developing nations across the board. At the same time, Piabuo and Tieguhong (2017) investigated on CEMAC sub-region with the adoption of POLS and it was revealed that health spending has a favorable and a very consequential influence on economic development. More so, there is also a long-term correlation between health spending and economic progress. Raghupathi and Raghupathi's (2020) empirical analysis suggested that spending on healthcare can lead to improved health opportunities, which can boost human capital and increase productivity, both of which can benefit economic performance.

According to the findings of a panel data analysis that was conducted by Qehaja et al. (2023) utilizing Western Balkan states, public health spending has a positive and large influence on GDP growth in the nations of the Western Balkans. This analysis was carried out between the years 2000 and 2020. When Ghaleno et al. (2023) investigated the relationship between the wealth of OPEC nations and the amount of money spent on healthcare, they used data from 2007 to 2018. The results of their investigation revealed that there is a significant and unfavorable correlation between healthcare spending and both have substantial expansion on the economy and the price of oil.

To determine how West African nations prioritize health, Adebisi *et al*. (2023) utilized data from 2010 to 2018. To discuss the data, descriptive statistics are used. The results showed that no West African nation achieved the minimal 15% health priority index. The three countries that came in first place with the highest average health priority index in the West African region were Burkina Faso (7.60%), Carbo Verde (8.29%), Ghana (8.43%) and Guinea-Bissau (3.56%) Guinea (3.05%) and Liberia (3.46%) had the lowest average health priority. To achieve UHC, the study reaffirms the necessity for West African governments and other pertinent stakeholders to give health top priority in their political goals. Following the above empirical reviews, it can be deduced that there is still scanty literature in the subject matter, especially in the countries, that this present study is evaluating using recent data.

Methodology

Both ex-post fact and exploratory designs were used for the study since the variables are secondary data sourced. The variables in question are total per capita health care (HEPCI), annual population growth (POPG), life expectancy (LIEX), and real gross domestic product (RGDP, a proxy for measuring economic growth). As described earlier, six countries from sub-Saharan Africa (SSA) are chosen using a practical selection approach based on the availability of data: Nigeria, Ghana, Togo, Benin, Cameroon, and Ethiopia. The understudy runs from 2000 to 2020.

The simple production function will be the bedrock for analysing the theoretical framework which will inform the model. According to the classical economist, all businesses in the economy generate output using a common production technique that uses labour and capital as inputs. As a result, the production function equation.

$$Y_t = f(K_t, L_t) \qquad (1)$$

s the quantity of output (portrayed by Y_t), the amount of capital (represented by $K_{t\,t}$), as well as the number of labour (depicted by L_t) at time 't'. Let K_t be taken to be capital in the form of investment or expenditure on health care and L_t be assumed to be a function of total population.

That is $K_t = HEP$ and $L_t = f(POPG)$

We rewrite the equation as:

$$Y_t = f(HEP_t, POPG_t) \quad (2)$$

Equation 2 is adopted to formulate the model of the study. Let Y_t be measured using real gross domestic product (RGDP), the redefined model is stated as:

$$RGDP = f(HEP, POPG) \quad (3)$$

This study draws from the works of Baltagi and Moscone (2010), Bakare and Sanmi (2011), Bedir (2016), and Qehaja et al. (2023), and make room for adjustment by including life expectancy (LEX) in the model. The model's functional forms are listed as follows:

$$RGDP = f(HEP, POPG, LEX) \quad (4)$$

The above equation can be restated as:

$$RGDP = \beta_0 + \beta_1 HEP_{it} + \beta_2 POPG_{it} + \beta_3 LEX_{it} + \varepsilon_{it} \quad (5)$$

Where:
RGDP = Real Gross Domestic Product or GDP (constant 2015 US dollars) in the survey countries
HEP = Per capita current health spending in US dollars in each of the economies.
POPG= aggregate population in the sampled nations.
LEX= Total life expectancy at birth in years in each of the sampled countries.
β_1, β_2 L_t and β_3 = Regression coefficients for the different variables
ε_{it} = Error term or stochastic term.
i =Individual country component and t = time component from 2000 to 2020

A priori Expectation

$$\frac{\partial RGDP}{\partial HEP} > 0, \quad \frac{\partial RGDP}{\partial POPG} > 0, \quad \text{and} \quad \frac{\partial RGDP}{\partial LEX} > 0$$

Both descriptive and analytical data analysis techniques were used in this investigation. Descriptive statistics, unit root tests (ADF) & Phillip Perron), Bound Test, and ARDL both short and long-run techniques were used to examine the data. Another pertinent test that supports further research and assessment is Granger causality technique. The econometric software; E-Views 10.0 is employed to estimate the data. In sum, secondary

data is collected and used. These published materials, facts, and figures came from World Development Indicators (WDI), which are available on the World Bank website. Six developing nations in SSA, including Cameroon, Ghana, Ethiopia, Togo, Benin, and Nigeria, provided the data for this article.

Result Presentation and Discussion

The outcomes in Table 2 depicts the descriptive properties of each of the variables (RGDP, HEP, POP & LEX) at the national and group levels. The mean per capita health care spending (HEP) in the result shows that three nations (Nigeria, Ghana & Cameroun) have values greater than the whole nation's average of $41.32.

Table - 2
Descriptive Statistics (for RGDP, HEP, POP & LEX) Individual Nations Likewise Whole Countries

		HEP	RGDP	POPG	LEX
NIGERIA	Mean	65.880	3.70E+11	1.63E+08	58.310
	Std. Dev. (stde)	25.911	1.14E+11	26756837	1.295
	Kurtosis (kur)	2.559	1.608	1.789	1.689
	Jarque-Bera Probability	0.513	0.384	0.506	0.463
ETHIOPIA	Mean	15.59	4.60E+10	90314566	58.93
	Stde	8.110	2.55E+10	15572452	5.311
	Kur	1.545	1.992	1.817	1.599
	J-b Prob	1.853	1.979	1.318	1.896
	Probability	0.396	0.372	0.517	0.387
CAMEROUN	Mean	48.244	2.67E+10	20228428	56.995
	Std. Dev.	10.007	6.60E+09	3561614.	2.927
	Kurt	2.600	1.842	1.832	1.612
	J-B Probability	0.303241	0.480	0.500	0.408
GHANA	Mean	59.166	3.85E+10	25715156	61.382
	Std. Dev.	26.491	1.45E+10	3919404.7	2.151
	Kuto	2.001	1.695	1.779	1.682
	J-B Probability	0.566	0.409	0.515	0.467
TOGO	Mean	31.789	3.46E+09	6620819.	57.649
	Std. Dev.	14.995	9.22E+08	1075882.	2.027
	Kurtosis	1.633	1.940	1.783	1.758
	J-B Probability	0.434	0.302	0.508	0.469
BENIN	Mean	27.231	9.67E+09	9583240.0	58.313
	Std. Dev.	6.0301	2.55E+09	1749173.1	1.295
	Kurtosis Kuto	2.546	2.151	1.839	1.689
	J-B Prob	0.689	0.468	0.519	0.463
Whole Six Nations	Mean	41.318	8.24E+10	52532058	58.597
	Std. Dev.	24.713	1.38E+11	58297519	3.123
	Kurtosis	2.607	5.993	3.123	3.020
	J-B Prob	0.008	0.000	0.000	0.997
	Observations	126.000	126.000	126.000	126.000

Author compilation (2024)

Nigeria is the most populated nation, with the highest RGDP, while the least RGDP, and populated is Togo (6620819). It is established that Ghana and Ethiopia have life expectancy that surpassed the whole nation's mean value of 58.597, as Ghana's longevity rate is 61.38, whereas, Cameroun has the lowest of 56.99 value. Based on the estimated Jarque-Bera tests, at the individual country-level results, for all the variables, the findings indicate that all the variables are keenly normally distributed as the probability values that were calculated are greater than that of the 5% significance level in the Table above. Contrary to the countries' level outcomes, the J-B statistics for the panel descriptive technique in Table 2 indicate that only LEX is normally distributed while other variables have figures lesser than 0.05, thus contrary to normal trends. The next test is the stationarity technique. The unit root tests are carried out to evaluate the stationarity properties of the selected four (4) variables. The techniques utilized herein include the PP (Phillips-Perron) and ADF (Dickey-Fuller) unit root techniques. The calculated unit root outcomes are depicted in Table - 3.

Table - 3
Table Showing Unit Root Estimates of PP and ADF

	ADF (Dickey-Fuller)				**PP (Phillips-Perron)**			
	LRGDP	LHEP	LPOP	LLEX	LRGDP	LHEP	LPOP	LLEX
NIGERIA (NIG)	-5.2	-4.92	-6.51	-3.4	-5.29	-3.64	-4.309	-7.1
	Mixed Order				**Mixed Order**			
ETHIOPIA (ETH)	-3.324	-4.288	-3.791	-7.154	-3.272	4.29	-3.733	-6.167
	Difference Order				**Difference Order**			
CAMEROUN (CAM)	-3.057	-4.674	-5.212	-4.724	-2.9299	-4.282	-8.173	-6.16
	Unit Root of Mixed Order				**Unit Root of Mixed Order**			
GHANA(GHA)	-2.789	-5.276	-6.019	-3.85	-2.789	-4.539	-6.03	-3.448
	Stationarity of Different Order				**Stationarity of Different Order**			
TOGO (TOG)	-4.038	-5.335	-4.984	-5.202	-2.734	-3.116	-7.022	-5.312
	Mixed Order				**Mixed Order**			
BENIN (BEN)	-4.391	-3.313	-4.159	-3.403	-3.268	-3.272	-5.773	-7.103
	Stationarity at Difference Level				**Stationarity at Difference Level**			
Panel Unit Root	**Levin, Lin and Chu T***				**Im, Pearan & Shin W-Statistics**			
WHOLE NATIONS	-2.94	-3.987	-8.635	-6.791	-2.583	-2.115	-8.241	-7.204
	Difference Level of Stationarity				**Difference Level of Stationarity**			

Author's estimation (2024).

Based on the results in Table 3, it can be said that all the estimated variables are integrated in different order, including the result of the panel data. Therefore, the ARDL F-Bound test is assessed.

To evaluate the long-run relationship among all the estimated parameters, the ARDL-bound econometric technique is utilized. The calculated results and critical levels are depicted in Table 4.

Table - 4
Table Showing F – Bound Cointegrated Order Test of ARDL

F-Bound Estimate				
Nations		Estimated Values	Critical Value	
NIG	F-Statistics	8.184	5%	2.79%
ETH		6.17		
CAM		23.58		
GHA		2.812		
TOGO		3.012		
BEN		8.208		

Author's estimation (2024).

From the results in Table 4, it is noted that all the variables are cointegrated, that is, they possess long-run association/relationship under the study periods. Drawing from the F-Bound result, the ARDL for each country and the panel data will be estimated.

The Table 5A gives a ARDL comprehensive analysis of the nexus between the outcome variable (LRGDP) and all the explanatory variables at each country level. The ARDL result for the Nigeria economy indicates that in the long and short run, health spending per capita and long term and of there is favourable at the same time significant influence on growth or expansion of the above-selected countries' economies (RGDP), however, an adverse effect of population on the economies is observed in the long-run, while direct impact in the SR. The estimate for the Ethiopian society reveals that LPOP and LLEX exert a negative effect on the economy in the LR, whereas the SR impact of LLEX on growth is noticed to be positive. Both LHEP and LPOP predict the dependent variable negatively within SR periods. For the Cameroonian result, LLEX directly exerts a direct effect on the predicted variables both at the LR and SR.

In the Ghana analysis, LPOP positively influences economic activities during the LR period but negatively predicts economic performance in the SR. Population is observed to hinder output growth in the LR in the Togo economy but supports growth within the SR era. Furthermore, healthcare spending is considered to relate positively with growth during the SR and LR periods in the analysis of the Togo result. In sum, while LHEP seems to support the growth of the national economy in Benin during both periods, the aggregate population is impeding the outcome variable (RGDP) during the period's understudy.

Table - 5A
Table Showing ARDL Outputs At Country Level

NATIONS		Variable	Coeff	T-Stat	R2	CointEq
NIG	LR	LPOP(-1)	-1.39	-2.25***	0.9	
		D(LHEP(-1))	0.095	2.12***		
		D(LLEX)))	1.95	2.05***		
	SR	D(LHEP(-1))	0.095	3.638**		-0.325
		D(LPOP)	1.226	3.478**		
		D(LLEX)	1.954	4.217**		
ETH	LR	D(LPOP(-1))	-2.221	-2.631**		
		D(LLEX)	-1.002	2.149 ***		
	SR	D(LHEP)	-0.126	-4.058**	0.96	-1.044
		D(LPOP(-1))	-2.222	-6.235*		
		D(LLEX))	2.092	4.5188*		
CAM	LR	LHEP	0.073	1.96		
		LLEX(-1)	2.912	3.84 **		
	SR	D(LLEX)	0.838	5.089**	0.637	-0.376
GHA	LR	LPOP(-1))	1.313	2.342**		
	SR	D(LHEP((-1))	-0.093	-2.854 **	0.8	-0.665
		D(LPOP(-1)))	-3.097	-3.728**		
TOGO	LR	(LHEP(-1))	0.661	3.089 **		
		((LPOP(-1))	-3.982	-2.506 **		
	SR	D(LHEP)	0.219	4.326**		
		D(LPOP(-2)))	2.814	6.883 *	0.919	-0.0239
		D(LLEX(-1)))	-5.319	-4.443**		
BENIN	LR	D((HEP(-2))	0.008	2.186***		
		D((LPOP((-2)	1.654	-3.556**		
	SR	D(LHEP(-2))	0.077	4.235*		
		D(LPOP)(-1)	-1.859	-9.593*	0.974	-0.491
			-1.173	-5.261*		

Author's estimation (2024).

Drawing from the panel results in Table 5B, all the regressors (LHEP, LLEX & LPOP) support RGDP positively as depicted by the LR analysis, surprisingly, a different outcome is noticed in the SR outcome, whereby the independent variables (D(LPOP), (DLLEX(-1)), (DLPOP(-1)), diminished the growth of the economies of the sampled nations. Particularly, the error correction coefficient has the right negative sign (-0.37661), which implies that if there is a disequilibrium in the economies, it will take about a speed of adjustment of approximately 38 percent for equilibrium to be restored from the SR to the LR.

Table - 5B
Table Showing Output Of Panel ARDL For The Whole Countries

SIX NATIONS RESULT	LR	LHEP	0.278	16.913*		CointEq
		LPOP	0.464	10.808*		
		LLEX	2.526	20.187*		
	SR	CONSTANT	0.859	2.580**		
		D(LHEP)))	-0.078	-3.257**		-0.37661
		D(LPOP((-1)	-1.623	-1.609		
		(DLLEX(-1))	-1.804	-2.047***		
1% (*), 5% (**) & 10% (***)						

Additionally, the researcher used the Granger causality test recommended by Granger (1969, 1986) to analyze and quantify the causal influences between LHEP and RGDP to meet the study's other goal. It should be noted that according to the Granger analysis, a time series X_t (let's say HEP) can only be said to cause a time series Y_t ($LRGDP_t$) if $X_t's$ past contributes to the forecasting of $Y_t's$ future after adjusting for $Y_t's$ past. This idea led to the Granger causality finding, seen below in Table 6.

Table - 6
Table Showing Granger Causality Result

Lags: 2				
Null Hypothesis:	Obs	F-Statistic	Prob.	Effect
LHEP →→→→ LRGDP	114	5.29089	0.006*	Two - Ways causality
(LRGDP) →→→→ LHEP		2.67059	0.074***	
LPOP →→→→ LRGDP	114	7.76840	0.001 *	One - Way Causal relationship
LRGDP d→→→→ LPOP		0.49571	0.6105	
1% (*), 5% (**) & 10% (***)				

Author's estimation (2024).

The result from Table 6 explained that when the variables were lagged twice, there was a bidirectional causal link that ran from LHEP to RGDP and there was a reversal from the regressand (LRGDP) to LHEP. Similarly, a unidirectional causal relationship runs from LPOP to LRGDP without feedback effect from RGDP to LPOP. Based on the outcome, it is concluded that per capita spending on health care and economic growth influence one another in the chosen economies under study.

Furthermore, the issue of endogeneity in the panel estimate was addressed. Endogeneity describes an issue in which an explanatory variable is associated/correlated with the error term. The correlation in the results contradicts the premise of exogeneity, resulting in biased and inconsistent estimates of parameters.

Thus, the Hansen J-test often known as the J-statistic is one of the essential diagnostic techniques for determining the validity of the instruments used in Generalized Method of Moments (GMM) estimate. One important goal of the Hansen J-test (or J-statistic) is to see that, valid instruments should be uncorrelated with the model's error term (instrument exogeneity) and sufficiently capture endogenous variation in the independent variables (instrument relevance).

The null hypothesis states that the instruments are valid—that is, they have no correlation with the error term and that the excluded instruments are appropriately removed from the calculated equation.

The findings from the estimations of the GMM and Hansen J-Test are shown in Tables 7 and 8. The outcome from Table 7 indicate that there is a strong positive and significant relationships between economic growth, and all the regressors (health care payments, population growth and life expectancy).

Table - 7
Table Showing GMM Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.	[95% Conf. Interval]
LHEP	0.15	0.04	3.75**	0	[0.07, 0.23]
LPOPG	0.22	0.05	4.4**	0	[0.12, 0.32]
LLEX	0.35	0.06	5.83*	0	[0.23, 0.47]
_cons	5.87	1	5.87*	0	[3.90, 7.84]

Author's estimation (2024).

The statistically significant of all the regressors in Table 7 highlight the importance of health investments and demographic variables in promoting economic growth.

Table - 8
Table Showing Hansen J-Test and its P-value

Test Statistic	Value	Prob.
Hansen J	3.12	0.21

Author's estimation (2024)

The Hansen J-test with a p-value of 0.21 and estimated statistic of 3.12, suggests that the study cannot reject the null hypothesis that the instruments are valid. This suggests that the instruments utilized in the model are most likely exogenous and suitable for dealing with endogenity. The Hansen J test validates the instruments and supports the dependability of the GMM estimates. Therefore, policymakers should prioritize boosting health spending and provide the right mechanisms for improving life expectancy, as these characteristics have been proved to benefit economic growth. Population growth management is also essential for promoting long-term economic development.

Conclusion and Recommendations

This study investigates the link between per capita healthcare spending and economic growth in several West African nations, including Nigeria, Ghana, Togo, Benin, Cameroon, and Sierra Leone. The panel data covered the years 2000 through 2020. ADF, PP, F-Bound test, panel Pedroni residual cointegration test, Autoregressive Distributed Lag (ARDL), and Granger causality tests were used to examine the data. All of the series were found to be stationary at level and one difference for the ADF and PP tests. The F-F-bound approach suggests that there is a long-term link among the variables at the national level but further research using the panel Pedroni residual cointegration test yielded a different result. According to the analyses of the F-bound results for each nation, the study was unable to rule out the alternative hypothesis of this work. As a result, all of the series are cointegrated, and the work of Sinha and Mbulawa (2023) supports this empirical proof of a cointegrated link between the variables.

The Autoregressive Distributed Lag (ARDL) method was also used to analyze the variables. According to the panel ARDL result, the main variable (LHEP) had a considerable influence on the economies (RGDP) of the tested countries, however, this impact was gradual as of the LR period and negative as of the SR period. The study tends to favor the alternative hypothesis two and reject the null hypothesis two. The results of Aurangzeb (2001), Odior (2011), Dauda & Akingbade, (2011), Mila and Sadeghi (2012), Raghupathi and Raghupathi (2020), and Qehaja et al. (2023) support the direct effect of HEP on RGDP, in contrast to the findings of Ghaleno et al. (2023) research. The SR result implies that household spending and government financing of each nation has a negative influence on growth. Nonetheless, the influence of household, private, government, and foreign expenditure will, however, accelerate the growth of these economies during the LR period if the funding is consistent and sustained.

In like manner, the Granger causality analysis revealed a two-way link between $LHEP_t$ and $LRGDP_t$. This result demonstrates that rising LHEP will support economic growth, and rising economic activity will raise buying power, which will lead to rising LHEP. The findings on the positive relationship between healthcare investment and capacity development of some West African nations are supported by the studies of Inuwa and Haruna (2012) and Odhiambo (2023). Furthermore, to address the issue of correlation between the explanatory variable and the error term: the GMM and J-test estimations were performed. The estimates were able to address the panel model's endogeneity problem, yielding accurate estimates of the impact of all the regressors on economic growth in the selected economies.

In sum, the findings emphasize the relevance of health-related measures (LHEP) in driving regional economic development. Following the results, the study recommended that the governments of Nigeria, Ghana, Togo, Benin, Cameroon, and Ethiopia must abide by the 2001 Abuja Declaration's suggestion to allocate 15% of their budgets to the health sector to improve government expenditure and funding to the health sector. Also, it is necessary to strengthen the current healthcare policies and programs and introduce new initiatives that will raise life expectancy rates, fertility rates, and health spending. Lastly,

the governments of these nations must also expand their economies to raise income per capita and adopt responsible policies that support macroeconomic stability, and the health, and education sectors. To reduce upfront costs, the policymakers in these nations must also implement common healthcare facilities and prepaid healthcare financing programs like social health insurance and tax-financed healthcare systems.

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