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The Impact of Coronavrius on Health and Economic Growth in Sub- Sahara Africa

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Abstract
Health enhancement is an essential determinant of economic growth; though, the impact of health on economic growth is affected by the level of poverty in any country. This paper, therefore, examined the impact of health on economic growth during corona virus in Sub-Sharan Africa and the verge of health required to alleviate the adverse effect of poverty on economic growth in Twenty (20) selected Sub-Sharan Africa countries. Based on the endogenous growth theoretical approach, the link between life expectancy, poverty incidence, and economic growth was estimated using the GMM technique of analysis. Findings showed that coronavirus pandemic exerts negative impact on health condition, household welfare, unemployment and the adverse effect of poverty on economic growth in Nigeria. Though government expenditure significantly increased during the period in a bid to check the pandemic, but household welfare degenerated and was negatively affected with high poverty rate, this paper recommended that the government of the Sub-Saharan countries should diversify the revenue base of their economies to cushion the effect of unprecedented shock due to the pandemic and provide adequate relief materials to pad the effect of loss of income to the poor and vulnerable, invest in the health sector to control infectious and pandemic diseases.
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Introduction

The spread of coronavirus a deadly disease from China in the late 2019 brought a boundless shockwave to the world as it t8urn to become global disease, in response to the spread of the disease, preventive measures were adopted to curb the spreading within the country through social isolation policies, which including closing all functional institution, restriction of movement of people, providing palliatives to the vulnerable in the society. As the virus continue to spread, assessment of the depth and the breadth of the impact of the pandemic on the social and economic activities of the nation become complex.

On July 25, 2020, it was reported that Nigeria recorded 845 fatalities out of global deaths o8f 638,169 (NCDC, 2020). Even as the global responses continue to develop, countries are facing significant challenges because of the impacts of the disease on the productivity and economic system. The total or partial lockdowns enforced by most countries to curtail the spread of the virus has generated huge social-economic crisis, production closures, bankruptcies, and loss of livelihood. This, no doubt will increase the level of poverty.

According to AFDB (2020) predicted an economic contraction for the continent of 3.4 percent coronavirus has posed serious public health challenges across the world with high rate of infections and fatality. The spreading of the deadly has adversely effect on Sub-Sharan Africa Countries. However, World Bank report (2020), that the population of Nigeria living in poverty was expected to increase by about two million people because of population growth before the pandemic. The novel corona virus disease became a global challenge to all economies as well as Sub Saharan Africa. Report from Brookings institute shows that Nigeria had a fragile economy even before the epidemic, as the nation's GDP growth was estimated at only 2.5 percent in 2020 (Onyekwena and Ekeruche, 2020).

Health enhancement is a vital determinant of economic growth; however, the impact of corona virus on economic growth is affected by the level of poverty in Sub Saharan Africa. As the corona virus predicament continues to intensify, the significant health and economic consequences of this virus is crippling even the most developed nations. Sub Saharan Africa appears to be relatively spared the untoward direct health consequences of the COVID-19 pandemic Johns, (2020). The syndrome nevertheless has already had a destabilizing effect on the lives of millions of regions with top-heavy impact on the poor Jayaram, and Leke, (2020). The interconnectedness that characterizes globalization has brought economic profit to many African countries. With the emergences of disease, there have been disruptions in Africa's global supply chains in the face of tumbling oil prices and a lowered global demand for Sub Saharan Africa non-oil products, which constitutes a threat to the economic stability of the region.

The efficacy of any country's response to the syndrome is chiefly dependent on the capability of its healthcare systems. The flimsy nature of Sub Saharan Africa's health systems has been allied with continuing inadequacies in public health spending and serious shortages of health workers. Statistics show that there is just one doctor and ten hospital beds per 1000 persons, less than two midwives and nurses for every 1000 persons

and less than 60% of the population have access to modern healthcare services Watkins, (2020). Against the scenery of such atrocious health indices, explicit policies are instantly required to reinforce capacity for management of severe cases of the virus, health-worker training, and community rendezvous (Watkins, 2020).

Improvement in human capital development amongst other macroeconomic indicators could help drive down poverty and contribute to economic growth. Over the last decade, it was recorded that public health management facility for containing the outbreaks in Africa ha8s undoubtedly enhanced following experiences of dealing with outbreaks such as Ebola, Lassa fever, meningitis, cholera, and measles USAID (2020). Corona virus, nevertheless, pose a deepen danger as asymptomatic individuals can infect others Oqubay (2020). The most vulnerable in this predicament are those living in densely populated areas, working in the shaky informal economy, and simply those who are the poorest USAID (2020). Such individuals form a huge proportion of Sub Saharan Africa's population. With the inadequate of potable water and sanitation in rural areas and the existence of urban slums in many Sub Saharan Africa countries, frequent hand washing as a essential and effective precautionary measure against virus will be unattainable, escalating the threat of the virus within and across co8untries USAID (2020).

Before the virus spread into Africa, the International Monetary Fund (IMF) in mid-February 2020 warned the continent of the impending risk of an economic slowdown as China, where the virus emerged, is the largest trading partner and foreign investor of many countries in the continent devermont and Olander (2020). Many African countries are interconnected to affected economies of the United States and European Union. The growth deceleration in these major economies will have a negative impact on price of goods exported from Africa such as mineral ores and metals (Vaillant,2020).

Conservative estimates suggest that COVID-19 could cause Africa's GDP to drop by as much as three to eight percentage points with projected economic losses of between US$90 and US$200 billion in 2020 alone Jayaran , Leke, Ooko-Ombaka, and Sun, (2020). The United Nations Development Programme (UNDP) estimate that this pandemic could result in the loss of nearly half of all jobs in Africa where unemployment is already a major concern Kitenge, (2020). This is likely to further aggravate Africa's fragile economic situation, one in which as many as 422 million people (one in three Africans) are estimated to be living below the international poverty line, i.e. $1.90 per day (Kitenge, 2020)

To fight COVID-19, many African countries have adopted some international policy trends such as border closures, strict migration measures, imposition of quarantines, and enforcement of stay-at-home orders Nantulya and Mavhinga, (2020). These measures embody the dialectical quality of contemporary globalization Browm and Laboute (2020); on the one hand they reflect the rapid communicative and even hegemonic nature of global knowledge exchange; while on the other hand they accentuate boundaries instead of eroding them and limit interactions across socio-economic, political, and technological spheres. This substantial disruption in globalization's economic integration has led to retardation of key sectors such as air transportation and tourism, with a concomitant reduction in trade, remittances, and investments. In the face of waning official development assistance to the continent and capital flight, unemployment and food insecurity is likely to be exacerbated across the continent (ECA ,2020)

The COVID -19 pandemic has had far-reaching effects on the global economy Ozili and Arun, (2020). It affected the global productive activities, health care system and global trade. Due to globalization, there are expectations of spillover effects to emerging and developing countries due to their dependence on developed countries for the importation of goods and services Ozili and Arun, (2020). Despite the hearty response to the virus by implementing screening exercises for alleged cases at the communities and entry port the level of testing has remained low in Sub Saharan Africa countries. Unsurprisingly, so has the number of cases and deaths, relative to other continents (WHO, 2020).

However, analyses of the relationships between health and economic growth can be conducted at the individual level, at regional levels within a country, and at aggregate level for a country's aggregate data. Consequently, this study intends to examine the impact of coronavirus on health and economic growth in Sub-Sharan Africa.

Literature Review

Health according to the United Nations (2007)) is a form of basic human capability. Therefore, improvement in health or life expectancy helps to reduce the level of human deprivation and contribute to economic growth. Poverty according to Sen, (1999) is capability deprivation. Coronavirus disease is an infection disease causes by severe acute respiratory syndrome coronavirus which was first discovered in Wuhan, China in late 2019 and became a global epidemic Yonar, Tekindal and Tekindal, (2020). Due to the high transmutation rate, coronavirus is zoonotic pathogens that are present in humans and various animals causing infections in respiratory, gastrointestinal, hepatic, and neurologic systems Gilbert, (2020). However, studies suggest that a pandemic - induced poverty and put pressure on the economy (Beck, 2020).

The outspread of the pandemic has significantly raised the uncertainty surround economic activities and this

would upturn the financial institution hesitancy to make loans available. Bach, (2020) opined that markets and investors are facing a high degree of uncertainty due to both financial and physical effects of the pandemic. Of course, the world is undergoing a global crisis different from what we are used to in terms of currency, financial and debt crises (Salius, 2020).

Shruthi and Ramani (2020) they found that the study evaluated the unpredictability transmission over the financial crisis in an attempt to analysis of impact of coronavirus on India's commodity markets, fiscal policies and contracting procedures that were executed 8during the period. It adopted the newly established connection in instinct response variance and functions test to every data from January 2020.

Salisu (2020) research on coronavirus global fear index and the predictability of the commodity price returns. In the Study, the global fear index (GFI) for the coronavirus epidemic was subjected to empirical analysis by investigative its projective power in the likelihood of price returns of commodity during the pandemic. Entire regions of the countries in the global were considered in construction of the index. The result showed an indication of a positive relationship between the global fear index and commodity price returns. It affirms tha8t commodity returns upsurges as coronavirus related fear escalated.

Udmale (2020) examined the coronavirus epidemic in selected developing countries that are prone to changing food supply shocks in Africa, Asia, Latin America, and Oceania. The study recognized the foremost players in the globe and sustainable development Goals (SDGs). The result found that the present coronavirus pandemic may cause temporary food insecurity and widen the poverty gap across such susceptible countries.

In African continent Egypt was the first to confirmed coronavirus cases in February, 2020, the importation of the disease was fast spread since China is the leading commercial partner for African countries. Egypt, Algeria, and south Africa were the countries at highest importation risk from china, with the moderate to high SPAR capacity scores 87,76 and 62 respectively, IDVI 53,49 and respectively UNDP (2020). Yet, there is vaccine for the treatment of the viral diseases that hampered the economic activities of the world. (Girodano,2020).

Ajibo, Chukwu and Okoye (2020) studied coronavirus and lockdown experiences in Nigeria, the result discovered that coronavirus had disastrous impact impacts on the economy and household welfare, and poorly equipped health sector to curb the pandemic.

Ngutsav and Ijrshar (2020) avowed that the coronavirus pandemic has had a disturber effect on the Nigerian various ways, particularly in the supply and demand sides of a small firm. Hence, on the supply -side , firms experience a decrease in the supply of labour, because employees may fall sick, yet they have to look after their dependents, as restriction of movement was enforced to curtail the spread of the disease which recorded adverse effect on capacity utilization. However, in the demand side, there is a probability of an abrupt and dramatic loss of demand and in consequence, revenue for SMEs. It recorded serious liquidity shortages as SMEs has the limited ability to function. Due to fear of being infected by the pandemic, as well as fear of uncertainty consumers were forced to reduce their spending and consumption. Thus, clearly effects on the economy were deepened as most firms witness pay cut and layoff their workers due to inability to pay salaries.

Methodology

Given the growth implication of the coronavirus pandemic on the Sub Saharan economics, the endogenous growth model propounded by Romer (1994) and lucas (1998) was adopted in this study. The model is called AK model which is expressed as $Y = AK$ ---------- (1)

where Y is national output, K is the aggregate capital and A is the constant that measures the quantity of output produced for each unit of capital. Fiscal policy can influence health status and in turn the economic growth through the following v2ariables, they are Revenue allocation, Capital Stock, Employment rate, Health status and Household welfare and contribution to national output. Therefor, from equation 1, we present a functional equation specified in equation

Model Specification

Following the availability of panel data in this study, modified, and adjusted endogenou8s growth model as developed by Romer (1994) was adopted. The variables of interest include Revenue allocation (REA), Capital Stock (CAS) Employment rate (EMR) Health stat2us (HEA) Household welfare (HOW) and the independent variable of the model is Per capita GDP and is used as a proxy for economic growth. Hence, their functional relationship is presented below.

$Y = f(REA, CAS,2EMR,HEA,HOW)$ ----------(2)

Therefore, to seek to verify the impact of health on economic growth in the midst of corona virus in Sub Sharan Africa in line with the first objective of this study, Eq. (1) can be expanded as:

$$Y_{it} = \alpha_1 + a_2REA_{it} + a_3CAS_{it} + a_4EMR_{it} + a_5HEA_{it} + a_6HOW_{it} + \mu_{it} \text{ ---------- (3)}$$

where Y is per capita GDP (constant of US$). It serves as a measure of economic performance in a countries, REA_{it} is revenue allocation, CAS_{it} is capital stock, EMR_{it} is employment rate, HEA_{it} is proxy by per

capita income ,the control variable is presented as (HOW_{it}) household welfare which was captured by private consumption per capita, i, denote the cross section identifier for country and t, denotes the time identifier for each month. In the model, the maximum of N-cross sectional observations is 20, while a maximum of t time periods is 12. Note, each co2untry has same number of time series (12 months) observation, then the recommendable technique to be adopt for the study is the balanced panel. α represents the constant, and μ is the disturbance term, thus, the main econometric analysis will involve the Generalized Method of Moments (GMM) technique with preliminary analyses which include: trend analysis, descriptive statistics, Augmented Dickey-Fuller and Phillip Peron(PP) unit roots test and Granger Causality test (Ohiomu and Ogbeide-Osaretin, 2020)

This study obtained data from the worldometer records and world development indicators as well as country's specific database for 20 countries in SSA for a period of 2020 fiscal year. The countries include Angola, Benin, Botswana, Cote d'Ivoire, Co2ngo DR, Ethiopia, Ghana, Kenya, Lesotho, Liberia, Mozambique, Mali, Namibia, Nigeria, Sierra leone, South Africa, Tanzania, Rwanda, Uganda, and Zambia. The choice of these countries was entrenched on the availability of data and different parts of SSA are considered in this work.

Table 1: Description statistics

	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis	Jatque-Bera	Probaility	Sum	Sum sq. Dev
Y	27569.4	6102.4	127762.6	144.83	37734.9	1.279906	3.322978	10.54017	0.005143	1047636	5.27E+10
REA	5153.38	753.70	25079.7	14.4711	7536.49	1.33783	3.43129	11.6298	0.00298	195828	5.47E+10
CAS	18255.2	5696.39	94144.9	94.3300	26975.3	1.70275	4.63980	22.6201	0.00001	693698	5.10E+09
EMR	1131912.	526122.	4256414	6876.00	1245136.	0.81666	2.48915	4.63712	0.00841	4301265	5.69E+10
HEA	18.2126	12.1432	47,6350	0.11450	16.0132	1.46300	3.7356	20.4269	0.00002	672.783	5.74E+13
HOW	20.3129	14.2575	76.7588	0.22480	18.0342	1.65800	4.82738	22.6975	0.00001	771.893	12033.7

Source: Authors compilation from E-views

The table reveal that the Jarque – Bera value is highly Signiant at the 1 per contributed. The level indicating that the density function of the series is not normally distributed. The null hypothesis of the J-B test is that the variable is normally distributed; hence we reject the null hypothesis and accept the alternative hypothesis that the serie8s is non – normally distributed. The J-B values for all the series are significant at the 1 percent level and indicate that series are not normally distributed. This outcome clearly shows that the use of panel data analysis procedure for the estimation of the relationships in this study is appropriate considering the heterogeneity in all the data series. The skewness is positive at 1.28 and indicates that the output figures for most of the states lies to the left of the mean value. The kurtosis value is high at 3.32 and indicates the presence of extreme values which may generate heteroskedastic variations in the data. The data set is highly leptokurtic and shows that extreme outliers in the output values may generate heterogeneity issues in the analysis.

To check unit root (stationarity) properties of the individual variables, the summary of the major panel unity root tests methods of levin, Lin and Chu, Im, Pesaran and Shim, ADF Fisher Chi-Square and PP Fisher Chi-Square was adopted. the probability value is indicated in parenthesis and the summary of the tests is presented in the table 2 below.

Table 2: Summary of panel unit root tests

Variable	LLC Test Probability	IPS Test Probability	ADF / Fisher Probability	PP / Fisher Probability	Remarks
Y	-5.72276 (0.0002)	-5.21455 (0.0001)	81.1634 (0.0004)	122.158 (0.0003)	Stationary I(I)
REA	-5.42322 (0.0002)	-6.43654 (0.0001)	98.8134 (0.0002)	181.458 (0.0000)	Stationary I(I)
CAS	-3.16202 (0.0011)	-4.41235 (0.0001)	72.2874 (0.0002)	132.618 (0.0004)	Stationary I(I)
EMR	8-3.111855 (0.0013)	-4.78112 (0.0000)	76.2427 (0.0000)	161.1378 (0.0000)	Stationary I(I)
HEA	0.29314 (0.0002)	-5.21432 (0.0000)	81.1634 (0.0000)	129.158 (0.0000)	Stationary I(I)
HOW	0.32154 (0.4860)	-5.35281 (0.0000)	82.6177 (0.0002)	131.217 (0.0001)	Stationary I(I)

Source: Authors compilation from E-views

The stationarity tests reveal that all the variables are integrated at order o2ne (that is, after first differencing)

Table 3: Co-integration Test

Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None*	0.762131	101.1876	67.83210	0.0000
At most 1*	0.57685	58.07234	44.67541	0.0031
At most 2	0.389764	28.93302	28.77631	0.0517
At most 3	0.18635	12.43280	13.98601	0.1978
At most 4	0.096430	3.765311	4.53871	0.0537
At most 5	0.089760	3.688451	4.43127	0.0557
Trace test indicates 2 cointegrating equations at the 0.05 level				
'*denotes rejection of the hypothesis at the 0.05 level'				
'**Mackinnon – Haug-Michelis (1999) p-values'				
Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None*	0.762131	50.10761	32.97853	0.0003
At most 1*	0.57685	30.07203	28.675342	0.0215
At most 2	0.389764	19.00302	21.97763	0.1254
At most 3	0.18635	7.792801	13.66560	0.4089
At most 4	0.096430	3.565310	3.641871	0.0537
At most 5	0.089760	3.688451	4.43127	0.0557
Trace test indicates 2 cointegrating equations at the 0.05 level				
'*denotes rejection of the hypothesis at the 0.05 level'				
'**Mackinnon – Haug-Michelis (1999) p-values'				

Source: authors compilation from E-views

Both trace test and Max-Eigen value test indicated that there are at least two co-integrating vectors in the model as shown in table 3, it means that there is co-integration and long run relationship between the variables in the model.

However, it is assumed that the biases in the pooled data that the panel data estimated employed in this section could be traced to cross-sectional heterogeneity or time series variations. The GMM estimation of model was adopted in this paper and the summary of the estimated result is presented in the table 4 below:

Table 4

GMM		Diagnostics and summary measures	
Explanatory variable	Coefficient / (P-value)	Hansen Test (P-value)	4.63671 (0.051021)
REA	4.760036 (0.0000)	R-squared	0.651376
CAS	3.670836 (0.0002)	Adjusted R-squared	0.552435
EMR	2.43472 (0.0002)	F-statistic	0.136
HEA	-2.16713 (0.0002)	Prob. (F-statistic)	0.273
HOW	-6.52147 (0.0004)	Durbin-Watson stat	1.461343
C	-95.2788 (0.0645)		

Source: authors compilation from E-views 9

From the result, the Durbin – watson statistics of 1,461343 outcomes does not threaten the model since the use of GMM technique of estimation might correct the existence of heteroscedasticity and serial correlation that may occur in the model. The model shows the validity instrument of Hansen test and accepts the null hypothesis as all instruments are valid given a Hansen / J statistic of 4.63671 and a probability (0.0581021). The R^2 of 0.651376 representing that 65% of the discrepancy in the dependent variable is accounted by the explanatory variables.

However, on the relationship between the GDP and the Health variable, the R-squared (R^2) and adjusted R-squared (R^{-2}) of the GDP growth rate on economic performance in SSA countries are 0.65 and 0.55 respectively. The adjusted R-squared shows that 55 percent of the systematic variations in GDP growth rate are accounted for

the explanatory variables in the model. The J-statistic is 4.6 with a probability of 0.05. This indicates the null hypothesis that over identifying restrictions of the model are valid cannot be rejected. 2Hence, the model is adequate.

Though the result revealed that REA, CAS, showed a positive significant impact on Y and HEA, HOW recorded a negative significant impact on Y. As a result of the epidemic, economic deteriorated to the extent that household welfare and health status in SSA is adversely affected and penurious. However, the positive relationship on REA, CAS, EMR, fall below expectation during this coronavirus plague. The coefficient of REA indicates the need to enhance the revenue generation of governments in the SSA economies. They should be policy measures towards reducing the impact of the pandemic on the variables examined.

The degree of capita stock (CAS) variable passes the significance test at 1 percent level with a positive coefficient of 3.67 signifying that a unit increase in CAS will cause a far more than proportional increase in Y. The EMR variable is likewise significant at the 1 percent level and positively signed. This conforms to a priori expectation of a significant positive relationship between employment rate and economic growth. The importations of coronavirus in Africa reduce economic growth as well as employment rate as most workers were forced out of job.

Findings and Policy Implications

The findings ascertained that the poor health status is significant, and it negatively impacts on economic performance in the sub-region. This finding indicates that economic performance is determined by Per capita GDP. Consequently, as revealed in the findings, 1 percent rise in per capita GDP will result in about 0.5 percent drop in economic performance, thus the poor health has a positive significant effect on economic performance – implying that the measure for poor health do not support the economic notion that poor health retards economic performance. The finding is counterintuitive and therefore should not be taken seriously. These unexpected results could be explained with the inaccurate nature of data from Sub-Saharan Africa.

The outcome of the study showed that coronavirus exhibited negative and substantial impact on economic performance and macroeconomic variables like poverty rate, unemployment, and economic gro8wth in Sub Saharan Africa. The Sub Saharan Africa should embark on immense productive investment to revive and re-engineer their economies. The restrictions in movements a total lockdowns of business activities invariably affected the revenue allocation of government of SSA countries with negative impact on output. Diversification of revenue base of SSA economies should be encouraged to cushion the effect of unprecedented shock due to pandemic. Creative investments in all sectors are recommended for the SSA countries.

The findings revealed that Household welfare degenerated and was negatively affected with high poverty rate in sub-Sahara Africa. The level of development in these SSA countries waned because of the epidemic; Consumption per capita of the citizens was worn by the plague particularly the susceptible in the society are recommended for the SSA countries.

Summary, Conclusion and Recommendations

Summary and Conclusion

The main aim of this study was to determine the effect of poor health on economic growth in Sub-Saharan Africa. The findings revealed that poor health status has a negative significant impact on economic growth and coronavirus pandemic exerts negative impact on economic performance as well as the macroeconomic variables such as poverty rate, unemployment household welfare and economic growth. The result showed that the household welfare deteriorated and was negatively affected with high poverty rate irrespective of the increased government expenditure to curb the pandemic.

Recommendations

Based on the empirical findings of this study, the following recommendations have been proffered:

- The governments of the Sub-Saharan African should continue to make concerted efforts towards alleviating the effects of poor health variables on economic performance or the impacts of poor health that may retard the economic growth.
- The study recommends that the Sub-Saharan African countries should embark on productive investment schemes in their economies to generate employment and stimulate growth.
- The governments of the Sub-Saharan African should provide the enabling health policies that will help curb pandemic diseases to entrench sustainable growth and development in the sub-region.
- Finally, government of the Sub-Saharan countries should diversify the revenue base of their economies to cushion the effect of unprecedented shock due to the pandemic, provide adequate relief support to cushion the effect of loss of income of the poor and vulnerable and implement sustainable health policies that will help curb infections and pandemic diseases which negatively impact on economic growth in Sub-Saharan African

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