THE NEXUS BETWEEN POPULATION'S HEALTH AND ECONOMIC GROWTH IN CAMEROON: AN ERROR CORRECTION MODEL APPROACH

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Abstract

Public spending on health in Cameroon remains very low despite the dream of Economic Emergence in 2035. The main objective of this study is to analyze the impact of health on economic growth in Cameroon. It specifically seeks to determine the effect of life expectancy, health expenditure and fertility rate on the economic growth of Cameroon and employs the Error Correction Model (ECM) to analyze the dynamics of the model using secondary data from the World Development Indicator within 39 years. Results suggest that health plays a positive significant role in economic growth in Cameroon through life expectancy and health expenditure both having a unidirectional causality. The study recommends amongst others that legislation to discourage authorities from travelling abroad for medical care at the peril of domestic health investment be initiated in Cameroon. Also, the government should create an enabling environment for private sector investors and health-oriented NGOs to operate safely without being considered as agents of destabilization, especially in the Anglophone regions currently experiencing socio-political crises.
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1. INTRODUCTION

Centuries ago, human capital in terms of health and education was not apprehended by most policymakers as a strong vector of Economic growth, given

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that most studies emphasized physical capital accumulation as an engine for economic growth. During the 1960s, human capital started getting recognition for its contribution to economic growth (Acemoglu *et al,* 2019). The World Health Organization (WHO) considers the health status of every nation as an important prerequisite to its development. This is because health intrinsically increases the happiness index, life expectancy and productivity of a Country's labor force. Inspired by this scientific fact, three of the millennium development goals adopted by world leaders in 2000 were closely related to health (Toronto, 2019).

In a similar move, the African Union (AU) leaders in subscribing to the Abuja Declaration in 2001, pledged to allocate at least 15% of their annual budget to improve the health sector in their respective countries (Njamnshi *et al,* 2009). Even though few countries like South Africa, Morroco and Tunisia have made marginal progress, the sad reality remains that more than two decades after the Abuja Declaration, the health sector remains one of the most neglected in the continent. Consequently, many in Africa still die of Malaria, HIV/AIDS and other diseases which ought to be a thing of the past reasons why some see the continent as one of the worst places to live on planet Earth (Nkfusai *et al,* 2019).

While developed nations have over the years formulated precise policies and invested a substantial quota of their Gross Domestic Product (GNP) in health, Cameroon and many other countries of the South have done very little in this area. Health expenditure in the United States, for instance, represented up to 19.7 % of its GDP in 2019, while in the same year health expenditure in Cameroon only represented 3.6 % of Cameroon's GDP (Acemoglu *et al,* 2015). Even the promise of universal health coverage trumpeted during the 2011 presidential campaigns has never been realized. Much attention has rather been accorded to public security with the advent of the Anglophone Crises and the war against the Boko Haram terrorist group in the Far North region of the country.

As a lower middle-income country, Cameroon has the vision of becoming an emerging nation with a double-digit growth rate by 2035. Much of this pursuit has however been pivoted on capital accumulation-oriented projects like the "Lom Pangah" dam project and the "Japoma Complex" project. Although Cameroon stands out as one of the fastest-growing nations within the Central African Sub Region (CEMAC), the growth rate of Cameroon when compared to its real potential as an oil exporter seems to fall short of expectations (Anyie *et al,* 2022). This low real growth has often been attributed amongst other factors to poor governance characterized by massive corruption, old old-fashioned educational system and little attention to the health sector. The recent COVID-19 pandemic has just come to confirm this as the growth rate dropped as low as -2.2% in the second quarter of 2020 (Toronto, 2021).

Even though, some efforts have been made in the health sector through the construction of reference hospitals in most regional headquarters of the country, most of these health structures remain poorly equipped and numerically insufficient for over 26 million Cameroonians (Nkfusai *et al,* 2019). Mindful of this reality, many government authorities including the 89-year-old head of state prefer to travel

overseas for the least medical concern. The question of most observers is how a nation with high growth visions gives little attention to health expenditure as is currently the case in Cameroon. It is with this background that this study seeks to investigate the effect of health on economic growth in Cameroon. To carefully analyze the impact of health on the economic growth of Cameroon, the study seeks to specifically address the following objectives: (a) to investigate the effect of life expectancy (b) to evaluate the effect of health expenditure and to scrutinize the effect of fertility rate on GDP in Cameroon.

2. LITERATURE REVIEW

As concern health, the Human Capital Theory by Grossman holds that individuals invest in themselves through education and health to increase earnings. Health can therefore be analyzed as a capital good like an investment good. The return of being healthy is greater for higher-wage workers, so increased wages will increase health capital (Pomp *et al,* 2008).

The Grossman Model bases the demand for medical care on the interaction between the demand and production function of health. It considers health as a durable capital good which is inherited and depreciated over time. Investment in health takes the form of medical care purchases. Health enters the utility function directly as a good from which people derive pleasure and indirectly as an investment which makes healthier time available for market and non-market activities (Dormont *et al,* 2006). Increases in the depreciation rate over time cause the optimal stock of health to decrease. The implication is that older people will spend more resources in terms of time, care and money on improving their health than younger people. Another implication is that since increases in wages shift the marginal efficiency of a capital curve to the right, an increase in wages will increase the demand for health capital.

Secondly and as concerns economic growth, a new stage in the development of the theory of economic growth in the mid-80s was inevitably the emergence of "New Growth Theory". Technical progress is considered as an endogenous factor generated by internal parameters (Bloom *et al,* 2004). Based on the Solow model, the state with the help of economic policy instruments cannot provide a long-term impact on the growth rate (Usman *et al,* 2015). The impact of the state on economic growth is only possible through the impact on the savings rate. Growth theory had little implication for politicians because theoretically, exogenous technological changes and exogenous population growth do not depend on the government (Bloom *et al,* 2004). Endogenous Growth Theory overcomes this shortcoming of neoclassical theory. First, they reject the neoclassical premise of diminishing marginal productivity of capital and assume the possibility of production scale effect throughout the economy. The value of intensive economic growth as defined in the theories of endogenous growth is dependent on the following factors: first, the creation of the necessary prerequisites for the protection of intellectual property rights in the conditions of competition, secondly, strong state support for the development of science and technology and thirdly, a remarkable role of government in creating a favorable investment climate and attracting new technologies.

Therefore, the theories of endogenous growth in contrast to neoclassical ones are in favor of the state's intervention in the development process.

On the spectrum of empirical literature, Aghion *et al* (2010) assessed the relationship between health and growth in the light of the modern Endogenous Growth Theory. Based on cross-country regressions over the period 1960-2000. The study reveals that a higher rate of improvement in life expectancy has a significantly positive impact on per capita GDP growth. By restricting attention to OECD countries, the study finds supportive evidence that only the reduction in mortality below 40 years of age generates productivity gains, which in turn may explain why the positive correlation between health and growth in cross-OECD country regressions appears to have weakened since 1960.

Baldacci *et al* (2004) for their part in the study of "Social Spending, Human Capital and Growth in Developing Countries" analyzed Panel Data to explore the direct and indirect channels linking social spending, human capital, and growth from 1975 to 2000. The paper finds out that both education and health spending have a positive and significant direct impact on the accumulation of education and health capital and can consequently lead to higher economic growth.

Anyanwu and Erhijakpor (2010) used Panel Data to study the relationship between poverty and international remittances for 33 African countries over the period 1990–2005. After instrumenting for the possible endogeneity of international remittances, they found out that a 10 % increase in official international remittances as a share of GDP leads to a 2.9 per cent decline in the poverty headcount. Regardless of the measure of poverty used as the dependent variable, income inequality captured as the Gini Index has a positive and significant coefficient, indicating that greater inequality is associated with higher poverty in African countries.

Bloom *et al* (2004) analyzed the effect of health on economic growth by integrating a Production Function Approach. Their main result reveals that good health has a positive, sizable, and statistically significant effect on aggregate output even when they control for experience. The study argues that the effect of life expectancy on growth regressions appears to be a real labor productivity effect rather than the result of life expectancy acting as a proxy for worker experience.

Baldacci *et al* (2017) examined the relationship between total healthcare and health outcomes for eight East African countries over the period 2000-2014. They realized that an increase in healthcare expenditures by 10 % is associated with a reduction in the number of infant deaths, the number of under-five deaths and the number of neonatal deaths by 5.4 %, 6.6 % and 2.9 % respectively.

Usman *et al* (2015) on their part investigated the long-run relationship between health and economic growth in Nigeria over the 1961-2012 period. They observed a long-run relationship between health, as measured by life expectancy and crude death rate measures, and economic growth. Further tests using the Granger Causality Test, show a one-directional causality running from health as measured by life expectancy and crude death rate to economic growth. Huang *et al* (2010) used Panel Data to investigate the effect of HIV/AIDS on life expectancy, human capital investment and income growth in 38 African countries between 1980 and 2004.

Results of the study reveal that HIV/AIDS has resulted in a considerable decline in life expectancy in African countries, which has then led to lower educational attainment and slower economic growth.

Mehrara *et al* (2011) tested for Granger causality between health expenditure and GDP in a panel of 11 selected oil-rich developing countries over the 1971-2007 period. The results show a strong causality from oil proceeds and economic growth to health expenditure in the oil-rich countries. Their finding indicates that GDP is not significantly affected by health spending be it in the short or long run. In the same line, Mishra and Newhouse (2009) examined the relationship between health aid and infant mortality using Panel Data from 118 countries between 1973 and 2004. Health aid has a beneficial and statistically significant effect on infant mortality: doubling per capita health aid is associated with a 2 % reduction in the infant mortality rate. On average, this implies that increasing per capita health aid by $1.60 per year is associated with 1.5 fewer infant deaths per thousand births.

Novignon (2017) in the study of "Improving Primary Health Care Facilities Performance in Ghana", used Secondary Data from the Institute for Health Facilities. He applied the Stochastic Frontier Analysis, and the results of the study revealed that fiscal space from efficiency gains varies across rural/urban as well as private/public facilities, if best practices are followed. The matching decomposition showed an efficiency gap of 0.29 between private and public facilities.

3. METHODOLOGY

The economic growth model used in this study, justified by the theoretical and empirical literature discussed above can be specified thus:

$$GDP = f(HP, LX, FR, GKF) \quad (1)$$

The reduced equation after taking the natural logs of both sides is specified below:

$$\log GDP_t = \beta_0 + \beta_1 \log HP_t + \beta_2 \log LX_t + \beta_3 \log FR_t + \beta_4 \log GKF_t + \varepsilon_t \quad (2)$$

The variables that form the model are expressed with respect to time ($_t$), where:

GDP_{real} = Real Gross Domestic Product, HP = Health Expenditure, LX = Life Expectancy, FR = Fertility Rate, GKF = Gross Capital Formation, ε = Error Term, β_0 = The Intercept $\beta_1, \beta_2, \beta_3, \beta_4 > 0$

For estimation of the parameters of the specified model, the Error Correction Mechanism was used**.** This method has gained increased importance in analyses that describe long-run data. The estimation procedure begins with testing for stationarity of the variables because the Error Correction Mechanism is only appropriate if all the variables are not stationary at levels but achieve stationarity at the same difference levels (Njong, 2010). When the series is integrated into order 1, the model is underspecified, and the Causality Test can lead to a false conclusion (Granger, 1988). However, the causality test Granger limits itself to the direction of causality in the short run and to have the long-run causality, we use the method of Johansen

and Juselius (Njong, 2010). This method consists of estimating the Error Correction Model (ECM) to put into evidence the existence of a long-run co-integration relationship.

4. FINDINGS

Table 1: *Descriptive Statistics*

	GDP_{real}	HP	LX	FR	GKF
Mean	0.32312	4.04567	53.38456	5.374549	3.142722
Median	1.305406	4.14561	53.00200	5.6425000	3.9982458
Maximum	10.56394	5.09093	58.97800	6.598000	45.782570
Minimum	-10.68959	3.047892	50.65700	4.465000	-25.70136
Std. Dev.	4.595800	0.471357	2.265865	0.704317	11.64889
Skewness	-0.456227	0.523464	0.9518901	0.017534	0.264778
Kurtosis	4.452189	3.225485	3.963090	1.656330	4.3268297
Jarque-Bera	4.670303	1.581750	4.689059	2.964505	8.2175463
Probability	0.025465	0.41571	0.045887	0.254852	0.06995
Sum	10.75146	156.5607	2079.855	223.5720	140.4260
Sum Sq. Dev.	812.522	8.67194	190.4673	17.76517	6076.654
Observations	39	39	39	39	39

Source: Estimated by the Authors from E-Views 9

From Table 1, the variables have 39 observations each. Also, from the table above, the variable with the largest mean, median and maximum value is LX with a mean value of 53.38456, median value of 53.00200 and a maximum value of 58.97800. The variables have as highest standard deviation of 11.64889 and a minimum value of 0.471357 coming from GKF. Also, the variable with the smallest mean and median is GDP_{real} with a mean value of 0.32312 and median value of 1.305406.

Table 2: *Correlation Matrix*

	GDPreal	HP	LX	FR	GKF
GDP_{real}	1.000000				
HP	0.11734	1.000000			
LX	0.057358	-0.433967	1.000000		
FR	-0.271434	0.297687	-0.643810	1.000000	
GKF	0.625776	0.145370	0.040542	-0.1874365	1.000000

Source: Estimated by the Authors from E-Views 9

The correlation results presented in Table 2 above show that there exist both positive and negative relationships between the variables included in the study. The correlation results were used to investigate the presence of multi-collinearity within the independent variables. From Table 2, there exists a weak positive correlation between GDP and Health expenditure as well as between GDP and Life Expectancy.

This implies that there is a direct relationship between the pairs of variables such that an increase in Gross Domestic Product is associated with an increase in Health Expenditure and Life Expectancy.

On the contrary, there is a weak negative correlation between GDP and Fertility Rate. Implying that there is an inverse relationship between GDP and Fertility rate such that an increase in GDP will lead to a reduction in Fertility rate in Cameroon.

Table 3: *Pairwise Granger Causality Test*

Null Hypothesis:	Observations	F-Statistic	Prob.
HP does not Granger Cause LGDP	20	0.25447	0.7416
LGDP does not Granger Cause HP		2.67366	0.0478
LX does not Granger Cause LGDP	20	0.20465	0.8543
LGDP does not Granger Cause LX		7.76839	0.0058
FR does not Granger Cause LGDP	20	0.74014	0.4832
LGDP does not Granger Cause FR		4.63820	0.0474
LX does not Granger Cause HP	37	4.44654	0.0155
HP does not Granger Cause LX		0.02013	0.9931
FR does not Granger Cause HP	37	2.54061	0.08457
HP does not Granger Cause FR		2.77782	0.04583

Source: Estimated by the Authors from E-Views 9

The above results from Table 3 reveal that there exists a unidirectional causality between GDP and health expenditure. Economic growth (GDP) causes expenditure on health to increase and have a contrary effect. Also, there exists a unit directional relationship between GDP and life expectancy, GDP and Fertility rate. Again, high life expectancy causes Health expenditure and not health expenditure that guarantees long life implying there is a unit-directional relationship between life expectancy and health expenditure. Finally, there is no direction in terms of causality between the Fertility rate and Health expenditure.

Table 4: *Results of regression analysis*

	Coefficient	Std. Error	t-Statistic	Prob.
$\boldsymbol{ECT}$	0.19538	0.060367	0.317767	0.0449
$\boldsymbol{d \log GDP_{-1}}$	0.024357	0.266843	-0.79358	0.4372
$\boldsymbol{d \log HP_{-1}}$	0.095679	0.209474	0.425391	0.0362
$\boldsymbol{d \log LX_{-1}}$	0.073436	0.537640	-0.132672	0.00387
$\boldsymbol{d \log FR_{-1}}$	-0.0214169	6.137849	0.729663	0.4376
$\boldsymbol{d \log GKF_{-1}}$	-0.035684	0.012454	0.354585	0.27466
Cons	0.092548	0.394739	0.225437	0.8145

R-squared	0.680243	Mean dependent var	-0.017634
Adjusted R-squared	0.474337	S.D. dependent var	0.483177
S.E. of regression	0.525437	Akaike info criterion	1.9452011
Sum squared residual	4.178551	Schwarz criterion	2.328727
Log likelihood	-12.71341	Hannan-Quinn criteria.	2.044543
F-statistic	0.135648	Durbin-Watson stat	1.523582
Prob(F-statistic)	0.009560		

Source: Estimated by the Authors from E-Views 9

As expected, in Table 4, the Error Correction Term (ECT) is negative with an associated coefficient of -0.19538. This implies that about 19.50% of any movement into disequilibrium was corrected within one period. Moreover, given that its results are statistically significant at a 5% level of significance since the probability value of 0.0449 is less than 0.05, we conclude that the equilibrium is converging to the equilibrium.

There was a positive and significant relationship between Health expenditure and GDP in Cameroon. A 1% increase in health expenditure will lead to a 9.56 % increase in the GDP of Cameroon. Life expectancy projects a positive and significant impact on the GDP of Cameroon. Its value of 0.073436 indicates that an increase in life expectancy by 1 year will result in a 7.34 % increase in GDP. Fertility rate and gross capital formation show a negative and insignificant relationship with GDP. The value of the fertility rate (-0.0214169) and gross capital formation (-0.035684) indicates that an increase in the fertility rate and Gross capital formation by 1% will lead to a decrease in GDP by 2.14 % and 3.56 % respectively.

The overall model is statistically significant at the 5 % level of significance as the F-test probability value of $0.009560 < 0.05$. An R-square value of 0.580243 indicates that about 68 % of variation in economic growth (GDP) in Cameroon is attributed to the changes in the variables included in the model while about 32 % of variations in economic growth (GDP) in Cameroon is caused by variables not included in the model.

5. CONCLUSION AND RECOMMENDATIONS

The study sought to investigate the effects of health on the economic growth of Cameroon. Findings revealed that health care in general has a significant and unidirectional effect on the economic growth in Cameroon. A detailed analysis supports the fact that while life expectancy and health expenditure have a positive significant effect on economic growth, fertility rate on its part has a significant but negative effect on economic growth. Based on the results above several recommendations can be made.

To begin, the legislative and judicial systems need to actively play their role to ensure that resources allocated to the development of health infrastructures serve the purpose. For this to take place it is necessary for parliament to courageously legislate laws that will deter top government officials from seeking medical care abroad. By this priority will be given to the health sector given that no rational official will want to jock with their health which should henceforth be a function of the quality of Cameroon's health system.

More so, administrative and legal procedures should be facilitated to ensure the smooth operation of non-governmental organizations specialized in the domain of health education and healthcare services in Cameroon. Public authorities in Cameroon have always regarded some of these NGOs especially those operating in the conflict-hit North West and South West regions as agents of destabilization. This unfounded blame game truncates the activities of these NGOs and deters economic growth and development.

Finally, the government should work towards the implementation of the presidential promise of Universal Health Insurance which will reduce the pressure on out-of-pocket health care and increase labor productivity. The promise made since 2010 should not just remain campaign propaganda as it seems to be the case, because it is only through such policies that the human potential can be optimally mobilized for the projected economic emergence in 2035.

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