THE CORONAVIRUS PANDEMIC: A THREAT TO HEALTH AND ECONOMIC STABILITY IN SUB- SAHARA AFRICA

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ABSTRACT

Economic growth is mostly determined by improvements in health; nevertheless, the degree of poverty in any given nation influences how health affects economic growth. Thus, this study looked at how health affected economic growth during the coronavirus in Sub-Saharan Africa and what health was needed to mitigate the negative impact of poverty on economic growth in 20 (20) chosen Sub-Saharan African nations. The GMM analysis technique was used to assess the relationship between life expectancy, poverty incidence, and economic growth based on the endogenous growth theoretical approach. Results indicated the negative effects of the coronavirus pandemic on household welfare, unemployment, and health conditions, as well as the detrimental influence of poverty on economic growth in Nigeria. Even though government spending rose dramatically during this time in an attempt to contain the pandemic, household welfare declined and was adversely impacted by the high poverty rate. This paper suggested that the governments of Sub-Saharan nations diversify their economies to lessen the impact of the pandemic's unprecedented shock, provide sufficient relief supplies to lessen the impact of income loss on the poor and vulnerable and invest in the health sector to control infectious and pandemic diseases.

Introduction

The world was rocked by the deadly coronavirus disease that spread from China in late 2019 and spread throughout the world. To stop the disease from spreading further within the nation, social isolation policies were implemented, which included closing all operational institutions, limiting travel, and providing palliative care to those who were most in need. Assessing the extent and scope of the pandemic's effects on the country's social and economic activities has grown more difficult as the virus continues to spread.

Nigeria was reported to have recorded 845 deaths out of 638,169 worldwide on July 25, 2020 NCDC, (2020). Countries continue to face major issues as a result of the disease's effects on economic systems and productivity, even as global responses continue to evolve. Most nations have implemented complete or partial lockdowns to stop the virus's transmission, which has resulted in severe social and economic problems, factory closures, bankruptcies, and loss of livelihood. Without a doubt, this will make poverty worse.

Coronavirus has caused major public health issues worldwide with a high rate of infections and fatalities, according to AFDB (2020), which also forecasted a 3.4 percent economic loss for the continent. The countries of Sub-Saharan Africa suffer from the spread of the dangerous.

However, World Bank (2020) report stated that due to pre-pandemic population growth, an additional two million Nigerians were predicted to live in poverty. The new coronavirus sickness become a global problem for Sub-Saharan Africa and all economies. As the country's GDP growth was projected to be just 2.5 percent in 2020, a report from the Brookings Institute demonstrates that Nigeria's economy was already weak prior to the outbreak (Onyekwena & Ekeruche, 2020).

One of the most important factors influencing economic growth is health improvement; nevertheless, the degree of poverty in Sub-Saharan Africa influences how the corona virus affects economic growth. Even the most sophisticated countries are being crippled by the serious health and economic effects of the continuing corona virus crisis. It seems that Sub-Saharan Africa has been mostly immune to the negative direct health effects of the COVID-19 epidemic Johns (2020). However, the syndrome has already caused instability in the lives of millions of people, particularly among the impoverished Jayaram & Leke (2020). The globalization-induced connection has benefited several African nations economically. A danger to the region's economic stability, the rise of disease has caused disruptions in Africa's global supply chains in the face of declining oil prices and a decline in demand for non-oil products from Sub-Saharan Africa worldwide.

The ability of a nation's healthcare systems to address the syndrome is a major determinant of its effectiveness. The weak state of the health systems in Sub-Saharan Africa has been linked to persistent insufficiencies in public health spending as well as severe shortages of medical personnel. The data indicates that less than 60% of the population has access to contemporary healthcare services, with just one doctor and ten hospital beds per 1000 people, as well as fewer than two midwives and nurses per 1000 people Watkins (2020). In light of these horrendous health indicators, clear policies are now needed to strengthen the ability to manage severe virus infections, train healthcare workers, and organise community gatherings (Watkins, 2020).

Economic growth and poverty reduction may be facilitated by improvements in human capital development and other macroeconomic variables. Following experiences with outbreaks like Ebola, Lassa fever, meningitis, cholera, and measles, public health management facilities for containing outbreaks in Africa have unquestionably improved over the past ten years, according to USAID (2020). Corona virus, nevertheless, pose a deepen danger as asymptomatic individuals can infect others Oqubay (2020). People who live in densely populated regions, work in the unstable informal sector, or are just the poorest are the most vulnerable in this situation USAID, (2020). These individuals make up a significant section of the population in Sub-Saharan Africa. The existence of urban slums in many Sub-Saharan African countries and the lack of access to clean drinking water and sanitation in rural areas make frequent hand washing, a crucial and effective virus prevention measure, impossible, increasing the virus's threat both within and between countries (USAID, 2020).

Prior to the virus's arrival in Africa, in mid-February 2020, the International Monetary Fund (IMF) issued a warning to the continent about the potential for an economic slowdown, given that China, the country where the virus originated, is the region's major trading partner and foreign investor Devermont & Olander, (2020). The economics of the United States and the European Union are impacted in many African nations. The price of items exported from Africa, such as metals and mineral ores, would suffer from the growth slowdown in these key economies (Vaillant, 2020).

According to conservative projections, COVID-19 could reduce Africa's GDP by three to eight percentage points, with economic losses alone expected to reach US$90–200 billion in 2020 Jayaran, Leke, Ooko-Ombaka, & Sun, (2020). In Africa, where unemployment is already a big concern, the United Nations Development Programme (UNDP) estimates that this epidemic might lead to the loss of over half of all jobs Kikenge, (2020). This would probably make Africa's already precarious economic condition worse. According to Kitenge (2020), up to 422 million people—or one in three Africans—are thought to be living below the international poverty line, which is $1.90 per day.

Many African nations have implemented worldwide policy trends to combat COVID-19, including border closures, stringent migratory controls, quarantines, and enforced stay-at-home directives Nantulya & Mavhinga (2020). The dialectical nature of modern globalisation is embodied by these actions. Laboute & Browm (2020); On the one hand, they show how quickly and even dominant the worldwide exchange of knowledge is, but on the other, they highlight rather than blur boundaries and restrict exchanges between the political, socioeconomic, and technological domains. Due to this significant disruption in the economic integration brought about by globalisation, important industries like tourism and air travel have been delayed, and trade, remittances, and investments have all decreased as a result. Food insecurity and unemployment are expected to worsen throughout the continent due to capital flight and declining official development support (ECA, 2020).

The worldwide economy has been significantly impacted by the COVID-19 epidemic, according to Ozili & Arun (2020). It had an impact on international trade, health care, and productive activities. Due to their reliance on developed nations for the importation of goods and services, emerging and developing nations are expected to experience spillover effects from globalisation Ozili & Arun, (2020). Despite the vigorous reaction to the virus, which included inspecting neighbourhoods and entry ports for suspected cases, the level of testing in Sub-Saharan African nations has remained low. The number of cases and fatalities has, predictably, increased in comparison to other continents WHO, (2020). Nevertheless, studies of the connections between economic growth and health can be carried out at the individual, regional, and aggregate levels for a nation's total statistics. Therefore, the drive of this study is to investigate how the coronavirus affects economic stability and health in Sub-Saharan Africa.

Literature Review

Health according to the United Nations (2007)) is a sort of basic human potential. Thus, an increase in life expectancy or health contributes to economic growth and lowers the degree of human deprivation. Sen (1999) defined poverty as a lack of capabilities. According to Yonar, Tekindal & Tekindal (2020), coronavirus disease is an infection caused by the severe acute respiratory syndrome coronavirus, which was initially identified in Wuhan, China, in late 2019 and spread throughout the world. Because coronaviruses have a high rate of mutation, they are zoonotic diseases that infect the respiratory, gastrointestinal, hepatic, and neurological systems in both humans and different animals. Gilbert (2020). But according to research, a pandemic may have caused poverty and economic strain (Beck, 2020).

Financial institutions' reluctance to offer loans has increased due to the pandemic's widespread effects, which have greatly increased economic activity uncertainty. According to Bach (2020), the financial and physical repercussions of the pandemic are causing a great deal of anxiety for investors and markets. In terms of currency, banking, and debt crises, the globe is undoubtedly experiencing a new kind of global crisis than we are accustomed to Salius, (2020). In an effort to analyse the influence of the coronavirus on India's commodity markets, fiscal policies, and contractual procedures that were implemented during the era, Shruthi & Ramani (2020) reviewed the study's assessment of the unpredictable transmission during the financial crisis. The recently discovered correlation between instinct response variance and functions test was applied to all data starting in January 2020.

Salisu (2020) investigated the predictability of commodity price returns and the worldwide fear index of coronaviruses. Through an investigation into its projective potential in the likelihood of commodity price returns during the pandemic, the study empirically analysed the global fear index (GFI) for the coronavirus epidemic. When creating the index, entire regions of the nations were taken into account. The outcome indicated a positive correlation between returns on commodities prices and the global fear index. It confirms that commodity returns increased as concern of the coronavirus increased.

Udmale (2020) investigated the coronavirus outbreak in a few poor nations in Africa, Asia, Latin America, and Oceania that are vulnerable to shifting food supply shocks. The sustainable development goals (SDGs) and major global players were acknowledged in the study. According to the findings, the current coronavirus epidemic may increase poverty in these vulnerable nations and temporarily create food insecurity. Egypt was the first country on

the African continent to identify coronavirus cases in February 2020. Since China is Africa's top trading partner, the disease quickly spread. With moderate to high SPAR capacity scores of 87,76, and 62, respectively, and IDVI scores of 53,49, and 62, respectively, Egypt, Algeria, and South Africa were the nation's most at risk of importing from China (UNDP, 2020). However, a vaccine exists to address the viral illnesses that have hindered global economic activity. (Girodano 2020). According to Ajibo, Chukwu, & Okoye's (2020) research on lockdown experiences in Nigeria, the coronavirus had a devastating effect on household welfare and the economy, and the health sector was ill-prepared to stop the epidemic.

According to Ngutsav & Ijrshar (2020), the coronavirus pandemic has damaged Nigeria in a number of ways, especially with regard to small businesses' supply and demand. On the supply side, businesses thus face a reduction in labour supply since workers may become ill but still have to care for their dependents because movement restrictions were implemented to stop the disease's spread, which had a negative impact on capacity utilisation. On the demand side, however, there is a chance that demand and, consequently, SMEs' revenue would suddenly and drastically decline. It noted severe financial problems because SMEs have a limited capacity to operate. People were compelled to cut back on their consumption and expenditure because they were afraid of contracting the epidemic and of becoming uneasy. Because most businesses saw wage cuts and layoffs because they couldn't pay their employees, the repercussions on the economy were obviously worsened.

Azu, Ijieh, Shadrack & Joel (2022), examined the impact of health on economic growth during corona virus in SubSharan Africa and the verge of health required to alleviate the adverse effect of poverty on 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. 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.

Seko, Kyalisiima, Kihumuro, Chunming, Gandaho & Pius (2023) investigated the economic effects of COVID-19 on Africa and the countermeasures. The review was carried out using the S1 Checklist and PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria. The findings indicate that a number of economic metrics in Africa have declined. In the petroleum, gold, and textile industries, production fell by over 25% compared to prior levels. There were significant economic swings, and the debt-to-GDP ratio increased across the board throughout Africa. The study also found that the pandemic's effects on Africa's main commercial partners—China, the United States, and Europe—have made the issue worse. However, the pandemic's progress has been delayed by different nations' countermeasures, and 2021 appears promising due to an anticipated recovery in Africa's economy.

Methodology

Given the impact of the coronavirus pandemic on Sub-Saharan economic growth, this study used the endogenous growth model proposed by Romer (1994) & Lucas (1998). The model is called AK model which is expressed as

$$Y = AK \quad \text{---------- (1)}$$

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. Revenue allocation, capital stock, employment rate, household welfare, and contribution to national output are the variables that fiscal policy can use to affect health status and, consequently, economic growth. Thus, using equation 1, we provide a functional equation that is given in equation

Model Specification

Romer's (1994) modified and adjusted endogenous growth model was used in this analysis after panel data became available. Revenue allocation (REA), capital stock (CAS), employment rate (EMR), health status (HEA), and household welfare (HOW) are among the variables of importance. Per capita GDP, the model's independent variable, serves as a stand-

in for economic growth. As a result, the following describes their functional relationship.

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

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:

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

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 country 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, Congo 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 Jarque-Bera value is highly significant at 1 per contribution, according to the table. The level shows that the series' density function is not regularly distributed. Since the variable is normally distributed, the null hypothesis of the J-B test is rejected, and the alternative hypothesis—that the series is not normally distributed—is accepted. The J-B values show that the series are not normally distributed and are significant at the 1 percent level for all of the series. This result unequivocally demonstrates that, given the heterogeneity in all of the data series, the panel data analysis approach to estimate the connections in this study is reasonable.

With a positive skewness of 1.28, the output figures for the majority of states fall to the left of the mean value. The data may exhibit heteroskedastic fluctuations due to the existence of extreme values, as indicated by the high kurtosis value of 3.32. The data set is extremely leptokurtic, indicating that extreme output value outliers could cause problems with analysis heterogeneity.

Using the summary of the main panel unity root test techniques of Levin, Lin and Chu, Im, Pesaran and Shim, ADF Fisher Chi-Square, and PP Fisher Chi-Square, the unit root (stationarity) features of the individual variables were examined. Table 2 below provides a summary of the tests, and the probability value is shown in parenthesis.

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	-5.35281	82.6177	131.217	Stationary

	(0.4860)	(0.0000)	(0.0002)	(0.0001)	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: Author compilation from E-views

The presence of at least two co-integrating vectors in the model, as displayed in table 3, was revealed by the trace test and the Max-Eigen value test. This indicates that the variables in the model have a long-term relationship and co-integration.

However, the panel data estimate used in this section is presumed to be able to attribute the biases in the pooled data to time series fluctuations or cross-sectional heterogeneity. The GMM model estimation was used in this work, and table 4 below provides a summary of the estimated outcome:

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	F-statistic	0.136

	(0.0002)		
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 results do not pose a threat to the model because the GMM estimation technique may be used to address any potential serial correlation and heteroscedasticity in the model. The model reveals the Hansen test validity instrument and accepts the null hypothesis because, with a probability of 0.0581021, and a Hansen/J statistic of 4.63671, all instruments are valid. The explanatory variables explain for 65% of the variance in the dependent variable, according to the R2 of 0.651376.

However, the R-squared (R2) and adjusted R-squared (R-2) of the GDP growth rate on economic performance in SSA nations are 0.65 and 0.55, respectively, regarding the association between the GDP and the health variable. The model's explanatory variables explain for 55% of the systematic fluctuations in GDP growth rate, according to the adjusted R-squared. With a probability of 0.05, the J-statistic is 4.6. This suggests that it is not possible to reject the null hypothesis that the model's overidentifying constraints are legitimate. The model is therefore suitable.

Even though the results showed that HEA and REA had a substantial negative influence on Y, HOW had a big positive impact on Y. Due to the epidemic, the economy in SSA deteriorated to the point where household welfare and health status are negatively impacted and people are living in poverty. Nevertheless, the coronavirus epidemic has caused the positive relationships on REA, CAS, and EMR to fall short of expectations. Government revenue collection in SSA economies needs to be improved, according to the REA coefficient. In order to lessen the pandemic's effect on the variables under investigation, several policies ought to be implemented.

With a positive coefficient of 3.67 and a passing significance test at the 1 percent level, the degree of capita stock (CAS) variable indicates that a unit increase in CAS will result in a significantly greater than proportionate increase in Y. The EMR variable is also positively signed and significant at the 1 percent level. This supports the a priori prediction that the employment rate and economic growth would be significantly positively correlated. Since the majority of workers were displaced, the importation of coronaviruses into Africa lowers both economic growth and employment rates.

Findings and Policy Implications

The results showed that the sub-region's economic performance is adversely affected by the substantial poor health status. This finding indicates per capita GDP determines economic performance. As a result, the results show that a 1 percent increase in per capita GDP will lead to a 0.5 percent decline in economic performance. This suggests that poor health has a positive and significant impact on economic performance, negating the idea that poor health hinders economic performance. Since the results are

counterintuitive, they shouldn't be taken seriously. These surprising findings may be explained by the imprecise quality of the Sub-Saharan African data.

The study's findings demonstrated that the coronavirus has a detrimental and significant effect on Sub-Saharan Africa's economic performance and macroeconomic factors, including the unemployment rate, poverty rate, and economic growth. To revitalise and re-engineer its economy, Sub-Saharan Africa needs to make massive investments in productive ventures.

Movement restrictions and complete lockdowns of economic activity always negatively impacted the government of SSA countries' revenue allocation, which also had an adverse effect on output. To mitigate the impact of the exceptional pandemic shock, it is important to support the diversification of SSA economies' revenue streams. Innovative investments in all sectors are advised for SSA countries.

The results showed that the high rate of poverty in sub-Saharan Africa had a detrimental impact on household welfare and had degraded. The pandemic caused the degree of development in these SSA countries to decline; the plague's consumption per capita of the populace, especially among the most vulnerable members of society, is advised for the SSA countries.

Summary, Conclusion and Recommendations

Summary and Conclusion

Determining the impact of poor health on economic growth in Sub-Saharan Africa was the primary goal of this study. The results showed that the coronavirus pandemic has a detrimental effect on economic performance and macroeconomic indicators such the poverty rate, unemployment, household welfare, and economic growth, and that low health status has a strong negative impact on economic growth. Regardless of the increased government spending to combat the pandemic, the results demonstrated that household welfare declined and was adversely impacted by the high poverty rate.

Recommendations

Considering the empirical results of this investigation, the following suggestions have been put forth:

i. The governments of Sub-Saharan Africa should keep working together to reduce the negative effects of health factors on economic performance or the negative effects of health that could impede economic growth.

ii. The report suggests that in order to create jobs and spur economic growth, Sub-Saharan African nations should implement profitable investment plans.

iii. To firmly establish sustainable growth and development in the subregion, the governments of Sub-Saharan Africa should implement the enabling health policies that would aid in the prevention of pandemic diseases.

iv. Finally, in order to mitigate the impact of the pandemic's unprecedented shock, the governments of Sub-Saharan African nations should diversify their economies' revenue bases, provide sufficient relief assistance to mitigate the impact of the impoverished and vulnerable losing their income, and put in place sustainable health policies that will help prevent infections and pandemic diseases that have a detrimental effect on the region's economic growth.

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