THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Socio-economic Effect of COVID-19 on the Global Economy

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Abstract:
Epidemics and pandemics have been part of human existence since time immemorial. Although the foregoing terms are often used interchangeably, they have distinctive meanings in the scientific world. The world has been plagued with a significant number of epidemics and pandemics in prior and recent years. Earlier news on the outbreak of COVID-19 was received with scepticism by leaders and citizens of several advanced, emerging and developing economies around the world. Most global leaders doubted the exponential effect of COVID-19 on their respective countries and on the global economy as a whole. The purpose of this research was to examine the impact of COVID-19 on global economic activities and output. The research relied on the quantitative approach to scientific inquiry. Specifically, a cross-sectional design was adapted and used in the study. This enabled the researchers to gather relevant research data over a specific period of time. Data required for the conduct of the study were obtained mainly from secondary sources. These included peer-reviewed articles published in journals, research papers, textbooks, and newspaper publications; Google Search Engine including Worldometers.info, Africanews.com, and Weforum.org; financial websites such as Tradingeconomics.com; and electronic databases of the World Bank, International Monetary Fund, and World Economic Outlook, among other significant sources. Annual data on global gross domestic products from 1990 through 2019, data on the top twenty global economies from 2019 through 2021 and available data on the COVID-19 pandemic as of 20th April 2020 were used in the study. Regression models and descriptive statistics were used to describe the research variables; and to evaluate their behaviour over the stated time frame on the global economy. Findings from the research revealed a positive but non-significant relationship between fiscal year and global GDP ($p = 1.12239$, $p > 0.05$). The results suggested that the fiscal year alone has no significant influence on global GDP. Rather, internal and external environmental factors in a given financial year, such as Tsunamis, tornadoes, earthquakes, bushfires, hurricanes, and pandemic outbreaks (such as COVID-19), influence global GDP and its attendant growth. The findings revealed Ghana's estimated economic losses from COVID-19 (GH¢15 billion) are equivalent to 4.27% of projected GDP (GH¢351.19 billion) for 2020 and equivalent to 4.34% of GDP (GH¢346 billion) for 2019, while estimated global economic losses from the pandemic (US$2.7 trillion) ranged from 3.05% to 3.06% of projected global GDP (US$88.574 trillion or US$88.312 trillion) for 2020. Almost all African economies are struggling to patch the economic holes created by the menacing COVID-19 pandemic. Since the non-occurrence of a similar or higher magnitude pandemic in the near and distant future cannot be guaranteed, the researchers recommended the need for leaders of various economies to put the necessary contingency measures and structures in place to avert devastating effects, should any pandemic occur. Experiences from the Ebola and Coronavirus outbreaks are expected to serve as strong practical case studies for the Africa Centre for Disease Control (ACDC) to improve its response rate to epidemic and pandemic outbreaks on the continent. The ACDC should be able to advise member countries on the state-of-the-art medical facilities required to facilitate treatments for epidemic and pandemic outbreaks. There is a need for inter-country collaboration. That is, African countries that are "handicapped" in medical facilities and equipment should collaborate with those that are endowed with and also share expertise to save the continent from socio-economic dissipation. The World Health Organisation (WHO) must continue to monitor health conditions and situations in countries and territories and provide early signals to enhance the preparedness and responsiveness of various economies. Member countries must provide the necessary logistics and technological assistance so WHO could improve on its existing structures and mechanisms for "systematic disease surveillance and reporting."

Keywords: *Coronavirus, COVID-19, epidemic, global economies, global GDP, pandemic*

1. Introduction

Epidemics and pandemics have been part of human existence since time immemorial. Although the foregoing terms are often used interchangeably, they have distinctive meanings in the scientific world. Saunders-Hastings and Krewski (2016) provided a succinct explanation for the two terminologies: "Epidemics result in local spikes in infection incidence and tend to be driven by seasonal influenza strains, whereas pandemics are epidemics that spread globally" (p.2). Thus, the term epidemic refers to an infectious outbreak that is contained within a locality or jurisdiction, while a pandemic explains the ability of an infectious outbreak to extend to several countries across the globe. To wit, the initial outbreak of the Coronavirus in Wuhan City and Hubei Province and its containment in China could be described as an

epidemic. However, as the Coronavirus "travels" beyond the borders of China into many other countries and territories around the world, it becomes a pandemic.

According to medical historians, the world has been plagued with a significant number of epidemics and pandemics in prior and recent years. Notable among these include the influenza outbreaks in 412 BC and 1580. A pandemic outbreak in Russia in 1729 spread across Europe for six months and around the world in three years. The pandemic occurred in multiple waves and resulted in high mortality and morbidity rates. In 1781, another pandemic outbreak occurred in China and spread through Europe and Russia over an eight-month period. The outbreak had more effect on the young adult population during the period. The world was confronted with another major pandemic outbreak in 1830. This pandemic originated in China with a magnitude comparable to the Spanish flu pandemic in 1918. The 1830 pandemic spread through Europe, Southeast Asia, and Russia. By 1831, the pandemic had spread to North America. The mortality rate associated with the 1830 pandemic was reportedly low. However, a significant rate of illness attacks was recorded during the period (Saunders-Hastings & Krewski, 2016).

An epidemic which started in Russia in 1889 later became a pandemic and spread by sea and rail across North America and Europe. The global death toll was estimated at one million people. The case fatality rate was estimated in the range of 0.1% - 0.28%, and the rate of spread was believed to be faster than previous pandemics. Some medical historians believed the rate of infection was indicative of the "accelerated spread of emergent diseases as a result of progress in transportation technology" (Saunders-Hastings & Krewski, 2016, p.3). Other pandemic outbreaks the world had to contend with included the Spanish flu (1918-1920), Asian flu (1957-1958), Hong Kong flu (1968-1970), and Swine flu (2009-2010) (Saunders-Hastings & Krewski, 2016). More recent ones are the Severe Acute Respiratory Syndrome or Middle East Respiratory Syndrome (2002-2003), Ebola (2014-2016), and Coronavirus (2019-2020). The case fatality rate of the 1918 pandemic was 2%; it was one of, if not the highest, fatality rates in human history. Gates (2020) argued that the severity of the Coronavirus pandemic places its case fatality rate around 1%, which is higher than the 0.6% recorded during the 1957 pandemic.

Gates (2020) advanced two arguments on why the Coronavirus pandemic is a threat to the global community. First, it places the lives of adults with pre-existing health conditions and healthy adults at risk. Finally, the mode of transmission is efficient; on average, an infected person could spread the virus to two or three other persons; individuals who are mildly ill or exhibit symptoms could transmit the virus to others. The rate of spread of COVID-19 is exponential; this renders its containment more challenging than the Severe Acute Respiratory Syndrome (SARS), which was spread by people with symptoms and with less efficiency. Comparatively, the total number of confirmed Coronavirus cases was about ten times the number recorded by SARS during the same period.

Gronvall, Waldhorn and Henderson (2006) predicted the occurrence of a pandemic across the globe. This pandemic may be caused by the H5N1 avian influenza, an unknown pathogen, a bioterrorist attack, or a different influenza. However, the occurrence of the pandemic was just a matter of time. Barely three years after their scientific prediction, the global community succumbed to another pandemic (the Swine flu) in 2009. Gronvall et al. (2006) noted that the greatest challenge to scientists in all pandemic cases is how to characterise a pathogen and determine its control. Challenges faced by scientists in determining the appropriate vaccines for COVID-19 lend strong credence to the foregoing assertion. However, Gronvall et al. noted that the difference in epidemics and pandemics requires different scientific and political dimensions, and these pose a major challenge to effective planning towards prevention and against further spread.

The narratives suggest that most of the global pandemics recorded thus far trace their origin to Asia. For instance, pandemic outbreaks such as the Spanish flu, Asian flu, and Hong Kong flu were believed to have originated in China, while the origin of the Swine flu was traced to Mexico. About 575,000 lives were lost in the Swine flu. However, prior pandemics recorded a significant number of deaths: between 40 and 50 million lives were lost during the Spanish flu outbreak; the respective death tolls recorded in the Asian flu and Hong Kong flu outbreaks were between 1 and 2 million, and between 500,000 and 2 million lives. The foregoing statistics indicate that the Spanish flu was more catastrophic and detrimental to human survival and existence. Due to its magnitude, some experts described the Spanish flu as the "greatest medical holocaust in history" (Waring as cited in Saunders-Hastings and Krewski, 2016, pp. 2 & 3).

Reynolds and Weiss (2020c) provided a succinct explanation for the coronavirus. They defined Coronaviruses as a large cluster of viruses noted for infecting animals and humans. In humans, the coronavirus causes respiratory illnesses ranging from the common cold to more serious ailments or infections. A member of the Coronavirus cluster known to have caused socio-economic havoc in recent years was the Severe Acute Respiratory Syndrome (SARS). A virus which started as an epidemic in China in 2002 morphed into a pandemic affecting twenty-six (26) countries and resulting in over eight thousand (8,000) confirmed cases and seven hundred and seventy-four (774) deaths. Presently, dry cough and fever are the most common symptoms associated with the Coronavirus disease. Other symptoms include acute respiratory tract illness, such as bronchitis and pneumonia.

1.1. Background of the Study

In December 2019, China was saddled with an epidemic outbreak called the coronavirus. This virus was believed to have spread first from a fish market in Wuhan City in the Hubei Province in China. Wuhan City has an estimated population of 60 million people. Thus, one could fathom the size of the population that was readily impacted by the spread of the coronavirus. Many global actors counted on China's "technological expertise" to quickly douse the flames of the epidemic by upping her containment measures to prevent further spread across borders. However, the containment measures proved ineffective; the virus began to spread into greater Hubei and other provinces in China.

On 31st December 2019, the World Health Organisation (WHO) was officially informed about the novel coronavirus, and on 12th January 2020, WHO confirmed COVID-19's ability to cause a respiratory illness in a group of

people (Elsevier, 2020). Further, on 21st January 2020, the World Health Organisation confirmed human-to-human transmission of the Coronavirus disease. Evidence of the latter was apparent in a series of confirmed reports of COVID-19 infections by health professionals in some countries across the globe (Reynolds & Weiss, 2020b). On 7th January 2020, health authorities in China identified a strain of coronavirus that had never been encountered in humans before as the cause of the infections. Five days later, China shared the genetic sequence of the identified virus with the rest of the world so health authorities in other jurisdictions could develop their own diagnostic kits to contain and prevent further spread (Reynolds & Weiss, 2020c). The World Health Organisation officially named the Coronavirus ***COVID-19*** on 11th February 2020. *Severe Acute Respiratory Syndrome Coronavirus 2* or *Sars-CoV-2* is the name of the virus that causes the disease (Reynolds & Weiss, 2020a, para. 6).

The fish market in Wuhan is noted for illegal trading in wild animals such as snakes, bats, birds, marmots, and rabbits. Generally, animal-to-human transmission of the coronavirus is not uncommon. As a result, it is believed that the first cluster of people who were infected had contact with animals. The foregoing is the contention of some medical researchers, although the animal source of the coronavirus still remains a puzzle. A research paper released by a team of virologists at the Wuhan Institute of Virology revealed a commonality in the genetic makeup of the novel Coronaviruses and the Coronavirus found in bats; the genetic makeup of the former is ninety-six per cent (96%) identical to that of the latter (Reynolds & Weiss, 2020b).

Conversely, another research published in March 2020 found a similarity in the genetic sequences of the human Coronavirus and the Coronavirus in pangolins; the similarity was estimated between 88.5% and 92.4%. Reynolds and Weiss (2020b) noted that some earlier confirmed cases of COVID-19 were not linked to the Wuhan fish market, implying some human infections might have occurred prior to the Wuhan fish market debacle. On 1st January 2020, the Wuhan market was shut down for inspection and cleaning and to avert the possible spread of the coronavirus. However, at the time of inspection and cleaning, it appeared the virus had spread beyond the market, thereby straining any efforts to limit the spread of the coronavirus to the Wuhan fish market (Reynolds & Weiss, 2020b). In early 2020, countries such as Italy, Spain, Belgium, and Iran, among others, offered to evacuate their nationals voluntarily from China and subsequently quarantine them on arrival for fourteen days. This was intended to detect symptoms, confirm active cases and prevent further spread of the virus in their respective countries.

However, the elusiveness of the novel coronavirus made early detection and treatment difficult for the countries that offered early voluntary evacuation from China. Contrary to expectations, the evacuations escalated the spread of COVID-19 across borders. New cases were quickly confirmed in Italy, Iran, South Korea, and Spain and in many other countries across the globe. Sooner than later, the coronavirus, which surfaced as an epidemic in China, morphed into a global pandemic. Immediate vaccines for the cure of the coronavirus are not available. As a result, infected countries and potential ones are compelled to improve their preparedness and responsiveness while ensuring strict enforcement of non-pharmaceutical interventions, including cancellation of mass gatherings, school closures, regular hand washing, and social distancing, among others.

Despite the strenuous efforts by China to curb the further spread of the Coronavirus pandemic, the devastating effects on Hubei Province were dreadful. Generally, two major factors account for the sporadic spread of pandemics. These include the *reproduction number* and *time or serial interval* (The World Economic Forum, 2020c, para. 7). The reproduction number relates to quantity. That is the estimated number of confirmed cases and infections. The serial interval alludes to the time it takes the virus to spread. COVID-19 is believed to have an average serial interval of four days. This implies that the spread of COVID-19 is at a geometric rate across the globe. Experts believed possible containment and prevention may be a challenge, given the speed of spread of the Coronavirus pandemic. This is evident in record cases confirmed in countries such as the United States, Italy, Spain, and Germany, among others. Adaption of aggressive measures to halt further spreads while ensuring containment is imminent. This corroborates Saunders-Hastings and Krewski (2016), Gronvall et al., Malik et al., Malik and Mahjour (2016), who found extended serial intervals for early pandemics but short for recent outbreaks and predicted imminent outbreaks in the near and distant future.

An examination of over four hundred and fifty (450) confirmed cases drawn from ninety-three (93) cities in China by Meyers and her team (as cited in World Economic Forum, 2020) confirmed asymptomatic spreading of the coronavirus; the test results revealed more than one of ten confirmed cases in China was from persons with no symptoms of COVID-19. It is believed that the results from the specimens tested by Meyers and her team would drench earlier scepticism about the spread of the coronavirus through asymptomatic transmission and enhance containment measures by infected economies across the globe. Meyers (as cited in World Economic Forum, 2020) affirmed the inevitable role of extensive non-pharmaceutical interventions such as cancellation of mass gatherings, restrictions on travel, quarantine, isolation, and school closures in the fight against the spread of the Coronavirus pandemic. Meyers (as cited in World Economic Forum, 2020) averred that silent transmission and increasing case counts were analogous to the asymptomatic transmission of COVID-19 in many countries across the globe and concluded that the probable elusiveness of the Coronavirus virus affirmed the need for countries to adopt extreme measures to contain and prevent further outbreaks.

The World Economic Forum (2020c) catalogued a set of reasons for the exponential spread of the coronavirus across borders. These included the infection of asymptomatic patients. That is, the likelihood of persons with no traits of the coronavirus being infected. As noted earlier, the study revealed asymptomatic infection accounts for one of ten confirmed COVID-19 cases. Results from recent tests revealed the average time or serial interval for transmission of the coronavirus from one person to another is less than a week; it is about four days. Earlier studies showed an average of fourteen-day gestation or transmission period. Further, more than ten per cent (10%) of individuals become infected from persons with the virus and yet are asymptomatic; that is, they do not exhibit symptoms of COVID-19. Given the portentous nature of the coronavirus, some experts believed it could be likened to flu.

1.2. Problem Statement

Earlier news on the outbreak of the coronavirus, commonly called COVID-19, at Wuhan City in the Hubei Province in the People's Republic of China was received with scepticism by leaders and citizens of several advanced, emerging and developing economies across the globe. Most global leaders doubted the exponential effect of COVID-19 on their respective countries and the global economy as a whole. Today, the world continues to record a significant number of confirmed cases, deaths, recoveries, and active cases, among other significant variables, while struggling to find exact medical solutions or prescriptions for the pandemic. The stir caused and the socio-economic effects of the epidemic on global economies are monumental. A pandemic which started in China has penetrated a significant number of countries and territories across the globe. The economy with the highest number of confirmed cases and remained the epicentre of the coronavirus as of 20th March 2020 was China (80,967), followed by Italy (41,035), Iran (18,407), Spain (18,077), Germany (15,320), United States (14,366), France (10,995), and South Korea (8,652), respectively. However, by 29th March 2020, the United States had become the epicentre of the pandemic with the highest number of confirmed cases (123,781), followed by Italy (92,472) and China (81,439), respectively. Italy recorded the highest number of deaths (10,023), followed by Spain (6,528), China (3,300) and the United States (2,229) during the period.

As of 19th March 2020, the total number of confirmed cases, deaths, recoveries, and active and critical cases across the globe were 240,772, 9,953, 86,689, 144,130 and 7,185. Globally, 177 countries and territories and 1 international conveyance, the Diamond Princess Cruise ship harboured in Yokohama, Japan, were infected during the period. The next day, 20th March, 2020, the respective total number of confirmed cases, deaths, recoveries, active, and critical cases throughout the world increased to 246,107, 10,049, 88,483, 147,575 and 7,389. The number of countries and territories increased from 177 to 182 during the period. However, the story was significantly different on 29th March 2020: the respective total number of confirmed cases, deaths, recoveries, active, and critical cases around the world surged to 678,910, 31,771, 146,339, 500,800 and 25,377. The respective data recorded during the period were 181.97%, 219.21%, 68.81%, 247.46% and 253.19%, higher than those recorded earlier on 19th March 2020. The significant increase in the total number of confirmed cases (about 181.97%) and deaths (about 219.21%) in less than two weeks (from 19th to 29th March 2020) raised concerns about the world's preparedness to curb further spread of the pandemic.

The total number of recovered cases in China on 19th March 2020 was 70,420. By 29th March 2020, the number increased to 75,448, with a total number of active cases reducing from 7,263 on 19th March 2020 to 2,691 on 29th March 2020, representing a 169.90% decrease. While China showed greater signs of recovery from the pandemic, countries such as the United States, Italy, Spain, Germany, Iran, and France, among others, were saddled with a significant increase in the total number of confirmed cases and deaths. For instance, the respective total number of confirmed cases in Italy and Spain increased by about 125.35% and 335.90% from 20th March 2020 to 29th March 2020. Other countries such as the United States (761.63%), Germany (280.20%), Iran (108.12%), France (241.75%), and the United Kingdom (422.76%) recorded significant increases in the total number of confirmed cases during the period. The imminent question is: *How prepared and responsive are individual countries across the globe to the Coronavirus pandemic to prevent its further spread and minimise its devastating effect on socio-economic activities in their respective economies?*

- The general management problem is the failure of some global leaders to pick early warning signals to facilitate immediate identification, development and implementation of the requisite medical and security measures to curb the spread of the Coronavirus pandemic and to curb its threats to socio-economic development and growth of countries across the globe. Available statistics indicate that China manufactures one-third (1/3) of the total goods required globally. Given China's valuable role in global manufacturing and trade, an early solution to the epidemic in that country would be vital to meeting global economic growth targets for 2020 and avoiding global recession. Though evidence of the phenomenon exists, there are no empirical studies to clearly establish the impact of pandemics such as COVID-19 on the socio-economic development and growth of the global economy.
- The specific management problem is the inability of less-endowed economies to acquire and install state-of-the-art medical equipment to ensure effective treatment of infected and potential COVID-19 patients and the inability of medical experts across the globe to develop quickly the type of vaccine or vaccines needed to cure infected patients; prevent further spread of the pandemic, and to ensure rapid global economic recovery. The present study sought to examine how the Coronavirus outbreak could disrupt socio-economic activities in countries and territories across the globe.

1.3. Research Objectives

1.3.1. General Objective

The main purpose of this research was to examine the impact of the Coronavirus pandemic on the social and economic development of economies and the eventual effect on global output.

1.3.2. Specific Objectives

Specifically, the current research sought to achieve the following objectives:

- Assess the social impact of the Coronavirus pandemic on economies across the globe.
- Evaluate the social implications of COVID-19 for countries in Africa.
- Examine the impact of COVID-19 on the global economy.
- Make recommendations to improve the preparedness and responsiveness of global economies to the current and future pandemic outbreaks.

1.4. Definition of Concepts

For the purpose of this research, the phrases *case fatality rate*, *case fatality ratio*, *rate of death*, and *death rate* were used interchangeably with one underlying conceptual meaning. That is the proportion of deaths relative to the total number of confirmed COVID-19 cases over a given period. This was consistent with Harrington's (2020) epidemiological definition of case fatality rate or ratio. Further, the terms *Coronavirus* and *COVID-19* were used interchangeably with the same conceptual meaning. That is, the novel virus is believed to have originated from Wuhan City in Hubei Province in Mainland China and spread across the world.

2. Literature Review

The topic underpinning the current research was the "Socio-economic Effect of COVID-19 on the Global Economy." The main purpose of this research was to assess how the rapid spread of the Coronavirus pandemic could adversely impact the social and economic development efforts of countries and the ultimate effect on world trade volumes and output. A synthesis of literature related to the research is presented in this section. Stated differently, this section presents a review of related and existing works in the study area. In scientific inquiries, it is imperative to identify relationships between the research objectives and reviewed literature on one hand and between the research problem and the reviewed literature on the other. It behoved the researcher to ensure these relationships are apparent, and this is evidenced in the present study. The main question that underpinned the current research was: "What are the socio-economic effects of the COVID-19 pandemic on economies across the globe?" Data required for the conduct of the present study were obtained from:

- Peer-reviewed articles published in journals, research papers, textbooks, and newspaper publications;
- Google Search Engine including Worldometers.info, Africanews.com, and Weforum.org;
- Financial websites such as Tradingeconomics.com and
- Electronic databases of international bodies such as the International Bank for Reconstruction and Development (World Bank), International Monetary Fund (IMF), and World Economic Outlook, among others.

The ensuing keywords and phrases were used to generate relevant information and data from the Google Search Engine and other databases: Coronavirus, COVID-19, updates on Coronavirus, the effect of Coronavirus on global GDP, and the effect of Coronavirus on global politics. Discussions in this section were preceded by a theoretical framework. The following sub-themes formed the basis for discussion in this section:

- Spread of pandemics and preventive measures;
- Constraints to the fight against pandemics; and
- Pandemics, education and the global economy.

Discussions in this section contributed significantly to the study objective that is, identifying the level of preparedness and responsiveness of countries across the globe against the threats of COVID-19 to minimize its menacing effects on the global economy.

2.1. Theoretical Framework

One of the doyens of sociological development and advancement across the globe was Herbert Spencer (27th April 1820 – 8th December 1903). The *theory of social evolution* was arguably Herbert Spencer's most significant theoretical contribution to the field of sociology. His contribution to the sociological field included, but was limited to the following publications: *The Proper Sphere of Government* (1843), *Social Statics* (1851) and the *Social Organism* (1860) (Offer, 2019). Herbert Spencer's social evolutionary theory is nucleated around two sub-protagonist themes: physical evolution and biological evolution. For the purpose of this research, we emphasized biological evolution. Herbert Spencer first coined and introduced the phrase "Survival of the fittest" (New World Encyclopedia, 2017). This phrase later formed the basis for Charles Darwin's popularity following his publication in 1859 entitled *On the Origin of Species* (Offer, 2019). The underlying principle of Spencer's biological evolution posits that in ever-changing environments or circumstances, it is only creatures or humans who demonstrate finesse and agility and are able to make effective adjustments with relative ease that would be assured of survival in their persistent struggle for existence.

Biological evolution emphasizes society's movement from simple to complex arrangements and that, it is only the strong that survive in the new and dynamic complex environment. Spencer (as cited in Priya, n.d.) affirmed that society is evolving from an indefinite state to one that is more definite; societies and existing structures across the world are transitioning from conditions characterized by homogeneity to those that are heterogeneous in nature. He argued that animals and, by extension, humans are compelled to struggle to protect their existence and well-being. Further, the struggle for existence is not limited to an aspect of life; it cuts across every spectrum of life. Spencer (as cited in Priya, n.d.) was of the strong conviction that in societies, only the strong are able to make meaningful progress; the strong are able to survive and evolve, and the weak are gradually eliminated into extinction.

Spencer (as cited in Priya, n.d.) noted that a strong creature is one who demonstrates the ability to adapt and adjust to prevailing conditions and circumstances in ever-changing environments. He argued that societies or civilizations that are unable to adjust to ever-changing circumstances tend to cave in and gradually become extinct. Thus, there is a constant struggle for survival in human civilizations; those creatures that adapt quickly and make the requisite adjustments tend to have an edge over those characterized by a slow pace of adaption and adjustment. Spencer's theory (as cited in Priya, n.d.) identified two stages of social evolution. These include the transition from simple to complex societies and the transition from militant to industrial society. The transition from simple to complex manifests in four

types of societies in terms of evolutionary levels. These include: *simple societies*, *compound societies*, *doubly-compound societies*, and *trebly-compound societies*.

In his seminal writing, Spencer (as cited in Priya, n.d.) defined a ***simple society*** as one characterized by a single working whole; it is not subjected to any other society; various sections of this society co-operate with each other with or without a regulating centre; and the efforts of the various parts or sections are geared towards a common public goal. Societies categorized under the foregoing definition are characterized by unstable relationship structures; they are primarily nomadic and small in size and population. The degrees of integration, specialization, and differentiation among these societies are generally low. Priya (n.d.) listed Pueblo Indians, the new Caledonians, Fuegians, Eskimos, and Guiana tribes as examples of a small society advanced in Spencer's theory.

A ***compound society*** is an end-product of a merger of two or more simple societies characterized by violence or peaceful arrangements and negotiations. A compound society usually has an organized priestly group and social strata comprising four or five divisions; it is a society formed by a group of settled agricultural societies, albeit the majority of the members are pastoral. A compound society mobilizes its "business" activities beyond basic agriculture initiatives to include industrial structures such as general and basic division of labour (Spencer as cited in Priya, n.d.). Examples of compound society included the Ashantees, Hottentots, Dahomans, New Zealanders, Teutonic peoples in the fifth century, and Homeric Greeks (Priya, n.d.).

A ***doubly-compound society*** is an improvement over simple and compound societies in human existence. This is evident in the customs, political and religious structures of the doubly-compound society. Spencer (as cited in Priya, n.d.) described a doubly-compound society as one in which the cluster of societies and the people therein have settled and are more integrated than disintegrated; the societies are fairly large and implement definite religious hierarchies and political structures. Further, doubly-compound societies show advancements in the provision of infrastructure such as good roads and construction of towns; make significant progress in arts and knowledge; implement both rigid and less rigid caste systems, apply complex division of labour; and transform customary law into positive laws while religious observances are developed into complex, rigid and definite systems. The Guatemalans, ancient Peruvians, Spartan Confederacy, Thirteenth Century France, and Eleventh Century England are classic examples of doubly-compound society.

The fourth category of societies is the ***trebly-compound society***. Although an in-depth analysis of trebly-compound societies was not proffered, Spencer (as cited in Priya, n.d.) described a trebly-compound society as a constellation of societies with traits superior to those exhibited by doubly-compound societies. Undoubtedly, trebly-compound societies may be traced to the 21st century and beyond. A trebly-compound society is characterized by general cultural complexity, integration, high population density, and increased geographical size. Great civilized countries such as Russia, Italy, Great Britain, France, Germany, and the Assyrian Empire are notable examples of trebly-compound societies.
Today, the pace of evolution among certain aborigines and tribes across the globe is either static or slow; there are societies today that are deeply-rooted in Spencer's (as cited in Priya, n.d.) definition of simple society with little or no signs of socio-economic progress and migration to the other evolutionary levels. As a result, some social philosophers have questioned the practicality of Spencer's classic postulations in the 21st century. The critiques notwithstanding, Spencer's (as cited in Priya, n.d.) theory has social significance in contemporary times; it helps social scientists to identify and appreciate the various stages of human development and to appreciate significant factors accounting for the socio-economic development of advanced, emerging, and developing economies across the globe. His archetypal phrase, survival of the fittest, provides ample justification for the intermittent "trade wars" between and among great and "budding" global economies in prior and recent years. Further, the constant struggle for survival and existence explains individual countries' and global efforts at mobilizing financial, technical, and social resources to overcome the threats of the Coronavirus pandemic to ensure the eventual emergence and continuous existence of healthy people in peaceful, productive, and economically prosperous economies across the globe.

2.2. Spread of Pandemics and Preventive Measures

Saunders-Hastings and Krewski (2016) averred that the spread of viral infections among dense populations is easier and faster than in scattered populations. This affirms the relevance of governments' ban on mass gatherings as a measure to curb further spread of the Coronavirus pandemic. Garfors (2016) shared that for the first time in the history of the global flight industry, the total number of passengers recorded in 2013 was in excess of three billion. This historic feat was advanced into 2014 as the annual average of flights per day exceeded 100,000. The foregoing affirms increased human mobility due to significant improvements in global transportation systems and enhanced bilateral and multilateral relations, which facilitate inter-country business travels and social visits around the world.

Palmer's (2014) empirical analysis of the Spanish flu revealed that it was spread by the Chinese Labour Corps (CLC) among countries across the globe. From 1916 to the end of World War I, more than 100,000 labourers were deployed to Europe by the Chinese Labour Corps to lend support to the Allied war effort. Their travels across cities in several countries led to the spread of the disease. Despite its suspicious origination from China, the effect of the Spanish flu pandemic on the country was relatively low. Cheng and Leung (2007) found a positive relationship between traditional herbal medicine and the prevention of pandemic outbreaks. Findings from Cheng and Leung's (2007) study revealed that the relatively mild effect of the Spanish flu pandemic on the Chinese population could be attributed to the application of traditional Chinese herbal medicines during the outbreak.

Gronvall et al. were emphatic on the possible outbreak of any pandemic in the not-too-distant future and the need for scientists to divulge accurate and timely information to the general public since information released by scientists influence global response to pandemics, including preparedness and responsiveness to medical treatments, political decisions, trade policy, internal and external travel restrictions, among other significant considerations. The authors found

that participants at a conference's discussions on the biosecurity and biosafety challenges posed by previous pandemics, including the Severe Acute Respiratory Syndrome, helped to unravel the significance of planning and collaboration between public health professionals and scientists in fighting epidemics and pandemics.

Gronvall et al. shared some of the challenges encountered by scientists when combating pandemics, including the likelihood of contracting and spreading the pandemic they research: "Researchers would need to share biological samples between laboratories, sometimes internationally; decision makers and journalists will want the latest information, which may not be peer-reviewed; and researchers will risk contracting the disease they research, which could then spread outside of the laboratory" (p. 0063). The foregoing suggests that health professionals are equally at risk of falling victim to some of the deadly pandemics that plague economies around the world and for which they are called upon to help cure and prevent.

Abusrewil, Algeer, Aljifri, Slail, Andrew, Eldin et al. (2019) presented a situational report on actions and surveillance systems and measures adopted by member countries of the Middle-East and Africa Influenza Surveillance Network (MENA-ISN) to combat the spread of the influenza pandemic. Data for the research were obtained from the eighth meeting organized by the Mérieux Foundation for Members of MENA-ISN in Egypt in April 2018. Participants identified immune-suppressed persons, pregnant women, the elderly, and children below age five as vulnerable groups to the threat of influenza in the MENA-ISN Region. Participants concluded that influenza still remains a significant threat to the socio-economic stability of the Region. A three-year strategic plan presented by participants outlined surveillance and control measures detailed by each country to combat threats of the pandemic, while effective planning and adequate funding were identified as major requirements by member countries to ensure containment. The need for policy formulation and initiatives for the production of effective vaccines to be characterized by creativity and innovation was recommended by participants. Production of effective vaccines coupled with strong surveillance and management of influenza-related cases among the most vulnerable groups was identified as a major panacea to the fight against the threats of pandemics and eventual reduction in mortality and morbidity rates in the Region and beyond.

Seto, Conly, Pessoa-Silva, Malik and Eremin (2013) revealed that a significant portion of diseases that are reported globally are often caused by acute respiratory infections (ARIs). Acute respiratory infections account for over four million reported deaths across the globe annually. Seto et al. (2013) identified the elderly, infants and children as the most vulnerable groups and the ARIs are more pronounced in low- and middle-income economies. The findings were consistent with Abusrewil et al. (2019), who identified the elderly, pregnant women, and children below age five as vulnerable groups to the threat of respiratory infection diseases. The authors identified weaknesses in laboratory diagnostic capabilities as a major setback to the effective determination of diseases caused by acute respiratory infections and the magnitude of those infections. However, there have been some improvements in diagnostics in recent years, thanks to the establishment of rapid viral diagnostic capabilities in some medical facilities in some economies across the globe. Experts attribute frequent nosocomial outbreaks and hospital admissions to the presence of acute respiratory infections. Generally, we find consistency in societal groups (children, pregnant women, adults, and elderly) that are vulnerable to pandemic outbreaks in countries across the globe (Seto et al., Abusrewil et al., Saunders-Hastings & Krewski, 2016; Laghali, Lawlor & Tate, 2020).

Thabet, Al-Kohani, Shadoul, Al-Mahaqri, bin Yahya, Saleh et al. (2016) sought to provide scientific descriptions for the underlying conditions, seasonality, demographic details, and etiological agents among patients hospitalized in Yemen as a result of viral severe acute respiratory infections (SARIs), using available data from January 2014 to December 2015; and laboratory testing of research participants' nasopharyngeal swabs. In all, 1,346 diagnostic specimens were tested and applied to the study. The results revealed that 733, representing 54% of the specimens, tested positive for influenza-related viruses with influenza A(H3) and A(H1N1) pdm09 predominating. The results revealed that influenza was more prevalent in males (61%) than females, while respiratory syncytial virus (RSV) was largely confirmed among children (41%). The median length of hospitalization of patients was six days; the most commonly reported underlying condition was chronic cardiovascular diseases; and the median age of the research participants was one year. Patients who were hospitalized due to severe acute respiratory infections had specimen tests confirming the presence of respiratory viruses such as influenza, respiratory syncytial virus, and adenovirus.

Abubakar, Malik, Pebody, Elkholy, Khan, Bellos et al. (2016) drew on eighty-three published and unpublished medical (pandemic) reports to present a descriptive summary of challenges related to acute respiratory infections in the Eastern Mediterranean Region. Abubakar et al. (2016) reviewed existing medical literature to facilitate their description of issues posed by epidemic- and pandemic-prone acute respiratory infections (ARIs) in the Region. The search through documented literature revealed acute respiratory infections and pneumonia as the leading causes of infections and deaths. However, diseases such as the Middle East respiratory syndrome coronavirus (MERS-Cov), acute respiratory infections, influenza A(H1N1), and avian influenza A(H5N1) were also prevalent in the Eastern Mediterranean Region. The research findings identified influenza (AH1N1) as a major contributor to the high morbidity rate recorded during the Swine flu pandemic in 2009-2010. The authors believed their research findings would be useful to policy-makers in the formulation and development of preventive and control measures and strategies.

Laghali et al. (2020) identified the influenza A virus (IAV) as one of the deadly infections that affect human lives across the globe. Laghali et al. revealed that between three million and five million people are infected annually by the influenza A virus. According to the World Health Organisation (as cited in Laghali et al.), influenza A virus claims between 290,000 and 650,000 lives annually across the globe. Social groups with the highest risk of contraction include persons with underlying lung and heart conditions, immune-compromised, young and old. Although human-to-human transmission of IAV is not scientifically well-proven, a high rate of infections occurs through birds-to-human transmissions.

Sirawan, Berry, Badra, El Bazzal, Dabaja, Kataya et al. (2020) reported the detection of the avian influenza virus H9N2 in Lebanon in 2006 and 2010 and the detection of the avian influenza virus H5N1 in 2016. From the foregoing, we observe the inter-epidemic period in Lebanon, which ranged from four to six years. Given the brevity of the epidemic occurrence period in Lebanon, Sirawan et al. (2020) sought to evaluate trending avian influenza viruses (AIVs) in Lebanon at the human-animal interface. The study was conducted in seven Lebanese governorates from March to June 2017. A thousand specimens were collected from selected poultry in the research area, while sixty-nine poultry farmers who were working and had direct contact with the poultry were included in the study. Sirawan et al. tested the poultry specimens for influenza infection, and blood samples of the poultry farmers were tested. The researchers conducted serological studies to test sera for antibodies against avian influenza viruses. Test results from the human (poultry farmers') samples taken were negative. However, 0.6% of the chickens screened tested positive for avian influenza virus H9N2. Sequences obtained from the screening clustered tightly with Lebanese H9N2 viruses from 2010 and those of Israeli origin. Based on the research outcomes, Sirawan et al. suggested the need for *one health approach* to be adopted in regular surveillance for the prevalence of avian influenza viruses in poultry to avert the occurrence of an epidemic and, possibly, a pandemic across borders.

Jones, Mahapatra, Chubwa, Clarke, Batten, Hicks et al. (2020) confirmed the detection, prevalence, and endemic nature of the peste des petits ruminants (PPR) disease in the northern part of Tanzania since 2008. The PPR was first confirmed among goats and sheep in the Ngorongoro District in Northern Tanzania. Jones et al. (2020) were interested in identifying the presence of and describing the peste des petits ruminants in pastoralist small ruminant herds in the Ngorongoro District. The study involved an investigation of thirty-three PPR-like disease reports in various parts of the Ngorongoro District in June 2015. The researchers employed techniques such as laboratory analysis, peste des petits ruminants' virus rapid detection test (PPRV-RDT), semi-structured interviews, and clinical examinations in the successful conduct of the study. Findings from the various screenings revealed an infection of the bluetongue virus (BTV) among two herds. This was confirmed by the reverse transcription-polymerase chain reaction (RT-qPCR). The test results confirmed the infection of ten herds with the peste des ruminants' virus (PPRV); the infection is believed to have been caused by PPRV-RDT or real-time (RT-qPCR) or both.

Bakhshi, Mousson, Vazeille, Zakeri, Raz, de Lamballerie et al. (2020) found that millions of confirmed disease cases and thousands of reported deaths annually are a product of mosquito-borne viruses such as the West Nile virus (WNV), dengue, Zika, and chikungunya. In addition to being fatal for humans, the West Nile virus remains the most widespread arbovirus across the globe (Kramer, Styer & Ebel, 2008). Narratives by Smithburn, Hughes, Burke and Paul (1940) revealed that the West Nile virus was isolated from Uganda for the first time in 1937. Extant research by Andreadis (2012) and Conley, Fuller, Haddad, Hassan, Gad and Beier (2014) discovered that one of the primary enzootic vectors of the West Nile virus is Cx. Pipiens: This vector is found and widely circulated in many countries across the globe. Petersen, Roehrig and Sejvar (2007) and Rizzoli, Jimenez-Clavero, Barzon, Cordioli, Figuerola, Koraka et al. (2015) reported widespread of the West Nile virus in temperate regions in Europe, Northern Australia, Africa and Southern Asia.

Heydari, Metanat, Rouzbeh-Far, Tabatabaei, Rakhshani, Sepehri-Rad et al. (2018); and Ziyaeyan, Behzadi, Leyva-Grado, Azizi, Pouladfar, Dorzaban et al. (2018) found constant increase in trade across borders, including transport of goods, cattle and other animals as safe conduits for the introduction and spread of arboviruses such as the West Nile virus in the Islamic Republic of Iran. Findings from earlier scientific studies conducted by Naficy and Saidi (1970) and Saidi, Tesh, Javadian and Nadim (1976) indicated that the West Nile virus is commonly spread; it remains the leading Cx.-transmitted infection frequently reported in Iran. The foregoing was supported by outcomes of a recent empirical study conducted by Zou, Foster, Dodd, Petersen and Stramer (2010), which revealed that about 20% of individuals with confirmed West Nile virus exhibit symptoms of the infection.

Saunders-Hastings and Krewski (2016) found a higher rate of emergency preparedness and responsiveness in Europe and North America in the fight against the Swine flu than in prior pandemic outbreaks. The authors attributed the enhanced preparedness to "efforts catalyzed by the earlier SARS outbreak of 2002-2003 and persisting fears surrounding H5N1 avian flu" (p. 12). Efforts of infected countries to contain the Swine flu pandemic included both pharmaceutical and non-pharmaceutical interventions. The non-pharmaceutical interventions included voluntary isolation of persons exhibiting traits of the pandemic, school closures, and personal hygiene, including regular hand washing with soap under running water. It was the first pandemic for which the response or interventions involved the use of antivirals and vaccinations. Measures adopted by the United Kingdom (UK) to contain and curb further spread of the Swine flu included mass prophylaxis of potential contacts, voluntary isolation with antiviral treatments for suspected cases, and school closure (Hine, 2010). The respective Swine flu vaccination coverages for Sweden and Norway were 59% and 45% (Samanlioglu & Blige, 2016), while the average vaccination coverage in the United States was in the range of 12.9% to 38.8% (Centres for Disease Control and Prevention, 2010).

Laghali et al. described the bird-to-human transmission of IAV as sporadic; the IAV possesses a variety of natural reservoirs, including swine and aquatic birds. In 2013, the avian H7N9 influenza A virus was confirmed in humans; since then, there have been more than 1,500 laboratory-confirmed cases with a mortality rate estimated at 40%. Lam et al. (as cited in Laghali et al.) predicted that another pandemic involving H7N9 is imminent. Current treatments identified and sanctioned to protect humans against predatory IAV include antiviral therapies and annual vaccination.

To ensure safe, prompt, and accurate responses to future pandemic outbreaks, Gronvall et al. suggested the need for scientists to ensure effective harmonization and modernization of standards and training in these areas. Similarly, Saunders-Hastings and Krewski (2016) concluded that challenges associated with the rate of infection and spread of pandemics could be addressed through concerted efforts at the local, national, and international levels. The combination of

mitigation and containment measures at the three levels could facilitate the realization of a set objective, that is, effective combat of pandemics in the immediate and near future.

Heymann, Chen, Takemi, Fidler, Tappero, Thomas, et al. (2015) believed that the recent Ebola outbreak presented global, especially African leaders, with an opportunity to redefine their responsive and preventive strategies towards combating epidemics and pandemics. This initiative would assure a significant reduction in mortality rates and vulnerabilities of societies to various forms of infectious diseases and threats of pandemics across national borders.

Although Canada did not consider state-wide school closure as one of her non-pharmaceutical measures to combat the spread of the Swine flu, the summer break, which culminated in school closure, resulted in about 50% reduction in infection rate among school children (Earn, He, Loeb, Fonseca, Lee & Dushoff, 2012). However, the closure of schools formed an integral part of the non-pharmaceutical strategies adopted and implemented by countries such as Australia, the United States and the United Kingdom (Borse et al., 2011; Rosella, Wilson, Crowcroft, Chu, Upshur, Willison, Deeks, Schwartz, Tustin, Sider et al., 2013; Isfeld-Kiely & Moghadas, 2014). Distinct empirical studies conducted by Amato-Gauci, Zucs, Snacken, Ciancio, Lopez, Broberg, Penttinen and Nicoll (2011); and Meler, Ajelli, Publiese and Ferguson (2011) revealed the second wave of the Swine flu pandemic in Europe was more severe following the re-opening of schools. The foregoing affirms the relevance of containment measures such as the closure of schools, though it is relatively challenging to readily assess their impact on curbing further spread of pandemics (Borse, Behravesh, Dumanovsky, Zucker Swerdlow, Edelson, Choe-Castillo and Meltzer, 2009; Saunders-Hastings & Krewski, 2016).

Seto et al. asserted scientific understanding of the mode of transmission of viruses is critical to the strategic development of management and control measures. Thus, understanding the way viruses behave is fundamental to mapping out cogent strategies to stem the tide of their negative effect on society. The researchers identified parainfluenza, adenovirus, influenza, and respiratory syncytial virus as the most commonly encountered viruses that cause acute respiratory tract infections globally. Among the foregoing viruses, influenza is the most commonly encountered by individuals globally.

The Ebola virus was first discovered along the Ebola River in the then Zaire (now Democratic Republic of Congo) in 1976. However, the recent Ebola outbreak was "first identified in December 2013 in the Guéckédou Region of Guinea-Conakry, a remote region of southeast Guinea bordering Sierra Leone and Liberia" (Briand, Bertherat, Cox, Formenty, Kieny, Myhre et al. as cited in Malik, Mahjour and Alwan, 2014, p. 656). Since its official discovery, the Ebola virus has yet to be recorded in the Eastern Mediterranean Region. However, it has been confirmed in many parts of Africa, including Sudan, and in other parts of the world. Malik and Mahjour (2016) reported the absence of enzootic foci of the Ebola virus in the Middle East. However, the virus was first spread from Africa into other parts of the globe through international travel. As a result, health authorities in the Middle East have identified international travel as a major risk conduit for the spread of the virus in the Region. Member states in the Region have been urged to improve the capacities of their respective health facilities to enhance their preparedness, responsiveness, early detection, prevention, and control of Ebola outbreaks. The overarching idea is to ensure that public health facilities in the Region meet standards set in the IHRs while ensuring the lives of citizens and other nationals.

Fauci (2014) described the Ebola virus as a zoonotic pathogen. That is, human-to-human circulation of the Ebola virus is rare; the common mode of transmission may be through animal-to-human. Fauci (2014) revealed that transmission to humans might be faster when they come into contact with infected animals' bodily fluids or tissue. These bodily fluids may be transmitted by additional intermediary species through direct contact. Malik et al. (2014) observed that the Ebola outbreaks are characteristically unpredictable and intermittent in nature. Public health measures rolled out for containment of previous Ebola outbreaks included the identification of cases, tracing of contacts of infected and potential patients, and isolation and quarantine of patients to curb the spread. As of 2014, confirmed cases of Ebola virus infections were restricted to East, Central and West Africa; the first multi-country outbreak of the Ebola virus was recorded during the 2014 through 2016 pandemic (Malik et al., 2014; Frieden et al., 2014).

Malik et al. enumerated four strategic ways in which the Middle East could minimize the spread of the Ebola virus, should it be introduced in the Region. These include:

- The need for immediate conduct of epidemiological investigations,
- The availability of test kits to ensure rapid laboratory confirmations,
- The proper isolation of suspected patients and effective practices in relation to infection management and control.

2.3. Constraints to the Fight against Pandemics

Saunders-Hastings and Krewski (2016) noted factors such as limited human capital, public health facilities and hospitals as major constraints to the fight against pandemics. The authors argued that though existing medical facilities may have the capacity to admit patients with regular cases in large numbers, a pandemic outbreak may result in over-crowding of patients; this may strain and disrupt the services of these medical facilities, which may compel them to turn patients away. They found increasing proximity to animal reservoirs, high population growth and human mobility rates as factors that increase the potential global pandemic outbreak at an accelerated rate. Potter (2001) revealed that the average inter-pandemic period between 1700 and 1889 ranged from 50 to 60 years. However, the average period after 1889 has reduced to a range between 10 and 40 years. To this end, Saunders-Hastings and Krewski (2016) concluded that while about a century ago, it could take a pandemic several weeks or months to spread across the globe, today, a virus could spread around the globe in a matter of days.

High case fatality rates and the devastating effects of pandemics on societies in prior periods could be attributed to a number of factors. These included:

- A lack of clear and evident systematic response plans;

- Non-availability of antibiotics, vaccinations, and antivirals to treat secondary infections;
- Limited knowledge of disease prevention, control and management; and
- Underdeveloped public health practice systems.

Priorities given by world economies to the establishment of state-of-the-art public health facilities and practices, as well as disease prevention and control, are attributed largely to the astronomical casualties associated with the 1918 pandemic, that is, the Spanish flu (Saunders-Hastings & Krewski, 2016).

Dawson, Malik, Parvez and Morse (2019) focused on systematic analysis and synthesis of existing literature on the Middle East respiratory syndrome coronavirus (MERS-CoV), which was first identified in humans in 2012 to ascertain contemporary knowledge and gaps, if any, in the research area. Dawson et al. (2019) adapted PRISMA guidelines to review systematically documented literature on MERS-CoV. For the purpose of this research, Dawson et al. selected two hundred and eight of the relevant four hundred and seven identified peer-reviewed documents. The applied publications were selected based on their contributions to four key scientific areas. These included:

- The interface of animals and search for natural hosts of MERS-CoV;
- Epidemiology and transmission;
- Virology and
- Characteristics, outcomes, and therapeutic and preventive options.

The research findings revealed evidence of camel-to-human transmission of MERS-CoV cases; the transmission is believed to occur through human-camel contacts. This evidence notwithstanding, the origin of many primary camel-to-human MERS-CoV transmission cases remains unknown.

Dawson et al. attributed the foregoing challenge to a limited understanding of transmission mechanisms. The researchers identified dipeptidyl peptidase 4 (DPP4/CD26) as the human receptor for MERS-CoV while different forms of serological and molecular assays developed. The only documented zoonotic source of human infection was dromedary camels. The findings revealed the global infection of bat species by MERS-like CoVs and the infection of dromedary camels by MERS-like CoVs throughout Africa and the Middle East. Dawson et al. concluded that despite the plethora of empirical research conducted on MERS-CoV since its primary discovery in humans in 2012, there remains a significant knowledge gap in the areas of epidemiology and the natural history of infections.

Research conducted by Kiyong, Cook, Okba, Kivali, Reusken, Haagmans et al. (2020) sought to establish the presence of antibodies to the Middle East respiratory syndrome coronavirus (MERS-CoV) in high-risk groups in Kenya. Kiyong et al. (2020) affirmed that the zoonotic coronavirus (CoV) is the major cause of respiratory diseases such as the Middle East respiratory syndrome (MERS). Kiyong et al. defined high-risk groups in Kenya to include herders, slaughterhouse workers, and camel handlers. Despite the high risk of infection among camel handlers in Africa, there is limited empirical documentation on the phenomenon. For the purpose of the research, specimens were collected from thirty-five camel herders, ninety-three camel handlers, and fifty-eight slaughterhouse workers. The researchers adapted PRNT and ELISA to screen participants for MERS-CoV antibodies. The results indicated that four of the fifty-eight slaughterhouse workers tested positive for the PRNT screening. Slaughterhouse workers' exposure to camels through slaughtering and drinking of camel blood was identified as some high-risk factors that could cause widespread MERS-CoV infections among the group.

Kiyong et al. stressed the need for further scientific inquiries to unravel the mode of transmission of MERS-CoV from dromedary to humans and further understand the epidemiology of MERS-CoV in Africa. Kiyong et al.'s recommended measures affirm the need for massive investments in medical infrastructure in Africa in the 21st century and beyond. The frequency and speed of global pandemic outbreaks are a "wake-up" call to African leaders to make the development of their respective health sectors and medical facilities a major priority.

Further phylogenetic analysis conducted by Jones et al. on 6 partial N gene sequences revealed viruses associated with the peste des petits ruminants "clustered with recent lineage III Tanzanian viruses and grouped with Ugandan, Kenyan and Democratic Republic of Congo isolates. No PPR-like disease was reported in wildlife" (p. 1). Clinical syndromes exhibited by the herds varied considerably. Jones et al. noted that such variations render field diagnosis of PPR very challenging to researchers. This challenge affirmed the urgent need for researchers to access "pen-side antigen tests and multiplex assays to support improved surveillance and targeting of control activities for PPR eradication" (p. 1).

Despite efforts by scientists to ensure considerable improvements in surveillance systems in some economies across the globe, Saunders-Hastings and Krewski (2016) expressed doubt about the ability of current surveillance systems to ensure early detection and successful prevention of pandemic outbreaks across the globe: "Despite expansion of surveillance efforts, it is impossible to predict with certainty whether next pandemic will arise from an antigenic shift in currently-circulating strains or a mutation that enables human-to-human transmission in one of the more lethal avian strains" (p. 13). Potter (2001) shared that human contact with animal reservoirs and high population growth rate, coupled with improved technology, have reduced the average inter-pandemic period from 50-60 years to 10-40 years. The former fairly estimated the inter-pandemic period between 1700 and 1889; the latter fairly predicted the inter-pandemic period from 1889 till the current period.

Lo, Mertz, and Loeb (2017) argued that improvements in reporting standards for pandemic outbreaks are essential to understanding the fundamental behaviour of various aspects or strains of these pandemics and the appropriate management techniques to adapt to neutralize their harmful effects on society. The authors examined the quality of reports on pandemic outbreaks in recent years to ascertain their conformity to high standards using a modified version of the STROBE statement. Lo et al. (2017) systematically analyzed and assessed sixty-four reports on seasonal, avian and H1N1 influenza outbreaks to determine their quality. The researchers assigned a score of 30 and reported confidence

intervals (CI) and median difference (MD) to facilitate the comparison of study characteristics. The reports were drawn from three distinct online databases: MEDLINE, PubMed, and Web of Science.

Findings from the research revealed that the quality of reporting standards associated with peer-reviewed articles was higher and better than all other forms, showing median difference of 2.79 and a confidence interval of 0.79-4.78. This was followed by reports presented by public health agencies. Reports from academic institutions had the lowest quality. Lo et al. concluded that though the availability of explicit reporting guidelines on pandemic outbreaks is helpful to measures to combat widespread, published reports do not usually include essential information on details of cases or cases investigated, characteristics of patients, and limitations that could have biased the outcomes.

To win the fight against current and future pandemics, Gronvall et al., Saunders-Hastings, and Krewski (2016) noted that surveillance capabilities of animals and humans at the global level require considerable improvements. They found a significant change in the rate of spread of pandemics in prior relative to current periods; while it took weeks and, in some cases, months for a pandemic to spread across the globe over a hundred years ago, today, an outbreak in one country only takes days to spread to different parts of the world.

Advancements in transportation systems during the early Industrial Revolution increased human mobility within countries and around the world. The developed transportation systems, including steamboats, railroads, and steam engines, became "perfect" conduits for the spread of pandemics among various countries and across the globe in the early 1900s (Saunders-Hastings & Krewski, 2016). Today, improvements in technology and global transportation systems have worsened the plights of humans during pandemic outbreaks across the globe; the speed of spread of infection related to pandemic outbreaks is beyond measure, as witnessed in the sporadic spread of the Swine flu in 2009: "The extent of global trade and travel allowed swine flu to spread as widely in six weeks as past pandemics had in six months. By July, [the rate of] infection was reported in 122 countries, with 134,000 laboratory-confirmed cases and 800 deaths" (Henderson, Courtney, Inglesby, Toner and Nuzzo as cited in Saunders-Hastings and Krewski, 2016, p. 11). In Europe, the re-opening of schools produced a more severe second wave of the Swine flu pandemic.

The Canadian Institute for Health Information (2010) identified most countries' inability to maintain constant diagnostic protocols as a major setback to their surveillance efforts. For instance, the generation of relevant surveillance data by health officials to inform timely decisions on pandemics was a challenge. These included a lack of reliable data on intensive care admission, mortality, and hospitalization (Eggleton & Ogilvie, 2010). Further investigations by Eggleton and Ogilvie (2010) revealed that at the beginning of the Swine flu outbreak in Canada, the surveillance group of the nation's public health agency (Public Health Agency of Canada (PHAC)) comprised only four (4) members. This rendered timely production, analysis, appraisal and communication of relevant data to key stakeholders difficult. The foregoing was complicated further by deficiencies in "inter-agency coordination, highlighting a dual need for clarification of roles and responsibilities in planning and response, and for a streamlined approach for the incorporation of evidence into decision-making processes" (Rosella, Wilson, Crowcroft, Chu, Upshur, Willison, Deeks, Schwartz, Tustin, Sider et al. as cited in Saunders-Hastings and Krewski, 2016, p. 12).

Malik and Mahjour (2016) examined significant lessons learnt by African countries during the Ebola virus pandemic outbreak and the preparedness of African leaders and their respective economies for other epidemic and pandemic outbreaks on the continent, and across the globe. The authors' narratives revealed that the Ebola outbreak, which started in December 2013, ended in 2016 with far-reaching socio-economic and security consequences for the global economy, with a strong emphasis on economies on the African continent. Statistics released by the World Health Organisation in 2016 indicated more than 28,600 confirmed cases were recorded, and more than 11,000 deaths were reported. Though the foregoing figures cannot be compared significantly with those recorded in other pandemics, such as the Spanish flu and Swine flu, they are unique and significant in the history of Ebola outbreaks; Frieden, Damon, Bell, Kenyon and Nichol (2014) found the total deaths (more than 11,000) and total confirmed cases (more than 28,600) during the period, that is, from late December 2013 through March 2016, were more than the combined total number of deaths and confirmed cases documented on all Ebola outbreaks in prior periods. These startling figures are symptomatic of the ill-preparedness and ill-responsiveness of many leaders to the recent outbreak of the Ebola pandemic.

Frieden (2015) argued that weak surveillance systems are a recipe for ineffective early warning signals; this could affect the ability to detect an early outbreak in the originating country and apply the necessary control measures to prevent further outbreaks. Failure to ensure effective control in the country of origin may expose vulnerabilities in the preventive and healthcare systems in other infected territories or countries. Thus, the need for strong "self-defence" against possible outbreaks of pandemics is a desideratum of every country across the world.

Malik et al. bemoaned the inimical effects of challenges such as lack of personal protective equipment (PPE), constant movement of people between porous borders, uncoordinated and weak health systems, and lack of adequate staff on effective documentation and contact tracing during pandemic outbreaks in Africa. Further, documentation on the total number of confirmed cases and deaths may be underestimated due to a number of factors such as ineffective contact tracing, lack of state-of-the-art medical equipment to facilitate laboratory testing and confirmation of cases, and challenges to early case identification.

Gostin and Friedman (2015) identified some countries' noncompliance with the International Health Regulations as a major contributory factor to their inability to meet the growing health needs of their respective peoples during epidemic and pandemic outbreaks. The IHRs provide specifications that help to expand the capacity of health infrastructure to accommodate the growing number of emergency and regular cases in a country. Rapid population growth and its attendant increasing health challenges call for improvements in medical facilities and healthcare delivery systems in countries across the globe. This would enhance each country's preparedness for a potential pandemic outbreak.

Farrar and Piot (2014) and Malik et al. revealed that as of 2014, human-to-human transmission of the Ebola virus has not been recorded outside Africa. At the epicentre of its outbreak, the Ebola virus is usually uncontrollable; this increases the likelihood of spreading into many parts of Africa and across the globe. The authors noted that the Ebola virus disease (EVD) is new to the Eastern Mediterranean Region, and given the different possible ways of introducing the disease into the Region, early recognition of signs and symptoms by existing surveillance systems and health personnel may be a challenge. This could accelerate the spread of the pandemic faster than detection, prevention, and control in the Region.

Malik et al. found strong air traffic connections between countries in the West African sub-region and their counterparts in the Middle East and asserted that air travel relations pose a high risk of importation of the Ebola virus disease into the Region. Travels accounted for the rapid spread of the Ebola virus to other West African countries such as Senegal and Nigeria. Beyond the Ebola virus and the Eastern Mediterranean Region, Malik and Mahjour (2016) predicted a more rapid spread of pandemics now and in the future than ever. To this end, the health security of the global community would be severely compromised if the World Health Organisation, member countries, and other international health agencies and partners do not adopt a proactive approach to curb the rapid spread of pandemics across the globe.

Extant research by Malik et al., Malik & Mahjour (2016) and Frieden et al. revealed that early identification of infected persons is predicated on the availability of effective equipment and facilities for diagnosis and treatments. The research outcomes indicated that the greatest risk of Ebola virus transmission is not from patients diagnosed with infections but from isolation of potential patients and delayed detection. In addition, the immediate symptoms of the Ebola virus are not specific; this increases the likelihood of diagnosed patients infecting healthcare workers and personal caregivers before the infections are detected and diagnosed.

2.4. Pandemics, Education and the Global Economy

As noted in the preceding section, the closure of schools has been identified as one of the essential non-pharmaceutical interventions that could effectively curb the further spread of pandemics among student- and teacher populations. However, such closures come at economic costs to affected countries across the globe. Borse et al. (2009) examined the economic effect of school closure following a pandemic outbreak on households in New York City. The research findings revealed that at least an adult in 17% of the households sampled had to miss work due to school closure. The estimate associated with the economic cost of schools' closure varies from one jurisdiction to another and is based on a considerable number of factors, including the duration of the closure and the size of the affected population. Despite the uncertainties surrounding the effectiveness of the non-pharmaceutical interventions, Isfeld-Kiely and Moghadas (2014) found high public acceptance and compliance rate in pandemic-infected countries.

Andradottir, Chiu, Goldsman, Lee, Tsui, Sander, Fisman and Nizam (2011) assessed reactive measures developed and adopted by economies to contain pandemic outbreaks. Findings from their research revealed that the economic cost of school closure could range from tens of millions to hundreds of millions of United States dollars, depending on the size and population. The global airline and tourism industries were severely impacted by the Swine flu pandemic. Losses to the two major industries were estimated to be in millions of United States dollars (Polycom, 2011; Page, 2011).

Smith, Keogh-Brown, Barnett and Tait (2009) argued that computations that are skewed towards the determination of economic losses from pandemics are often underestimated since they seldom take into consideration "longer-lasting impacts related [to] infection prevention efforts, such as school closures, lost productivity from work absenteeism, shifts in consumer habits, and reduced tourism" (as cited in Saunders-Hastings and Krewski, 2016, p. 11). The authors' postulation affirmed earlier findings by Ferguson, Cummings, Fraser, Cajka, Cooley and Burke (2006), which revealed that costs related to the implementation of reactive school closures are difficult to compute due to their attendant work absenteeism and lost productivity.

Documentation on the socio-economic impact of the 2009-2010 Swine flu on global economies was an improvement over earlier records kept for prior pandemics. This notwithstanding, Girard, Tam, Assossou and Kieny (2010) believed many people had a limited understanding of the pandemic's socio-economic effect on the global economy. Saunders-Hastings and Krewski (2016) believed that direct costs associated with treatment, including hospitalizations, outpatient visits, and drugs, were underestimated. In Canada, the Canadian Institute for Health Information (2010) estimated the total cost of visits to the emergency department at 50 million Canadian dollars, the average cost of treating each H1N1-infected patient at 11,000 Canadian dollars, and the total cost of prevention and management of the pandemic at 200 billion Canadian dollars. Smith, Keogh-Brown, Barnett and Tait (2009) and Polycom (2011) found that the estimated economic losses in countries affected by the pandemic ranged from 0.5% to 1.5% of GDP. This finding was significant; it aligned with one of the underlying objectives of the current study, which sought to examine the economic impact of COVID-19 on countries across the globe.

According to the International Monetary Fund (IMF) (as cited in World Economic Forum, 2020c), containment measures adopted by China in the fight against the Coronavirus pandemic could serve as a prototype for modelled economies across the globe. China's success, thus far, in the fight against the pandemic asserts the enviable role of sound policies and strategies in the combat of pandemics, including the Coronavirus. However, the adaption and implementation of these preventive and control measures come at significant economic costs and trade-offs. The IMF (as cited in World Economic Forum, 2020c) believed the global economic shock waves of COVID-19 are as severe as those encountered during the global financial crisis in 2007–2008 and that it is imperative for policy-makers to formulate and implement strategies that would provide the requisite assistance to small- and medium-sized businesses and households to mitigate the ominous effects of the Coronavirus pandemic on their socio-economic activities.

The World Economic Forum (2020c) recounted the menacing effects of COVID-19 on the global economy and gyrating efforts by policy-makers to respond appropriately and positively to the pandemic. China's adaption and implementation of non-pharmaceutical interventions, including social distancing, imposition of curfews in some provinces, and restricted mobility at local and national levels, slowed down economic activities; the end economic results included projected contraction in China's total gross domestic product (GDP) targets for 2020, and provision of economic stimulus for the vulnerable to mitigate the severe impact of the pandemic outbreak on their socio-economic lives. This included waiving utility bills and social security fees and channelling credit through Fintech firms. Other countries, such as the United States and Ghana, have announced separate economic stimulus packages for their respective populations. It is worth noting that strict containment measures implemented in the Hubei Province were critical to the Government's efforts to limit the further spread of the virus in different parts of China.

Globally, industrial production and retail sales have been impacted severely by the Coronavirus pandemic (World Economic Forum, 2020c). Following the Coronavirus outbreak, Apple was compelled to temporarily close all its forty-two (42) stores across China. This impacted negatively on iPhone production and sales in the country. China remains iPhone's largest international market. In February 2020, the distribution of iPhones in China plummeted by over 60% (Bloomberg News, 2020). Data released by the China Academy of Information and Communications Technology (as cited in Bloomberg News, 2020) estimated total mobile phone shipments to China to be 6.4 million units during the period. The alarming effect of the Coronavirus pandemic on demand and supply of iPhones was envisaged to be short-lived. However, analysts believe an extension of the pandemic into the second quarter of 2020 may negatively impact the arrangements to launch Apple's 5th-generation capable or 5G iPhones towards the end of the second quarter (Bloomberg News, 2020). A year-on-year analysis revealed about 56% reduction in shipment quantity during the period.

Based on its year-on-year analysis, Bloomberg Intelligence (2020) predicted Apple's second-quarter fiscal sales in China may thump by approximately $5.1 billion to $5.6 billion. As of Monday, 2nd March 2020, Apple had lost approximately $167 billion of its market value. While individual companies and countries have started computing their respective losses in revenues, global bodies such as the Organisation for Economic Co-operation and Development (OECD), have started estimating the impact of the pandemic on global GDP growth for 2020 (Orlik, Rush, Cousin & Hong, 2020). The Coronavirus continues to remain a major threat to the global financial markets and the global economy in general (Lee, 2020).

3. Research Methodology

The current research relied on the quantitative approach to scientific inquiry. Specifically, a cross-sectional design, an example of a survey design, was adapted and used in the study. This design allowed the researchers to gather relevant research data over a specific period of time (Ashley, Takyi & Obeng, 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). Data required for the conduct of the current research were obtained mainly from secondary sources. These included:

- Peer-reviewed articles published in journals, research papers, textbooks, and newspaper publications;
- Google Search Engine including Worldometers.info, Africanews.com, and Weforum.org; financial websites such as Tradingeconomics.com; and
- Electronic databases of international bodies such as the International Bank for Reconstruction and Development, International Monetary Fund, and World Economic Outlook, among others

Annual data on global gross domestic products (GDPs) denominated in United States dollars (US$) from 1990 through 2019; data on the top twenty global economies denominated in the United States dollars from 2019 through 2021; and available data on the COVID-19 pandemic as of 20th April 2020 were used in the study.

3.1. Analytical Tools

Regression models and descriptive statistics were used to describe the research variables and to evaluate their behaviour on the global economy over the stated time frame. Measures such as the range and standard deviation were employed to describe the extent of dispersion about the central tendency (Ashley et al., 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). These measures were used to describe trends in the world's top twenty (20) economies over a three-year period (from 2019 to 2021) and in the global GDP values for a twenty-year period (from 1999 to 2019).

3.2. Research Variables

The independent research variable was the fiscal year, while the dependent research variable was the relative effect of the fiscal year on annual global GDP.

3.3. Regression Model

Regression statistical model was adapted to measure the effect and level of interaction of a given fiscal or financial year on global gross domestic product values over the research period. Specifically, the research sought to measure the extent to which a given fiscal year, controlling for internal and external environmental factors such as Tsunamis, earthquakes, bushfires, hurricanes, and pandemics (such as COVID-19) could impact significantly on annual global GDP. The Microsoft Excel analytical software was adapted and used in the research. Diagrams and tables were derived from Microsoft Excel to explain the research data.

3.4. Research Hypotheses

The study tested the causal relationship between a given fiscal year and global gross domestic product values using the following null and research or alternative hypotheses:

- Ho: μ1 = μ2; this implies a given fiscal year alone does not have a strong effect on global GDP
- H1: μ1 ≠ μ2; this implies that a given fiscal year alone has a strong effect on global GDP

4. Research Findings and Discussions

4.1. Global Outbreak of COVID-19 and Measures Taken

Some economists argue that the world is saddled with a *coronavirus recession*. That is, an economic recession that is likely to occur throughout the global economy in 2020 due to the Coronavirus outbreak. However, available statistics on the pandemic lend credence to the foregoing statement. As of Monday, 20 April 2020 (about 5:30 pm GMT), Worldometers.info (2020) revealed that the Coronavirus pandemic has been recorded in 210 countries and territories and two *international conveyances* across the globe. These international conveyances included the Princess Diamond Cruise ship harboured in Yokohama, Japan, and the Holland America's MS Zaandam Cruise ship. In all, there were 2,444,344 confirmed cases, 167,990 deaths, and 640,252 recoveries globally during the period. On 27 March 2020, Japan recorded 113 new cases. It was the highest number of cases recorded in a day in Japan. However, the number (113) recorded in Japan did not compare with the thousands of confirmed cases recorded in the United States during the period.

Data in table 1 and figure 1 reveal that the United States was the epicentre of the pandemic during the period. That is, the country had the most COVID-19 cases in the world, with respective total confirmed cases, deaths recovered, and active cases of 771,116, 41,353, 71,489 and 658,274 during the period. The United States' dominance confirmed earlier prediction by the World Health Organisation (WHO) that the economy is likely to be the epicentre of COVID-19, given the sporadic rate of infection in the country. In the United States, the rate of deaths (41,353) relative to the total number of confirmed cases (771,116) was about 5.36 % 1.80% ((41,353 deaths ÷ 771,116 confirmed cases) x 100% = 0.0536275 x 100% = 5.36275 = 5.36%) during the period. The States of New York (252,094), New Jersey (88,806), and Massachusetts (39,643) had the respective highest confirmed cases in the United States. The recovery rate (about 9.27%) coupled with the death rate (about 5.36%) suggests that the United States had more active and critical cases (85.37%) during the pandemic than the former. The number of confirmed cases in the United States constituted about 31.55% of all confirmed cases globally (2,444,344) during the period. The severity of the pandemic compelled the President Donald Trump-led administration to postpone the possibility of re-opening the United States economy from mid to the end of April 2020 and possibly beyond April 2020.

Country	Confirmed Cases	Confirmed Deaths	Case Fatality Rate	Total Recovered	Active Cases
United States of America	771,116	41,353	5.36%	71,489	658,274
Spain	200,210	20,852	10.42%	80,587	98,771
Italy	181,228	24,114	13.31%	48,877	108,237
France	152,894	19,718	12.90%	36,578	96,598
Germany	146,293	4,683	3.20%	91,500	50,110
United Kingdom	124,743	16,509	13.23%	N/A	107,890
Turkey	86,306	2,017	2.34%	11,976	72,313
Iran	83,505	5,209	6.24%	59,273	19,023
China	82,747	4,632	5.60%	77,084	1,031
Russia	47,121	405	0.86%	3,446	43,270
Belgium	39,983	5,828	14.58%	8,895	25,260
Brazil	39,548	2,507	6.34%	22,130	14,911
Canada	35,708	1,618	4.53%	12,197	21,893
Netherlands	33,405	3,751	11.23%	250	29,404
Switzerland	27,944	1,427	5.11%	17,800	8,717
Portugal	20,863	735	3.52%	610	19,518
India	17,615	559	3.17%	2,854	14,202
Peru	15,628	400	2.56%	6,811	8,417
Ireland	15,251	610	4.00%	77	14,564
Austria	14,795	470	3.18%	10,631	3,694
Europe	1,109,245	103,671	9.35%	319,576	685,998
North America	827,548	44,163	5.34%	87,799	695,586
Africa	23,304	1,140	4.89%	6,081	16,083
Asia	389,853	14,945	3.83%	184,106	190,902
Oceania	8,157	83	1.02%	5,252	2,822
South America	84,283	3,936	4.67%	36,794	43,553
World	2,444,344	167,990	6.87%	640,252	1,636,102

Table 1: Confirmed COVID-19 Cases and Deaths in Selected Global Countries
Source: Worldometers.info

The extended lockdowns in the United States were attributed to overstretched medical facilities, especially in States that were heavily affected by the pandemic in the economy. The social distancing and stay-at-home policy adopted and implemented by the President Trump-led administration was intended to curb the further spread of the virus and to ease pressure on the existing medical facilities. These measures became necessary despite their debilitating effect on the economy. The fight against the Coronavirus pandemic in the United States is state-managed and federally supported.

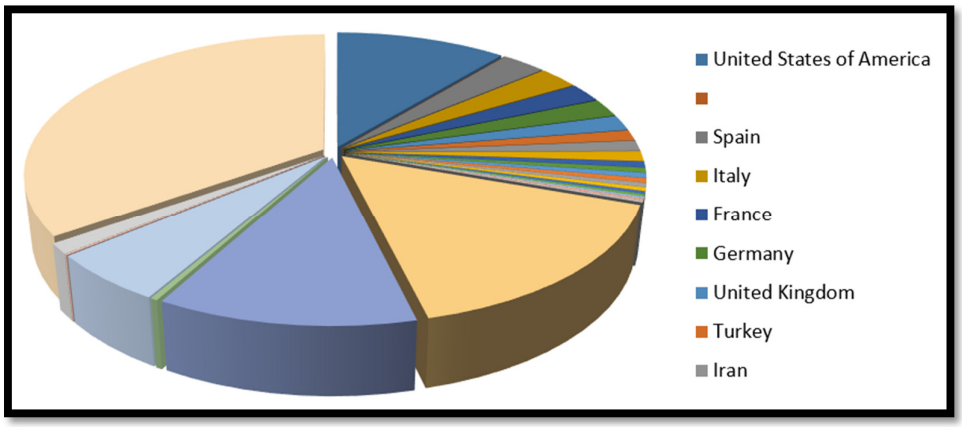

Figure 1: Confirmed COVID-19 Cases and Deaths in Selected Global Countries

President Donald Trump described the COVID-19 pandemic as a "plague." During the last week of March 2020, about 6.648 million Americans filed for unemployment claims. Health analysts have predicted that deaths from the Coronavirus in the United States would be more than two hundred thousand (200,000). As of 20 April 2020, about 84% (167,990 confirmed deaths) of the projected death toll (200,000) had been recorded. To minimise the effects of COVID-19 on businesses and households, the United States Congress approved a US$2 trillion stimulus package on 27 March 2020, and President Donald Trump signed it into law on 28 March 2020. The approved amount (US$2 trillion) was equivalent to 9.43% of GDP (US$21.2 trillion) for 2019 and 8.96% of the projected GDP (US$22.3280 trillion) for 2020.

Also worrying during the period was the increasing number of confirmed cases and deaths in Spain and Italy. Statistics in table 1 and figure 1 indicate that Spain and Italy respectively recorded the second and third highest number of confirmed cases. The respective total confirmed cases, deaths, recovered, and active cases in Italy were 181,228, 24,114, 48,877 and 108,237. The foregoing was compared somewhat favourably with the respective numbers recorded in Spain during the period: 200,210, 20,852, 80,587 and 98,771. The case fatality rate in Italy (13.31%) was about 1.94 times the global rate (6.87%) and about 4.16 times the rate recorded in Germany (3.20%) during the period. Belgium and Russia recorded the highest (14.58%) and the lowest (0.86%) fatality rates. On 28 March, 2020, Italy recorded the highest daily jump in deaths since the outbreak of the pandemic. China remained fairly stable during the period with the following respective statistics: 82,747 confirmed cases, 4,632 deaths, 77,084 recovered and 1,031 active cases.

However, China witnessed 1,308 and 1,332 respective increases in confirmed cases and deaths during the period 29 March 2020 through 20 April 2020. The number of active COVID-19 cases in China (1,031) was less than the active cases in each of the over fifty (50) leading countries with confirmed cases in excess of 3,000. For instance, Panama had a total number of confirmed cases of 4,467 and active cases of 4,176 during the period. The total number of active cases in Panama (4,176) outweighed the total number in China (1,031), although the latter had comparatively higher confirmed cases (82,747) than the former (4,467). The rate of deaths relative to the total number of confirmed cases in China during the period is 5.60% (4,632 deaths ÷ 82,747 confirmed cases) x 100% = 0.055977 x 100% = 5.5978 = 5.60%). This rate is relatively lower than the death rates recorded in Italy (13.31%), the United Kingdom (13.23%), France (12.90%), Spain (10.42%), and Iran (6.24%) but more than the rates recorded in Germany (3.20%) and in the United States (5.36%) during the period. The United States witnessed a significant increase in COVID-19 cases (from 123,781 to 771,116 confirmed cases) and deaths (from 2,229 to 41,353 deaths) between 29 March 2020 and 20 April 2020. This resulted in an increase in the rate of death from 1.80% to 5.36%.

The number of confirmed cases and deaths in countries such as Sweden (14,777; 1,580), Netherlands (33,405; 3,751), South Korea (10,674; 236) and Turkey (86,306; 2,017) was not encouraging either; the statistics kept soaring. The endemic nature and rapid spread of the Coronavirus pandemic in the foregoing economies and the United Kingdom may be attributed to their decision to evacuate voluntarily their nationals from the Hubei province in February 2020 (Grinevičius & Nefas, 2020). Although the countries offered to quarantine symptomatic patients or persons on arrival for fourteen days, we observe rising numbers of reported and confirmed cases in these countries. The ominous increase in confirmed cases and deaths affirmed the ineffectiveness of that containment strategy; Prof. Meyers and her team of medical experts found asymptomatic transmission as an alternative source of spreading COVID-19. Thus, overreliance on individuals exhibiting symptoms as a strategic way of preventing further spread of the Coronavirus pandemic may be ineffective (World Economic Forum, 2020c). The foregoing suggests that a person may not exhibit symptoms of COVID-19, yet he or she may be a potential carrier and transmitter of the virus. On 25 March 2020, New Zealand announced a four-week shutdown to contain the virus and prevent further outbreaks. On 2 April, 2020, Russia extended her non-working policy from a week to the end of April 2020 to curb further spread of the pandemic in the country. The European Union

announced a total of US$109 billion package to support unemployment crises in member countries. The assistance would be advanced in the form of a loan, and beneficiaries are expected to pay back. In April 2020, the UK Government announced a £1.3 billion stimulus package to assist small start-ups in the country.

The Diamond Princess Cruise ship had a respective total of confirmed cases, deaths, recovered, and active cases of 712, 13, 644, and 55. MS Zaandam Cruise ship had 9 confirmed cases, 2 deaths, and 7 active cases, respectively. Some Cruise ships believed to be Coronavirus-stricken along the coast of Florida were prevented from docking. The Cruise ships had eight (8) confirmed cases and four (4) deaths, while two hundred and thirty-three (233) others exhibited symptoms of flu. Floridians, Americans, Canadians and other nationals were believed to be on-board the Cruise ships. Regional distributions of COVID-19 cases in table 1 and figure 1 affirm that Oceania had the lowest number of confirmed cases (8,157), deaths (83), and case fatality rate (1.02%) during the period. The recovery rate in Oceania (64.39%) was superior to rates recorded in all the other regions: Asia (47.23%), South America (43.66%), Europe (28.81%), Africa (26.09%), and North America (10.61). The global average recovery rate from the COVID-19 pandemic during the period was 26.19; this was better than the rates in Africa (26.09%) and North America (10.61%). However, the world recovery rate suggests global efforts at fighting the Coronavirus pandemic is, on average, about 26.19%, which is below 30% and far below 50%. This implies that the global community has an arduous task on hand in relation to measures to contain the Coronavirus. It is worth emphasising that although the pandemic has spread rapidly and caused socio-economic destruction to large and small countries and territories across the globe, the effect of COVID-19 on large cities in China, such as Beijing and Shanghai, has been very minimal.

4.2. COVID-19 Outbreaks in Africa and Measures Taken

Available data from the Africa Centre for Disease Control (ACDC) (as cited in Shaban, 2020) and Worldometers.info (2020) indicated that as of 20 April 2020, the African continent had 23,304 confirmed cases, 1,140 deaths, and 6,081 recoveries. Data in table 2 and figure 2 depict the top twenty African countries with the highest number of confirmed COVID-19 cases during the period. The total number of infected countries during the period was 52, while non-infected were 2 (54 – 52 = 2). In this section, an analysis of the pandemic outbreak in Africa is presented on a regional basis. The five economies in North Africa were all infected, with Egypt and Libya recording the highest (3,144) and least (51) number of infections during the period. Morocco had the second-highest number of infections (2,990), followed by Algeria (2,718) and Tunisia (879), respectively. Algeria recorded the highest case fatality ratio (14.13%) in Africa and the second highest in the world after Belgium (14.58%). On 25 March 2020, Egypt imposed a fifteen-day curfew from 7 pm to 6 am and ordered the closure of schools and other public places. However, the curfew did not affect bakeries and pharmacies. The curfew was intended to save the lives of Egyptians and to prevent the further spread of the pandemic. Statistically, Egypt currently has the second-highest number of confirmed COVID-19 cases in Africa. In Egypt, the first case of COVID-19 was recorded in mid-February 2020. On average, Egypt recorded about 35 confirmed cases daily. The Egyptian government has noted that strict measures would be implemented if the situation worsens or deteriorates over the period.

All Central African economies reported cases of COVID-19. Cameroon ranked fifth with the highest number of confirmed cases in Africa (1,017) and the highest in the Region, followed by the Democratic Republic of Congo (327), Congo Brazzaville (160), Gabon (109), Equatorial Guinea (79), Chad (33), Central African Republic (12) and Sao Tome and Principe (4). Lesotho and Comoros Island were the only Southern African countries without the Coronavirus outbreak during the period. South Africa had the highest number of confirmed cases (3,158) in the Region. The other seven infected economies in the Region had a relatively small number of confirmed cases. They included: Mayotte (271); Madagascar (121); Zambia (65); Mozambique (39); Zimbabwe (25); Eswatini (24); Angola (24); Botswana (20); and Namibia (16).

Country	Confirmed Cases	Confirmed Deaths	Case Fatality Rate	Total Recovered	Active Cases
South Africa	3,158	54	1.71%	903	2,201
Egypt	3,144	239	7.60%	732	2,173
Morocco	2,990	143	4.78%	340	2,507
Algeria	2,718	384	14.13%	1,099	1,235
Cameroon	1,017	42	4.13%	305	670
Ghana	1,042	9	0.86%	99	934
Tunisia	879	38	4.32%	148	693
Cote D'Ivoire	847	9	1.06%	260	578
Djibouti	846	2	0.24%	102	742
Niger	648	20	3.09%	117	511
Nigeria	627	21	3.35%	170	436
Burkina Faso	576	36	6.25%	338	202
Guinea	579	5	0.86%	87	487
Réunion	408	N/A	N/A	237	171
Senegal	377	5	1.33%	235	137
Mauritius	328	9	2.74%	224	95

Country	Confirmed Cases	Confirmed Deaths	Case Fatality Rate	Total Recovered	Active Cases
DR Congo	327	25	7.65%	27	275
Kenya	281	14	4.98%	69	198
Mayotte	271	4	1.48%	117	150
Mali	224	14	6.25%	42	168
Africa	23,304	1,140	4.89%	6,081	16,083

Table 2: Confirmed COVID-19 Cases and Deaths in Selected African Countries
Source: Worldometers.info

South Africa is the epicentre of the Coronavirus in Africa; it is the country with the highest number of confirmed cases, yet it has one of the lowest case fatality rates (1.71%) on the continent. However, health experts in South Africa have warned of further spread of COVID-19 in the over-crowded and low-income communities in the suburbs of Pretoria, Cape Town, Durban, and Johannesburg (Shaban, 2020). South Africa announced a twenty-one (21)-day economic lockdown effective 28 March 2020, whilst Moody's downgraded its credit ratings to "Junk" status. Some economic experts affirmed that the credit rating was timely since it coincided with prevailing challenges in the South African economy.

During the same period, all countries in the Horn of Africa or East Africa had confirmed cases of the Coronavirus. Djibouti had the highest number of infections (846) with South Sudan recording the least number (4) in the Region. The other breakdowns were as follows: Mauritius (328); Kenya (281); Tanzania (170); Somalia (164); Rwanda (147); Ethiopia (111); Sudan (92); Uganda (55); Eritrea (39); Seychelles (11); and Burundi (5).

Kenya's case fatality rate (4.98%) was higher than the continent's average (4.89%) during the period. Djibouti ranked 9th on the list of countries with the highest number of confirmed COVID-19 cases in Africa. This was a significant hike (about 5,943%) in confirmed cases over a three-week period; as of 29 March 2020, Djibouti had only 14 confirmed cases.

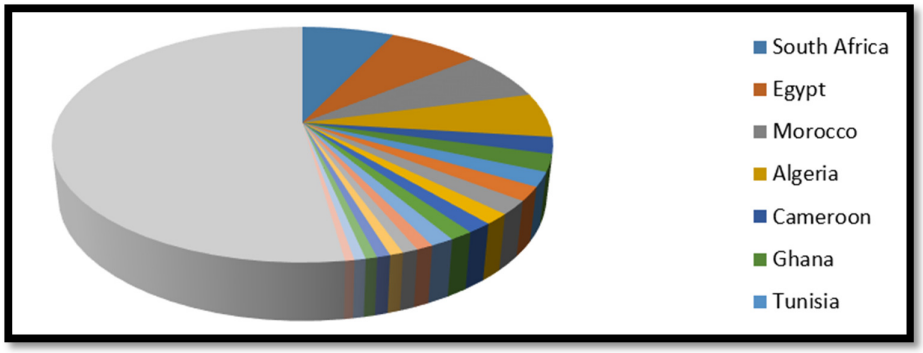

Figure 2: Confirmed COVID-19 Cases and Deaths in Selected African Countries

On 26 March 2020, the Ugandan government announced certain measures to ensure containment. These included a fourteen (14)-day suspension of all public transport and a ban on the sale of all non-food items in the country. At the outset of the pandemic outbreak in Somalia, the samples taken were sent to Kenya for testing. Somalia's capacity to test samples for confirmation of COVID-19 was attained recently (Shaban, 2020a). Somalia's experience is an ample indication and affirmation of the sub-standard nature of medical facilities and equipment in many African economies and the ill-preparedness of these countries to effectively counter the threats of COVID-19 and other pandemic outbreaks in their respective countries and on the continent.

The West African Sub-region is embroiled in the Coronavirus pandemic; all the sixteen-member countries, including Ghana, have been infected. Ghana had the highest rate of infection (1,042) in the Region, the 6th highest on the continent, and ranked 78th globally during the period. At the Regional level, the ensuing cases were recorded during the period: Cote D'Ivoire (847), Niger (648), Nigeria (627), Guinea (579), Burkina Faso (576), Senegal (377), Mali (224), Liberia (99), Togo (84), Cape Verde (67), Benin (54), Guinea-Bissau (50), Sierra Leone (43), The Gambia (10) and Mauritania (7). Data in the table and figure reveal that eight of the twenty most infected countries in Africa during the period were in West Africa. Respectively, La Cote D'Ivoire and Senegal ranked 8th and 15th in Africa in terms of confirmed coronavirus cases, respectively. On 23 March 2020, the two Presidents declared a state of emergency in their respective countries and instituted measures to impose heavy fines on individuals and groups who would violate laid-down procedures intended to curb further spread of the Coronavirus pandemic. In Togo, three (3) months of emergency have been declared to contain the virus. Nigeria ranked 11th in the total number of confirmed COVID-19 cases in Africa.

The total number of confirmed cases in Africa during the period was in excess of 23,000, specifically 23,304. Africa had the least number of confirmed cases after Oceania (8,157). However, economies on the continent are characterised by weak healthcare systems. This threatens the continent's ability to effectively fight the virus, should the outbreak increase in leaps and bounds. A sporadic outbreak of the pandemic in Africa may be described at least as a crisis (Coronavirus pandemic) on an existing crisis (weak healthcare systems). An individual and co-ordinated approach is required to tackle

the COVID-19 pandemic in Africa. An individual approach refers to preventive measures adopted and implemented by each country, and a coordinated approach relates to the collective efforts of leaders and health professionals on the continent to curb the further spread and ensure the possible end to the pandemic.

4.2.1. Basic Statistics on Africa

Available data indicate the total number of confirmed cases in Africa (23,304) represented about 0.95% ((23,304 ÷ 2,444,344) x 100% = 0.009533846 x 100% = 0.9533 = 0.95%) of total confirmed cases on the pandemic across the globe (2,444,344). Total deaths (1,140 deaths) recorded in 52 countries on the African continent were equivalent to 0.68% ((1,140 ÷ 167,990) x 100% = 0.0067861 x 100% = 0.6786 = 0.68%) of deaths recorded globally. The total number of cases recovered (6,081) in 52 African countries translated into 0.95% of total cases recovered globally (640,252). The estimated intra-recovery rate relative to the total number of confirmed cases (23,304) in 52 countries during the period was 26.09% ((6,081 recovered cases ÷ 23,304 confirmed cases) x 100% = 0.2609423 x 100% = 26.09423 = 26.09%). This suggests the prevalence of a high rate of active and critical cases (about 73.91%) (100% - 26.09% = 73.91%) on the African continent. However, the current average recovery rate (26.09%) was an improvement over the average rate (6.90%) recorded earlier on 29 March 2020.

As noted earlier, South Africa had the highest number of confirmed COVID-19 cases (3,158) and the fourth highest number of confirmed deaths (54) during the period. The total case fatality rate in South Africa (1.71%) ((54 deaths ÷ 3,158 confirmed cases) x 100% = 0.0170994 x 100% = 1.709943 = 1.71%) was compared favourably against the rates recorded in Algeria (14.13%), Egypt (7.6%), Morocco (4.78%), Tunisia (4.32%) and Cameroon (4.13%). So far, Africa has on average about 448.15 confirmed cases (23,304 confirmed cases ÷ 52 infected countries = 448.1539 = 448.15 confirmed cases), 21.92 deaths (1,140 total deaths ÷ 52 infected countries = 21.92307 = 21.92 deaths) and 116.94 recovered cases (6,081 total recovered cases ÷ 52 infected countries = 116.94231 = 116.94 recovered cases). As of 29 March, 2020, Sao Tome and Principe (Central Africa); Botswana, Lesotho, Comoros Island and Malawi (Southern Africa); South Sudan and Burundi (East Africa) and Sierra Leone (West Africa) remained the eight African countries that had not recorded cases of to the Coronavirus pandemic. However, the story was different on 17 April 2020; only Lesotho and the Comoros Island remained uninfected during the period.

4.3. Economic Effect on Ghana

The global rankings as of 20 April 2020 revealed that Ghana ranked 78th among 210 countries and territories with confirmed cases of the pandemic and ranked 6th among 52 infected economies on the African continent. In Ghana, at least seven (7) immediate- and medium-term impacts of the Coronavirus pandemic on the economy were identified. These included:

- A fall in projected revenue mobilisation from the sale of crude oil in the global market;
- Likely fall in revenue projections from tariffs collection by the Ghana Revenue Authority (GRA) through the various ports;
- Fall in periodic corporate tax payments;
- Challenges to prompt payments on national debt or interests or both;
- increase in national health expenditure; significant reduction in international trade, foreign direct investment (FDI), travel, tourism, and conferences;
- Challenges to poverty reduction and food nutrition; and
- Financing gap in the 2020 Budget, among others.

Some economic analysts attributed the fall in the price of crude oil per barrel in the global market to a sharp decline in demand for the product by China and other leading consumers. Other factors included the closure of borders and a considerable decrease in exports and imports among global economies. The enactment of quarantine policies by most COVID-19-infested countries, including Ghana, negatively impacted business operations and productivity in many sectors of their respective economies.

On Friday, 27 March 2020, Ghana's President, Nana Addo Dankwa Akufo-Addo, announced additional preventive measures instituted by the State to curb the further spread of the coronavirus and economic measures to assist small- and medium-sized businesses to mitigate adverse effects of the pandemic on their trading activities and operations. These included a fourteen (14)-day partial lockdown with strict enforcement, GH¢1 billion financial assistance through the Ministry of Finance, GH¢3 billion monetary assistance through GCB Bank; a reduction in policy rate from 16% to 14.5%; and a directive by the Bank of Ghana to various banks to lower their minimum reserves requirement by 2% to increase liquidity to facilitate economic stimulation. In addition, charges on mobile money transactions (involving transfers) from a Pesewa to GH¢100 were waived, and respective limits on GH¢300, GH¢2,000, and GH¢5,000 mobile money transactions were increased to GH¢1,000, GH¢5,000, and GH¢10,000. The latter was intended to improve social distancing by limiting face-to-face transactions and to encourage cashless transactions in the economy. Additional measures announced by the Government on 5 April, 2020 included collaboration with selected commercial and rural banks, the National Board for Small Scale Industry (NBSSI), and Business and Trade Associations to roll out a soft loan scheme to the tune of GH¢600 million to assist micro, small- and medium-sized businesses in the country. Beneficiaries would enjoy a one-year moratorium and repay the loan over a two-year period.

In his fifth address to the Nation on the Coronavirus on Sunday, 5 April 2020, President Nana Akufo-Addo provided updates on measures outlined by his administration to alleviate the plight of citizens, motivate frontline health workers and allied professionals to curb further spread of the pandemic. Some novel incentives announced by President

Nana Akufo-Addo included a daily allowance of GH¢150.00 for all contact tracers; payment of additional 50% allowance on regular salary of each health worker for four months, starting from March through June 2020; and insurance coverage of GH¢350,000.00 for each frontline health worker and paramedic or allied professional involved in the fight against COVID-19. All health workers who have already received their salaries for March 2020 will have their March allowance added to the salary and allowance for April 2020. Taxes on the emoluments of all health workers would be waived from April to June 2020. Further, the Transport Ministry was tasked to make free transportation arrangements ('Aayalolo Bus') for health workers in parts of the country affected by the partial lockdown. These areas included Accra, Tema, Kumasi, and Kasoa. The buses were to convey health workers to and from work in the aforementioned areas during the lockdown period. The need for further lockdown or otherwise after the restriction period was contingent on the outcomes of contact tracing tests on a total of 19,276 persons and other significant health factors.

The Government of Ghana, through the Ministry of Local Government and Rural Development; Ministry of Gender, Children and Social Protection; and National Disaster Management Organisation (NADMO), working in close collaboration with the Metropolitan, Municipal, and District Chief Executives (MMDCEs), and faith-based organisations presented food items to about 450,000 vulnerable persons and homes in areas affected by the partial lockdown. Further, President Nana Akufo-Addo directed the Electricity Company of Ghana and Ghana Water Company Limited to ensure respective stable power and water supplies during the period; the two companies are to ensure uninterrupted services during the period. As an added incentive, the Government of Ghana would absorb the water bills for all Ghanaians for three months, commencing from April through June 2020. Further, consumers of electricity from 0 to 50 kilowatt hours would have three months' electricity supply at no cost, using domestic and commercial consumption units in March 2020 as the baseline; individuals and companies that consume electricity in excess of 50 kilowatt hours would enjoy 50% discount during the period (April to June 2020). To ensure vulnerable communities have regular access to water supply during this period, the Government further arranged for public and private water tankers to supply water to the targeted communities. Nonetheless, President Nana Akufo-Addo called for public discipline in the use of the utilities (Communications Bureau at the Presidency, 2020, para. 19 & 20).

Due to the exigencies of the pandemic outbreak, Ghana's projected gross domestic product growth rate for the 2020 financial year was revised from 6.8% to between 2.5% and 3% and further to 1.5%. However, this compares favourably with the current negative 42% growth rate projected for the Chinese economy during the same period (Standard Chartered as cited in Al Jazeera News, 2020b). Suppose the projection holds, it would be the first contraction for the Chinese economy since the 1970s. Earlier growth projections by Morgan Stanley revealed that the Chinese economy would grow between 5.6% and 5.9% in 2020, with 5.6% being the worst-case scenario. In a related development, an earlier promise by the Australian Treasury to maintain a fiscal surplus for the 2020 financial year has become a challenge owing to the impact of COVID-19 on the economy. The possibility of ending the current fiscal year with a surplus is now a mirage rather than a reality to the Australian government.

Ghana's planned fiscal deficit for 2020 has been reviewed from GH¢18.9 billion to GH¢30.2 billion. The latter represents 7.8% of GDP, while the former equals 4.7% of projected GDP. The primary balance is expected to decrease from a projected GH¢2.811 billion surplus, equivalent to 0.7% of GDP, to a deficit of GH¢5.62 billion or 1.4% of GDP. Shortfalls in crude oil revenue are estimated at GH¢5.679 billion. This implies corresponding shortfalls in the Annual Budget Funding Amount by about GH¢3.526 billion, a reduction in the Ghana Stabilisation Fund by GH¢1.058 billion, and about GH¢453 million decrease in the Ghana Heritage Fund. Import duties are expected to decrease by GH¢808 million, and an estimated reduction of GH¢1.446 billion in other non-oil tax revenues is envisaged. Total non-tax revenue losses are estimated to equal GH¢2.254 billion (GH¢1.446 billion + GH¢808 million = GH¢2.254 billion). Planned expenditure for COVID-19 preparedness and response equals GH¢572 million, while projected expenditure on the *Coronavirus Alleviation Programme (CAP)* is GH¢1 billion. The purpose of the establishment of the CAP is to provide protection for "households and livelihoods, support micro, small, and medium-sized businesses, minimise job losses, and source additional funding for promotion of industries to shore up and expand industrial output for domestic consumption and exports" (Communications Bureau at the Presidency, 2020, para. 18). Total estimated financing gap for the 2020 budget is GH¢11.3 billion (GH¢30.2 billion - GH¢18.9 billion = GH¢11.3 billion), which is equivalent to 3.1% (7.8% - 4.7% = 3.1%) of GDP.

Temporary amendments to key financial management legislation coupled with new strategic initiatives in collaboration with a number of public and private sector institutions have been proposed by the current administration to "douse" the flames of the coronavirus pandemic on the Ghanaian economy. Agitations by some economic analysts about the sustainability of the Ghanaian economy should COVID-19 last longer than expected are expected to be mitigated by the strong gross international reserves (GIR) of over US$10 billion, which is equivalent to 4.8 months import cover and in excess of the 3.0 months import cover projected for the current financial year. The sharp decline in inflows from crude oil is likely to be offset partially by the increase in prices of gold and cocoa in the world market. Currently, an ounce of gold sells at about US$1,682, while the telepathic understanding between Ghana and La Cote d'Ivoire has resulted in an appreciable increase and relative stability in the price of cocoa per tonne in the global market. However, proceeds or inflows from the foregoing commodities to the Government of Ghana remain a challenge since various borders (air, sea, and land borders) to the international markets are virtually closed.

The necessary remedial measures put in place by the Government of Ghana to bridge the financing gap in the 2020 budget included discussions with the World Bank to access GH¢1.716 billion equivalent of its US$12 billion facility intended to fast-track the treatment of COVID-19-related cases. Similar discussions were held with the International Monetary Fund to secure GH¢3.145 billion equivalent of its US$10 billion rapid credit facility and with other multilateral and bilateral partners across the globe. Another option is withdrawal from the Ghana Stabilisation Fund (GSF) to offset any potential shortfall in the Annual Budget Funding Amount (ABFA). Other measures include a reduction in planned

expenditure on goods and services by GH¢1.248 billion and lowering of the gap on the Ghana Stabilisation Fund from US$300 million to US$100 million in accordance with Section 23, sub-section 3 of the Petroleum Revenue Management Act. The latter is expected to facilitate the transfer of about GH¢1.210 billion to the Contingency Fund to fund the *Coronavirus Alleviation Programme*. This year, the government's policy of zero borrowing from the Bank of Ghana since 2015 as part of IMF's conditionalities and guidance may be set aside to allow the Government to meet its financial obligations and budget funding needs for the 2020 fiscal year. The Government has arranged with the Bank of Ghana to defer payments on non-marketable debt instruments issued through it to 2022 and beyond. This was intended to create fiscal space and allow the Government's access to debt instruments amounting to GH¢1.222 billion. In a bid to ensure some flexibility in conditions, the government negotiated with some institutional investors to accept 200 basis points or a 2% reduction in yields on short-term treasury instruments of 364 days or less. However, it was unclear whether or not the investors would accept the proposal. If it is accepted, the Government could save up to GH¢300 million on her public debt servicing costs.

The Government proposed a reduction in the Nation's carried and participation equity interest in impending upstream oil and gas projects through the Ghana National Petroleum Corporation (GNPC) from 30% to 15% to ensure a substantial increase in immediate savings and to increase available funds for financing gap in the 2020 budget. An amendment to the Petroleum Revenue Management Act (PRMA), Act 815, is being sought to ease the current administration's access to the Ghana Heritage Fund. The amendment would make an estimated US$591.1 million available for use from the Fund. The foregoing measures are expected to reduce the budget deficit for 2020 to 6.6% of GDP and the primary balance to 1.1%. It is worth emphasising that 6.6% is still higher than the 5% gap allowed under the Fiscal Responsibility Act. However, some Provisions in the Act allow the Parliament of Ghana to review and set aside the 5% cap under *extraordinary circumstances*, and the Coronavirus pandemic qualifies under the definition of extraordinary circumstances.

Further, the Fiscal Responsibility Act does not allow a negative or deficit primary balance. However, the extraordinary circumstance makes this exceptional and "waivable." Parliamentary approval of the Executive's proposal was required within the shortest possible time so the Government's business could continue uninterrupted. The economic measures adopted by the current political administration in Ghana to combat the Coronavirus could be summarised into three:

- Allocation of an equivalent of US$100 million for preparedness and responsiveness to the Coronavirus pandemic;
- Allocation of an equivalent of US$219 million for the Coronavirus Alleviation Programme; and
- Broader stimulus package programme for the entire economy.

The Finance Ministry in Ghana was focused on three major priorities:

- The presentation to Parliament on the Coronavirus Alleviation Programme;
- A strategy that would make the Ghanaian economy more resilient in a post-COVID-19 era and
- Coordinated efforts of African economies to get the requisite support for international debt relief.

Finance Minister, Hon. Ken Ofori-Atta, noted that the COVID-19 pandemic has the potential to swab between 10% and 15% of Ghana's GDP. The IMF, under its Rapid Credit Facility for COVID-19-affected countries, has approved US$1 billion loan request to Ghana. The Government expected to expend an equivalent of GH¢1 billion on the electricity subsidy announced by President Nana Akufo-Addo during the period. Should Ghana's total economic stimulus package amount to GH¢15 billion, this would be equivalent to 4.34% of GDP (GH¢346 billion) for 2019 and 4.27% of projected GDP (GH¢351.19 billion) for 2020. The projected GDP for 2020 (GH¢351.19 billion) was computed based on 1.5% GDP growth target for 2020. Stated differently, *Ghana's estimated economic losses from COVID-19 (GH¢15 billion) are equivalent to 4.27% of projected GDP (GH¢351.19 billion) for 2020*.

4.4. Economic Effect on China

China remains a significant economy and maintains a major manufacturing hub among global economies. Available data from the World Bank indicated that China's GDP for 2019 was US$14.2 trillion. This represented about 16.27% of the global economy's GDP during the period. In absolute terms, that is, in terms of individual economies, China is the world's second-largest economy after the United States of America (USA). The latter's total GDP in 2019 was US$21.2 trillion, representing about 24.29% of the global economy. Further, China manufactures one-third (1/3) of all goods required globally. As a result, any socio-economic unrest in China is likely to have a ripple effect on the global economy. Stated differently, socio-economic unrests in China are likely to destabilise economies around the world. The foregoing was corroborated by Agathe Demarais of the Economist Intelligence Unit (EIU), who affirmed that global markets would remain volatile until the world gets a clearer picture of the potential outcomes of COVID-19 (DW.com, 2020).

The devastating effects of the Coronavirus pandemic on twenty-four (24) of the thirty-one (31) provinces in China cannot be overemphasised. The affected provinces generate about 90% of China's total exports and contribute about 80% to GDP. As of 6 March 2020, automobile sales and passenger traffic normal levels in China had decreased to 20% and 15%, respectively, while the first quarter year-on-year economic growth was projected at 1.2% (Bloomberg Economics as cited in Orlik et al., 2020). As part of the government's relief measures, the People's or Central Bank of China reduced its policy rate by 10 basis points or 0.10% and instructed financial institutions to ease the pressure on businesses that were distressed. Statistics released by Dr. Tedros, Director-General of the World Health Organisation (WHO), indicated that demand for personal protection equipment (PPE) across the globe has increased over hundred (100) times, and the excess demand over supply has resulted in upward price adjustments over twenty (20) times the normal price. Further, the

excess demand was likely to have negative effects on the regular supply of medical products and equipment among global economies between four (4) and six (6) months (Boseley, 2020).

Globally, demand for the following medical products is high relative to supply: patient monitors, infusion pumps, syringe pumps, detection reagents, disinfection supplies, purifying respirators, gloves, masks, and face shields, among other significant medical products necessary for the cure of the COVID-19 pandemic. China has been able to dispatch humanitarian aid worth millions of United States dollars to Europe, Asia, Africa and other parts of the globe. Europe has raised concerns about the United States' inability to provide assistance in these turbulent times, while China has demonstrated friendship. However, the United States is saddled with a shortage of medical supplies and therefore lacks the ability to supply the same to other economies affected by the pandemic, and needs assistance at this time. Governors across the United States have raised concerns about the shortage in the supply of medical items in their respective States and are requesting for more medical supplies and tests from the Federal Government to curb the further spread of the pandemic.

While the rest of the world is struggling to come to terms with the Coronavirus pandemic and how to possibly contain and curb its further spread within and across countries, China seems to have recovered from the social shocks and has already begun economic restructuring. Stated differently, industrial activities have resumed in China while the Chinese government has announced a stimulus package of over US$344 billion for fiscal measures, including assisting various businesses and bringing the Chinese economy back on track. The overarching idea is to stabilise the Chinese economy and to enhance its competitiveness in the global market as soon as practicable. Chinese firms are currently encouraged to manufacture pharmaceutical and medical products such as nose masks and gloves in large commercial quantities to meet increasing demand in the international market. Zoos and some tourist attraction sites in China have been re-opened to Chinese tourists. About 9,000 new businesses were established in February 2020 to manufacture medical products, especially nose masks, gloves, and ventilators. However, the "early" re-opening of the Chinese economy has had adverse effects on her containment efforts; the respective total confirmed COVID-19 cases and deaths increased from 81,439 and 3,300 on 29 March 2020 to 82,747 and 4,632 on 20 April 2020. The figures suggest increases in confirmed cases and deaths by 1,308 and 1,332, respectively. These new pandemic casualties increased China's case fatality rate from 4.05% to 5.60% during the period. Happenings in other countries, in addition to China, indicate an attempt to re-open the economy while the virus keeps spreading to neighbouring and distant countries, minimises the immediate chance of economic success and rather increases the risk of widespread infections and economic costs.

Daily mask production in China has increased from 120 million units to over 160 million units. Most of these masks are sold to countries outside China. BMW and other auto manufacturing firms with factories in China have resumed operations. Available reports indicated that all foreign-funded businesses in China have resumed operations with 80% returned-employed rate and 70% business resumption rate. Overall, the Chinese business climate, in particular, and the economic environment in general is improving steadily. China's ban on most foreign visitors to the country took effect on 28 March 2020. This initiative is intended to minimise the importation of the virus, curb its spread and accelerate the economic restructuring efforts.

It is worth emphasising that full-scale operation in China may not be analogous to immediate economic turn-around; it may take a while for the supply chains to maximise their operations to ensure optimum manufacturing capacity. Some economic analysts have argued that China's humanitarian assistance to Europe and other parts of the world could extend her global relations to include United States allies. However, China lacks the "magic wand", that is, the capacity and know-how required to "topple" the United States and emerge as the leading economy across the globe. Indeed, China's economic performance in the current and subsequent years would either confirm or reject the hypothetical submission of her opponents.

4.5. Effects on Politics, Education and Entertainment

Indeed, the Coronavirus pandemic has proven beyond reasonable doubt that it is no respecter of persons. For instance, in the Islamic Republic of Iran, Advisers to Messieurs Mohammad J. Zarif and Ali Khamenei were reported dead from COVID-19, while fifteen (15) current and former top government officials, including the Vice President, have been infected. In addition, more than twenty-three (23) of the two hundred and ninety (290) Members of the Iranian legislature tested positive. The infected persons constituted about 8% (7.93%) of all members of the legislature. The growing rate of infections resulted in the closure of the Iranian Parliament. The foregoing fall-outs led many to question the future survival of the current Iranian administration (Cunningham, 2020; Haltiwanger, 2020; National Review, 2020; Reuters, 2020). In the Democratic Republic of Congo, a top legal aide to President Felix Tshisekedi, Mr. Jean-Joseph Mukendi wa Mulumba, was reported dead from COVID-19 infection. Mr. Mukendi wa Mulumba was the acting head of President Tshisekedi's legal advisory council. On 17 March 2020, Madam Rose Marie Compaore, the sixty-two-year-old first Vice President of Burkinabe's Parliament, was confirmed dead from COVID-19 infection. Madam Compaore was the first to be confirmed dead from COVID-19 in Burkina Faso (Shaban, 2020a).

On Friday, 17 April 2020, Nigeria's Chief of Staff, Mallam Abba Kyari, was confirmed dead from the Coronavirus pandemic. Mallam Kyari was infected earlier and was receiving treatment before his death on the above-mentioned date. He was believed to have been infected while on an official duty in Germany. During the same period, the death of former Somali Prime Minister Nur Hassan Hussein was reported. Prime Minister Hussein, who was affectionately called 'Nur Adde' and served in this capacity from November 2007 to February 2009, died from COVID-19 infections in London. In Egypt, the death of Mr. Mahmud Jibril, head of the Libyan rebel government that ousted President Muammar Gaddafi from office in 2011, was reported on 5 April 2020. The sixty-eight-year-old former Libyan Prime Minister was diagnosed with and died from COVID-19 infection. On 30 March 2020, former President of the Republic of Congo, Mr. Jacques Joachim

Yhombi-Opango, was confirmed dead from the Coronavirus disease in France. Mr. Yhombi-Opango led the Republic of Congo from April 1977 to February 1979 (Shaban, 2020). Ghana's High Commissioner to the United Kingdom and the Republic of Ireland, Mr. Papa Owusu-Ankomah, tested positive for COVID-19 in April 2020. The High Commissioner's wife, Mrs. Augustina Owusu-Ankomah, also tested positive for the virus during the period (Ghanaweb.com, 2020b).

Reports by Jeune Afrique (as cited in Shaban, 2020a) revealed that the Chairperson of the Electoral Commission of Guinea, Mr. Amadou Salif Kebe, also died from the COVID-19 pandemic on Friday, 17 April 2020. He was believed to have been infected during the recent elections (referendum and parliamentary elections) held in the country. During the same period, the death of fifty-seven-year-old Mr. Benedict Somi Vilakazi from the Coronavirus pandemic was reported in South Africa. Mr. Vilakazi was the grandson of South Africa's first Black lecturer at Witswatersrand University in South Africa; and the first producer of an English/Zulu dictionary in the country. On Sunday, 12 April 2020, Somalia lost a top regional official, Mr. Khalif Mumin, to the Coronavirus pandemic, barely two days after his infection. Mr. Mumin served as a Minister of State for Justice in Somalia (Shaban, 2020a). In the United Kingdom (UK), Prime Minister Boris Johnson, Under-Secretary of State for Mental Health, Suicide Prevention and Patient Safety and Parliamentarian Nadine Dorries; Parliamentarians Lloyd Russell-Moyle and Kate Osborne; and Prince Charles were infected. The latter was the first member of the British royal family to be infected (BBC, 2020c, d; ITV News, 2020).

Australia's Minister for Home Affairs, Peter Dutton, tested positive for the Coronavirus on 13 March 2020 and subsequently went into self-isolation (USA Today, 2020). Earlier on 12 March 2020, Mrs. Sophie Grégoire Trudeau, wife of Canadian Prime Minister Justin Trudeau, was confirmed to have been infected with the Coronavirus disease (BBC, 2020b). In March 2020, three new cases of COVID-19 were confirmed in the United States Congress. They included two members of Congress (Representatives Ben McAdams and Mario Diaz-Balart) and a member of the Senate (Senator Rand Paul). Prior to the confirmation of his test results, Senator Rand Paul did not isolate himself from his colleagues in the Senate (New York Post, 2020; NPR, 2020; Politico, 2020a, b).

Similarly, Madam Mary Lou McDonald, President of Sinn Féin in Ireland, tested positive for the Coronavirus. She was the first high-profile politician in Ireland to have contracted the virus (Burke, 2020; Newstalk, 2020). Some stalwarts in Italian politics were not spared by the Coronavirus. The Vice President of Italy's Democratic Party, Madam Anna Ascani, tested positive for COVID-19 on 14 March 2020. A week earlier, the President of Lazio and Secretary of the Democratic Party, Nicola Zingaretti, announced his infection with the Coronavirus disease (The Guardian, 2020d). As of 25 March 2020, two Senators in the Philippines (Senators Juan Miguel Zubiri and Koko Pimentel) were confirmed to have contracted the COVID-19 disease (CNN Philippines, 2020; Rappler, 2020).

A political rally organised by Vox in Spain attracted an estimated crowd of nine thousand people. In attendance were the party's president, general secretary, and some members of the party in Congress. Reports indicated multiple members of the party in Congress, the party's president as well as the general secretary later tested positive for the Coronavirus disease (El Pais, 2020b). Some people in the United States chided President Donald Trump for closing down the ***global health security unit*** of the ***United States Security Council***, a unit founded to prepare the United States Government for potential pandemic outbreaks. Critics believe the global health security unit would have envisaged the outbreak of the pandemic and subsequently advised the government on its prevention and containment to avert its catastrophic effect on the United States economy (The Boston Globe, 2020a).

The COVID-19 pandemic outbreak renewed and intensified protests in the administrative region of Hong Kong against the government of the Communist Party of China (CPC), while Taiwan raised concerns about her possible inclusion in the travel ban by China (Channel News Asia, 2020; Medicalexpress.com, 2020). Meanwhile, the Communist Party of China, led by its General Secretary, President Xi Jinping, dismissed a number of administrative leaders in some of the provinces affected by the pandemic. The dismissal followed poor handling of the response and quarantine measures in those provinces and Central China. Prime Minister Hun Sen of Cambodia recently visited China to express Cambodia's solidarity and support for China's fight against the pandemic (Bostock, 2020; Wilson, 2020; Politico, 2020). In Belgium, seven main opposition parties pledged to assist the newly sworn-in Prime Minister Sophie Wilmès in adopting effective measures to fight the COVID-19 pandemic (Het Laatste Nieuws, 2020).

South Korea expressed concerns about Japan's nonchalant efforts to tackle the coronavirus pandemic to ensure containment and prevent further spread within the country and across borders. In the wake of the pandemic outbreak in South Korea, President Moon Jae-in's administration came under siege; more than 1,450,000 South Koreans signed a petition to support his impeachment from office, blaming the President for sending earlier personal protective equipment and other medical supplies to China to assist the latter in the fight against the pandemic outbreak (The Guardian, 2020b; Foreign Policy, 2020a, b). As of 9 April 2020, the total number of confirmed cases in South Korea (10,423) was more than twice the number in Japan (4,667). However, recent polls conducted by Gallup Korea in March 2020 showed an increase in President Moon's approval rating from 44% to 49%. Analysts attributed the positive approval rating to President Moon's immediate and dynamic response to the pandemic outbreak in South Korea, which attracted both local and international commendations (Foreign Policy, 2020b).

In Brazil, many citizens criticised President Jair Bolsonaro for his reference to COVID-19 as a "fantasy;" and also criticised his administration's "lethargic" approach to the pandemic. This was evidenced in the outcomes of polls conducted in the country, which revealed that 64% of Brazilians involved in the study expressed grave concerns and outright rejection of President Jair Bolsonaro's approach to the Coronavirus pandemic, and 44.8% supported his impeachment. President Bolsonaro's speech on COVID-19 culminated in massive public protests, especially in balconies across the country (Diaz, 2020; El Pais, 2020a; BBC, 2020a; The Guardian, 2020a). The public uproar was justified by the rate of COVID-19 infections in the country during the period. Available statistics revealed that as of 20 April 2020, Brazil ranked 12th among 210 countries and territories with confirmed cases of the Coronavirus; the country reported 39,548

confirmed cases, 2,507 deaths, and a 6.34% case fatality rate and remained the epicentre of COVID-19 in Latin America. Brazil's case fatality ratio (6.34%) was very close to the global average (6.87%) during the period. The pandemic outbreak disrupted parliamentary proceedings and activities in many countries across the globe. For instance, in Canada, Parliament voted to adjourn proceedings and sittings in both the Senate and House of Commons to a later date (CP, 2020).

In Chile, considerations for drafting a constitutional plebiscite scheduled for 25 April 2020 were unanimously postponed by political parties on 19 March 2020. The political parties agreed on 25 October 2020 as the new date. The Chilean political calendar for municipal and regional elections was equally disrupted; municipal and regional elections scheduled for 25 October 2020 were rescheduled to 4 April 2021. The postponements which affected primaries and the second round of elections were justified by the speed of the spread of COVID-19 infections in the country (Cooperativa, 2020). As of 20 April 2020, Chile has recorded 10,507 COVID-19 cases and 139 deaths; these figures ranked Chile 25th among 210 countries and territories with reported cases of COVID-19 and the third highest in the South American Region.

On 15 March 2020, the first round of local elections was held in France amidst controversy over the effect of the pandemic outbreak on those elections. On 16 March 2020, President Emmanuel Macron heeded the call of the populace and announced the postponement of the second round of the local elections from 22 March 2020 to 21 June 2020 (BBC, 2020e; Le Parisien, 2020). The postponement was reasonably justified by the sporadic rate of spread of COVID-19 infections in the country; as of 20 April 2020, France ranked 4th among 210 countries and territories across the world and ranked 3rd in Europe with the highest number of reported cases. The data showed that France had 152,894 confirmed cases and 19,718 deaths during the period. The data for France revealed a case fatality rate of about 12.90%, which was nearly 1.88 times the global average (6.87%) during the period.

Legislative activities in many states in the United States, including New Hampshire, Vermont, Colorado, Georgia, Illinois, Kentucky, and Delaware, among others, were suspended to avoid further spread of the pandemic. In the state of Georgia in the United States, Lieutenant Governor Geoff Duncan and the entire Georgia state senate staff were quarantined until 30 March 2020 after state senator Brandon Beach tested positive for the Coronavirus infection. As noted in the preceding section, the United States remained the epicentre of the Coronavirus pandemic, and the nation's political administration has been blamed for its lukewarm approach to the fight against the pandemic at the early stages. Threats of the Coronavirus pandemic have severely impacted the political activities of both Democrats and Republicans in the United States. For instance, the nomination of candidates, election of delegates, and voting for presidential primaries, among other significant political activities, became a major challenge to many states. The rapid spread of COVID-19 called for the relocation of some polling stations in states across the United States (Courier Journal, 2020; Hill, 2020; NCSL, 2020a, b; NBC, 2020; Roll Call, 2020).

In March 2020, the Congress of Deputies in Spain voted to adjourn sittings after some members tested positive for the Coronavirus. Also, the respective Galician election and Basque regional elections for 2020 in Spain have been suspended and postponed. Spain ranked 2nd among 210 countries and territories across the world and 1st in Europe with respective total confirmed cases of 200,210 and deaths of 20,852. The case fatality ratio (10.42%) in Spain was quite worrying; it was about 1.5 times the global average during the period. In Ghana, Parliament had to go on recess and be on "stand-by" to attend to the government's business when necessary to convene. Further, political campaigns for parliamentary primaries in the country have been severely impacted. As part of non-pharmaceutical measures to contain the COVID-19 pandemic, President Akufo-Addo announced a ban on political activities in Ghana. This affected the organisation of primaries to elect parliamentary candidates for the ruling party, the New Patriotic Party (NPP), to contest in the 7 December 2020 presidential and parliamentary elections. The NPP parliamentary primaries were originally scheduled to be held on 25 April 2020. Due to the outbreak of the COVID-19 pandemic, arrangements to organise a referendum on constitutional amendment in Italy on 29 March 2020 have been postponed indefinitely. The referendum sought to reduce the number of representatives in the Italian Parliament from 630 to 400. The Coronavirus pandemic compelled the electoral commission of Sri Lanka to postpone this year's parliamentary elections indefinitely. Planned local elections in the United Kingdom originally scheduled for 7 May 2020 have been rescheduled to 6 May 2021. The postponement was reached following an agreement between the Liberal Democrats and the Labour Party and the advice of the UK's electoral commission (El Pais, 2020b; BBC, 2020c).

The Italian government raised agitations about the European Union's "non-commitment" to her plight in the wake of the pandemic outbreak but praised China for support through bilateral relations. The Italian government's position was corroborated by the Serbian President, Aleksandar Vučić, when he asserted that the existence of European solidarity is only a mirage. On 16 March 2020, the Serbian electoral commission announced the postponement of planned parliamentary elections in the country (Financial Times, 2020; The Guardian, 2020b). The recent pandemic outbreak compelled the United States to adapt and implement socially-driven policies such as paid family leave, increased funding levels for public health, universal health care, and universal child care, among others. Some states were compelled to draw on their state emergency orders to suspend laws on open meetings, which required physical presence at public meetings so that public meetings could be held through teleconferences (The Boston Globe, 2020b).

A news item on the Cable News Network (CNN) in 2020 revealed that as of 4 April, 2020, more than 10,000 health workers in Spain have been infected with the Coronavirus. In Italy, fifty-one (51) medical doctors who were diagnosed with the Coronavirus were later confirmed dead. A fifty-one-year-old Nigerian medical doctor, Emeka Chugbo, who was infected while on his professional assignment, was later confirmed dead from the Coronavirus pandemic. In Ghana, renowned Physician and Rector of the Ghana College of Physicians and Surgeons in Accra and former President of the Ghana Medical Association (GMA) and Ghana Kidney Association, Prof. Jacob Plange-Rhule, was confirmed dead on Friday, 10 April 2020. He died from the Coronavirus pandemic (Shaban, 2020a). Globally, an estimated 3.6 billion individuals have been affected by the lockdowns; these individuals have been compelled to stay at home following the pandemic outbreak.

It is believed that COVID-19 has transformed the daily lives of these 3.6 billion people. The lockdowns have affected about 1.63 billion students globally. For instance, in the United States, the closure of over 124,000 public and private schools nationwide was reported on 10 April 2020. Students of these schools and others in other jurisdictions are compelled to interact with their instructors and learn through a virtual classroom environment to ensure the non-disruption of their respective academic calendars and the continuous impact of academic knowledge. There is no gainsaying that the advent of technology has salvaged many academic calendars from disruptions. The challenges posed by the pandemic outbreaks notwithstanding, extant research has proven that lockdowns reduce the costs associated with public health significantly; and minimise the short-term economic impact of pandemics such as COVID-19 on countries.

On 24 March 2020, the death of the Cameroonian music icon, Mr. Manu Dibango, was reported in France. He died from COVID-19 infection. Mr. Dibango was an "Afro-Jazz legend;" and noted for his famous music hit, *Soul Makossa*, in 1972. The first official death from COVID-19 infection in Senegal was confirmed by the renowned sixty-eight-year-old Journalist and Sports Commentator, Mr. Pape Diouf. Mr. Diouf served as the President of the Marseille Football Club in France from 2005 to 2009. Similarly, the first official death from COVID-19 infection in Zimbabwe was confirmed by the thirty-year-old broadcaster Zororo Makamba. Mr. Makamba was the second person to test positive for COVID-19 in Zimbabwe. Also, the ninety-two-year-old 'Father of Modern Music' in Somalia, Mr. Ahmed Ismail Hussein Hudeydi, was reported dead in London after an earlier infection with the Coronavirus disease. Further, the death of the sixty-seven-year-old "King of Soukous Music," Mr. Aurélien Miatsonama, was reported in France on Thursday, 19 March 2020. The music legend died from an infection with the Coronavirus disease. The Soukous music icon from Congo-Brazzaville was known in public life as Aurlus Mabélé (Shaban, 2020a).

4.6. Impact on the Global Economy

It is believed the effect of COVID-19 on the global economy would be more severe than the shocks associated with the Severe Acute Respiratory Syndrome (SARS) outbreak in 2002 - 2003. The effect of the Coronavirus outbreak on the global supply chain has been projected to be in excess of US$300 billion, and the disruption to the global supply chain may last up to two (2) years. Earlier global economic growth projection for 2020 by the Organisation for Economic Co-operation and Development was 2.9%. Using the 2019 global GDP value in table 4, this implied targeted global GDP of about *US$89.7957 trillion* (US$87.265 trillion + (US$87.265 trillion x 0.029) = US$87.265 trillion + US$2.5307 = US$89.7957 trillion) for 2020. Later, the OECD revised the global economic growth projection for the current fiscal year to 2.4% and further to 1.5%. The foregoing implied the downward review of global GDP for 2020 to *US$89.3594 trillion* and *US$88.5740 trillion*, respectively.

However, given the debilitating effect of the pandemic on Spain, South Korea and the world's ten leading economies, including the United States, China, Japan, Germany, India, United Kingdom (UK), France, Italy, Brazil, and Canada, Orlik et al. believed the global economic growth projection for 2020 could be scaled down to 1.2%, implying further downward review of projected global GDP to *US$88.3122 trillion* (US$87.265 trillion + (US$87.265 trillion x 0.012) = US$87.265 trillion + US$1.0471 = US$88.3122 trillion) during the period. Should the global economy struggle to emerge from the shocks of the pandemic, Japan and the Euro-Area may experience a recession, while the unemployment rate in the United States may surge in 2020. Based on the foregoing, the projected growth rate for the United States economy for the current fiscal year is 0.5%. This is at variance with earlier projections for GDP (US$22.32180) and growth (5.29%) during the period. The twenty leading economies contribute about 79% to global GDP; the 10 leading economies contribute about 66%; and the remaining 173 countries altogether contribute about 21% to global GDP (Silver, 2020).

Panic buying surged in economies affected by the pandemic and in economies where governments announced measures for containment, including shutdowns or lockdowns. Reports indicated a widespread shortage of medical and pharmaceutical products, food and other essential groceries relative to demand. However, in China, HEMA (Freshippo), a grocery chain of Alibaba remained committed to its policy of stabilising prices, maintaining large supply of essential goods on its shelves; and open for business at all times. The *Green Channel*, launched by Cainiao Smart Logistics Network and other logistics partners, ensured quick and safe delivery of medical items from different countries to economies affected by the pandemic across the globe (Aikman & Chan, 2020). The respective Chinese and global airline industries were projected to lose US$12.8 billion and US$113 billion in revenue, while the global economy is estimated to lose US$2.7 trillion in revenue, which is equivalent to 92.78% of the United Kingdom's GDP (US$2.91 trillion) for 2019. The latter was arrived at after Bloomberg Economics (as cited in Orlik et al.) has drawn on a large-scale model of the global economy, estimates of risks to global supply chains, the experience in China, and the distribution cases in other economies around the world in its computations and presentation of four possible global economic scenarios from the pandemic. The foregoing economic projections could remain the same, increase or decrease depending on the potential outcomes of the Coronavirus pandemic. Using the 1.5% targeted growth rate, the estimated revenue losses of US$2.7 trillion are equivalent to 3.05% of the projected global GDP (US$88.574 trillion) for 2020. However, the rate of revenue losses increases to 3.06% when the targeted growth rate for 2020 is 1.2%. *Thus, we could state the estimated global economic losses from the pandemic range from 3.05% to 3.06% of projected global GDP for 2020*.

4.6.1. Gross Domestic Products (GDPs) of Selected Economies

Data on the actual and projected gross domestic product values of the top twenty economies across the globe are presented in table 3 and figure 3. Data used for the analysis in this section were obtained from Tradingeconomics.com, Knoema.com, Statisticstimes.com, and the IMF (as cited in Silver, 2020). Data in the table and figure present actual GDP values for 2019 and projected GDP values for 2020 and 2021. The data are nominal GDP or GDP values at current prices. Data in table 4 reveal that the global GDP in 2019 was US$87.265 trillion. The data indicate that the United States was the

leading economy with a GDP of US$21.200 trillion in 2019. Dovetailing available data in table 3 with data in table 4, we observe that the United States' contribution to global GDP in 2019 was about 24.29% ((US$21.200 trillion ÷ US$87.265 trillion) x 100% = 0.242938 x 100% = 24.29%), implying she contributed about a quarter to global GDP in 2019. The United States is the world's third largest country, with a total landmass of about 9,833,517 square kilometres and an estimated population of over 331 million people. Perhaps significant contributions of the United States to global GDP account for her being christened as the *world's superpower* by many nations and individuals around the world.

Country	2019	2020	2021
United States	21.20000	22.32180	23.18030
China	14.20000	15.02360	15.70000
Japan	5.11000	5.88890	6.03770
Germany	4.04000	4.58910	4.75130
United Kingdom	2.91000	3.23960	3.35750
France	2.89000	3.16130	3.26980
India	2.80000	2.95000	3.10000
Italy	2.03000	2.50460	2.57610
Brazil	2.02000	2.15000	2.25000
Canada	1.74000	1.97680	2.04180
Russia	1.75000	1.78000	1.91000
Korea	1.69000	2.41810	2.53580
Spain	1.46000	2.01560	2.09220
Australia	1.45000	1.48000	1.52000
Mexico	1.20000	2.71500	2.82370
Indonesia	1.12600	4.00500	4.30130
Netherlands	0.95100	0.98800	1.02000
Saudi Arabia	0.78500	1.97850	2.,06410
Turkey	0.74000	2.46460	2.59090
Switzerland	0.71500	0.72900	0.74000

*Figures in US$ Billions

Table 3: Actual and Projected GDP Values for Top 20 Economies (2019 – 2021)
Sources: Trading Economics.com; Knoema.com; Statisticstimes.com

Available records indicate that the United States has remained the world's leading economy since 1871 and remains the leading exporter of agricultural produce in the world (Silver, 2020). The United States' resilient economy is backed by advanced infrastructure development and significant advancement in information technology. The country is endowed with a wealth of natural resources such as crude oil, mercury, silver, copper, nickel, and clean coal. Projections for the United States' gross domestic products for 2020 and 2021 in table 3 and figure 3 suggest a significant increase in growth target for 2020 (5.29%) and a decline in 2021 (3.85%). As noted earlier, the United States has been hit hardest by the COVID-19 pandemic, and this may affect its overall performance in the current financial year. Some economic pundits have predicted that the United States will be toppled by China as the leading global economy by 2030 (Plecher, 2020); others have predicted a shorter period than 2030. For several decades, China has consistently maintained an annual average growth rate of 10%. In terms of purchasing power parity (PPP), China recorded a superior GDP (US$27.31 trillion) to the United States (US$21.44 trillion) in 2019. China's GDP in terms of PPP for 2020 and 2021 has been projected to reach US$29.472 trillion and US$31.855 trillion respectively. The expected economic gains by China and the United States in 2020 may be stifled by the Coronavirus pandemic, while the respective GDP growth targets (5.8% and 5.29%) for 2020 may be missed.

China remained the second largest economy in the world in 2019, with a nominal GDP of US$14.2 trillion, representing about 16.27% of the global GDP (US$87.265 trillion) during the period. With an estimated population of 1.41 billion people and a total land area of 9,596,961 square kilometres, China is the most populous and the fourth largest country in the world. It borders fourteen (14) different countries. Data in table 3 and figure 3 show the difference in GDP values for the United States and China in 2019 was US$7 billion (US$21.2 trillion - US$14.2 trillion = US$7 trillion); the difference is expected to inch-up to about US$7.3 billion (US$22.32180 trillion - US$15.02360 trillion = 7.2982 = US$7.3 trillion) in 2020. It is worth emphasising that different global economic institutions maintain varying economic projections and predictions for the United States and China. The foregoing notwithstanding, there is no gain-saying China has made giant economic strides in recent years; the economy has transitioned from the 7th largest in 1980 to the 2nd largest in recent years. China emerged from her centrally-planned economic strategy as the *world's factory* and manufacturer of about 33.33% of goods required around the world. This enviable economic feat was achieved despite the decline in the manufacturing sub-sector's contribution to China's GDP in recent years. Contributions of the services sector to China's GDP have seen significant improvements in recent years. The economy is projected to grow by about 4.5% in 2021. The projection for 2021 is contingent, to a great extent, on the economic success of the current fiscal year.

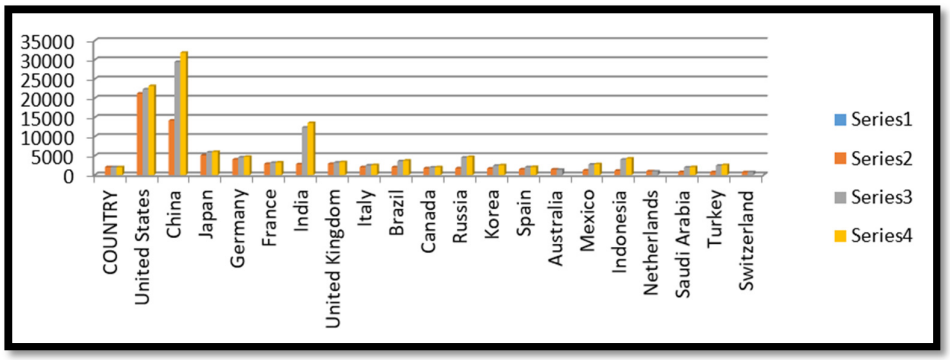

Figure 3: Actual and Projected GDP Values for Top 20 Economies (2019 – 2021)

The fourth largest economy throughout the world in 2019 was Germany, with a record nominal GDP of US$4.04 trillion. However, this was a slip from the third position in 1980. The resilience of the German economy makes it the leading and strongest economy in Europe. The data available in table 3 and figure 3 show the respective GDP growth targets of 13.59% and 3.53% for 2020 and 2021, respectively. These growth projections compare favourably against respective GDP growth rates of 1.5% and 0.5% for 2018 and 2019 (IMF as cited in Silver, 2020). Germany's targeted GDP growth for 2020 may be described as an "outlier;" this exceptional growth target may be attributed to an expected economic boom arising from increased manufacturing activities to boost capital goods exports in 2020. However, this expectation may be short-lived by the pandemic outbreak in the current fiscal year.

The data depict that the estimated nominal GDP for the United Kingdom in 2019 was US$2.91 trillion. This performance ranked the UK economy 5th in the world during the period. In terms of PPP, the UK's total GDP amounted to US$3.04 trillion, the 9th highest global value in 2019. Despite the dwindling performance in recent years, the UK's economy is anchored in order of significance by the services, manufacturing, and agricultural sectors. The services sector contributes over 75% to the national GDP and remains one of the main sectors with the highest employment rate. The agricultural sector employs less than 2% of the active labour force, and yet it produces about 60% of the UK's domestic food needs. Despite its breakaway from the European Union, the United Kingdom's economy is expected to be robust; it is the third most visited country in the world after France and Spain, respectively. Thus, tourism plays a significant role in the measurement of the annual economic output or GDP of the UK, France and Spain. However, the United Kingdom, France, and Spain's robustness and resilience, especially earnings from tourism in 2020, may be undermined by the Coronavirus pandemic, which has necessitated lockdowns and their attendant adverse effects on socio-economic activities in these countries. France and Spain were ranked 6th and 13th in the global economic rankings in 2019, with respective nominal GDPs of US$2.89 trillion and US$1.46 trillion, respectively. In 1980, India ranked 13th globally with a nominal GDP of US$189.438 billion.

The economic exploits of India in recent years deserve commendation; it was the seventh largest with an estimated nominal GDP of US$2.8 trillion in 2019 and is described as the fastest-growing trillion-dollar economy in the world. In terms of PPP, India's GDP of 2019 was estimated at US$11.33 trillion, the third highest after China (US$27.31 trillion) and the United States (US$21.44 trillion) (Silver, 2020). Economic growth in India increased from 7.3% in 2018 to 7.5% in 2019. India's GDP target for 2020 (US$2.95 trillion) translates into about 5.36% growth during the period. The Indian services sector employs about 28% of the active labour force, contributes about 60% to GDP, and remains the fastest-growing services sector in the world. Reforms in exchange rate regimes and favourable tax policies constitute an integral part of India's economic success in recent years. The Government's 'Make in India' campaign is propelling investment initiatives in the manufacturing sub-sector (Silver, 2020).

In terms of geographical size, Brazil has an estimated total landmass of 8,515,767 square kilometres. This total land area makes Brazil the fifth largest country in the world. The country has an estimated population of 212.56 million people, the highest in Latin America and the sixth highest in global population rankings (Worldometers.info, 2020a). Statistics in table 3 and figure 3 indicate that in 2019, Brazil ranked 9th in the world with a nominal GDP of US$2.02 trillion. Brazil's GDP projections for 2020 (US$2.15 trillion) and 2021 (US$2.25 trillion) suggest the respective GDP growth targets of 6.44% and 4.65% during the period. These growth targets are an improvement over the economic contraction of 3.5% in 2016 and a rebounding of 1.0% in 2017. Attempts by the Brazilian government to boost investor confidence and revamp the business environment may be predicated on the success of her preparedness and containment strategy for the coronavirus pandemic.

Russia has a total land area of 17,098,242 square kilometres. It is the largest country in the world. Its geographic size is equivalent to 11.48% of the global total landmass of 148,940,000 square kilometres. Like China, Russia borders fourteen different countries and forms part of the BRICS nations or economies. The acronym BRICS stands for Brazil, Russia, India, China, and South Africa (Mattyasovszky, 2019; Silver, 2020). Statistics in the table and figure indicate Russia ranked 11th on the list of global economies in 2019, with an estimated nominal GDP of US$1.75 trillion. In terms of purchasing power parity, the Russian economy ranked sixth with an estimated GDP of US$4.21 trillion in 2019. The performance of the Russian economy in 2020 may be negatively impacted by the Coronavirus pandemic, which has disrupted a significant number of economic activities in countries across the globe. The data suggest Russia ranked 10th among 210 countries and territories with reported cases of the Coronavirus pandemic. Russia's economic growth target

for 2020 is approximately 1.71%. However, the projected nominal GDP value for 2021 (US$1.91 trillion) relative to the projection for 2020 (US$1.78 trillion) suggests a targeted growth rate of about 7.30%. This growth target may be borne out of the expected commodity boom in 2021.

4.6.2. Performance of the Global Economy in Selected Periods

Extant research revealed that the earth and countries therein have witnessed a series of pandemic outbreaks in addition to other natural occurrences such as tornadoes, earthquakes, hurricanes, and bushfires, among others, in prior and recent periods. Undoubtedly, most of these natural disasters have redefined countries and territories and their socio-economic dispositions. However, what is most intriguing is the "quick economic turnaround" that human capital within individual countries and in the comity of nations is able to ensure in the global economy through impressive GDP values and related growth rates in 'post-disaster' periods. Data in table 4 and figure 4 outline annual GDP values for the global economy over a thirty-year period, that is, from 1990 through 2019. The data would help us define and assess the impact of pandemic outbreaks in the last three decades on the performance of the global economy. The data depict a steady increase in annual GDP values from 1990 through 2008, a thump in 2009, and a rebound in 2010 through 2014.

We observe that the performance of the global economy in 2002 (US$34.674 trillion) and 2003 (US$38.902 trillion) was impressive, implying that the outbreak of the Severe Acute Respiratory Syndrome did not undermine global economic performance and growth during the period. In 2009 and 2010, the world succumbed to the Swine Flu, which is believed to have originated in Mexico in North America. Notwithstanding this pandemic, the global economy recorded strong GDP values during the period: US$60.334 trillion in 2009 and US$65.051 trillion in 2010. However, the global GDP for 2009 (US$60.334 trillion) had a corresponding negative growth rate (-5.15%), implying that the initial and peak stages of the pandemic did affect global trade, its related activities, and output. Available data affirm that the performance of the global economy in the post-Swine flu era was phenomenal; the global GDP value in 2011 was US$73.393 trillion, representing about 12.82% growth over the value recorded earlier in 2010 (US$65.051 trillion).

Year	Amount	Growth Rate
2019	87.265	1.58%
2018	85.91	6.13%
2017	80.951	6.29%
2016	76.164	1.49%
2015	75.049	-5.40%
2014	79.333	2.72%
2013	77.236	2.87%
2012	75.085	2.31%
2011	73.393	12.82%
2010	65.051	7.82%
2009	60.334	-5.15%
2008	63.612	9.74%
2007	57.968	12.67%
2006	51.448	8.41%
2005	47.457	8.31%
2004	43.817	12.63%
2003	38.902	12.19%
2002	34.674	3.83%
2001	33.396	-0.57%
2000	33.588	3.21%
1999	32.543	3.71%
1998	31.378	-0.20%
1997	31.44	-0.36%
1996	31.555	2.22%
1995	30.871	11.15%
1994	27.775	7.36%
1993	25.87	1.60%
1992	25.464	6.18%
1991	23.981	5.85%
1990	22.656	12.83%
Figures in US$ Trillions		
Sources: The World Bank; Worldometers.info		

Table 4: Global GDP for Selected Years (1990 – 2019)

Another pandemic outbreak that tested the resilience of the global economy in the last decade was the Ebola virus, which was recorded between 2013 and 2016. During the pandemic period, the global economy did not witness a

contraction in 2013 (US$77.236 trillion) and 2014 (US$79.333 trillion) but did so in 2015 (US$75.049%). Data in table 4 and figure 4 show a negative growth rate of 5.40% in 2015. However, the global economy recovered in 2016 with respective annual GDP and growth rates of US$76.164 trillion and 1.49%, respectively. The data reveal a common thread. That is, the performance of the global economy in post-pandemic periods has been encouraging: 2004 (US$43.817 trillion), 2011 (US$73.393 trillion) and 2017 (US$80.951 trillion). The respective growth rates during these periods were 2004 (12.63%), 2011 (12.82%) and 2017 (6.29%). Ironically, the highest GDP value and least growth rate during the post-pandemic comparative periods were recorded in 2017 (GDP = US$80.951 trillion; growth = 6.29%). Further statistical analysis in the subsequent section would help determine whether or not natural disasters such as the Coronavirus pandemic have a significant influence on the performance of the global economy in a given financial year.

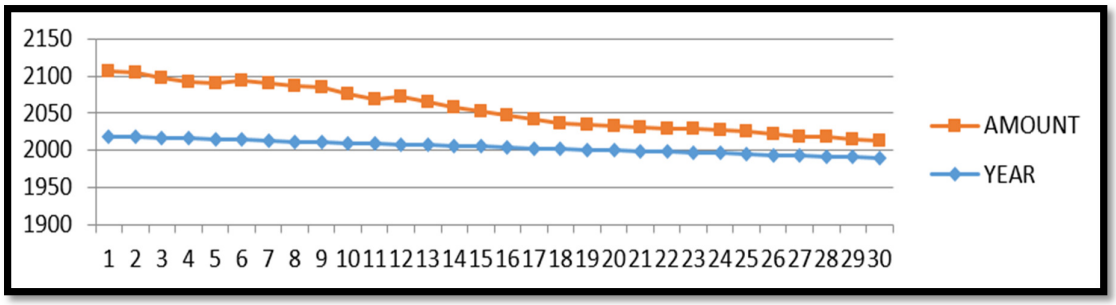

Figure 4: Global GDP for Selected Years (1990 – 2019)

The pandemic affected China's regular supply of machinery, chemicals, and communication equipment to the European Union, United States, Japan, Vietnam, Taiwan, and Korea (UNCTAD, 2020). These supply chain defects were likely to affect the gross domestic product of the implied economies and, by extension, the performance of the global economy during the period. Shortage in the supply of medical and pharmaceutical products relative to demand is resulting in price hikes and causing inflation in some economies across the globe. China's total imports in 2019 were estimated at US$2.1 trillion (Orlik et al.), which translated into about 14.79% of GDP during the period. The Coronavirus pandemic is likely to affect China's total trade volumes, including imports for the current fiscal year. This would affect the GDPs of her trading allies, partners, and the global economy. Despite the challenges, manufacturing firms in China were expected to assume full production capacity by the end of April 2020. It is believed that the rest of the world's ability to fight and contain the Coronavirus pandemic is predicated on how quickly China brings it under control and assumes full-scale production capacity. An expedition of the recovery rate in China could speed up the economic recovery process at the global level.

One of the reliable sources of corporate funding across the globe is loans or borrowing from financial institutions, including micro-credit, microfinance, savings and loans, investment, and universal banks, among other categories. Due to the interruption in manufacturing and service activities in most economies, Standard and Poor's (as cited in Al Jazeera News, 2020b) has estimated global non-performing loans for 2020 at US$1.1 trillion. The foregoing suggests that the global banking industry would have its "fair share" of the economic setbacks created by the Coronavirus pandemic. The global stock markets were equally not spared by the Coronavirus pandemic; stock trading activities in North America, Asia, and elsewhere recorded historic low prices per share during the earlier months but later bounced back and showed appreciation in prices per share in some markets. The plummeted stock prices adversely impacted investors' confidence and household wealth. In March 2020, the G20 leaders promised to inject US$5 trillion into the global economy to avert the occurrence of deep recession.

4.6.3. Human Capital Factor

As stated earlier, the World Health Organisation has affirmed that the actual vaccines for the cure of the COVID-19 pandemic may be obtained in 12 to 18 months. This underscores the need for precautionary and preventive measures such as stay-at-home to be given the necessary attention they deserve; strict adherence to these preventive measures is very paramount to the success rate of the fight against the pandemic. The lockdown measures in some economies, including Tunisia, Cameroon, and Ghana, were initially received with mixed feelings and reactions; some citizens underestimated their significance and called for the non-implementation so they could continue with their daily routine of commuting and trading. Some protesters emphasised the immediate economic losses and the effect of the lockdown on their livelihood in the immediate term due to the neglect of the consequences on individuals' health, the possible spread of the pandemic, and the eventual loss of human lives.

However, the overarching consideration by global leaders in the implementation of the lockdown measure is the critical ***human capital factor.*** Human capital consists of three major components and talents. These include individuals with the requisite ideas and technological know-how to help in the socio-economic turn-around of their respective economies; their presence minimises the need for foreign 'virtual' capital in their economies while the sound judgements and innovativeness of these individuals serve as desiderata of propelling their respective countries to higher economic echelons. The second component comprises persons with the necessary financial resources for the acquisition of other factors of production, including machinery and equipment, and to reward labour. These individuals ease the financial burdens of their respective economies through direct investment and through the attraction of other investors, locally and

internationally, to aid in the national and global socio-economic development process. The third component relates to people who are endowed with the natural strength required for smooth operations of plant and equipment and other labour-driven tasks within the economy. Their physique serves as an asset to their respective economies; their presence minimises the urgent and future need for the importation of able-bodied individuals from other economies to help in the development process.

However, it is worth emphasising that some individuals are endowed with all three talents, that is, intellectualism, wealth, and strength; others are endowed with two, while some are endowed with one. What is most important is the fact that every human capital has a role to play in nation-building. The collective contributions of human capital through the foregoing talents are vital to the economic restructuring of any country in post-COVID-19. Thus, it is imperative for global leaders to consider the preservation of human lives as a priority to ease the development process of their respective economies in post-COVID-19. The foregoing was corroborated by Madam Kristalina Georgieva, the International Monetary Fund (IMF) Managing Director when she noted: "The human costs of the Coronavirus pandemic are already immeasurable and all countries need to work together to protect people and limit the economic damage" (IMF Communications Department, 2020, para. 2). The critical role of human capital in national socio-economic development and hence, the need for their protection in perilous times was affirmed by Ghana's President, Nana Akufo-Addo, when he stressed: "We know how to bring the economy back to life but do not know how to bring people back to life." The statement implies that the protection of human capital is a collective or shared responsibility. However, it is the responsibility of various governments to provide broader and national protection. It behoves citizens and other nationals therein to practice and add-on, if necessary, to the precautionary, safety, and preventive measures outlined by respective governments across the globe. Although President Nana Akufo-Addo's statement was directed at people domiciled in Ghana, it is equally applicable to people in other jurisdictions; governments may not be able to resuscitate the dead. However, governments can revive economies over time.

As indicated in the previous section, the Coronavirus does not show any mercy to persons; it affects the young and old, affluent and impoverished, nobles and commons, among others. As a result, any effort geared towards protecting human lives deserves the maximum cooperation and commitment of all stakeholders so economies across the globe can emerge stronger in post-COVID-19 to facilitate their restructuring processes and efforts. The global average rate of deaths relative to the total number of confirmed cases of COVID-19 as of 20th April, 2020 was about 6.87%. This was higher than the rate (about 4.48%) recorded earlier on 25th March 2020 and higher than the 1% case fatality rate advanced by Gates (2020). As new cases are confirmed, the death toll may rise. As the total number of deaths increases, the case fatality rate also surges, and this may affect the overall number and quality of human capital across the globe. Therefore, it is imperative for global leaders to institute measures that would preserve and protect the lives of people to facilitate and expedite economic restructuring in their respective economies in the aftermath of the Coronavirus pandemic.

4.6.4. Individual, Religious and Corporate Contributions

The challenges posed by the Coronavirus pandemic to global economies are multi-faceted; they include economic and health challenges. Economies require the assistance of individuals and corporate organisations to effectively stem the tide of the pandemic. To this end, some individuals and organisations have responded positively. Mr. Atiku Abubakar, a former Vice President of Nigeria, donated an equivalent of US$140,000 as his contribution to the fight against the Coronavirus pandemic in Nigeria. It is believed that similar donations would alleviate the plight of average Nigerians following the devastating effect of the epidemic on the economy. In Ghana, the International Central Gospel Church (ICGC) headquartered in Accra donated GH¢100,000 as its contribution to the COVID-19 National Trust Fund; a fund set up by the current administration to alleviate the effect of the Coronavirus pandemic on the Ghanaian population and economy. Absa Group Limited (formerly Barclays Bank Limited) also donated GH¢1 million as its contribution to the Coronavirus Alleviation Programme set up by the President Nana Akufo-Addo-led administration to combat threats of the pandemic. As of 5th April 2020, total contributions to Ghana's COVID-19 Trust Fund amounted to GH¢8.75 million; this included donations equivalent to US$600,000.00. In his sixth and seventh addresses to the nation, President Nana Akufo-Addo acknowledged the benevolence and solidarity of the Jack Ma Foundation, the United States, China, IMF, World Bank, and the African Development Bank (AfDB) in Ghana's fight against the pandemic. He expressed sincere gratitude on behalf of all Ghanaians to individuals and corporate bodies that have made generous contributions to the COVID-19 National Trust Fund (Communications Bureau at the Presidency, 2020). The leadership of the main opposition party in Ghana, the National Democratic Congress (NDC), donated items to selected health and social institutions as part of its contribution to the collective fight against the deadly coronavirus.

The current socio-economic climate in the Chinese economy is characterised by a modicum of uncertainty. This notwithstanding, China has witnessed a dramatic turn-around from the ashes of the Coronavirus pandemic to massive economic restructuring. The contributions of corporate bodies to this significant economic progress cannot be underestimated. Companies incorporated in China have provided tremendous assistance in the areas of education, virtual work environments, public education on facts about the pandemic, and infrastructure development. Aikman and Chan (2020) identified five distinctive ways in which companies have contributed positively to the fight against the pandemic in China. These include putting the necessary measures in place to remain in operation so the supply chain is not disrupted; assisting in the construction of facilities to ensure infrastructural updates; diffusing misinformation; ensuring that education and work are not interrupted through the provision of virtual learning and working environments; and the acceleration of medical responses through sharing of technology solutions.

In the wake of the pandemic, Chinese companies thought it necessary to maintain the supply chain for medical logistics, including safety goggles, protective suits, surgical masks, and disinfectants, among others. Makeshift assembly

lines have been established by corporate bodies such as SAIC-GM-Wuling, BYD, Foxconn, and Guangzhou Automobile Group Company to increase the production of disinfectants and masks. Affected areas and provinces in China received a significant amount of food, healthcare and other supplies from leading firms, including China COSCO Shipping Corporation, China Merchants Group, Envision Energy, Guangzhou Pharmaceutical, JD.com, Sinopec, SinoChem, Ping An, Tencent, Xiaomi, Yili, Tai Kang Insurance, ByteDance, Alibaba, Baidu, Bank of China, and China Construction Bank, among others. Autonomous ground robots were deployed by JD Logistics to facilitate last-mile delivery of medical items in Wuhan hospitals, while Dongfeng-Xiaokang provided vehicles to transport medical items to Wuhan City (Aikman & Chan, 2020). Samsung has channelled part of its resources into the production of masks while one of its manufacturing facilities has been converted into a care centre. The initiatives are intended to meet the increasing demand for medical supplies, especially masks, and to increase available medical facilities to expedite the treatment of COVID-19 patients and potential ones.

Similar initiatives were considered in Ghana during the period. For instance, the Government partnered with and encouraged the private sector to manufacture personal protective equipment such as gowns, head covers, surgical scrubs, and face masks to complement available quantities for supply to all medical facilities across the country. The private sector's response to the government's call was swift; this assured the local production of about 3.6 million face masks, with an output capacity of 150,000 per day. The Centre for Scientific and Industrial Research (CSIR) and the Ghana Academy of Arts and Sciences partnered with the Government in the fight against the pandemic. Other institutions such as the National Public Health Reference Laboratory at the Korle-Bu Teaching Hospital, Noguchi Memorial Institute for Medical Research at the University of Ghana (UG), and the Centre for Collaborative Research at the Kwame Nkrumah University of Science and Technology (KNUST) have been extremely useful to the treatments and fight against the pandemic. It is worth emphasising that as of 5th April 2020, the Government of Ghana had distributed the following respective personal protective equipment to health workers in all districts across the country: 350,000 masks; 558,650 examination gloves; 1,000 reusable goggles; 20,000 cover-alls; 7,000 N-95 respirators; 500 waterproof gumboots; 2,000 reusable face shields; 2,000 gallons of hand sanitisers; and 500 shoe covers (Communications Bureau at the Presidency, 2020, para. 13, 16, 22 & 23).

Findings from the research revealed that a limited supply of hospital beds for infected COVID-19 patients was a major challenge to the Chinese economy. To address this medical nemesis and ensure speed and efficiency in service delivery to affected patients, the Chinese government, through the assistance of companies, fast-tracked the construction of two major hospitals in ten (10) days. These included the Leishenshan Hospital with 1,600 bed-capacity and Huoshenshan Hospital with 1,000 bed-capacity in Wuhan. To minimise the level of physician-patient contacts while maintaining efficiency in medical service delivery to potential COVID-19 patients, China Telecom and Huawei established a 5G-enabled remote video diagnostic centre at the newly constructed medical facilities. Beyond COVID-19, the new technology would enhance remote online consultations between potential patients and medical staff at the facilities. The roles of Far East Smarter Energy Company Limited and State Grid Corporation of China in the successful completion of the two major hospitals cannot be overemphasised: the latter guaranteed an adequate supply of electricity while the former committed to laying all the requisite network cables (Aikman & Chan, 2020). Misconceptions and dissemination of false information about the Coronavirus pandemic and the Chinese economy were a major concern to most companies. As a result, several companies, including Baidu, adopted strategic measures to provide facts and adequately inform the world about the pandemic.

The research outcomes further revealed in China, Tencent "Medipedia," a healthcare encyclopaedia, has included preventive measures, relevant symptoms and medical treatments in its database. This information is reviewed and edited by renowned medical experts. The underlying objective is to ensure that the Chinese, together with the rest of the world, have access to reliable and authentic medical information. The measures also include a graphical presentation of hot spots, potential or suspected, and confirmed areas of COVID-19 in China so people can make informed travel decisions. Ping An's (AskBob) portal provides one-stop access to updates and advice on virus-related cases, while others, such as JD Health and Ping An, have launched online health consultation services at no cost to users. A platform launched by Qihoo 360 enables travellers to check whether or not a person on their recent airplane or train trips has since tested positive so they can apply the requisite self-quarantine measures or visit the nearest hospital if they exhibit symptoms of COVID-19.

The procedures for approval of gene-sequencing systems and testing kits were simplified by China's National Medical Products Administration (NMPA) to facilitate testing procedures and expand the supply capacity of virus detection products. Public research institutions have been given the necessary boost by Infervision, Alibaba, Baidu and others to enhance the detection and monitoring of disease on CT scans, protein screening, virus gene sequencing, and research and development on new drugs. Hospitals in Wuhan City and Hubei Province benefitted from Neusoft Medical's donation of medical equipment such as cloud platforms, remote advanced post-processing software, high-end CT scanners, and Al medical imaging. BGI has established an emergency test laboratory called the Huoyan Laboratory to expedite the process of testing cases and has donated testing kits to Wuhan City and Hubei Province. BGI increased its production capacity in testing kits, so its contribution to Wuhan would be significant.

Most companies incorporated in China and other jurisdictions are assisting their respective governments through alternative arrangements to ensure a sizable number of people return to work and school. The virtual work and school environment has become an essential socio-economic desideratum in China and in many countries across the globe. In Ghana, many tertiary institutions have resorted to online teaching and learning to ensure the academic calendar is not disrupted by the Coronavirus pandemic. Further, the Government of Ghana has encouraged the organisation of learning sessions on various television stations to enable students at the Junior High School (JHS) and Senior High School (SHS) levels to maintain their academic focus while they remain at home as a strategic way of curbing further spread of the virus. In China, virtual workplace collaboration is facilitated by technological tools designed and implemented by Huawei

(WeLink), ByteDance (Feishu), Tencent (WeChat), and Alibaba (DingTalk) to minimise the negative impact of COVID-19 on the employment rate. They have also launched online classrooms to facilitate interactions, teaching and learning between lecturers and students from homes.

Similarly, JD.com and Alibaba engaged the services of individuals from affected areas in China to ease the effect of the pandemic on the unemployment rate. These individuals were engaged temporarily in supermarkets and e-commerce while Pinduoduo, Alibaba and Meituan-Dianping provided low-interest loans and subsidies to small- and medium-sized businesses to mitigate damages and short-risks. Small- and medium-sized enterprises (SMEs), non-governmental organisations (NGOs), medical institutions, hospitals, and street communities have been granted free access to the commercial version of ByteDance's "Feishu" for the next three years. To increase flexibility and usage, these technological giants have added new features to the existing ones. These include industry-specific solutions, increased call times, increased quota of video conference participants, and online health check-in features.

4.6.5. Scientific Cure for COVID-19

Findings from the current research revealed that in January 2020, the World Health Organisation declared the Coronavirus outbreak a "public health emergency of international concern;" and declared the same a pandemic on 11th March 2020 (Reynolds & Weiss, 2020d, para. 2). This was after a series of delayed decisions by the global health body. Following recent sporadic outbreaks in countries such as Italy and Iran with no clear link to China's "now-known" Coronavirus, the Director-General of the World Health Organisation, Dr. Tedros Adhanom Ghebreyesus, sounded a word of caution to the global community he noted the window of opportunity for effective containment of the Coronavirus pandemic is narrowing steadily. The foregoing statement presupposes that the speed of spread of COVID-19 outpaces containment measures implemented by infected countries. Further, Dr. Ghebreyesus warned that attempts to relax lockdown measures would only result in escalation and ostensibly defeat the purpose of fighting against the pandemic. He predicted a further increase in confirmed cases in Central and South America, Eastern Europe and Africa.

Despite the reduction in transmission rate, owing to the implementation of measures such as social or physical distancing and stay-at-home orders, Dr. Ghebreyesus believed that COVID-19 still remained very dangerous; we cannot underestimate its propensity and capabilities to cause socio-economic havoc; hence, the need for some countries to guard against complacency (Citinewsroom.com, 2020). His assertion was supported by happenings in the People's Republic of China; as of 19th March 2020, the respective number of confirmed cases and deaths in China was 80,928 and 3,245; by 20th April 2020, the respective numbers had increased to 82,747 and 4,632, suggesting 1,819 and 1,387 respective increases in confirmed cases and deaths during the period. It is worth noting that the World Health Organisation has made six international public health emergency declarations since 2009. These included emergency declarations on the Swine flu pandemic outbreak in 2009, polio outbreak in 2014, Ebola outbreak in West Africa in 2014, Zika virus outbreak in 2015, another Ebola outbreak in the Democratic Republic of Congo in 2019, and the Coronavirus outbreak in 2019 (Reynolds & Weiss, 2020d, para. 3).

According to the World Health Organisation and Reynolds and Weiss (2020e), actual vaccines for the cure of COVID-19 are twelve (12) to eighteen (18) months away. Reynolds and Weiss (2020d) noted that the process of introducing new vaccines to the market is generally "a notoriously slow process and any potential vaccine will have to pass multiple stages of testing for safety and effectiveness" (para. 1) before approval for sale and human consumption. Reynolds and Weiss (2020e) revealed tremendous efforts by global pharmaceutical manufacturing giants to develop quickly vaccines for COVID-19. For instance, Sanofi, a pharmaceutical manufacturing company, is making significant efforts to build on its already-approved flu vaccine so it can be transformed into a suitable vaccine for the coronavirus. Other measures include vaccine testing by Oxford University to determine how external spike proteins on the Coronavirus can be used to target vaccines. This implies that social distancing guidelines, frequent hand washing, and other announced measures remain the "immediate cure" for the pandemic. Therefore, it behoves everyone to take the preventive measures very seriously.

However, in the interim, the World Health Organisation asserts that the global fight against the pandemic could be summarised into three: "fight, unite, and ignite." First, global leaders must fight together to end the further spread of the pandemic and ensure the eventual disappearance of the pandemic from their respective economies. Second, leaders must unite in their quest to confront the pandemic head-on to expedite and increase their success rate. Finally, the industrial might and innovativeness of the advanced economies must be ignited and harnessed to manufacture and distribute essential medical equipment and items needed to save human lives across the globe. Health professionals in various economies were urged to visit the World Health Organisation's website regularly for updates and training to enhance their knowledge of COVID-19 preventive measures and to accelerate the rate of recovery in their respective countries and at the global level.

In Africa, some medical practitioners suggested the need for cross-border collaboration to allow countries deficient in state-of-the-art medical facilities (such as kits of all forms) and infrastructure (such as laboratories) to benefit from their availability in sister countries. An example is Somalia's benefit from medical and testing facilities in Kenya at the outset of the Coronavirus outbreak in the former; second, the establishment of a continental specialised agency (as established during the outbreak of Ebola) by the African Union (AU) to combat the Coronavirus; and third, an increase in response rate to prevention and cure for COVID-19. Drawing on the experience from the combat of Ebola could help the continent's specialised agency, the Africa Centre for Disease Control, to mitigate the widespread and eventual debilitating impact of the Coronavirus pandemic on African economies. The call by some health professionals for establishing another specialised agency by the AU undermines the effectiveness of the ACDC in preventing and controlling epidemics and pandemics on the continent.

4.6.6. Use of Drones in the Fight against COVID-19

The research findings revealed that Ghana originally engaged the services of Zipline, an American Healthcare logistics company, to dispatch medical supplies from the city centres to the rural areas and remote parts of the country through drones. Zipline transports two hundred (200) different medical supplies to health facilities in remote areas. Examples of these medical supplies include personal protective equipment, antivenins, plasma, vaccines, and blood (Time Magazine as cited in Ghanaweb.com, 2020c). However, COVID-19 has reversed the original drone services of the company. In his seventh address to Ghanaians on Sunday, 19th April 2020, to provide updates on the collective fight against the novel Coronavirus pandemic, President Nana Akufo-Addo noted the use of drones as part of the preventive and containment measures in the country.

Findings from the study indicated that Ghana was the first country in the world to apply drone services to the treatment of COVID-19 cases. To ease testing and minimise the spread of the virus, Ghana uses contactless drone delivery technology to transport swabs of COVID-19 from rural areas to designated urban centres where testing equipment has been installed. A round trip journey for test samples delivery from the hinterlands to the cities that could take a day when transported by road is completed within thirty (30) minutes by drones, and test results are released through SMS within two days to medical sites where the samples were taken (Time Magazine as cited in Ghanaweb.com, 2020c). This ensures early detection, enhances contact tracing, and prevents further spread of the virus.

Data released by the Ghana Health Service (2020) indicated that ten (10) of the country's sixteen (16) regions had reported cases of COVID-19 during the period. These included the Greater Accra, Ashanti, Eastern, Northern, Volta, Upper East, Upper West, Central, Western, and North East regions. The drones are deployed to two collection points in the country. As stated earlier, Zipline now collects test samples from the rural areas to testing centres in two cities. The fleet of drone equipment used by Zipline in Ghana has the capacity to transport up to fifteen thousand (15,000) specimens daily, using three hundred (300) flights. However, Ghanaians are hopeful the pandemic will not escalate to the extent of exploiting or stretching Zipline to its maximum capacity. To minimise human contact and virus transmission, small medical supplies are delivered through drone services. Ghana's initiative could serve as a sterling example to advanced, emerging, and developing economies in their fight against COVID-19 and future epidemic and pandemic outbreaks. Zipline hoped to replicate its drone services in the United States to expedite the country's fight against COVID-19 (Time Magazine as cited in Ghanaweb.com, 2020c).

4.7. Descriptive Statistics

A statistical description of the gross domestic product values for each of the twenty (20) economies included in the analysis is presented in table 5. Analysis in this section drew on the data in table 3, column 2. Specifically, the GDP values for 2019 were used in the analysis. The table indicates the respective sample variance (26008487.61) and skewness (2.8962) of the distribution. Skewness explains the distortion or asymmetry of the random variable around the mean in the distribution. The statistical data depict the respective Kurtosis and standard error values of 8.2667 and 1140.3615, respectively. The extent to which the coefficients are significantly different from zero is explained by the standard error value. The minimum value in the table is 715, representing Switzerland's GDP value for 2019 (US$715 billion), while the maximum value (21200) is representative of the total gross domestic product value of the United States for 2019 ($21.200 trillion). The range explains the difference between the maximum and minimum values for the distribution. Value for the *range* (20485) explains the substantial difference (US$20.485 trillion) between the respective GDP values of the United States ($21.200 trillion) and Switzerland ($715 billion).

Mean	**3540.35**
Standard Error	1140.361513
Median	1745
Mode	#N/A
Standard Deviation	5099.851724
Sample Variance	26008487.61
Kurtosis	8.266727896
Skewness	2.896213416
Range	20485
Minimum	715
Maximum	21200
Sum	70807
Count	20

Table 5: Actual GDP Values for Top 20 Economies – 2019

It is worth reiterating that a significant proportion of global GDP is contributed by the top twenty economies. According to Silver (2020), the composition of the top twenty global economies has not witnessed significant changes since the 1980s; about seventeen (17) of the current top twenty economies have been consistent since the 1980s. The top ten economies contribute about 66%, and the top twenty economies contribute about 79% to global GDP; the other one hundred and seventy-three (173) economies in the IMF database (as cited in Silver, 2020) contribute about 21% to global GDP. Coincidentally, a significant number, if not all, of the world's top twenty economies constituted the most affected by

the Coronavirus pandemic during the research period. This raised concerns about the possibility of meeting the growth target for the global economy in 2020.

Another descriptive statistical test was conducted to ascertain the magnitude of global GDP values during the period from 1990 to 2019. Global GDP data in table 4 were used for the analysis in this section. Table 6 provides a statistical description for measures of central tendency, such as the mean, median, and mode, and measures of dispersion, such as the range, minimum, maximum, and standard deviation (Ashley et al.; Frankfort-Nachmias & Nachmias, 2008) for the global GDP values used in the research.

Mean	**50.80553333**
Standard Error	4.01784246
Median	45.637
Mode	#N/A
Standard Deviation	22.00662948
Sample Variance	484.2917409
Kurtosis	-1.548006933
Skewness	0.296148489
Range	64.609
Minimum	22.656
Maximum	87.265
Sum	1524.166
Count	30

Table 6: Global GDP for Selected Years – 1990 – 2019

The highest gross domestic product value (US$87.265 trillion) and lowest value (US$22.656 trillion) were recorded in 2019 and 1990, respectively. The *range* of global GDP values during the period is 64.609 (US$64.609 trillion). This represents the difference between the highest and lowest global GDP values during the period. Results in table 6 depict respective *mean* and *median* of 50.8055 and 45.637 and standard deviation of 22.0066. These tell us the extent to which the observations were dispersed around the central tendency. The *mode* explains the variable with the highest frequency in the data. Figure 4 shows no absolute value (#N/A) for the mode. This implies that no global GDP value was repeated during the period.

4.8. Results

The objective of this research was to test the underlying hypothesis, that is, to measure the extent to which a given fiscal year significantly influences global GDP values. Statistics in column 2 in table 4 depict the GDP values for the global economy from 1990 through 2019. Data in column 2 show a steady increase in global GDP values from 1990 through 2019, except for 2009 and 2015 when there were decreases in values relative to their respective preceding years (2008 and 2014). Column 3 presents the growth rates for global GDP during the period. Values for the data in table 4 are in *trillions of United States dollars (US$)*. Data used in this section were obtained from the World Bank databases and Worldometers.info. A causal relationship between the independent variable (fiscal year) and the dependent variable (global GDP) was tested using regression analytical tools. Results from the analysis are presented in the following section.

4.8.1. Test of Hypotheses

The alternative hypothesis underlying the research in section 3.4 sought to test whether or not a given fiscal year has a strong influence on the performance of the global economy. Output from the statistical analysis of the research hypothesis is presented in the following section.

4.8.2. Model Summary

Regression analysis outputs on the research hypothesis are presented in tables 7 through 10 and in figures 5 and 6. Summary constitutes an essential aspect of a regression model. Table 7 presents an overall description of the regression model. Values for R, R^2 and adjusted R^2 are displayed in the table. The value of the multiple correlation coefficients between the independent variable (fiscal year) and the dependent variable (global GDP) is presented in the R row. The R^2 value tells us the extent to which variability in the dependent variable is accounted for by the independent variable. The R^2 value implies that the fiscal year accounts for about 94.93% (0.94934144 x 100% = 94.934144% = 94.93%) of the variation in global GDP values. The results suggest that less than 6% (100% - 94.93% = 5.07%) of the outcome is explained by external random factors. However, further analysis in the following section would help determine the significance of the independent variable's (fiscal year) influence on the dependent variable (global GDP).

Regression Statistics	
Multiple R	0.97434154
R Square	0.94934144
Adjusted R Square	0.9475322
Standard Error	2.01649553
Observations	30

Table 7: Summary Output

One of the measures that determine the generalisability of the regression model is the adjusted R^2. Generally, an ideal adjusted R^2 value is closer to zero or the R^2 value. The adjusted R^2 value (0.9475322) in table 7 is not significantly different from the observed value of R^2 (0.94934144). This implies that the cross-validity of the regression model is good; the model may accurately predict the same dependent variable from the given independent variable in a different group of participants (Field, 2009). The R^2 significance was computed using an F-ratio. The ideal F-ratio formula for measuring R^2 significance is:

$$F = \frac{(N - k - 1)\, R^2}{k\,(1 - R^2)}$$

Where:
R^2 = Unadjusted value
N = Number of cases or participants in the study
k = Number of independent variables in the regression model
Value for the F-ratio was determined as follows:

$$F = \frac{(30 - 1 - 1)\ 0.94934144}{1\ (1 - 0.94934144)}$$

$$= \frac{26.58156032}{0.05065856}$$

$$= 524.7200$$

Our computations revealed that the change in the amount of variance that can be explained gives rise to an F-ratio of 524.7200, equivalent to the F-value (524.7199931) in table 8. This F-ratio shows a non-significant value ($p = 1.12239$, $p > 0.05$) as presented in table 8.

4.8.3. ANOVA

In general, the ANOVA helps to determine whether or not regression analysis provides a better and more significant prediction of the outcome than the mean. Data in table 8 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 28 (30 – 2 = 28); total degrees of freedom (df) of 29 (30 – 1 = 29), and an F-value of 524.71999.

	df	SS	MS	F	Significance F
Regression	1	2133.644882	2133.645	524.7199931	1.12239E-19
Residual	28	113.8551179	4.066254		
Total	29	2247.5			

Table 8: ANOVA

Statistics in table 8 depict the model sum of squares (SSM) value, represented by *Regression*; the residual sum of squares (SSR) value, represented by *Residual*; the total sum of squares (SST) value, represented by *Total*; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising one independent variable (fiscal year). The sum of squares divided by the degrees of freedom gives us the mean squares (MS). That is, 2133.644882 ÷ 1 = 2133.644882 = 2133.645; and 113.8551179 ÷ 28 = 4.066254.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1984.69752	0.93961174	2112.253	2.19672E-74	1982.772814	1986.62223
X Variable 1	0.38977012	0.017015501	22.90677	1.12239E-19	0.354915444	0.42462479

Table 9: Model Parameters

4.8.4. Model Parameters

A normal probability plot on the relationship between fiscal year and global GDP values is presented in figure 5. The figure depicts a steady rise in comparative values over the thirty-year period. Table 9 presents results on the parameters of the regression model. Data in the table show the coefficients, standard error, test statistic, significance, and confidence intervals for the coefficients. The coefficients hint at the contribution of the independent variable (fiscal year) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable; a negative value symbolises a negative relationship between the two variables. Results in table 9 show a positive coefficient value (0.38977012). This means there is a positive relationship between fiscal year and global GDP.

However, the relationship between the two variables (independent and dependent variables) is not significant (p = 1.12239, p > 0.05); the results suggest that the fiscal year alone has no significant influence on global GDP. Rather, internal and external environmental factors in a given financial year, such as Tsunamis, tornadoes, earthquakes, bushfires, hurricanes, and pandemic outbreaks, influence global GDP and its attendant growth rate. Thus, a fiscal year alone does not suffice to determine the performance of the global economy; activities such as those permitted by natural weather or climatic conditions influence global economic output (GDP) in a given year. The foregoing is justified by the portentous disruptions caused in global economic activities in 2020 by the COVID-19 pandemic. Growth in global GDP for 2020 has been reviewed severally (2.9%, 2.4%, 1.5% and 1.2%) by different international economic institutions, while individual countries such as Australia, Ghana (6.8%, 2.5% and 1.5%), and others, have been compelled to review their respective GDP growth targets for 2020.

We observe that most countries found in the top 20 brackets of the global economic rankings, including the United States, China, France, Germany, United Kingdom, Italy, Turkey, Russia, Brazil, Canada, Netherlands, Switzerland, and India were among the top 20 most infected countries with COVID-19 during the period. The overwhelming effect of pandemics such as the Coronavirus outbreak on the global economy depends on several factors:

- The speed of spread,
- The number of infected countries,
- The number of confirmed cases in each infected country,
- Case fatality ratio;
- The extent of socio-economic disruptions caused by the pandemic outbreak and
- Global economic rankings of infected countries, among others.

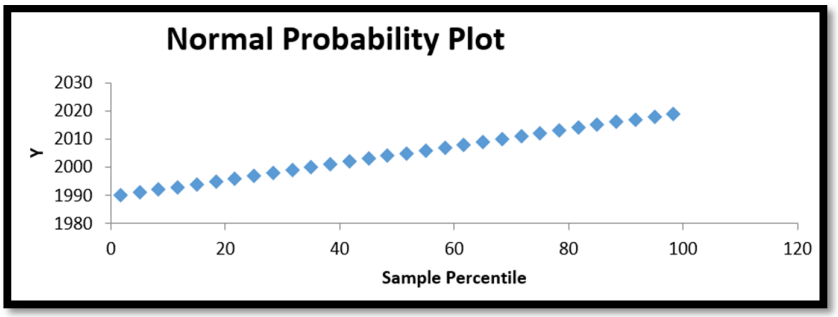

Figure 5: Normal Probability Plot for Fiscal Year and Global GDP

The magnitude of the t-test in table 9 tells us that the independent variable (fiscal year) has no strong influence on the dependent variable (global GDP). A standard error is identified with the coefficients in the table. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). The table shows respective Upper 95% values for the *Intercept* (1986.62223) and *X Variable 1* (0.42462479).

4.8.5. Test of Assumptions

Statistical tests were conducted to determine the linearity of the relationship between the independent variable (fiscal year) and the dependent variable (global GDP) and to measure the variance in residual values. The statistical outputs are presented in figure 6 and table 10. The scatter plots in figure 6 are in a straight line. This affirms that the relationship between the independent variable and dependent variable is linear; it implies that the model fits the analysis.

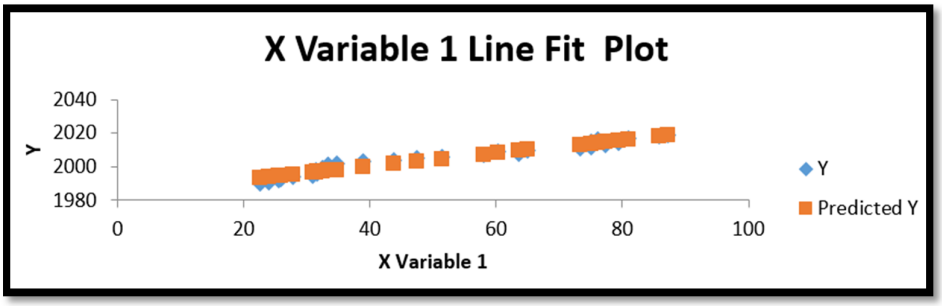

Figure 6: Linear Relationship between X and Y Variables

The *residual* values in table 10 allow us to test the *homoscedasticity* of the model. That is, whether or not the residual values at each level of the independent variable depict constant variance. Residuals in table 10 show constant variance values; this implies that the assumption of homoscedasticity is met. Further, data in figure 6 indicate that the relationship between the X and Y variables was measured at the interval level and beyond, while the variability of the dependent variable (global GDP) was not constrained. The foregoing analysis indicates that most of the assumptions have been met; this renders the regression model fit and appropriate for the research.

Predicted Y	Residuals	Standard Residuals
2018.710811	0.289189431	0.145950349
2018.182672	-0.182672061	-0.092192342
2016.249802	0.750197946	0.378615676
2014.383973	1.616027494	0.815589198
2013.949379	1.050621174	0.530235583
2015.619154	-1.619154005	-0.81716711
2014.801806	-1.801806071	-0.909349361
2013.963411	-1.963410551	-0.990909154
2013.30392	-2.303919513	-1.16275984
2010.052457	-0.052457202	-0.026474505
2008.213912	0.786088438	0.396729165
2009.491578	-1.491578004	-0.752781072
2007.291715	-0.291715467	-0.147225208
2004.750414	1.249585693	0.630650529
2003.194842	1.805158227	0.911041153
2001.776079	2.223921451	1.122385802
1999.860358	3.139641574	1.584538484
1998.21241	3.787589626	1.911549896
1997.714284	3.285715835	1.658260367
1997.78912	2.210879973	1.115803928
1997.38181	1.618189744	0.81668046
1996.927728	1.07227193	0.541162454
1996.951894	0.048106183	0.024278599
1996.996717	-0.99671738	-0.503031002
1996.730115	-1.730114621	-0.873167568
1995.523386	-1.52338634	-0.768834348
1994.780874	-1.780874268	-0.898785338
1994.622628	-2.622627601	-1.323607891
1994.044599	-3.044598518	-1.536571423
1993.528153	-3.528153114	-1.780615479

Table 10: Predicted Y Values and Residual Values for Variable X

4.8.6. Report on P-Value and Confidence Interval

Tables 8 and 9 depict a *P*-value of 1.12239 and a positive coefficient value of 0.38977012. These values are not significant at Alpha level α = 0.05. The table further shows a confidence interval of 0.354915444 and 0.42462479. The Alpha level, a priori, for this study is α = 0.05. This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood that the population mean would not fall within the interval (Ashley et al.; Bowerman et al., 2004; Frankfort-Nachmias & Nachmias, 2008). However, we are 95% certain our conclusions would be right. Again, the Microsoft Excel output in table 8 shows degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 28 (30 - 2 = 28); total degrees of freedom (df) of 29 (30 - 1 = 29), and an F-ratio of 524.71999. These values could be interpreted as:

F (1, 28) = 524.71999, p > 0.05, two-tailed.

4.8.7. Interpretation and Rejection of Alternative Hypothesis

The foregoing results indicate that a given fiscal year alone has no strong influence on global GDP. Therefore, we reject the alternative hypothesis (H1: μ1 ≠ μ2) and accept the null hypothesis (Ho: μ1 = μ2), which states that a given fiscal year alone has no strong effect on global GDP.

4.8.8. Debt Relief for Africa

Indeed, COVID-19 has veered the economic activities of most African nations off the progressive track; almost all African economies, including Ghana, are struggling to patch the economic holes created by the menacing COVID-19 pandemic. In the wake of the unexpected COVID-19 outbreak, African countries' ability to honour their debt obligations has become a strong challenge; debt cancellation and debt relief have now become inevitable in the chequered post-independence history of the African economy. Africa's total GDP for 2019 was estimated at US$2.580 trillion. Statistics released by the African Development Bank revealed that Africa's projected GDP growth rate for 2020 is 3.9%, implying a projected total GDP of US$2.681 trillion (US$2.580 trillion + (US$2.580 trillion x 0.039) = US$2.580 trillion + US$0.10062 trillion = US$2.681 trillion) during the period. As of February 2020, eight of the fifteen fastest-growing economies in the world were African countries (Pilling, 2020). However, this remarkable economic feat was short-lived by the novel Coronavirus pandemic.

Many African economies and their respective leaders were believed not to be frugal in spending donor funds and financial support from the Breton Woods institutions and other bilateral and multilateral financial agencies. Even though

Africa's estimated total population (1.334 billion) represents about 17.1% of the world's total population of about 7.8 billion people, the continent's contribution (US$2.580 trillion) to global GDP (US$87.265 trillion) in 2019 hovered around 3% (2.96%). Some economic experts argued that Africa's total contribution to global GDP could have been phenomenal in prior years if leaders had been strongly committed to their respective national development and growth agendas. Despite the high and perceived levels of corruption in Africa in prior years, the last two decades have been characterised by tremendous improvements in democratic governance; economic connoisseurs argued accelerated policy reforms could help the continent increase its wealth to about US$5.6 trillion within five years. Prior to COVID-19, many African economies exhibited improvements in governments' accountability to the people; life expectancy increased by more than ten (10) years; basic health provision witnessed improvements, while mortality rates among children and pregnant women reduced considerably. Further, civil societies and pressure groups in Africa are beginning to find their voices; they can hold elected governments and agencies accountable for their stewardship.

Notwithstanding Africa's seemingly aggressive preventive measures in the fight against the Coronavirus, the pandemic continued to spread on the continent. The World Bank (2020) predicted that the Coronavirus pandemic is more likely to plunge the entire African economy into its maiden continent-wide recession in twenty-five (25) years. It predicted Africa's economic growth in 2020 would range from -2.1% to -5.1%. The World Bank's analysis indicated that COVID-19 could cost the African economy between US$37 billion and US$79 billion in economic losses in 2020. A similar analysis by the Economic Commission for Africa (ECA) revealed that Africa's economic losses from COVID-19 are in billions of dollars in the United States; oil exporting economies in Africa could lose up to US$65 billion in revenues from crude oil in 2020.

Dahir (2020) believed the economic cost of the COVID-19 pandemic to Africa could be estimated at 2.1% of GDP; McKinsey (as cited in Dahir, 2020) predicted the African economy could lose between US$90 billion and US$200 billion in revenues to COVID-19; the pandemic could result in about 20 million job losses while an estimated 15% of foreign direct investment (FDI) may be lost. The ECA (2020) noted that the continent could lose about US$101 billion in fuel revenues while US$10.6 billion would be required to mitigate unanticipated increases in health spending during the period. A report released by the African Union (AU) estimated the continent's total economic losses from COVID-19 at US$270 billion (Business & Financial Times, 2020). This translates into about 10.1% (US$270 billion ÷ US$2.681 trillion) x 100% = 0.1007087 x 100% = 10.070869 = 10.1%) of Africa's projected GDP (US$2.681 trillion) for 2020; and equivalent to 10.47% (US$270 billion ÷ US$2.250 trillion) x 100% = 0.104651 x 100% = 10.465116 = 10.47%) of total GDP (US$2.580 trillion) for 2019. McKinsey's (as cited in Dahir, 2020) projected revenue losses (US$90 billion – US$200 billion) imply estimated economic losses ranging from 3.36% to 7.46% of projected GDP for 2020. Based on the foregoing, we could state *that Africa's estimated economic losses from COVID-19 range from 3.36% to 10.1% of the projected GDP for 2020*.

Pilling (2020) revealed that about one-fifth (1/5) of Africa's total debt is owed to China, bilateral and multilateral agencies. Africa's total debt is estimated at US$700 billion, with about US$44 billion due for payment in 2020. Debt relief is a catalyst for economic re-insurgence among African countries in their post-independence era, especially during and after the COVID-19 period. Stated differently, debt relief has become a major financial desideratum for the liberation of the entire African economy during and after COVID-19. Pilling (2020) described the quantum of debt relief (US$44 billion) sought after by Africa in 2020 as trivial and a rounding error compared to bailouts granted to Western economies. He concluded that Africa's win in the fight against COVID-19 is a win for the global community.

5. Recommendations

Many were those who underestimated the propensity and magnitude of the Coronavirus pandemic on social and business activities across the globe. Today, it is stirring in the face of all and sundry. The onus lies on each one of us to find a lasting antidote to, arguably, the most devastating pandemic ever encountered on the planet Earth. Undoubtedly, the world requires concerted efforts and a holistic approach to curb the menace and halt the "carnage" inflicted on global economies by the predatory Coronavirus. In view of the foregoing, the following recommendations are proffered:

- Since the non-occurrence of a similar or higher magnitude pandemic in the near and distant future cannot be guaranteed, it behoves leaders of various economies to put the necessary contingency measures and structures in place to avert devastating effects, should any pandemic occur. The extent of socio-economic disruption caused by the Coronavirus and the remedial measures identified as useful to curbing further spread and reviving economies should be maintained and improved on by economies. This would create the enabling environment for global leaders to "arm" themselves fundamentally against any possible future outbreak.
- Fall-outs from COVID-19 have indicated clearly that the ability of any economy to effectively marshal resources – financially, intellectually, and technologically – to successfully combat epidemics and pandemics is predicated on collaboration and concerted efforts of leadership and corporate bodies. Thus, the socio-economic cohesion between governments and corporate entities in various economies must be strengthened to the advantage of the economy.
- Experiences from the Ebola and Coronavirus outbreaks should serve as strong practical case studies for the Africa Centre for Disease Control to improve its response rate to epidemic and pandemic outbreaks on the continent. The ACDC should be able to advise member countries on the state-of-the-art medical facilities required to facilitate treatments for epidemic and pandemic outbreaks. Consistent with prior suggestions, we call for inter-country collaboration. That is, African countries that are "handicapped" in medical facilities and equipment should collaborate with those that are endowed with them and also share expertise to save the continent from socio-economic dissipation. However, the "best" solution lies in each African country endeavouring to mobilise the requisite funds to establish its own modern medical facility or facilities to expedite responsiveness and prevention during epidemic and pandemic outbreaks. ACDC's collaboration with WHO to ensure the ultimate success of its

initiatives and healthcare "adventure" on the African continent cannot be overemphasised. Given the economic conditions of many countries on the continent, the ACDC would prevent further economic predicaments if it adopted proactive measures and asserted its role in improving health conditions among member countries. The foregoing is equally applicable to struggling and healthy economies on other continents.

- At the global level, the World Health Organisation must continue to monitor health conditions and situations in each country and territory and provide early warnings or signals to enhance the preparedness and responsiveness of each country, group of countries, regional blocks, and various continents. Constant education by WHO on the immediate- and medium-term solutions to the COVID-19 pandemic is required to minimise the respective number of confirmed cases, deaths, and active and critical cases across the globe. Engagements with global leaders on the urgent need for massive investment in health and medical facilities in their respective economies are essential to the minimisation of the effects of the current and any future outbreak or outbreaks. Member countries must provide the necessary logistics and technological assistance so WHO can improve its existing structures and mechanisms for "systematic disease surveillance and reporting" (Saunders-Hastings & Krewski, 2016, p. 4). It is imperative for global leaders to take pronouncements of the World Health Organisation very seriously and to take steps to address recommended health challenges and measures early to minimise the eventual socio-economic costs, should any epidemic or pandemic occur.
- The necessary structures must be put in place to ensure early signals related to epidemics and pandemics are picked; leaders must attach strong importance to those signals and seek remedial measures early enough. Further, implementation of preventive measures within individual economies must be swift and strict; individual and collective compliance must be enforced to enhance the realisation of the set objective, that is, preserving the lives of human capital (the population) to ease economic rebuilding after the unfortunate and disastrous wind of the epidemic or pandemic has blown and subsided. Evidently, the immediate socio-economic loss to any country following the occurrence of any pandemic is high. However, this loss would arguably not compare with the medium- and long-term gains the economy stands to benefit from post-pandemic periods if the necessary measures are put in place to protect the lives of her citizens and other nationals during the pandemic periods. Thus, massive investments in preparedness, responsiveness, and prevention of pandemics must not be sacrificed for perceived immediate economic gains by any country.
- Companies incorporated in China scaled up their collaboration with the Chinese Government through the development and sharing of technological tools to enhance the nation's preparedness and responsiveness to the Coronavirus pandemic and future outbreaks. The mitigation measures adopted in China transcend the current pandemic to include possible future outbreaks. To be fore-warned, they say, is to be fore-armed. This implies that the measures rolled-out could "wean" China off or minimise the devastating impact of any future pandemic outbreaks on her economy. The collaboration improved significantly, as did the nation's response to pressing and immediate medical needs in affected areas and beyond. Consistent with the Chinese model, we recommend that mitigation measures be adapted and implemented by each country to transcend the current pandemic and include any possible outbreaks in the future. Preparedness and responsiveness should not be limited to "hot spots;" adequate preparation must be made for potential and non-potential hot spots in each economy and continent. For instance, as of 29th March 2020, there were eight countries in Africa with COVID-19-free cases. However, the story was different as of 4th April 2020; four more countries - Botswana, Burundi, Sierra Leone, and Malawi - had confirmed cases of the pandemic, and on 17th April 2020, only Lesotho and Comoros Island remained uninfected in Africa.
- The advent of improved technological standards has increased the proximity among economies across the globe. Stated differently, the power of technology has reduced the physical geographical distance among countries across the globe to almost zero. This development has increased the socio-economic impacts, both positive and negative, of an event or outbreak in one country on others at a geometric rate. The world has recorded three successive pandemic outbreaks in recent years. These include the Severe Acute Respiratory Syndrome (SARS), Ebola, and the Coronavirus. The extent of socio-economic damage caused by these pandemics brings to question the significant role of technology in the 21st century. We fervently believe that the G20 member countries and other economies with technological sophistry would maximise the economic use of technology by developing proactive mechanisms to prevent the occurrence or minimise the eventual effect of epidemics on countries around the world in the near and distant future. Improved technology would eliminate or minimise any unforeseen interruptions in the global supply chains and possible global recession.
- Saunders-Hastings and Krewski (2016) identified over-crowding or large gatherings in public or private places as a major risk factor for pandemic outbreaks; large gatherings escalate pandemic outbreaks and increase the spread's speed. Avoidance of such gatherings through social and physical distancing minimises the potential outbreak of pandemics. To this end, some districts in Ghana adopted the policy of "alternate-days-for-alternative-products" (Communications Bureau at the Presidency, 2020, para. 27) for commercial activities in their respective markets to ensure decongestion and social distancing and to minimise the potential outbreak of the Coronavirus pandemic in their respective districts. Duplication of the foregoing initiative in the yet-to-be-implemented districts across the country and in other jurisdictions across the globe would be useful to the collective fight against COVID-19 and other pandemics in future.
- Despite the clouds of uncertainty surrounding the COVID-19 pandemic, global economies and their respective leaders have the opportunity to emerge from their ashes with novel ideas that could propel the global economy to

higher echelons. This is the defining moment for leaders of advanced, emerging, and developing economies to make amends by marshalling their human capital and other significant resources based on comparative advantage to develop and establish preventive measures for future pandemics. Indeed, the 21st century and beyond create little room for prolonged global shocks and economic setbacks. Thus, the relevance and practical "feel" of improved technological advancements in the 21st century across the globe must manifest in the collective fight against COVID-19 and future epidemics and pandemics.

- As the Coronavirus pandemic spreads into many parts of the globe, the definition of economic vulnerability could be extended to include individual countries with weaker economies in terms of structures and total GDP. The sporadic spread and menacing effects of COVID-19 call for immediate financial and technical, including technological assistance, from economically viable countries to vulnerable economies across the globe. It is not surprising to learn that debt relief has been granted to some less developed economies while others are canvassing support for the same. The portentous effects of COVID-19 on global trade, coupled with the invaluable role of some of these vulnerable economies in international trade, affirms the need for the identified weaker economies (ostensibly based on their annual total GDP and GDP growth) to be provided with the requisite techno-financial assistance to curb further spread; minimise the overall impact of the menace on their respective economies; accelerate efforts by the G20 member countries and others at reviving the global economy; and to prevent possible economic contraction or recession at the global level. Efforts by the World Bank, IMF and other multilateral and bilateral financial institutions to establish distinct funds to assist weaker and stronger economies during the Coronavirus outbreak deserve commendation. In perilous economic times such as this, the assistance of these global financial bodies and individual economies to affected countries cannot be overemphasised.
- COVID-19 has exposed the frailties in existing global surveillance systems. Early warning signals from pandemic outbreaks are analogous to early prevention and treatments. To this end, global economies with state-of-the-art medical facilities and sophisticated technological equipment should endeavour to detect epidemics early to prevent their further spread and eventual transformation into pandemics. The estimated period to obtain vaccines for cure of the Coronavirus disease is relatively too long (from twelve to eighteen months). If medical laboratory sophistry could be improved to expedite prevention and cure for future outbreaks, that would be helpful to the global economy.
- Global leaders are urged to implement the contents of the International Health Regulations in the letter to ensure significant improvements in their respective public health structures and capacities and to enhance their preparedness for and responsiveness to emergency health situations occasioned by COVID-19. Undoubtedly, the development of a country's public health structures in tandem with IHR specifications would ensure efficiency and effectiveness and ensure structure-development capacities based on international standards. This would ensure the medical facilities of countries against overcrowding during epidemic and pandemic outbreaks.
- Indeed, COVID-19 affected educational activities in thousands of public and private institutions at different levels (early childhood education through tertiary levels) in many economies across the globe; over one billion students were compelled to interact with their instructors through virtual classroom settings. Although the recent pandemic outbreak is perceived by many connoisseurs as a setback in education, it has created a unique opportunity for stakeholders in academia to enhance global innovativeness in teaching and learning and compelled lecturers who were only used to the traditional method of teaching and learning that is, the physical classroom settings, to be abreast of modern teaching methods and practices. Gone are the days when the physical classroom settings were seen as the only "safe haven" for efficient and effective imparts of academic and social knowledge to students. Undoubtedly, the pandemic outbreak served as a defining moment; it reminded "classical" instructors of social and technological evolution and the urgent need for them to quickly evolve to adapt so they are not left behind in the dynamic and ever-changing global learning environment.

6. References

i. Amato-Gauci, A., Zucs, P., Snacken, R., Ciancio, B. C., Lopez, V., Broberg, E., Penttinen, P., & Nicoll, A. (2011). Surveillance trends of the 2009 influenza a (H1N1) pandemic in Europe. *Infektionsepidemiologie*, *16*, 4.

ii. Andradottir, S., Chiu, W., Goldsman, D., Lee, M. L., Tsui, K. L., Sander, B., Fisman, D. N., & Nizam, A. (2011). Reactive strategies for containing developing outbreaks of pandemic influenza. *BMC Public Health, 11(Suppl. 1),* S1.

iii. Andreadis, T. G. (2012). The contribution of Culex pipiens complex mosquitoes to transmission and persistence of West Nile virus in North America. *J. Am. Mosq. Control. Assoc.*, *28*, 137–152.

iv. Ashley, E. M., Takyi, H., & Obeng, B. (2016). *Research Methods: Quantitative and Qualitative Approaches to Scientific Inquiry.* Accra: The Advent Press.

v. Associated Press. (2020). EU condemns Trump's travel ban from Europe as virus spreads. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

vi. Babbie, E. (1990). *Survey Research Methods* (2nd ed.). Belmont, CA: Wadsworth.

vii. BBC. (2020a). Brazil coronavirus protesters urge 'Bolsonaro out.' Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

viii. BBC. (2020b). Canadian PM Trudeau's wife tests positive for coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

ix. BBC. (2020c). Coronavirus: English local elections postponed for a year. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

x. BBC. (2020d). Coronavirus: Health Minister Nadine Dorries tests positive. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xi. BBC. (2020e). France's Macron defies coronavirus lockdown with elections. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xii. BBC. (2020f). Prince Charles tests positive for coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xiii. Baize, S., Pannetier, D., Oestereich, L., Rieger, T., Koivogui, L., Magassouba, N. & et al. (2014). Emergence of Zaire Ebola virus disease in Guinea. *N Engl J Med., 10.1056/NEJMoa1404505.* PMID:24738640
xiv. Bakhshi, H., Mousson, L., Vazeille, M., Zakeri, S., Raz, A., de Lamballerie, X., Dinparast-Djadid, N., & Failloux, A-B. (2020). High transmission potential of West Nile virus lineage 1 for cx. pipiens s.l. of Iran. *MDPI, 12(397),* 1–9.
xv. Beauchamp, T. L., & Bowie, N. E. (Eds.). (1988). *Ethical Theory and Business*. Englewood-Cliffs: Prentice-Hall.
xvi. Bloomberg Intelligence. (2020). What Bloomberg Intelligence says. Retrieved from: https://www.aljazeera.com/ajimpact/coronavirus-drags-iphone-shipments-china-60-percent-200310021741767.html
xvii. Bloomberg News. (2020). Coronavirus drags iphone shipments to China down 60 percent. Retrieved from: https://www.aljazeera.com/ajimpact/coronavirus-drags-iphone-shipments-china-60-percent-200310021741767.html
xviii. Blumer, H. (1969). *Symbolic Interactionism: Perspective and Method.* Berkeley, CA, USA: University of California Press.
xix. Borse, R. H., Behravesh, C. B., Dumanovsky, T., Zucker, J. R., Swerdlow, D., Edelson, P., Choe-Castillo, J., & Meltzer, M. I. (2009). Closing schools in response to the 2009 pandemic influenza a H1N1 virus in New York City: Economic impact on households. Clin. Infect. Dis., 52 (suppl. 1), S168-S172
xx. Boseley, S. (2020). WHO warns of global shortage of face masks and protective suits. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxi. Bostock, B. (2020). China sacked a brace of top officials in Hubei province, likely in a move to protect Xi Jinping from people's anger over the coronavirus outbreak. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxii. Bowerman, B. L., & O'Connell, R.T. (1990). *Linear Statistical Models: An Applied Approach (2nd ed.).* Belmont, CA: Duxbury.
xxiii. Breman, J. G., & Johnson, K. M. (2014). Ebola then and now. *N Engl J Med.,* 10.1056/NEJMp1410540 PMID:25207624
xxiv. Burke, C. (2020). TD Thomas Pringle in isolation after potentially coming into contact with coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxv. Business & Financial Times. (2020). Africa to suffer US$270bn loss from Covid-19-AU report. Retrieved from: https://thebftonline.com/2020/editors-pick/africa-to-suffer-us270bn-loss-from-covid-19-au-report/
xxvi. Bwaka, M. A., Bonnet, M. J., Calain, P. (1999). Ebola hemorrhagic fever in Kikwit, Democratic Republic of Congo: Clinical observations in 103 patients. *J Infect Dis. 179 (Suppl 1),* S1-7. PMID:9988155
xxvii. Canadian Institute for Health Information (CIHI). (2010). *The Impact of the H1N1 Pandemic on Canadian Hospitals*. CIHI: Ottawa, ON, Canada
xxviii. Centres for Disease Control and Prevention. (n.d.). Coronavirus: Know how it spreads. Retrieved from: https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html
xxix. Centres for Disease Control and Prevention (CDC). (2010). Interim results: State-specific influenza a (H1N1) 2009 monovalent vaccination coverage – United States, October 2009-January 2010. *Morb. Mortal. Wkl. Rep., 58,* 363–368.
xxx. Chancey, C., Grinev, A., Volkova, E., Rios, M. (2015). The global ecology and epidemiology of West Nile virus. *Biomed. Res. Int.*, *2015*, 376230.
xxxi. Channel News Asia. (2020). Hong Kong protesters torch planned Wuhan virus quarantine building. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxxii. Checchi, F., Waldman, R. J., Roberts, L. F., Ager, A,, Asgary, R., Benner, M. T., et al. (2016). World Health Organization and emergency health: If not now, when? *BMJ., 01(28),* 352:i469. PMID: 26821569.
xxxiii. Cheng, K. F., & Leung, P. C. (2007). What happened in China during the 1918 influenza pandemic? *Int. J. Infect. Dis., 11,* 360–364.
xxxiv. Citinewsroom.com. (2020). Coronavirus: Lifting lockdowns could see virus 'reignite,' WHO warns. Retrieved from: https://citinewsroom.com/2020/04/coronavirus-lifting-lockdowns-could-see-virus-reignite-who-warns/
xxxv. CNN Philippines. (2020). Senator Zubiri tests positive for Covid-19. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxxvi. CP. (2020). Parliament suspends for five weeks over Covid-19 concerns. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics
xxxvii. Communications Bureau at the Presidency. (2020). Address to the Nation by President Akufo-Addo on updates to Ghana's enhanced response to the coronavirus pandemic. Retrieved from: http://presidency.gov.gh/index.php/briefing-room/speeches/1555-address-to-the-nation-by-president-akufo-addo-on-updates-to-ghana-s-enhanced-response-to-the-coronavirus-pandemic

xxxviii. Conley, A. K., Fuller, D. O., Haddad, N., Hassan, A. N., Gad, A. M., Beier, J. C. (2014). Modeling the distribution of the West Nile and Rift Valley Fever vector Culex pipiens in arid and semi-arid regions of the Middle East and North Africa. *Parasites Vectors*, *7*, 289.

xxxix. Cooperative. (2020). Acuerdo politico por elecciones del 2020: Plebiscito se postergará para el 25 de octubre. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xl. Courier-Journal. (2020). Beshear rips into Senate budget proposal as Kentucky lawmakers hit pause on session. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xli. Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (3rd ed.).* Thousand Oaks, CA: Sage Publications.

xlii. Cunningham, E. (2020). Coronavirus pummels Iran leadership as data show spread is far worse than reported. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xliii. Dahir, A. (2020). Analysis-Covid-19 could mean crippling economic losses for Africa. Retrieved from: https://www.aa.com.tr/en/analysis/analysis-covid-19-could-mean-crippling-economic-losses-for-africa/1804287

xliv. Dawson, P., Malik, M. R., Parvez, F., & Morse, S. S. (2019). What have we learned about Middle East respiratory syndrome coronavirus emergence in humans? *A systematic literature review. Vector-Borne and Zoonotic Diseases, 19(3),* 174–192.

xlv. Diaz, I. (2020). Could the coronavirus topple Jair Bolsonaro? Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xlvi. DW.com. (2020). China's Coronavirus epidemic threatens the global economy. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xlvii. Earn, D. J., He, D., Loeb, M. B., Fonseca, K., Lee, B. E., Dushoff, J. (2012). Effects of school closure on incidence of pandemic influenza in Alberta, Canada. *Ann. Intern. Med., 156,* 173–175.

xlviii. Economic Commission for Africa. (2020). ECA estimates billions worth of losses in Africa due to COVID-19 impact. Retrieved from: https://www.un.org/africarenewal/news/coronavirus/eca-estimates-billions-worth-losses-africa-due-covid-19-impact

xlix. Eggleton, A., Ogilvie, K. K. (2010). *Canada's Response to the 2009 H1N1 Influenza Pandemic*. Standing Senate Committee on Social Affairs, Science and Technology, Ed., Senate of Canada: Ottawa, ON, Canada.

l. El Pais. (2020a). Gestão de Bolsonaro do coronavirus é reprovada por 64%, e 45% se dizem a favour de impeachment. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

li. El Pais. (2020b). More Spanish politicians confirm they have been infected with the coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lii. Elsevier. (2020). Novel coronavirus information center. Retrieved from: https://www.elsevier.com/connect/coronavirus-information-center

liii. European Commission. (2020). Applications welcome from start-ups and SMEs with innovative solutions to tackle coronavirus outbreak. Retrieved from: https://ec.europa.eu/info/news/startups-and-smes-innovative-solutions-welcome-2020-mar-13_en

liv. Farrar, J. J., & Piot, P. (2014). The Ebola emergency - Immediate action, ongoing strategy. *N Engl J Med., 10.1056/NEJMe1411471* PMID:25244185

lv. Fauci, A. S. (2014). Ebola–underscoring the global disparities in health care resources. *N Engl J Med., 371(12),* 1084–6. PMID:25119491

lvi. Feldmann, H., Geisbert, T. W. (2011). Ebola haemorrhagic fever. *Lancet, 377(9768),* 849–62. PMID: 21084112.

lvii. Ferguson, N. M., Cummings, D. A., Fraser, C., Cajka, J. C., Cooley, P. C., Burke, D. S. (2006). Strategies for mitigating an influenza pandemic. *Nature*, *442*, 448–452.

lviii. Field, A. (2009). *Discovering Statistics Using SPSS (3rd ed.).* London: Sage.

lix. Financial Times. (2020). Italy wonders where Europe's solidarity is as coronavirus strains show. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lx. Foreign Policy. (2020a). Japan and Korea won't let a pandemic stop them from fighting. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lxi. Foreign Policy. (2020b). South Korea's President tried to help China contain the coronavirus. Now, people want him impeached. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lxii. Frankfort-Nacmias, C. & Nachmias, D. (2008). *Research Methods in the Social Sciences (7th ed.)*. USA: Worth Publishers.

lxiii. Frieden, T. R. (2015). Shattuck lecture: The future of public health. *N Engl J Med. 373(18),* 1748–54. PMID:26510022

lxiv. Frieden, T. R., Damon, I., Bell, B. P., Kenyon, T., & Nichol, S. (2014). New challenges, new global response and responsibility. *N Engl. J. Med., 371(13),* 1177–1180.

lxv. Garfors, G. (2016). 100,000 flights a day. Retrieved from: http//www.garfors.com/2014/06/100000-flights-day

lxvi. Gates, B. (2020). Responding to Covid-19 – A once-in-a-century pandemic? *The New England Journal of Medicine,* 1–3.

lxvii. Ghana Health Service. (2020). Situation update: COVID-19 outbreak in Ghana as of 19 April 2020. Retrieved from: https://ghanahealthservice.org/covid19/archive.php

lxviii. Ghanaweb.com. (2020a). IMF predicts negative global growth in 2020. Retrieved from: https://www.ghanaweb.com/GhanaHomePage/business/IMF-predicts-negative-global-growth-in-2020-902548

lxix. Ghanaweb.com. (2020b). Papa Owusu Ankomah on ventilator after testing positive for coronavirus. Retrieved from: https://mobile.ghanaweb.com/GhanaHomePage/NewsArchive/Papa-Owusu-Ankamah-on-ventilator-after-testing-positive-for-coronavirus-921010?_e_pi_=7%2CPAGE_ID10%2C6631064090.

lxx. Ghanaweb.com. (2020c). Time magazine lauds role of Ghana's drones in Coronavirus fight; tips the US to follow Ghana's lead. Retrieved from: https://mobile.ghanaweb.com.

lxxi. Ghanaweb.com. (2020d). We can battle COVID-19 with US$100 million funding – GHS. Retrieved from: https://www.ghanaweb.com/GhanaHomePage/NewsArchive/We-can-battle-COVID-19-with-US-100-million-funding-GHS-894277

lxxii. Girard, M. P., Tam, J. S.; Assossou, O. M.; Kieny, M. P. (2010). The 2009 a (H1N1) influenza virus pandmeic: A review. *Vaccine*, *31*, 4895–4902.

lxxiii. Gomes, M. F. C., P.y. P. A., Rossi, L., Chao, D., Longini, I., Halloran, M. E., Vespignani, A. (2014). Assessing the international spreading risk associated with the 2014 West African Ebola Outbreak. *PLOS Currents Outbreaks, 1*.

lxxiv. Gostin, L. O., Friedman, E. A. (2015). A retrospective and prospective analysis of the West African Ebola virus disease epidemic: Robust national health systems at the foundation and an empowered WHO at the apex. *Lancet, 385(9980),* 1902–9. PMID:25987158

lxxv. Grinevičius, J., & Nefas, L. (2020). 31 solutions people came up with to try to protect themselves from coronavirus. Retrieved from: https://www.boredpanda.com/creative-ways-people-protect-corona-virus/?utm_source=int.search.myway&utm_medium=referral&utm_campaign=organic

lxxvi. Gronvall, G. K., Waldhorn, R. E., & Henderson, D. A. (2006). The scientific response to a pandemic. *PLoS Pathogens, 2(2),* 0063-0065.

lxxvii. Haltiwanger, J. (2020). 8% of Iran's parliament has the coronavirus, and it released 54,000 prisoners as the country descends into chaos. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lxxviii. Haq, Z., Malik, M., & Khan, W. (2016). The H1N1 influenza pandemic of 2009 in the Eastern Mediterranean Region: Lessons learnt and future strategy. *Eastern Mediterranean Health Journal, 22(7),* 548–552.

lxxix. Harrington, R. A. (2020). Case fatality rate: Epidemiology. Retrieved from: https//www.britanica.com/science/case-fatality-rate

lxxx. Henderson, D., Courtney, B., Inglesby, T., Toner, E, & Nuzzo, J. (2009). Public health and medical responses to the 1957–1958 influenza pandemic. *Biosecur. Bioterror., 7,* 265–273.

lxxxi. Het Laatste Nieuws. (2020). Sophie Wilmès leg teed als premier. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lxxxii. Heydari, M., Metanat, M., Rouzbeh-Far, M.-A., Tabatabaei, S. M., Rakhshani, M., Sepehri-Rad, N., KeshtkarJahromi, M. (2018). Dengue Fever as an emerging infection in Southeast Iran. *Am. J. Trop. Med. Hyg.*, *98*, 1469–1471.

lxxxiii. Heymann, D. L., Chen, L., Takemi, K., Fidler, D. P., Tappero, J. W., Thomas, M. J., et al. (2015). Global health security: The wider lessons from the West African Ebola virus disease epidemic. *Lancet, 385(9980),* 1884–901. PMID:25987157

lxxxiv. Hill. (2020). Entire Georgia state legislature urged to self-quarantine after positive coronavirus test. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

lxxxv. Hine, D. (2010). *The 2009 Influenza Pandemic: An Independent Review of the UK Response to the 2009 Influenza Pandemic.* United Kingdom Cabinet Office: London, UK.

lxxxvi. IMF Communications Department. (2020). IMF director Kristalina Georgieva's statement following a G20 ministerial call on the coronavirus emergency. Retrieved from: https://www.imf.org/en/News/Articles/2020/03/23/pr2098-imf-managing-director-statement-following-a-g20-ministerial-call-on-the-coronavirus-emergency

lxxxvii. International Monetary Fund. (2019). GDP, current prices–Billions of dollars. Retrieved from: https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD

lxxxviii. Isfeld-Kiely, H., & Moghadas, S. (2014). *Effectiveness of School Closure for the Control of Influenza: A Review of Recent Evidence*. National Collaborating Centre for Infectious Disease: Winnipeg, MB, Canada.

lxxxix. ITV News. (2020). Second MP Kate Osborne diagnosed with coronavirus following self-isolation. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

xc. Jahrling, P. B., Geisbert, T. W., Dalgard, D. W., Johnson, E. D., Ksiazek, T. G., Hall, W. C., et al. (1990). Preliminary report: Isolation of Ebola virus from monkeys imported to USA. *Lancet, 335(8688),* 502-505. PMID: 1968529.

xci. Jones, B. A., Mahapatra, M., Chubwa, C., Clarke, B., Batten, C., Hicks, H., Henstock, M., Keyyu, J., Kock, R., & Parida, S. (2020). Characterisation of peste des petits ruminants' diseases in pastoralist flocks in Ngorongoro District of Northern Tanzania and bluetongue virus co-infection. *MDPI, 12(389),* 1–26.

xcii. Jones, L., Brown, D., & Palumbo, D. (2020). Coronavirus: A visual guide to the economic impact. Retrieved from: https://www.bbc.com/news/business-51706225

xciii. Kamradt-Scott, A., Harman, S., Nunes, J., Roemer-Mahler, A., Wenham, C. (2015). WHO must remain a strong global health leader post-Ebola. *Lancet, 385(9963),* 111. PMID:25706459

xciv. Kieny, M. P., Dovlo, D. (2015). Beyond Ebola: A new agenda for resilient health systems. *Lancet, 385(9963),* 91–2. PMID:25706456

xcv. Kiyong, A. N., Cook, E. A. J., Okba, N. M. A., Kivali, V., Reusken, C., Haagmans, B. L., & Fevre, E. M. (2020). Middle East respiratory syndrome coronavirus (MERS-CoV) seropositive camel handlers in Kenya. *MDPI, 12(396),* 1–6.

xcvi. Knoema.com. (2020). GDP forecast by country | statistics from IMF | 2020-2024. Retrieved from: https://knoema.com/tbocwag/gdp-forecast-by-country-statistics-from-imf-2020-2024

xcvii. Koon, C. P. (2020). After the storm: Asian stocks rebound following massive selloff. Retrieved from: https://www.aljazeera.com/ajimpact/storm-asian-stocks-rebound-massive-sell-200310075251301.html?utm_source=website&utm_medium=article_page&utm_campaign=read_more_links

xcviii. Kramer, L. D., Styer, L. M., Ebel, G. D. (2008). A global perspective on the epidemiology of West Nile virus. *Annu.Rev. Entomol. 53*, 61–81.

xcix. Laghali, G., Lawlor, K. E., & Tate, M. D. (2020). Die another way: Interplay between influenza A virus, inflammation and cell death. *MDPI, 12(401),* 1–23.

c. Le Parisien. (2020). Coronavirus: le second tour des municipals reporté. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

ci. Lee, P. (2020). Can banks withstand the impact of Covid-19? Retrieved from: https://www.euromoney.com/article/b1kxrvx42r38r6/can-banks-withstand-the-impact-of-covid-19

cii. Lee, Y. N. (2020). 6 charts show the coronavirus impact on the global economy and markets so far. Retrieved from: https://www.cnbc.com/2020/03/12/coronavirus-impact-on-global-economy-financial-markets-in-6-charts.html

ciii. Lo, C., Mertz, D., & Loeb, M. (2017). Assessing the reporting quality of influenza outbreaks in the community. *Influenza Other Respi Viruses, 11,* 556–563.

civ. Malik, M. R., & Mahjour, J. (2016). Preparedness for Ebola: Can it transform our current public health system? *Eastern Mediterranean Health Journal, 22(8),* 566–567.

cv. Malik, M. R., Mahjour, J., & Alwan, A. (2014). Preventing the introduction of Ebola virus into the Eastern Mediterranean Region: Enhanced preparedness is the key. *Eastern Mediterranean Health Journal, 20(10),* 656–660.

cvi. Martin, E., & Bloomberg. (2020). Coronavirus economic impact 'will be severe,' at least as bad as Great Recession, says IMF. Retrieved from: https://fortune.com/2020/03/23/coronavirus-economic-impact-predictions-great-recession-2020-markets-imf/

cvii. Mattyasovszky, M. (2019). The largest countries in the world – Worldatlas.com. Retrieved from: https://www.worldatlas.com.

cviii. Merler, S.; Ajelli, M.; Pugliese, A.; Ferguson, N. M. (2011). Determinants of the spatiotemporal dynamics of the 2009 H1N1 pandemic in Europe: Implications for real-time modelling. *PLoS Comput. Biol.*, *7*, e1002205.

cix. Moon, S., Sridhar, D., Pate, M. A., Jha, A. K., Clinton, C., Delaunay, S., et al. (2015). Will Ebola change the game? Ten essential reforms before the next pandemic. The report of the Harvard-LSHTM Independent Panel on the Global Response to Ebola. *Lancet, 386(10009),* 2204–21. PMID:26615326

cx. Naficy, K., Saidi, S. (1970). Serological survey on viral antibodies in Iran. *Trop. Geogr. Med.*, *22*, 183–188.

cxi. National Review. (2020). Will Iran's regime survive coronavirus? Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxii. New York Post. (2020). Rand Paul defends the decision to not self-quarantine while awaiting coronavirus test. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxiii. New World Encyclopedia. (2017). Herbert Spencer. Retrieved from: https://www.newworldencyclopedia.org/entry/Herbert_Spencer

cxiv. Newsghana.com. (2020). Egypt sets daily record with 232 new COVID-19 cases. Retrieved from: https://newsghana.com.gh/egypt-sets-daily-record-with-232-new-covid-19-cases/?_e_pi_=7%2CPAGE_ID10%2C6409945000.

cxv. Newstalk. (2020). Mary Lou McDonald cancels meetings as children attend coronavirus-hit Dublin school. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxvi. NBC. (2020). 7th case of coronavirus in NH as state house suspends legislative activities for a week. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxvii. NCSL. (2020a). Coronavirus and state legislatures in the news. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxviii. NCSL. (2020b). Legislature to temporarily adjourn due to coronavirus concerns. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxix. NPR. (2020). GOP Senators in self-quarantine will be unable to vote on Coronavirus Relief. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxx. Offer, J. (1994). *Herbert Spencer: Political Writings. Edited with an Introduction.* Cambridge: Cambridge University Press.

cxxi. Offer, J. (1999). Spencer's future of welfare: A vision eclipsed. *Sociological Review, 47,* 136-162.

cxxii. Offer, J. (2000). *Herbert Spencer: Critical Assessments. Edited in four volumes.* London; New York, NY: Routledge.

cxxiii. Offer, J. (2014). From 'natural selection' to 'survival of the fittest:' On the significance of Spencer's refashioning of Darwin in the 1860s. J. Classical Sociol, 14, 156-177.

cxxiv. Offer, J. (2019). Herbert Spencer, sociological theory, and the professions. Retrieved from: https://www.frontiersin.org/articles/10.3389/fsoc.2019.00077/full

cxxv. Orlik, T., Rush, J., Cousin, M., & Hong, J. (2020). Coronavirus could cost the global economy $2.7 trillion. Here's how. Retrieved from: https://www.bloomberg.com/graphics/2020-coronavirus-pandemic-global-economic-risk/

cxxvi. Page, S., Song, H., and Wu, D. C. (2011). Assessing the impacts of the global economic crisis and swine flu on inbound tourism demand in the United Kingdom. *J. Travel Res., 51,* 142–153.

cxxvii. Palmer, J. (2014). Chinese labour corps. *World Chin., 4,* 25-26

cxxviii. Petersen, L. R., Roehrig, J. T., Sejvar, J. J. (2007). West Nile virus in the Americas. In *New and Evolving Infections of the 21st Century*. Springer: Berlin/Heidelberg, Germany, pp. 3–56.

cxxix. Plecher, H. (2020). Countries with the largest gross domestic product (GDP) in 2019. Retrieved from: https://www.statista.com/statistics/268173/countries-with-the-largest-gross-domestic-product-gdp/

cxxx. Pilling, D. (2020). Why we should be selfish and provide Africa debt relief. The Financial Times Limited.

cxxxi. Polycom. (2011). *A Swine Flu Vaccine for Businesses: Ensuring Operational Continuity Amid a Global Pandemic.* Polycom: Pleasanton, CA, USA.

cxxxii. Politico. (2020a). China is winning the coronavirus propaganda war. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxxxiii. Politico. (2020b). Florida Republican becomes the first lawmaker to test positive for coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxxxiv. Politico. (2020c). Second member of Congress tests positive for Covid-19. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxxxv. Potter, C. (2001). A history of influenza. *J. Appl. Microbiol., 91,* 572-579.

cxxxvi. Priya, R. (n.d.). Herbert Spencer's theory of social evolution (Explained with diagram). Retrieved from: http://www.yourarticlelibrary.com/sociology/herbert-spencers-theory-of-social-evolution-explained-with-diagram/43739

cxxxvii. Rappler. (2020). Pimentel tests positive for coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxxxviii. Reuters. (2020). U.S. sanctions' severely hamper' Iran coronavirus fight, Rouhani says. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxxxix. Reynolds, M. (2020). What is coronavirus and how close is it to becoming a pandemic? Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxl. Reynolds, M., & Weiss, S. (2020a). How coronavirus started and what happens next, explained. Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxli. Reynolds, M., & Weiss, S. (2020b). How did covid-19 start? Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxlii. Reynolds, M., & Weiss, S. (2020c). What exactly is covid-19? Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxliii. Reynolds, M., & Weiss, S. (2020d). What's going to happen next? Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxliv. Reynolds, M., & Weiss, S. (2020e). What's happening with a vaccine? Retrieved from: https://www.wired.co.uk/article/china-coronavirus

cxlv. Reuters News Agency. (2020). Recovery stalled: Shares fall as US virus measures disappoint. Retrieved from: https://www.aljazeera.com/ajimpact/recovery-stalled-shares-fall-virus-measures-disappoint-200311024655420.html

cxlvi. Rizzoli, A., Jimenez-Clavero, M., Barzon, L., Cordioli, P., Figuerola, J., Koraka, P., Martina, B., Moreno, A., Nowotny, N., Pardigon, N. (2015). The challenge of West Nile virus in Europe: Knowledge gaps and research priorities. *Euro. Surveill.*, *20*, 21135.

cxlvii. Roll Call. (2020). States expecting big revenue hit as COVID-19 slows the economy. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

cxlviii. Rosella, L. C., Wilson, K., Crowcroft, N. S., Chu, A., Upshur, R., Willison, D., Deeks, S. L., Schwartz, B., Tustin, J., Sider, D., et al. (2013). Pandemic H1N1 in Canada and the use of evidence in developing public health policies–a policy analysis. *Soc. Sci. Med.*, *83*, 1–9.

cxlix. Saidi, S., Tesh, R., Javadian, E., Nadim, A. (1976). The prevalence of human infection with West Nile virus in Iran. *Iran. J. Public Health*, *5*, 8–13.

cl. Samanlioglu, F., & Bilge, A. H. (2016). An overview of the 2009 a (H1N1) pandemic in Europe: Efficiency of the vaccination and healthcare strategies. *J. Healthc. Eng.*

cli. Saunders-Hastings, P. R., & Krewski, D. (2016). *Reviewing the history of pandemic influenza: Understanding patterns of emergence and transmission*. *MDPI*, Basel, Switzerland.

cliii. Seto, W. H., Conly, J. M., Pessoa-Silva, C. L., Malik, M., & Eremin, S. (2013). Infection prevention and control measures for acute respiratory infections in healthcare settings: An update. *Eastern Mediterranean Health Journal, 19(Suppl. 1), S39–S47*.

cliii. Shaban, A. R. A. (2020a). Africa's top coronavirus deaths: Nigeria's chief of staff, Guinea poll chief. Retrieved from:https://www.africanews.com/2020/04/18/africa-s-prominent-coronavirus-deaths/?_e_pi_=7%2CPAGE_ID10%2C2332233221

cliv. Shaban, A. R. A. (2020b). Coronavirus in Africa: Cases pass 4,200; 134 deaths, 302 recoveries. Retrieved from: https://www.africanews.com/2020/03/29/coronavirus-in-africa-breakdown-of-infected-virus-free-countries/

clv. Shaban, A. R. A. (2020c). Coronavirus in Africa: Close to 8,000 cases, 334 deaths, 702 recoveries. Retrieved from: https://www.africanews.com/2020/04/04/coronavirus-in-africa-breakdown-of-infected-virus-free-countries/

clvi. Silver, C. (2020). The top 20 economies in the world. Retrieved from: https://www.investopedia.com/insights/worlds-top-economies/

clvii. Sirawan, A., Berry, A., Badra, R., El Bazzal, B., Dabaja, M., Kataya, H., Kandeil, A., Gomaa, M. R., Ali, M., & and Kayali, G. (2020). Avian influenza surveillance at the human-animal interface in Lebanon, 2017. *Eastern Mediterranean Health Journal,* 1–10.

clviii. Smith, R. D., Keogh-Brown, M. R., Barnett, T., & Tait, J. (2009). The economy-wide impact of pandemic influenza on the UK: A computable general equilibrium modelling experiment. *BMJ*, *339*, b4571.

clix. Smithburn, K., Hughes, T., Burke, A., Paul, J. (1940). A neurotropic virus isolated from the blood of a native of Uganda1. *Am. J. Trop. Med. Hyg.*, *1*, 471–492.

clx. Thabet, A. A. K., Al-Kohani, A., Shadoul, A., Al-Mahaqri, A., bin Yahya, M., Saleh, A. H., Al-Adeemy, D., Khan, W., & Malik, M. (2016). Characteristics of severe acute respiratory infection-associated hospitalisation in Yemen, 2014/15. *Eastern Mediterranean Health Journal, 22(7),* 440–444.

clxi. The Boston Globe. (2020a). America's botched response to the coronavirus is a problem bigger than Donald Trump. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxii. The Boston Globe. (2020b). Local governments take the lead, collaborate, and improvise to manage crises. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxiii. The Guardian. (2020a). Bolsonaro's son enrages Beijing by blaming China for coronavirus crisis. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxiv. The Guardian. (2020b). Coronavirus quarantine plans ignite row between South Korea and Japan. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxv. The Guardian. (2020c). Italy criticises EU for being slow to help over coronavirus epidemic. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxvi. The Guardian. (2020d). Leader of Italian Democratic Party has coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxvii. The Straits Times. (2020). Coronavirus: China showers Europe with virus aid while sparring with Trump. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxviii. The World Bank. (2020a). COVID-19 (Coronavirus) drives Sub-Saharan Africa toward first recession in 25 years. Retrieved from: https://www.worldbank.org/en/news/press-release/2020/04/09/covid-19-coronavirus-drives-sub-saharan-africa-toward-first-recession-in-25-years

clxix. The World Bank. (2020b). GDP (current US$). Retrieved from: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

clxx. Tradingeconomics.com. (2020). GDP of G-20 countries. Retrieved from: https://tradingeconomics.com/forecast/gdp?continent=g20

clxxi. UNCTAD. (2020). Global trade impact of the coronavirus (COVID-19) epidemic. *UNCTAD/DITC/INF/2020/1*.

clxxii. USA Today. (2020). Australian politician who met Ivanka Trump, Attorney General William

clxxiii. Barr infected with coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxxiv. Verity, A. (2020). Coronavirus: Trump seals emergency virus deal worth trillions. Retrieved from: https://www.bbc.com/news/business-52030034

clxxv. Waring, J. (1971). *A History of Medicine in South Carolina.* South Carolina Medical Association: Columbia, SC, USA.

clxxvi. Wilson, A. (2020). Hun Sen is more worried about Beijing than the coronavirus. Retrieved from: https://en.wikipedia.org/wiki/Impact_of_the_2019%E2%80%9320_coronavirus_pandemic_on_politics

clxxvii. World Economic Forum. (2020a). Facts and fiction-myths about COVID-19. Retrieved from: https://www.weforum.org/agenda/2020/02/coronavirus-myths-facts-questions-world-health-organization

clxxviii. World Economic Forum. (2020b). The IMF explains the economic lessons from China's fight against coronavirus. Retrieved from: https://www.weforum.org/agenda/2020/03/imf-economic-lessons-from-china-fight-against-coronavirus/

clxxix. World Economic Forum. (2020c). This is the reason why the spread of coronavirus is so rapid. Retrieved from: https://www.weforum.org/agenda/2020/03/it-s-not-just-people-with-symptoms-who-can-spread-covid-19/
clxxx. World Economic Forum. (2020d). This is what our Google searches can teach us about the economic impact of coronavirus. Retrieved from: https://www.weforum.org/agenda/2020/03/coronavirus-perceptions-of-mortality-and-contagion-raise-economic-anxiety/
clxxxi. World Health Organisation (WHO). (2016). Situation report of Ebola. Retrieved from: http://apps.who.int/ebola/current-situation/ebola-situation-report-16-march-2016
clxxxii. Worldometers.info. (2020a). Brazil Population (2020) – Worldometer. Retrieved from: https://www.worldometers.info.
clxxxiii. Worldometers.info. (2020b). Confirmed cases and deaths by country, territory, or conveyance. Retrieved from: https://www.worldometers.info/coronavirus/#countries
clxxxiv. Worldometers.info. (2020c). Confirmed cases and deaths by country, territory, or conveyance. Retrieved from: https://www.worldometers.info/coronavirus/
clxxxv. Worldometers.info. (2020d). Confirmed cases and deaths by country, territory, or conveyance. Retrieved from: https://www.worldometers.info/coronavirus/#countries
clxxxvi. Worldometers.info. (2020e). Confirmed cases and deaths by country, territory, or conveyance. Retrieved from: https://www.worldometers.info/coronavirus/#countries
clxxxvii. Wordometers.info. (2020f). 2019 global GDP. Retrieved from: https://www.worldometers.info/gdp/
clxxxviii. Ziyaeyan, M., Behzadi, M. A.; Leyva-Grado, V. H., Azizi, K., Pouladfar, G., Dorzaban, H., Ziyaeyan, A., Salek, S., Hashemi, A. J., & Jamalidoust, M. (2018). Widespread circulation of West Nile virus, but not Zika virus, in Southern Iran. *PLoS Negl. Trop. Dis. 12*, e0007022.
clxxxix. Zou, S., Foster, G. A., Dodd, R. Y., Petersen, L. R., Stramer, S. L. (2010). West Nile fever characteristics among viremic persons identified through blood donor screening. *J. Infect. Dis.*, *202*, 1354–1361.