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ASSESSMENT OF THE IMPACT OF COVID-19 ON SELECTED HEALTH AND ECONOMIC INDICATORS IN GHANA

BY

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DECLARATION

I BENJAMIN NORVINYO hereby declare that this dissertation is the result of my original work and portions of studies from other researchers used in this study, have been referenced. To the best of my knowledge, the dissertation does not contain any information that has already been shared by another person or information that has already been used to award another degree from the university.

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DEDICATION

I dedicate this work to God Almighty, my late Father, Mr. Stephen Nonvignon and my mother, Sefora Asogba.

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I am grateful to God Almighty for the wisdom and strength granted me. I thank my supervisor, Dr. Genevieve C. Aryeetey as well as Prof. Duah Dwomoh for their inputs throughout my thesis.

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LIST OF ABBREVIATION

DHIMS	District Health Information Management System
COVID-19	Coronavirus 19
GDP	Gross Domestic Product
ITSA	Interrupted Time Series Analysis
MOH	Ministry of Health
OPD	Outpatient Department
WHO	World Health Organization

ABSTRACT

Introduction: The COVID-19 pandemic brought challenging situations to many countries. The effect, nevertheless, might be more extreme for poorer countries who are in distress need and whose circumstances might get worse if ignored. While the COVID-19 pandemic affects many aspects of everyday life and society, this paper focuses on how the outbreak has affected some economic and health indicators in Ghana.

Methods: This study analyzed secondary data from various sources including the Bank of Ghana,- the main source of data for the Economic indicators and the District Health Information Management Solutions (DHIMs)-main source of data for the health indicators. The interrupted time series design was used to model the effect of the pandemic on selected indicators using two years before the pandemic as the baseline and two years post-pandemic as the endline. The estimation procedure for this study was Quantile and Negative Binomial regression.

Results: COVID-19 does not have any significant effect on GDP growth (P-value>0.05 CI: [-0.41, 1.87]) and Government revenue (P-value<0.05, 95% CI: [-0.39, -0.20]). There was a 0.73 percentage point increase and 0.03 percentage point reduction in GDP growth and Government revenue respectively. Exchange rate appeared to have appreciated by 0.06 percentage point post trend (P-value<0.05, 95% CI [0.03, 0.10]).

A 1.02 significant percentage point of post trend increase was recorded in depression (IR 1.02, 95% CI: [1.01, 1.03, p<0.05) and a 0.92 percentage point immediate reduction in OPD attendance was recorded (IR 0.92, 95% CI: [0.84, 1.00], p-value <0.05). Hypertension incidence appeared to have had a significant increase of 1.09 percentage point immediate after COVID-19 (IR 1.09, 95% CI [1.09, 1.18], p<0.05)

Conclusion - COVID-19 did not have any significant effect on GDP growth of the economy. Government revenue was significantly reduced because of COVID-19. The incidence of depression, OPD attendance and hypertension all increased positively due to the incidence of COVID-19. This increase was significant immediately after the impact of COVID-19. Therefore, the governments must make stopping this disease and preserving lives their top priority. Health system needs to be well structured in making it more resilient for future occurrence by investing in healthcare.

Keywords – Economic and health impact, Interrupted Time Series Analysis, pandemics, COVID-19, Ghana.

CHAPTER ONE

1.0 Introduction

COVID-19, like other variants of the coronavirus family, transmits from person to person via droplet dispersion, and the virus can infect a host by encountering any mucous membrane linings, including the mouth, nostrils, and eyes, according to (Klingelhöfer et al., 2022). This can occur directly because of respiratory particles present in the atmosphere when an infected individual sneezes, coughs or speaks. Contact with a contaminated surface preceded by contact with a mucosal surface is another transmission mode.

The disease's intensity can vary from asymptomatic to extreme. The most reported symptoms include cough and fever, which continues to acute respiratory distress syndrome (ARDS), severe pneumonia, and, ultimately, respiratory distress, which is the most stated cause of death(Calligaro et al., 2020).

The number of individuals affected, and deaths worldwide rose at such a rapid pace that the pandemic's epicentre is rapidly moving. To save lives and control the ongoing global health crisis, WHO has urged nations to trace, treat, and reduce transmission of the pandemic. The health issue is becoming more of an economic shock that has resulted from it have hurt the world economy more than any other post-war epidemic. The new coronavirus COVID-19 has a significant effect on both business and society. Not only is it causing human pain around the world, but it is also causing economic suffering. Numerous public health interventions, including social segregation, have been enacted in nations around the world because of COVID-19's explosive expansion (Fong et al., 2020). Many companies, institutions and communities hall have had to close their doors because of social exclusion. Mass meetings have also been outlawed, and several nations have instituted lockdown protocols, limiting movement to only that which is needed. The motive is to significantly cut down the COVID-19 cases daily, limit massive rises and lessen the strain on healthcare systems (John Hopkins University, 2020a).

Globally confirmed cases as of June 23, 2022, was 548,527,758, with 6,408,192 deaths as compared to SARS outbreak that occurred between November 2002 and July 2003 which killed 774 people and infected 8,098 (Woodward, 2020). Nevertheless, as of 23 June 2022, 526,115,650 individuals have recovered, making the global fatality rate for COVID-19 1.19 percent. Even though the virus has so far infected 200 nations and territories, it seems to be most prevalent in China, the United States, and Europe.

Africa had generally seen less infections. After Egypt announced the first occurrence on the continent in February 2020, there had been a surge in infections to over 12 million, 255 thousand fatalities, and 9.9 million recoveries by June 2oth, 2022 (Haileamlak, 2020).

The incidence has also reached Ghana, making it one of the five African countries with the greatest number of coronavirus infections ever reported, along with South Africa, Egypt, Nigeria, and Morocco (Laar et al., 2021) . Ghana reported its first COVID-19 virus case on March 12, 2020. Two tourists from the European nations of Turkey and Norway transported the infections into the country.

In militating against the deteriorating public health conditions resulting from the coronavirus pandemic, the Ghanaian government developed the COVID-19 strategic plan, implemented policy measures such as enforcing strict immigration policies that limits the number of travelers entering the country, quarantine, testing, partial lockdown of specific areas as hot spots centers (Greater Accra and Kumasi), mobilizing revenue through external loans from the World Bank (WB), and internal resource mobilization by reprioritizing budgetary allocation to health, setting up the

COVID-19 National Trust Fund (CNTF), building disease and infectious canters, scaling up the number of testing canters to 16 (12 public and 4 private), purchasing PPEs and vaccines, 50% allowance and insurance package for frontline health workers (Nonvignon & Tabiri, 2022).

1.1 Problem Statement

The COVID-19 infection has had an impact on the world economy and created a public health emergency. Globally, significant economic effect has decreased productivity, fatalities, and trade disruption. Because of the widespread concern that the COVID-19 pandemic has sparked around the world, numerous studies both internationally and locally on the issue have been conducted in the short time that the pandemic has been active. Some examined the impact of the pandemic on the economic growth. (Barro et al., 2020) for example, predicted a 6% reduction in GDP growth and 8% decline in real consumption in 43 countries. The World Bank estimated that the world economy experienced its worst recession since 1945 in 2020, with a 4.3% drop in global GDP in 2020 (World Bank, 2022), and a further drop by 4% in 2021. Another research conducted in Asia by (Lim et al., (2020) indicates that, depression, a health problem increased by 23.5 percent during the COVID-19 pandemic.

Some studies for example in the Ghanaian context focus on the challenges and prospects of the Ghanaian economy (Aduhene & Osei-Assibey, 2021). Another study according Fenny 2021 on the impact of the COVID-19 on the health sector for example reveals that health-care spending as a percentage of GDP could rise from 4.2% in 2019 to 10.3% in 2021. Health spending per capita is expected to rise by about 24% in 2020 and 26% in 2021(Fenny & Otieku, 2020). Majority of these studies are reviews and have not virtually undertaken any empirical investigation or proper examination with data to understand the impact. Besides, the studies were conducted in a short period and the impact of the pandemic is still ongoing. The impact of COVID-19 on Ghana's Economic and Health sector cannot be underestimated and therefore the need for this study to assessed the impact of COVID-19 on selected Economic and Health indicators and contributes to the recent literature.

1.2 General objectives

To assess the impact of the coronavirus pandemic (COVID-19) on selected economic and health indicators in Ghana.

1.3 Specific objectives

1. To determine the impact of COVID-19 on selected economic indicators
2. To determine the impact of COVID-19 on selected health indicators

1.4 Research Question

i. What is the impact of COVID-19 on health and economic indicators in Ghana?

ii. What is the impact of COVID-19 on health?

iii. What is the impact of COVID-19 on the economy?

1.5 Justification of the Study

Research on the COVID-19 effects on industrialized nations has increased, but it has paid less attention to developing nations, which are still dealing with the virus's harmful effects. A study by Aduhene and Osei-Assibey (2021) (Aduhene & Osei-Assibey, 2021) , for instance, focused on the difficulties and remedies rather than the impact of COVID-19 on economic indicators such as inflation, the exchange rate, GDP. The aim of this study is to assess the impact of COVID-19 on selected health and economic indicators. This will make it simpler to understand the catastrophic effects of the initiative taken by the Ghanaian government to help prevent the spread of the virus.

1.6 Organization of the study

The first chapter concentrates on the conceptual framework, issue statement, research questions, and importance of the research. Chapter 2 covers literature pertinent to the goals of the research. The third chapter covers the study's methodology, including the design, study site, data collection method, study variables, and data management and analysis strategies. The results of the study and a brief analysis considering the research rationale are presented in the fourth chapter. The study results are discussed in relation to other authors' works in the fifth chapter of this essay. The study concludes its results and makes a few recommendations in the sixth chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 COVID-19 Pandemic overview

The corona virus is not a new phenomenon. In the past, different strains have emerged which were not regarded as harmful. For instance, Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome were the two most recent cases, which occurred in some Middle Eastern and non-Middle Eastern countries in 2012, and China in 2002 and 2003 respectively(Zhu et al., 2020). They were "considered to be not particularly pathogenic in humans until they circulated in the Guangdong province of China in 2002 and 2003 during the severe acute respiratory syndrome (SARS) outbreak," causing "mild infections in immunocompromised people" (Zhu et al., 2020).

After the discovery of COVID-19 in China in 2019, the virus has spread to over 155 countries, causing severe morbidity and mortality. (Wu et al., 2020). The findings indicate that 947,123 of the infections are from Africa, 60,752,474 are from Southeast Asia, 188,351,540 are from America, 123,385,710 from Europe and 111,667,559 from Western Pacific, among others. As of 25th January 2023, the world had witnessed six hundred and sixty-four million, eight hundred and seventy-three thousand, and twenty-three (664,873,023) cases of COVID-19 with 6,724,248 fatalities (Worldometer, 2023).

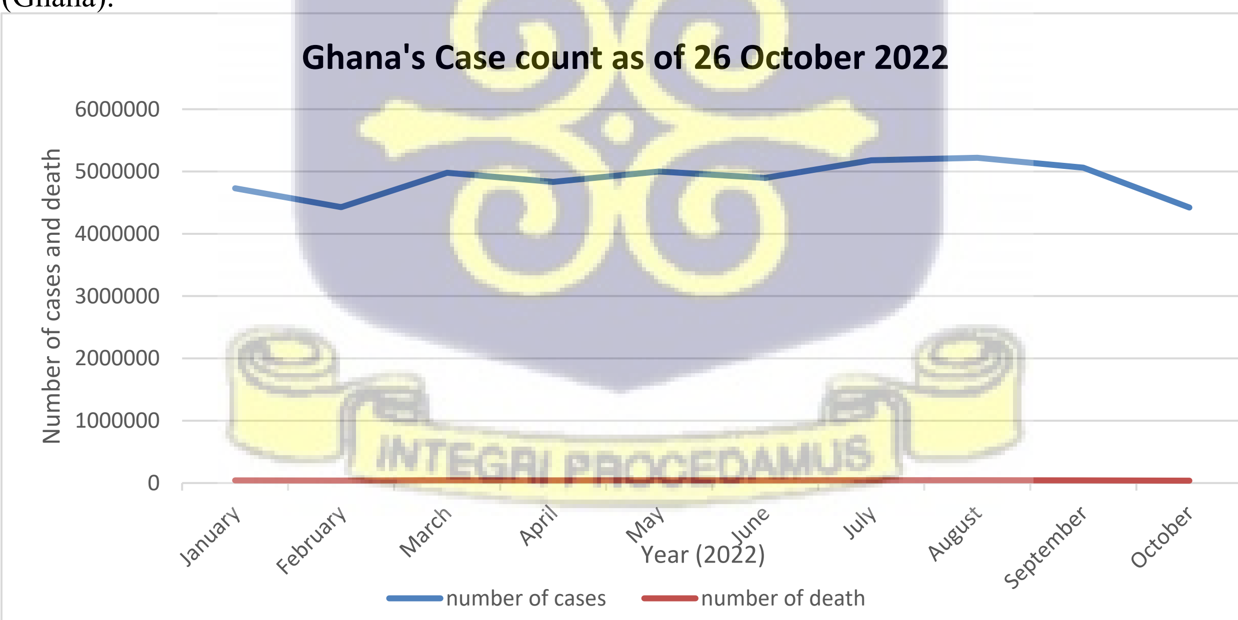
The top 10 nations in terms of infections and fatalities are listed in Table 2. With many infected and fatal cases at first, China was the epicentre; nevertheless, this quickly spread to Europe, with Italy becoming the second epicentre. With 88,686,311 confirmed cases and 1,043,213 fatalities as of March 30, 2020, the US is at the top of the list and is the most recent epicentre of the diseases.

Cumulative Cases, **Table 1**: Top 10 Nations (as of 23 June 2022)

Rank	Nations	Infections (Cumulative)	Country	Fatalities (Cumulative
1	United state	88,686,311	US	1,043,213
2	India	43,868,476	Brazil	676,826
3	Brazil	33,555,526	India	525,997
4	France	33,413,698	Russia	382,118
5	Germany	30,331,131	France	151,350
6	UK	33,212,565	UK	182,727
7	Italy	20,539,016	Italy	170,682
8	South Korea	19,146,180	Germany	143,177
9	Russia	18,524,732	Turkey	99,184
10	Turkey	15,524,071	S. Korea	24,855

Source: Data from the Coronavirus Resource Center, Worldometers

Figure 2 below shows a diagrammatic representation of the total cases and fatalities in 2022 (Ghana).



Source: Data from Our World in Data as of 26th October 2022.

Since the first two occurrences, Ghana's total case count has increased and as of October 26th, 2022, it totals 170573. (View Figure 1.) The GHS sample backlogs were compiled, and on January 9, 2022, Ghana had the newest cases, at 1507. Unfortunately, from March 21st, when Ghana reported its first fatality, and October 26th, 2022, 1460 persons died from the virus (GHS 2020)

2.2 COVID-19 Global Measures

According to (Ward et al., (2016) policy responses, are complex and contextualized. They are propelled by forces that have impact on the economy, health, and environment. (Torjman & Caledon Institute of Social Policy., 2005). He continues by citing the 2003 SARS epidemic in Toronto as an illustration of how the crisis led to the implementation of new regulations and measures that would not have been made otherwise. To lessen the detrimental effects of health policies on the economy and to maintain and advance public welfare, governments globally quickly put in place a few measures. Measures for monetary, and fiscal policy are included (Gourinchas, 2020). The measures are directed at households, businesses, health systems, and/or banks, and their breadth and scope vary by county. (Weder di Mauro, 2020).

Due to the worldwide epidemic, testing policies have been introduced in practically all nations. The country's capacity for testing, nevertheless, has had a significant impact on the policy decision. WHO (2020) suggested that nations should adopt a mass testing strategy and quarantined protocols. However, many nations, notably in Africa, depended significantly on targeted testing, in which those presenting symptoms were the focus of the testing, due to the cost and availability of the tests.

(Cheng et al., 2020) assemble the "CoronaNet-COVID-19 Government Response Database," which incorporates declarations of policy made by countries worldwide from December 31, 2019. The dataset shows how various policy measures differ. Most countries have adopted "external border control" as a response to COVID-19, which aims to restrict access to ports of entry. The researchers found that 186 countries have implemented exterior border controls. Similar to that, 153 nations use "school closures" as their second-most common policy measure. However, "obtaining or securing health resources" tops the list of policies that have been implemented the most frequently. This includes supplies (like face masks), people (like doctors and nurses), and infrastructure (e.g., hospital).

Several African nations have also unveiled stimulus plans to fight the virus. For instance, in April the South African government unveiled an R500 billion ($26.3 billion) economic and social stimulus plan. Similarly, Namibia initiated an economic stimulus package on April 1, 2020, with a total cost of 8 billion Namibian dollars (about $482 million USD) (IMF, 2020).

2.3 Overview of Ghana's Economic and Health Systems

Ghana, a democratic nation on Africa's west coast, has a population of around 32.83 million people as of 2021. In 1957, Ghana became the first nation in sub-Saharan Africa to renounce British colonial sovereignty. Ghana's annual average growth was 5.2 percent between 1984 and 2010. Ghana attained lower middle-income status after its national accounts were rebased in 2010 (Paul et al., 2013).

With a total GDP of $289.62 billion in 2022 and a per capita GNP of $78.66 billion, the country's economy is rated 85th in the world (World Bank, 2022). Ghana's economy is the second largest in the ECOWAS subregion, after Nigeria, accounting for 10.3 percent of the subregion's total GDP.

Ministry of Health is at the Center of Ghana's health system. The Ministry's principal responsibility is policy development, integration, and oversight of all stakeholders in the health system. A study by (Aseweh Abor et al., 2008) indicated that the Ministry of Health is organized in a hierarchical manner, with the regions, districts, and sub-districts all connected to the central offices in Accra. Healthcare delivery systems is divided into four types: traditional, private for-profit, public (primarily provided by the Ghana Health Service and the Christian Health Association of Ghana) and private not-for-profit.

2.4 Ghana's COVID-19 Measures

After the first infections of the coronavirus were announced on March 12, 2020, the Ghanaian government put various legislative measures in place to restrict its spread. A few of the actions that will be implemented include spotting and containing incidents and economic reactions, improved self-reliance, and household capacities (Agyemang-Manu, 2020). For instance, the first two patients to test positive, according to the GHS, were people who had just returned from Turkey and Norway. On March 22, 2020, the government implemented a transit embargo by blocking all land, sea, and air borders to reduce the number of subsequent positive cases from individuals returning from abroad. Following are some policy solutions employed by the Ghanaian government to combat the pandemic, with an emphasis on the health, economic, and social sectors.

2.4.1. Health

The government has implemented numerous health-related initiatives. The intention was to ensure that Ghana's coronavirus issue could be controlled by the medical community and personnel. Agyemang-Manu, Ghana's Minister of Health stated in 2020 that government initiatives in the healthcare system have included insurance packages and relief on taxes for frontline healthcare workers for three (3) months that was extended for an additional three more months, the formation of isolation facilities for mild cases, reinforced research, the development of infectious disease centers, and finally, the formation of isolation facilities for chronic conditions (Agyeman-Manu 2020).

While some policy solutions have caused controversy, others have received positive feedback from the public, healthcare professionals, and other stakeholders. The 3T strategy was adopted and successfully used to stop the virus's transmission. According to Reuters, the President said that the strict "Test and Trace" approach had helped Ghana prevent raise in cases that may have overloaded the health system when speaking at a conference about Africa's response to the COVID-19. (Ha et al., 2022)

2.4.2 Economy

In addition to resulting in significant human misery and fatalities, COVID-19 has also resulted in a significant financial impact that is burdening people, businesses, and governments. The COVID-19 outbreak caused the government to alter its priorities from routine spending on infrastructure to ad hoc financial measures intended to boost the economy (Antwi-Boasiako et al., 2021).

The government started the COVID-19 Trust Fund, which gained 45 million cedis in cash contributions from numerous institutions as well as private donors around the nation within its two months of formation. The acquired monies were utilized to buy food for the most defenseless residents of the nation. To guarantee that healthcare professionals and facilities in the nation have enough PPE to combat the coronavirus pandemic, PPEs were acquired from the COVID-19 trust fund for them. TheCOVID-19 Trust Fund according to the government had GHS 53, 911,249.87 in it as of the end of June 2020.

As soon as the first lockout began on March 30th, Ghana's central bank (BOG) lowered the fees for user-to-user transactions of mobile money for the following three months. Consumers were happy to learn that transfers of less than 100 cedis to another customer were free of charge.

2.5. Economic Impact of COVID-19

Continuous research on the economic effects of pandemics has improved our understanding of these effects directly and also reducing the uncertainty and depressing shocks that precede pandemics. The relevance of this area of economics is highlighted by the fact that research has also been utilized to prevent and prepare for other contagious diseases (Beach Karen Clay Martin Saavedra et al., 2020) demonstrated through a literature review that the health effects of the pandemic were widely spread, while the economy declined because of shock in supply. Barro, Ursa, and Weng (2020) examined 43 countries from 1901 to 1929 to estimate the macroeconomic effects of the pandemic. Their study revealed a 6% reduction in real GDP per capita.(Barro et al., 2020)

Previous research looked at the economic impact of some infectious diseases such as HINI flu and SARS. The Congressional Budget Office (2005) assessed the impact of influenza pandemic in two scenarios in the United State, mild and severe, estimating that GDP would reduce by 1.00%-4.25%. Examining the H1N1 flu in each quarter of 2010 using Computable General Equilibrium (CGE) model, the Author discovered that GDP reduced by 1.6% due to demand shocks (Lee et al., 2010). Another study evaluated the pandemic planning documents using data from 2004, separating the fatality and infection rate regarding closing schools and immunizations. They hypothesized GDP declines of 0.5%–1.0%, 3.3%–4.3%, and 6.0%–9.6% in accordance with different pandemic severity scenarios and concluded that school closings raise costs while pre-pandemic responses lessen negative effects (Keogh-Brown & Smith, 2008).

Countries on other continents such as the United States of America, 5% drop in monthly GDP growth of partial lockdown was estimated, based on several assumptions (Makridis & Hartley, 2020). According to a report from November 2021, the actual impact of the COVID-19 pandemic on US GDP was 31.2% in 2020Q2% change from the previous quarter). Even though the COVID-19 pandemic did not attack as quickly in Africa as it did in Europe, GDP growth is anticipated to fall by three to eight percent by 2020 (Jayaram et al., 2020).

The World Bank predicted that in 2020, the global economy will endure its worst recession since 1945, with a 4.3 percent decrease in world GDP, a 6.2 percent decline in global GDP per person, and a further 4 percent decline in 2021 (World Bank, 2022). According to estimates, the COVID-19 pandemic will cost the global economy USD 8.5 trillion between 2020 and 2021 and USD 22 trillion between 2020 and 2025.

According to a different study on the Chinese economy, "the COVID-19 pandemic has had a considerable negative effect on China's GDP growth," mostly in the first quarter of 2020 (Gunay et al., 2021). An analysis of the regional economic growth in Indonesia conducted recently using econometric models leads to the conclusion "the government also needs to improve public spending efficiency by applying better governance and accountability" (Solihin et al., (2021). Another research that considers numerous nations that have implemented lockdown or closure concludes that "countries that adopted workplace and school closures suffered higher contractions in GDP growth in the first half of 2020, while countries that took other measures did not demonstrate significantly larger contractions in economic growth." (Chen et al., 2020).

(Jordà et al., 2020) examine the impact on interest rate and discovered that the real interest rate falls to -1.5 percent in 20 years.

(Clemens & Veuger, 2020) examine government income tax collections and sales. According to the authors, the pandemic will cause a reduction in tax collections of the state by $42 billion in the second quarter of 2020. The authors forecast $106 billion decrease in sales and income tax revenues for the fiscal year 2021, with disparities across US states. Another study calculated the economic cost using global model such as DSGE/CGE to model COVID-19 as a negative shock to the financial markets, but a positive shock to government spending and particularly health-related spending. The authors present seven different scenarios and provide estimates of the increase in mortality and fall in GDP for a variety of countries around the world. In the most contained outbreak, the number of deaths reaches around 15 million, with a $2.4 trillion reduction in global GDP in 2020 (Fernandes, 2020).

According to Fenny (2021), the government has no means to raise income through taxes due to the pandemic's economic downturn. She also stated that health-care spending as a percentage of GDP could rise from 4.2% in 2019 to 10.3% in 2021. Health spending per capita is expected to rise by about 24% in 2020 and 26% in 2021(Fenny & Otieku, 2020).

A study revealed that consumer prices increased due to the incidence of COVID-19 pandemic, especially agricultural prices (+6%) and the price of catering (+4%) in Burkina Faso (Kinda & Zidouemba, 2020). According to data from the Ghana Statistical Service (2020), food price inflation increased by 6.0%, reduction in production by 71.7%, sales by 89.7% and labor supply by 36%, as well as increase in the cost of credit by 25.9% between March and April 2020, most likely due to supply shortages caused by general stocking prior to the partial lockdown in the Greater Accra and Ashanti regions (Ghana Statistical Service, 2020)

2.6. Impact on Health Outcomes

Numerous research has examined the effects of the pandemic on mortality and physical health (e.g., Goldstein & Lee, 2020; Lin and Meissner, 2020). Others, like Alé-Chilet et al. (2020), investigate how cases of emergency have decreased in hospitals attendance around the world. When compared to the same week in previous years, the authors indicates that it is linked to a 67 percent drop in total outpatient attendance per provider during the week of April 12–18, 2020. (Chatterji & Li, 2020). The health of people could be negatively impacted by this, especially those who already have chronic conditions. According to a different study, the number of outpatient visits for pneumonia, and acute upper respiratory infections dropped between 2019 and 2020 by 76.79 percent, 71.03 percent, and 56.87 percent, respectively (Wang et al., 2020).

According to a study done in the United States, the number of outpatient visits for all disorders has dropped by about 60%. Hospital admissions for acute coronary syndrome decreased starting in mid-February 2020, going from a 2019 baseline rate of 3017 admissions per week to 1813 per week by the end of March 2020, a 40% decrease. This was revealed by data analysis on hospital admissions in England for types of acute coronary syndrome starting on January 1, 2019. It also showed that this fall was somewhat reversed in April and May 2020, resulting in 2522 admissions in the last week of May 2020, which is a 16 percent drop from the baseline. (Mafham et al., 2020). Nonetheless, during a crisis, such as the COVID-19 pandemic, everyone experiences increased levels of depression and anxiety, particularly the feeling of social isolation (American Medical Association, 2020). A growing number of studies have shown deterioration in the mental health and well-being of people due to COVID-19. For instance, using data from a survey in South Korea during the Middle East Respiratory Syndrome (MERS) epidemic, approximately 16.6% and 7.6%

of respondents reported anger and symptoms of depression 6 during quarantine, respectively (Jeong H et al., 2016).

Another research conducted in Asia disclosed that depression was the highest health problem recorded which increased by 12.5 percent prior to the pandemic and 23.5 percent during the pandemic. (Lim et al., 2020). In the first year of the COVID-19 pandemic, the World Health Organization (WHO) reported a significant 25% rise in the incidence of depression worldwide (WHO,2021). A recent study involving 1,563 health professionals found that more than half (50.7%) of the participants reported depressive symptoms, 44.7% anxiety, and 36.1% sleep disturbance(Xiang et al., 2020).

With 190 hospitalized heath failure patients evaluated using specific questionnaire in Greece revealed that, 24.7% and 32.6% of patients were found to have moderate or high levels of depression, respectively in the total sample. The research further estimated that 17.4% of patients had minor and 24.2% major depression using simple multinomial logistic regression (Polikandrioti et al., 2015). Another study showed carried out in Germany found that the demand for psychological assistance (via helpline calls) increased because of lockdown measures (Armbruster & Klotzbücher, 2020.). The authors claim that melancholy and feelings of loneliness were the main causes of these calls. Another study found that during the first few weeks of lockdowns, there was a considerable rise in the number of searches on Google for the term's "boredom" and "loneliness" in nine Western European countries and the United States. (Brodeur, A., Clark, A., Fleche, S., & Powdthavee, 2020).

A systematic review study performed of published studies to examine the risk factors associated with mortality in COVID-19 showed that, hypertension (odds ratio [OR], 2.5) were associated with significantly higher risk of death amongst patients with COVID-19 (Tian et al., 2020) . Using a systematic review and meta-analysis, the prevalence of hypertension in Chinese patients with COVID-19 was estimated to be between 15% and 25% (Hu et al., 2020). Meanwhile, in the United States, hypertension among COVID-19 -hospitalized patients was 49.7% (Garg et al., 2019). Abor & Abor (2020) studies shows that the public's fear of contracting the disease when visiting medical facilities has led to a general reduction in OPD cases whilst the suspension and cancellation of non-COVID-19 care, as well as restrictions imposed by lockdown procedures such as lockdowns and transport closures has had an effect on IPD cases attendance across various health facilities

2.7 Conclusion

Numerous research has been conducted on the issue in the brief time that the pandemic has existed due to the great amount of concern that the COVID-19 epidemic has caused globally. Studies looked at how the COVID-19 lockdown affected business operations. Others looked at how the COVID-19 pandemic lockdown affected growth in the economy (Jayaram et al., 2020, Makridis & Hartley, 2020 and Barro et al., 2020). The studies' findings show that the COVID-19 pandemic has had a considerable socioeconomic impact on international economies in addition to its effect on economic growth.

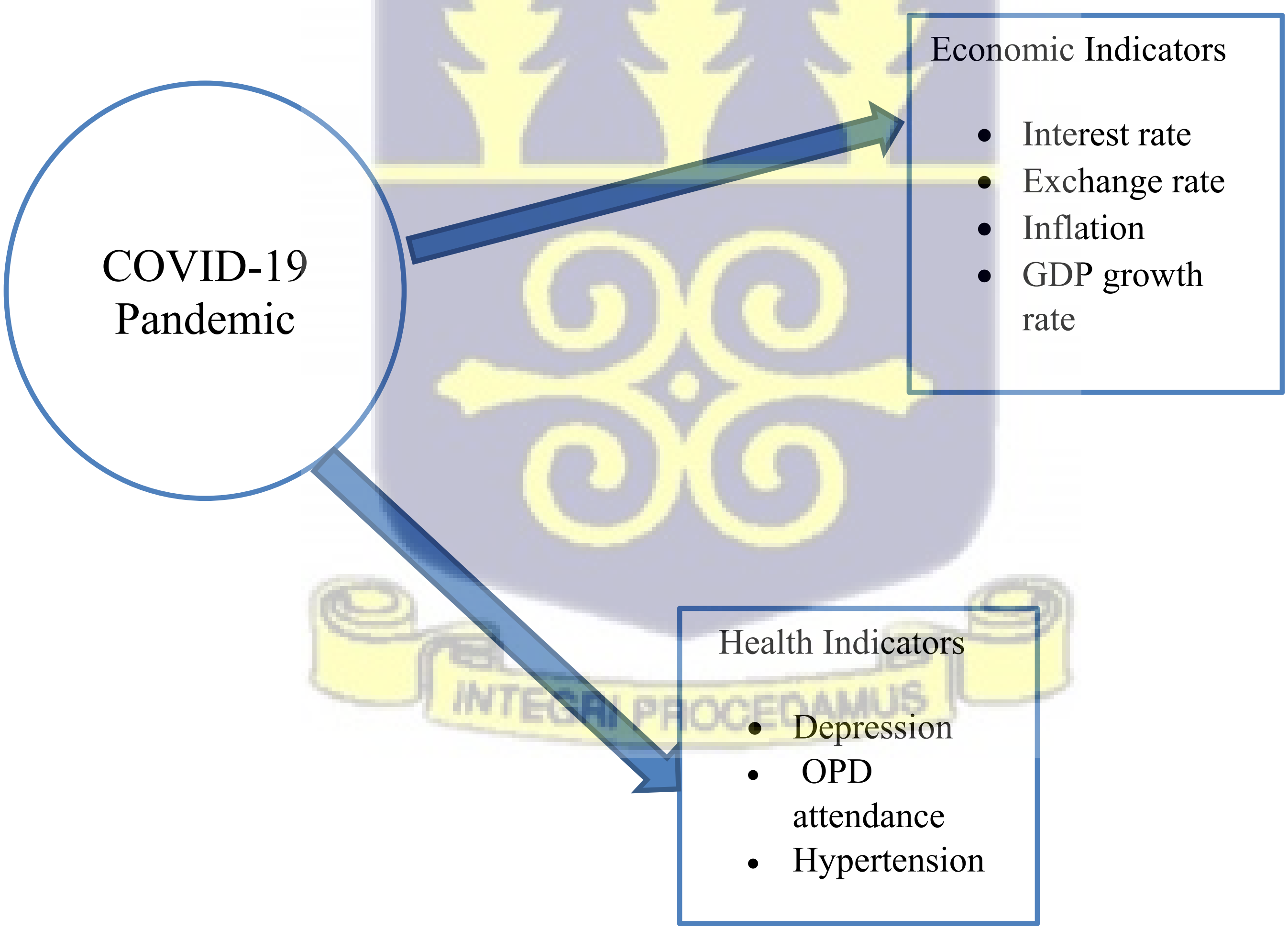
Despite widespread knowledge of COVID-19 's economic effects, little has been done in the Ghanaian context. For example, a study focuses on the challenges and prospects of the Ghanaian economy (Aduhene & Osei-Assibey, 2021). The impact of COVID-19 on Ghana’s Economic and Health sector cannot be underestimated and therefore the need to for this study. Besides this, the COVID-19 pandemic's effects on economic growth continue to this day. To broaden the scope of knowledge, this study aimed to close the gaps that had been found.

2.8 Conceptual framework

The variables that connect to the impact of COVID-19 on the health and economy are defined in detail in the diagram below, which also demonstrates their link using arrows.

The figure displays the indicators that would be used to gauge the COVID-19 impact on the economic and health outcome. Inflation, exchange rate, GDP growth, and interest rates are some of the economic indicators used in this study. OPD attendance, depression and hypertension are among the health indicators used. COVID-19 is defined in the framework as an independent variable while the Economic and Health indicators are the dependent variables.

Figure 1: Conceptual Framework for COVID-19 impact on Selected Economic and Health indicators in Ghana.



CHAPTER THREE

METHODS

3.1 Study design

This study employed interrupted time series (ITS) design to examine the impact of COVID-19 on selected health and economic indicators. The ITS design employs data collected at multiple time intervals before and after an intervention or incidence (time series data) to establish a clear causal relationship between an intervention (QI) and an outcome of interest (Campbell et al., 1963). The single ITS study splits the study into two segments divided by the intervention; the first segment includes a series of monthly pre-intervention observations from 2018 to 2020 that establish a baseline trend. The coronavirus incidence occurs in 2020 and then is followed by a series of monthly post trend observations from 2020 to 2022, which are analyzed to determine the impact. The advantages of this strategy enable comparison of scores on the same variables before and after the intervention. The design reduces issues brought on by the absence of a control group to access the same dependent variables.

Lack of a control group in this study's design makes it vulnerable to numerous threats to internal validity, which is one of its limitations.

3.2 Study Area

The map below shows the distribution of COVID-19 across various regions in the country as of 25th January,2023. Greater Accra region recorded more of the cases of 97,234 followed by Ashanti region recording 22,638. The region with the lowest COVID-19 cases is the Savannah Region.

Figure 3: Map showing the distribution of cases across the regions in Ghana.

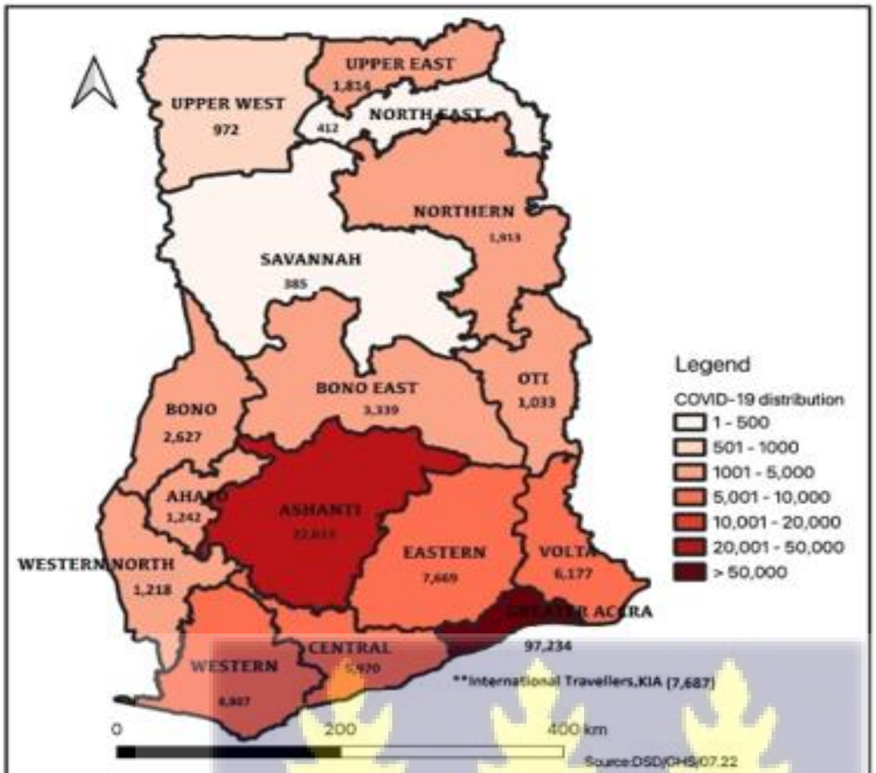


Figure 7: Cumulative cases of COVID-19 in Ghana by region, 23 Jan 2023

Source: Ghana Health Service

3.3 Data Source

ITS analysis requires data collected at equally spaced intervals of time. The study utilized exclusively secondary data. Monthly Economic data for this study such as Exchange rate, Interest rate and GDP growth rate were collected from the Bank of Ghana website. Reports on some the Economic indicators such as Government revenue and Inflation rate from the Ministry of Finance and Ghana Statistical Service served as other source of data collection. Data on COVID-19 cases and death were collected from WHO and Worldometers websites. Data on Health indicators was obtained from the DHIMS which has the date base of various health indicators at the facility level aggregated to district and regional level for the period of January 2018 to December 2021. The pre-covid period span from 2018 to 2020, whereas the post-covid was from 2020 to 2021.

The District Health Information Management System (DHIMS) is managed by the largest agency of the Ministry of Health, Ghana Health Service (GHS) but includes data from the other agencies (Teaching hospitals, CHAG, and private facilities) of the ministry. DHIMS is the main data repository of the Ghanaian heath system hence the source of information for managers at all levels of the health system in decision making and policy formulation. On a daily, weekly, monthly, and quarterly basis, the system gathers both averaged data and personal level data (line listing) on a range of indicators. Data on OPD attendance and depression are collected and collated at the facility level and reported to the District Health Directorate (DHD) by the close of the reporting period usually the end of the month, for validation. Completed datasets are entered into the national database for each reporting facility within the district which makes the district total. The district level data are validated at the regional level ensuring data timeliness, completeness, and validity.

3.4 Data processing and analysis

Data obtained was entered into a Microsoft Excel template. Before being imported into the STATA program (Version 16.0) for the study, the economic and health indicators were coded in a separate worksheet in Microsoft Excel template. Graphs were created once the data were evaluated and displayed. Because graphs represent a great deal of information in a succinct, straightforward, clear, and easy-to-read format, results were presented in this manner. A STATA software application was used to evaluate the data that was gathered.

The analysis focused on the years 2018 to 2019 (prior to COVID-19) and 2020 to 2021 (after COVID-19). The brief time frame between 2018 and 2021 was feasible because of data availability.

Basic inferential statistical was carried out to examine the statistical significance between the independent and the listed dependent variables to assess the effectiveness. An unequal welch t-test was used to assess the mean difference between the pre- and post-periods for each dependent variable. A 95% confidence interval was used to determine means and standard deviation.

A quantile and negative binomial regression model with robust standard error was used for the statistical analysis to determine the impact of Coronavirus (COVID-19) on Economic and Health indicators respectively and to adjust for seasonality.

3.5 Study variables

The variables of interest are linked to the main and specific objectives of the study. The main independent variable of interest is COVID-19 cases. The dependent variables would include Real sector indicators such as GDP growth rate, Interest rate, exchange rate, Inflation and Health such as depression, OPD attendance and Hypertension.

The variables for the study COVID-19 are detailed in the table 2 below.

Table 2: Operation definition of Variables used in the study.

TYPE OF VARIABLE	CATEGORY OF VARIABLE	OPERATIONAL DEFINITION ESCRIPTION
Impact of COVID-19 on Real Sector Economy		
Dependent Variables		
Dependent Variable	**Economic Indicators**	
	GDP Growth Rate	Rate of change in GDP over specified time at market price.
	Inflation (food)	Measure of the rate of rising prices of goods and services in the economy
	Lending Rate (Monetary Policy rate)	Amount of interest due per period as a proportion of the amount lent, deposited, or borrowed.
	Exchange Rate	Average cumulative mean of a country's currency (Cedis) to another currency (USD)

TYPE OF VARIABLE	CATEGORY OF VARIABLE	OPERATIONAL DEFINITION ESCRIPTION
	Government Revenue	Total Government revenue is earnings received from taxes and other forms of income to pay for government expenditures. To this study natural logarithm of government revenue was used.
Impact of COVID-19 on Health Indicators		
	Health Indicators	
	OPD attendance	An OPD is designed to serve as the main means of communicating between a patient and medical staff in a medical department.
	Mental Health(depression)	Total cases of depression reported in various facilities in the country (pre and post covid)
	Hypertension	Total cases of hypertension reported in various facilities in the country (pre and post covid)
Independent Variable	COVID-19	Binary count "1" indicating post-covid and "0" indicating pre-covid. COVID-19 cases

3.6 Estimation technique

Interrupted Time Serie Analysis (ITSA) is a technique that is frequently utilized in research on public policy, as well as medical and public health investigations (Bernal et al., 2017b). Numerous current research methods have shown it to be an excellent instrument for continuous intervention assessments, able to give efficacy in estimates and expose the specific changes of the performance measures (MOE) before and after the treatments (Penfold & Zhang, 2013).

An interrupted time series model has some strengths in terms of estimating the effects of a treatment:

- The ITSA provides more thorough demonstrations of variation in additional to an assessment of the intervention's before-after effectiveness (Huitema et al., 2014).
- Interrupted time series analysis produces graphical findings that are simple to understand and clear. (Penfold & Zhang, 2013)

Ordinary least square (OLS) regression is used in interrupted time series analysis (ITSA) because of its flexibility and take autocorrelated error into consideration (Linden, 2017). According to (Linden, 2017), a single-group time series analysis must be used when the study only contains one group. Hence the use of single-group single group Interrupted time series analysis in this study, and the regression equation is shown below.

3.7 Model formula: Model specification

Equation 3.1: Standard Interrupted Time Series Regression Model for Single Group Analysis

$$Y_t = \beta_0 + \beta_1 time_t + \beta_2 level_t + \beta_3 trend_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots (3.1)$$

Where:

Y_t = represents the outcome variable measured at equal space-time point t

$time_t$ = continuous variable that indicates the time (month) passed from the start of the study.

$level_t$ = COVID-19 incidence rate (0 to 1).

$trend_t$ = the time (month) after the intervention, the interaction between $time_t$ and $level_t$

ε_t = random error term.

The coefficients to determine the COVID-19 impact are:

β_0 = intercept, indicating the initial level of the dependent variable.

β_1 = slope of the dependent variable during the pre-incidence.

β_2 = shows the immediate impact following the incidence of COVID-19

β_3 = shows the sustained impact over time or post trend change.

3.7.1 Model Specification Application of the model for each dependent variable

GDP Growth = $\beta_0 + \beta_1$ time + β_2 covid + $\beta_3$timecovid + ε_t .... (3.2)

GovR = $\delta_0 + \delta_1$ time + δ_2 covid + $\delta_3$timecovid + ε_t .... (3.3)

Exchange rate = $\alpha_0 + \alpha_1$ time + α_2 covid + $\alpha_3$timecovid + ε_t .... (3.4)

Food inflation = $\theta_0 + \theta_1$ time + θ_2 covid + $\theta_3$timecovid + ε_t .... (3.5)

Interest rate = $\rho_0 + \rho_1$ time + ρ_2 covid + $\rho_3$timecovid + ε_t .... (3.6)

Depression = $\sigma_0 + \sigma_1$ time + σ_2 covid + $\sigma_3$timecovid + ε_t .... (3.7)

OPD attendance = $\gamma_0 + \gamma_1$ time + γ_2 covid + $\gamma_3$timecovid + ε_t .... (3.8)

Hypertension = $\vartheta_0 + \vartheta_1$ time + ϑ_2 covid + $\vartheta_3$timecovid + ε_t .... (3.9)

The models above were specified with difference parameter terms for each of the equation.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the descriptive statistics for the multiple factors used in the research and is covered in the first section. The second section presents the trend analysis for the variables under the research. The third section presents the study findings from the impact evaluation analysis conducted. Results are presented in tables with a graphical display from the impact analysis, followed by interpretation of the outputs from the analysis.

4.1 Descriptive Statistics

Table 3: Comparison of pre and post COVID-19 means, standard deviation and confident interval.
of outcome variables using t-test

Summary statistics: N mean SD p-value 95% CI by (COVID-19)
Pre and Post COVID-19

Variables	Mean (pre-covid)	Mean (post-covid)	SD (pre-COVID-19)	SD (post-COVID-19)	p-value
GDP growth	4.068	11.824	2.697	12.473	0.00
log GovR	10.859	8.575	0.094	2.207	0.00
exchange rate	5.699	5.744	0.528	0.101	0.70
food inflation	9.497	11.519	2.706	2.561	0.10
mpr	17.722	14.214	2.095	0.463	0.00
depression	469.444	417.952	116.679	66.287	0.08
OPD attendance	2641614.3	2588650	243603.106	331080.1	0.52
hypertension	52004.148	51269.857	4018.767	4189.902	0.53

Level of significance: *** p-value <0.001, ** p-value <0.01, * p-value <0.05.

From Table 4.1, the average value of GDP Growth pre- and post-Covid was estimated at 4.068 and 11.824 and their standard deviation was estimated at 2.697 and 12.473 respectively. This shows that the data for GDP Growth pre and post COVID-19 is relatively distributed farther away from the mean. It has a sample size of 27 and 21 before and after COVID-19 respectively. There was a statistically significant difference in the GDP Growth pre and post-intervention with a significance level $p<0.002$

The average value of government revenue pre- and post-COVID-19 was estimated at 10.859 and 8.575 and their standard deviation was estimated at 0.094 and 2.20 respectively. This shows that the data for Government revenue pre-covid is distributed relatively closer to the mean value compared to post-COVID-19. It has a sample size of 27 and 21 before and after covid respectively. There was a statistically significant difference in the GDP Growth pre-covid and post-COVID-19 with a significance level p-value <0.000.

The average value of exchange rate pre- and post-COVID-19 was estimated at 5.699 and 5.744 and their standard deviation was estimated at 0.528 and 0.101 respectively. This shows that the data for exchange rate pre-COVID-19 is relatively distributed closer to the mean value compared to post-COVID-19. It has a sample size of 27 and 21 before and after COVID-19 respectively. The distribution was not statistically significant difference in the GDP Growth pre- and post-intervention with a significance level $p>0.070$.

Mean food inflation pre-COVID-19 was estimated at 9.497 and a post- cost-19 mean of 11.519 with a statistically significance level of $p= 0. 01$.The standard deviation was estimated at 2.706 and 2.561 respectively. This shows that the data for food inflation pre- and post-COVID-19 is relatively distributed further away from the mean value.

Mean hypertension pre-COVID-19 was estimated at 10.856 and a post- cost-19 mean of 10.841 with a significance level of $p= 0. 532$.The standard deviation was estimated at 0.0776 and 0.0806 respectively. This shows that the data for hypertension pre and post-COVID-19 is relatively distributed closer to the mean value.

Mean depression pre-COVID-19 was estimated at 469.44 and a post- COVID-19 mean of 417.95 with a significance level of p= 0. 532.The standard deviation was estimated at 116.679 and 66.287 respectively. This shows that the data for depression pre- and post-COVID-19 is relatively distributed closer to the mean value.

4.2 Impact Analysis

Table 4.: Impact of COVID-19 on the outcome variables (Economic Indicators)

Variables	Coefficients (95% CI)	p-value
GDP Growth		
Time	0.09 [-0.56, 0.74]	0.78
Covid	-2.44 [-18.13, 13.25]	0.75
Interaction/impact	0.73 [-0.41, 1.87]	0.20
Log_GovR		
Time	0.01 [-0.04, 0.07]	0.67
Covid	0.58[-0.80, 2.00]	0.39
Interaction/Impact	-0.30[-0.39, -0.20]	0.00*
Exchange rate		
Time	-0.05[-0.08, -0.03]	0.00*
Covid	0.60[0.08, 1.11]	0.03*
Interaction/Impact	0.06[0.03, 0.10]	0.00*
Food inflation		
Time	-0.23[-0.44, -0.013]	0.03*
Covid	7.26[2.18, 12.35]	0.00*
Interaction/Impact	0.05[-0.32, 0.42]	0.77
mpr		
Time	-0.26[-0.33, -0.194]	0.00*
Covid	0.74[-0.83, 2.30]	0.35
Interaction/Impact	0.18[0.06, 0.29]	0.00*

Level of significance: *** p <0.001, ** p <0.01, * p <0.05.
Note: Seasonality adjustment made.

The parameter estimations for "covid" and "interaction/impact" in perspective of COVID-19 exposure effects indicate the immediate (difference in result number) and long-term (difference in slope) impacts on monthly outcome measures.

As shown in the regression output, the starting level of the GDP growth estimated increased insignificantly every month prior to the incidence of COVID-19 by 0.09 percentage points (*P-value* >0.05, CI -0.56, 0.74). In the first year of the COVID-19 incidence, there appeared to be an insignificant decrease in GDP growth of 2.44 percentage point (*P-value* > 0.05, (%% CI −18.13, 13.25), followed by an insignificant increase in the post trend change in GDP growth (relative to the pre-covid trend) of 0.7 percentage point per month (*P-value* = 0.20, 95% CI −0.41, 1.87).

For Government revenue, the starting level estimated appeared to increase insignificantly every month prior to the incidence of COVID-19 by 0.01 percentage points (*P-value* >0.05, 95% CI -0.04, 0.07). In the immediate year of the COVID-19 incidence, there appeared to be an insignificant increase in GDP growth of 0.58 percentage point (*P-value* > 0.05, 95% CI -0.80, 2.00). However, they were a significant decrease in the post trend of government revenue (relative to the pre-covid trend) of 0.30 percentage point per month (*P-value <0.05*, 95% CI -0.39, -0.20).

Every month prior to the incidence of COVID-19 (2020) in Ghana, Exchange rate has significantly decrease of 0.05 percentage point (*P-value* < 0.05, 95% CI -0.08, -0.03). However, the immediate impact after the incidence of COVID-19 showed a significant increase of 0.60 (*P-value* <0.05, 95% CI = [0.08, 1.11]), followed by a significant increase in the post trend change of exchange rate of 0.06 percentage point (*P-value* <0.05, 95% CI 0.03, 0.10).

The estimation of food inflation indicated a significant decrease in time prior to COVID-19 every month of 0.23 percentage point with a *P-value* and 95% confident interval of 0.03 and -0.44, -0.013 respectively. Immediately after the incidence of COVID-19 pandemic, the impact estimated showed statistically significant increase of 7.26 percentage point with P-value and 95% confident interval of 0.00 and [2.18, 12.35] respectively. The post trend impact of COVID-19 incidence appeared to increase insignificantly of 0.05 percentage point (*P-value* >0.05, 95% CI -0.32, 0.42)

4.3 Impact Analysis

Table 5: Impact of COVID-19 on the outcome variables (Health Indicators)

Variables	Coefficients (95% CI)	p-value
Depression		
Time	1.00[1.00,1.00]	0.00*
Covid	1.12[1.00, 1.30]	0.07*
Interaction/Impact	1.02[1.01, 1.03]	0.00*
OPD attendance		
Time	1.00[1.00, 1.01]	0.00*
Covid	0.92[0.84, 1.00]	0.04*
Interaction/Impact	1.00[1.00, 1.01]	0.50
Hypertension		
Time	0.99[0.993, 0.998]	0.00*
Covid	1.09[1.01, 1.18]	0.04*
Interaction/Impact	1.00[0 .99, 1.01]	0.31

Level of significance: *** p-value <0.001, ** p-value <0.01, * p-value <0.05.
Note: Seasonality adjustment made.

The parameter estimations for "covid" and "interaction/impact" in perspective of COVID-19 exposure effects indicate the immediate (difference in result number) and long-term (difference in slope) impacts on monthly outcome measures.

Depression had a significant increase of 12% immediately after the incidence of COVID-19 (level) (IR 1.12, 95% CI 1.00, 1.30) and a 2% subsequently significant raise in the post trend (IR 1.02, 95% CI 1.01, 1.03). Before the incidence of COVID-19, there was no significant increase in depression as compared to immediate impact and post trend.

OPD attendance showed a significant increase of 18% immediately after the incidence of COVID-19 (IR 0.92, 95% CI 0.84, 1.00). However, there was a subsequently insignificant *(P-value* =0.50) increase in the trend of OPD attendance (IR= 1.00, 95% CI 1.00, 1.01) in the 12-month post-covid. Finally, for hypertension, there was a 9% significant increase change in level associated with the immediate effect of COVID-19 pandemic (IR 1.09, 95% CI 1.01, 1.18). Subsequently, hypertension continues to increase but with no significant changes compared to the immediate impact (IR 1.00, 95% CI 0.99, 1.09).

4.4 Impact of COVID-19 on Health indicators across the 16 regions

4.4.1 OPD Attendance

From Table 6 in appendix, the Ashanti region recorded a significant post trend decrease in OPD attendance due to the incidence of COVID-19, with Bono and Bono East recording both an insignificant increase in the post trend (sustained impact) of 0 (*P-value* >0.05, 95% CI [-0.006, 0.006]) and 0.003 (*P-value* >0.05, 95% CI [-0.002, 0.08]) percentage points respectively and the Ahafo region seeing an increased sustained impact in OPD attendance of 0.001 (95% CI [-0.006, 0.008]) percentage points as compared to Ashanti region.

OPD attendance saw a significant post trend increase of 0.01 (*P-value* <0.05, 95% CL [0, 0.02] after the incidence of COVID-19 in the Northern region of the country. Again, a significant post trend increases of 0.007 (*P-value* <0.05, 95% CI [-0.002, 0.012]) percentage point was observed in the Upper East region as compared to an insignificant reduction of 0.005 (*P-value* >0.05, 95% CI [-0.013, 0.003]) percentage point in the Upper West region. The savannah region recorded a significant increase in OPD attendance of 0.013 (*P-value* >0.05, 95% CI [0.003, 0.034]) percentage points.

Central region recorded a significant increase in the post trend (sustained impact) change of OPD attendance of 0.01 (*P-value* <0.05, 95% CI [0.004, 0.015]) and a significant increase in the post trend of 0.007 (*P-value* <0.05, 95% CI [0.002, 0.013]) and 0.008 (*P-value* >0.05, 95% CI [-0.001, 0.018]) in the Eastern and Northeast regions respectively.

There was a significant increase in the post trend change in OPD attendance of 0.019 (*P-value* <0.05, 95% CI [0.012, 0.027]) and 0.005 (*P-value* <0.05, 95% CI [0, 0.01]) percentage point in Volta and Western regions respectively.

4.4.2 Depression

From Table 7 in the appendix, depression significantly increased in post trend of .063 (p-value<0.05, 95% CL [0.023, 0.104] after the incidence ofCOVID-19 in the Northern region of the country. Again, a significant post trend increases of 0.054 (p-value <0.05, 95% CI [0.017, 0,09]) percentage point was observed in the Upper East region as compared to an insignificant increase of 0.008 (p-value >0.05, 95% CI [-0.034, 0.051]) percentage point in the Upper West region. The savannah region recorded an insignificant reduction in depression of 0.014 (p-value <0.05, 95% CI [-0.093, 0.012]) percentage points.

Bono and Bono East recording both a significant decrease immediately after the incidence of COVID-19 of 1.191 (p-value <0.05, 95% CI [-1.646,0.735]) and 0.438 (p-value <0.05, 95% CI [-0.728, -0.148]) percentage points respectively.

Central region recorded a significant increase in the post trend (sustained impact) change of depression of 0.41 (p-value <0.05, 95% CI [0.023, 0.058]) and a significant increase in the post trend of 0.019 (p-value <0.05, 95% CI [0.002, 0.036]) and 0.073 (p-value >0.05, 95% CI [0.029, 0.117]) in the Eastern and Northeast regions respectively.

There was a significant increase in the post trend change in depression of 0.07 (p-value <0.05, 95% CI [0.034, 0.104]) and 0.047 (p-value <0.05, 95% CI [0.003, 0.091]) percentage point in Western and Western North regions respectively.

4.4.3 Hypertension

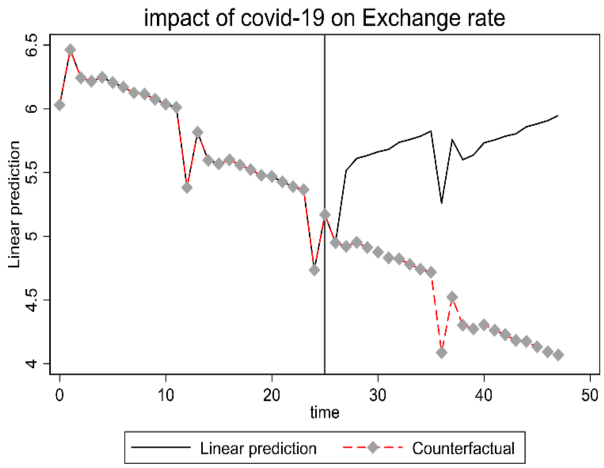
Ahafo and Ashanti region recorded a significant decrease in the post trend (sustained impact) change of hypertension of 0.031 (p-value <0.001, 95% CI [-0.052, -0.009]) and 0.034 (P-value <0.01, CL [-0.064, -0.005]) respectively. A significant decrease in the post trend of 0.012 (p-value <0.05, 95% CI [-0.023, -0.002]) was observed in the Greater Accra region.

Hypertension significantly decrease in post trend of 0.011 (p-value<0.05, 95% CL [-0.023, 0.001] after the incidence of COVID-19 in the Northern region of the country. Again, a significant post trend increases of 0.013 (p-value <0.001, 95% CI [0.004, 0,02]) percentage point was observed in the Upper East region as compared to an insignificant increase of 0.008 (p-value >0.05, 95% CI [-0.004, 0.019]) percentage point in the Upper West region. The savannah region recorded an insignificant increase in hypertension of 0.009 (p-value >0.05, 95% CI [-0.008, 0.026]) percentage points.

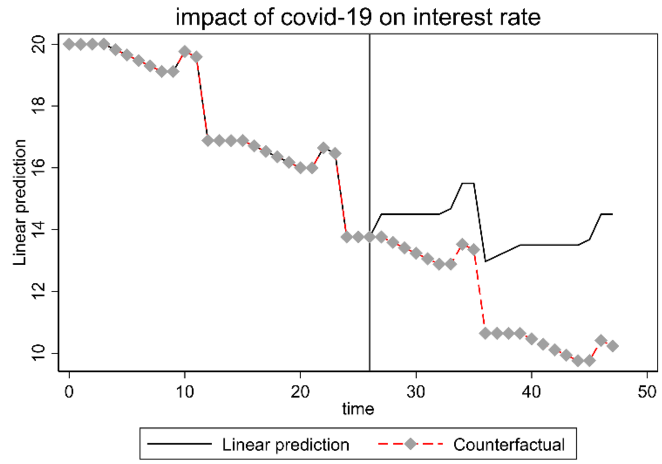
The central region recorded an significant post trend decrease in hypertension due to the incidence of COVID-19, with Eastern and Oti region recording both a significant increase post trend (sustained impact) after the incidence of COVID-19 of 0.032 (p-value <0.001, 95% CI [0.02,0.043]) and 0.083 (p-value <0.001, 95% CI [0.067, 0.1]) percentage points respectively and the Volta region seeing an insignificant decrease in hypertension of 0.001 (p-value>0.05, 95% CI [-0.013, 0.011]) percentage points.

Counterfactual Graphs

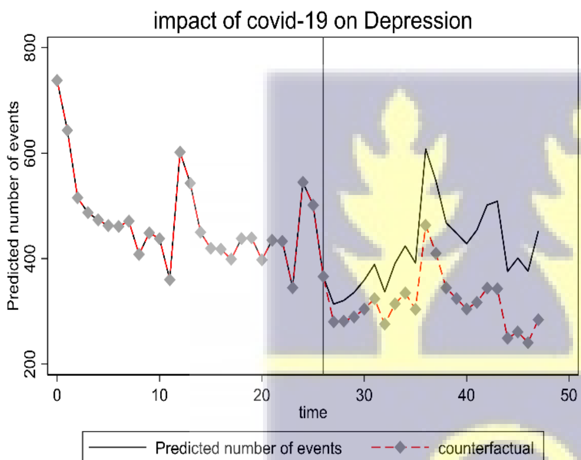
Visual displays of the ITSA regressions of some significant outcome variables are presented in Figure 4. The solid lines represent estimated trend from actual data points, and the dashed lines represent the predicted counterfactual trend. To present a simpler visualization for easier comparison of the estimations, the seasonality effects were excluded in the visual displays. The counterfactual, which is the dashed lines in each of the graphical display shows what would have occurred to the outcome variables if COVID-19 incidence had not been recorded. The solid line in the graphs indicates the actual observed slope of the data for the outcome variables. The perpendicular line in each of the graphs indicated the time of COVID-19 incidence occurrence. Froe example, graph “a” which is the impact of COVID-19 on exchange rate clear indicated the before and after impact. The time from 0 to 26 shows the slope of the line before the incidence of COVID-19 which is the actual data trend of the outcome variable. Time (t26) indicates the time of COVID-19 incidence occurrence. After COVID-19 was recorded, the slope of the line change sloping upward indicating the impact of COVID-19 on the outcome variable exchange rate. The change in the slope of the line is the sustained impact due to the incidence of COVID-19.



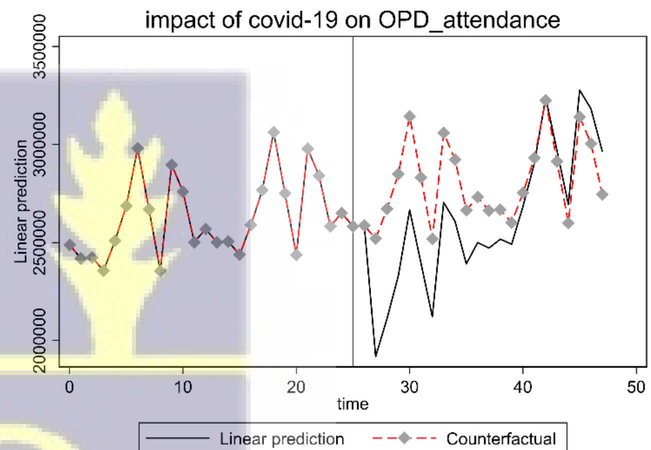
(a) Exchange rate



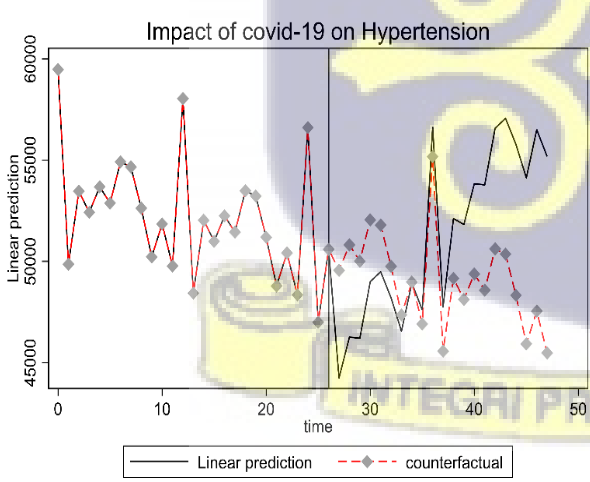
(b) Interest rate



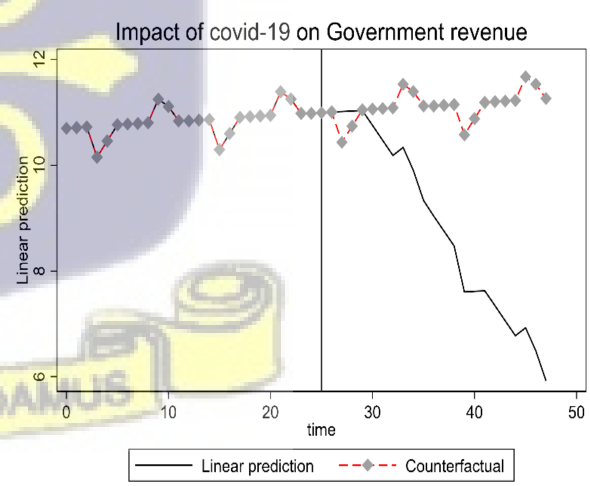
(c)Depression



(d) OPD attendance



(e) Hypertension



(f) Government revenue

CHAPTER FIVE

DISCUSSION

5.0 Introduction

Findings from the study showed a statistically insignificant impact of COVID-19 on the GDP - growth, this impact was, however, a reduction in the level of COVID-19. Post-trend impact of COVID-19 on GDP growth showed an increase but the increase was not significant statistically.

Government revenue increased at the level or immediately after the incidence of COVID-19 but was not statistically significant. However, the post-trend impact of COVID-19 recorded a statistically significant reduction. The study also showed a raise in the immediate and post-trend impact of COVID-19 on the exchange rate. However, this impact was statistically significant both at level and post-trend.

Food inflation increased at the level and the impact was statistically significant. The post-trend impact increased but the impact was not statistically significant. Monetary price rate estimates showed an increase at the level, but the impact was not statistically significant. However, a post trend shows a statistically significant increase impact of COVID-19.

5.1. GDP Growth

Following the incidence of COVID-19, Ghana's GDP growth was projected to fall from a target of 6.8% to about 2.6% in 2020 (MoF). Previous study conducted in Europe and Africa estimated a fall in GDP growth due to the incidence of COVID-19. For example, a study by Jayaram et al, 2020 in Africa, anticipated GDP growth to fall by 3% to 8% percent by 2020.

The finding is consistent with previous literature on the impact of COVID-19 on GDP growth. The reason for the fall in GDP growth may be explained by the devastation of the tourism industry brought on by COVID-19, widespread workplace absenteeism, decreased productivity, negative supply shocks, manufacturing activity slowdown, and global supply chain disruptions.

Slower GDP growth has the following effects: (1) slower rise in living standards – inequality may become more apparent to those with lower incomes; (2) less tax revenue than anticipated to spend on national infrastructure; (3) risen governmental borrowing – for instance, if demand for medical care and old-age pension benefits grows faster than the low rate of economic growth; (4) potential job losses due to inadequate growth to create new jobs; (5) lower inflation rates; and (6) less spending on defense.5.3 Government revenue

The impact of the study showed an immediate increase in Government revenue immediately after the incidence if COVID-19. There was immediately insignificant 58% raise in government revenue. The post-trend impact indicates a significantly 30% reduction in government revenue over the period after the incidence of COVID-19 in Ghana. Government tax revenues are examined state-by-state in a study by (Clemens & Veuger, 2020). The authors claim that COVID-19 has significantly decreased state revenue. The COVID-19 pandemic, according to the authors, will result in a $42 billion decrease in state tax revenue (collection) in the second quarter of 2020. For the fiscal year 2021, the authors predicted a $106 billion decline in tax receipts, with variations between US states.

5.2 Depression

For both diseased and non-infected people, infectious disease epidemics are recognized to have negative effects on health, society, and the economy. Previous research has demonstrated the negative, significant effect of COVID-19 on depression. The results of this study are in line with earlier research by Lim et al., 2020, who carried out a study in Asia using the EQ-5D, a generic health status measure with five dimensions (mobility, self-care, usual activities, pain/discomfort, depression), before and during the pandemic for outpatients. They found that depression registered the highest increase in health problems, increasing by 12.5 percent before the pandemic and 23.5 percent during the pandemic.(Lim et al., (2020)..

This study's impact of an rise in depression is not unexpected and may be accounted by the following factors: (1) the volume of information, from various government agencies to social media sites, reiterating the increased risks of COVID-19 with cardiovascular disease (CVDs), (2) the cancellation of non-critical CVD follow-up consultations and the focus on social and physical distance may have changed their perception of healthcare accessibility, (3) the isolation that resulted from being cut off from family and friends during the social distancing and lockdown, and (4) the necessity to wear masks in public places as a result of these factors. Future policies and actions could be shaped by having a better understanding of the relative contributions of these factors; sadly, this little study did not collect any such data.

5.3 OPD Attendance

Previous studies on OPD attendance have reported a significant decreased in various countries due to incidence of COVID-19 pandemic (Chatterji and Li, 2021). By contrast, my finding is not consistent with the previous literature. My finding revealed a significant increase in OPD attendance over time. The percentage of OPD attendance increased dramatically after the occurrence of COVID-19, but only slightly after the trend of COVID-19.

The study's conclusion conflicts with findings from earlier research. An investigation on the effects of the COVID-19 pandemic on the US healthcare system, for instance revealed a 67 percent drop in total outpatient attendance per provider during the week of April 12–18, 2020 when hen compared to the same week in prior years.(Chatterji & Li, 2020)

5.4 Hypertension

The prevalence of hypertension in my finding shows 9% increase in hypertension cases among patient immediately after the incidence of COVID-19 and it is statistically significant. This finding is consistent with other researches done which shows a statistical increase in the incidence of hypertension due to the outbreak of the COVID-19.

5.5 Limitation of the study

The research is exploratory in nature and relies on secondary data. There was a lack of randomization in this time series study, which is said to reduce internal validity of study findings, limiting the researcher's ability to generalize the study's findings to a larger context, and thus statistical analysis may not be meaningful due to the validity threats caused by the lack of randomization. Pre and Post-test designs cannot control for other pre-existing factors that may have influenced the outcome of interest, which is a limitation of the study. Because there is no perfect control or counterfactual to assess an impact, the use of an interrupted time series analysis is another drawback.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The global health and economic crisis brought on by the 2019 coronavirus is unparalleled in terms of its broad scope and the depth of its effects on the economy, society, and even the environment. A very serious possibility of a worldwide disaster exists due to the ongoing increase in the intensity of the incidents and numerous connected elements.

COVID-19 caused a reduction in the GDP growth of the economy but however this reduction was not significant. Government revenue significantly reduced because of COVID-19. The incidence of depression, OPD attendance and hypertension all increased positively due to the incidence of COVID-19. This increase was significant immediately after the impact of COVID-19

Therefore, the governments must make stopping this disease and preserving lives their top priority. We can all work together to fight this virus and build a more prosperous and hopeful future if we have the right focus and priorities, such as utilizing all macroeconomic tools, including fiscal, monetary, and structural policies, and sharing and putting into practice best practices to improve our healthcare structure and supplies. We are now aware of the vast scope of this situation.

6.2 Recommendations

The pandemic danger has brought to light major flaws in both rich and developing economies around the world, particularly in the provision of proper health care and tackling wealth disparity. The authorities need to realize that, despite their necessity, urgent actions to address the epidemic's immediate health and economic effects are insufficient to address the systemic problems that Ghanaian society has long faced and which the virus has exacerbated. As a result, the government faces the challenging task of developing and putting into effect policies and reforms to kick-start a long-term sustainable economic recovery. Ghana should concentrate on and prioritize the following in this context to achieve the longer-term socioeconomic recovery:

- Ghana needs to diversify and broaden its manufacturing base to properly use its abundant natural resources. To achieve food security, it should put into practice a sustainable agriculture-led growth strategy (farming, fishing, and cattle) and generate exportable surpluses to improve the balance of payments position.
- Prioritizing and effectively funding quality public investments would help restore the nation's economic infrastructure and improve institutional and human resource capacities based on technological innovation.
- The country should invest in the provision of basic social services (health and education) and in the creation of sustainable minimum livelihoods for the vulnerable communities to address inequalities and challenges facing women and the youth and to improve the livelihoods of the poor.
- As a prerequisite for improving the provision of economic and social services, ambitious and robust resource mobilization from domestic sources and foreign financial aid should be prioritized.

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APPENDICES

APPENDIX A: Tables indicating Regional Analysis of COVID-19 impact of Health Indicators

Table 6: Impact of COVID-19 on OPD attendance across the regions

OPD attendance

region = Ahafo

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.206[-0.296, 0.116]	-4.49	0	***
Time	.006[0.002, 0.011]	2.81	.005	***
Sustained impact	.001[-0.006, 0,008]	0.26	.799	

region = Ashanti

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.185[-0.318,0.051]	-2.71	.007	***
time	.011[0.004, 0.017]	3.17	.002	***
Sustained impact	-.009[-0.018, 0]	-2.05	.04	**

region = Bono

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.145[-0.235,0.056]	-3.17	.002	***
time	.005[0, 0.009]	2.15	.031	**
Sustained impact	0[-0.006, 0.006]	-0.04	.97	

region = Bono East

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.276[-0.352, -0.2]	-7.14	0	***
time	.01[0.006, 0.014]	5.29	0	***
Sustained impact	.003[0.002, 0.008]	1.19	.235	

region = Central

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.275[-0.365, -0.185]	-5.99	0	***
time	.004[-0.001, 0.008]	1.65	.099	*
Sustained impact	.01[0.004, 0.015]	3.24	.001	***

region = Eastern

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.237[-0.321,0.154]	-5.50	0	***
time	.005[0.001, 0.009]	2.38	.017	**
Sustained impact	.007[0.002, 0.013]	2.73	.006	***

region = Greater Accra

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.131[-0.283, 0.021]	-1.68	.092	*
time	.011[0.004, 0.018]	2.95	.003	***
Sustained impact	-.004[-0.013, 0.006]	-0.73	.465	

region = Northeast

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.181[-0.33,0.032]	-2.37	.018	**
time	.011[0.003, 0.018]	2.85	.004	***
Sustained impact	.008[-0.001, 0.018]	1.73	.083	*

region = Northern

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.112[-0.264,0.041]	-1.43	.152	
time	0[-0.008, 0.007]	-0.06	.955	
Sustained impact	.01[0, 0.02]	2.00	.046	**

region = Oti

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.145[-0.24, -0.05]	-3.00	.003	***
time	.005[0.001, 0.01]	2.31	.021	**
Sustained impact	0[-0.007, 0.006]	-0.14	.886	

region = Savannah

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.078[-0.245, .089]	-0.91	.36	
time	-.004[-.012, .004]	-0.91	.362	
Sustained impact	.013[0.003, 0.024]	2.47	.013	**

region = Upper East

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.299[-0.364, -.233]	-8.94	0	***
time	.005[.002, .008]	3.02	.003	***
Sustained impact	.007[.002, .012]	2.84	.004	***

region = Upper West

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.242[-0.346,.138]	-4.58	0	***
time	.012[0.007,.017]	4.60	0	***
Sustained impact	-.005[-.013, .003]	-1.28	.2	

region = Volta

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.284[-0.404, -0.164]	-4.63	0	***
time	-.002[-0.007, 0.004]	-0.51	.611	
Sustained impact	.019[0.012, 0.027]	4.95	0	***

region = Western

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.204[-0.284,0.125]	-5.05	0	***
Time	.003[-0.001, 0.007]	1.48	.138	
Sustained impact	.005[0, 0.01]	1.99	.047	**

region = Western North

	Coef. (95% CL)	t-value	p-value	Sig
Immediate impact	-.235[-0.652, 0.182	-1.10	.269	
Time	-.002[-0.023, 0.018	-0.23	.816	
Sustained impact	.015[-0.011, 0.041]	1.10	.27	

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

Table 7: Impact of COVID-19 on Depression across regions

Depression

region = Ahafo

	Coef.(95% CL)	t-value	p-value	Sig
Immediate Impact	-.081[-0.638,0.476]	-0.29	.775	
time	-.007[-0.032,0.018]	-0.57	.571	
Sustained impact	-.009[-0.052, 0.034]	-0.41	.683	

region = Ashanti

	Coef.	t-value	p-value	Sig
Immediate Impact	.001[-0.251, 0.252]	0.00	.997	
time	.006[-0.006, 0.019]	0.96	.336	
Sustained Impact	.004[-0.012, 0.021]	0.54	.588	

region = Bono

depression	Coef.	t-value	p-value	Sig
Immediate Impact	-1.191[-1.646,0.735]	-5.13	0	***
time	.026[0.005, 0.047]	2.42	.016	**
Sustained Impact	-.011[-0.04, 0.018]	-0.76	.448	

region = Bono East

	Coef.	t-value	p-value	Sig
Immediate impact	-.438[-0.728, -0.148]	-2.96	.003	***
Time	.045[0.029, 0.061]	5.57	0	***
Sustained impact	-.031[-0.05, -0.011]	-3.09	.002	***

region = Central

depression	Coef.	t-value	p-value	Sig
Immediate impact	-.012[-0.28, 0.256]	-0.09	.932	
Time	-.016[-0.029, -0.003]	-2.39	.017	**
Sustained impact	.04[0.023, 0.058]	4.64	0	***

region = Eastern

	Coef.	t-value	p-value	Sig
Immediate impact	-.112[-0.376, 0.151]	-0.84	.402	
Time	.001[-0.012, 0.014]	0.15	.882	
Sustained impact	.019[0.002, 0.036]	2.22	.027	**

region = Greater Accra

	Coef.	t-value	p-value	Sig
Immediate impact	.049[-0.184, 0.281]	0.41	.681	
Time	.005[-0.006, 0.017]	0.87	.385	
Sustained impact	.011-0.004, 0.026]	1.44	.151	

region = Northeast

	Coef.	t-value	p-value	Sig
Immediate impact	.266[-0.478, 1.009]	0.70	.484	
Time	-.027[-0.063, 0.01]	-1.45	.149	
Sustained impact	.073[0.029, 0.117]	3.25	.001	***

region = Northern

	Coef.	t-value	p-value	Sig
Immediate impact	.578[-0.068, 1.223]	1.75	.079	*
Time	-.056[-0.087, -0.026]	-3.62	0	***
Sustained impact	.063[0.023, 0.104]	3.06	.002	***

region = Oti

	Coef.	t-value	p-value	Sig
Immediate impact	.784[0.254, 1.314]	2.90	.004	***
Time	-.052[-0.077,0.027]	-4.03	0	***
Sustained impact	.034[0.001, 0.067]	2.02	.043	**

region = Savannah

	Coef.	t-value	p-value	Sig
Immediate impact	1.185[0.419,1.95]	3.03	.002	***
Time	.004[-0.038,0.046]	0.18	.856	
Sustained impact	-.041[-0.093, 0.012]	-1.52	.129	

region = Upper East

	Coef.	t-value	p-value	Sig
Immediate impact	-.369[-0.867,0.13]	-1.45	.147	
Time	-.019[-0.042, 0.004]	-1.60	.11	
Sustained impact	.054[0.017, 0,09]	2.87	.004	***

region = Upper West

	Coef.	t-value	p-value	Sig
Immediate impact	.063[-0.505,0.632]	0.22	.827	
Time	-.035[-0.061, 0.009]	-2.66	.008	***
Sustained impact	.008[-0.034, 0,051]	0.39	.698	

region = Volta

	Coef.	t-value	p-value	Sig
Immediate impact	-.695[-1.135, -0.255]	-3.10	.002	***
Time	-.012[-0.033, 0 .009]	-1.09	.278	
Sustained impact	.007[-0.021, 0.036]	0.50	.617	

region = Western

	Coef.	t-value	p-value	Sig
Immediate impact	-.055[-0.611,0.501]	-0.19	.846	
Time	-.031[-0.057,0.004]	-2.26	.024	**
Sustained impact	.07[0.0348, 0.104]	3.92	0	***

region = Western North

	Coef.	t-value	p-value	Sig
Immediate impact	.166[-0.598, 0.930]	0.43	.67	
Time	-.029[-0.066 0.008]	-1.55	.12	
Sustained impact	.047[0.003, 0.091]	2.09	.037	**

Significance level: *** p< 0.001, **p< 0.01, *p< 0.05

Table 8: Impact of COVID-19 on Hypertension across regions

Hypertension

region = Ahafo

	Coef.(95% CL)	t-value	p-value	Sig
Immediate impact	-.05[-0.327, 0.226]	-0.36	.721	
Time	.023[0.01, 0.036]	3.40	.001	***
Sustained impact	-.031-0.052, -0.009]	-2.78	.006	***

region = Ashanti

	Coef.	t-value	p-value	Sig
Immediate impact	.24[-0.183, 0.664]	1.11	.266	
Time	.001[-0,019, 0.021]	0.09	.926	
Sustained impact	-.034[-0.064, -0.005]	-2.29	.022	**

region = Bono

	Coef.	t-value	p-value	Sig
Immediate impact	.17[-0.003, 0.343]	1.93	.054	*
Time	-.006[-0.015, 0.002]	-1.48	.138	
Sustained impact	.029[0.018,0.039]	5.13	0	***

region = Bono East

	Coef.	t-value	p-value	Sig
Immediate impact	-.118[-0.335, 0.099]	-1.06	.288	
Time	.01[-0.001, 0.021]	1.82	.069	*
Sustained impact	0[-0.014, 0.014]	-0.00	.999	

region = Central

	Coef.	t-value	p-value	Sig
Immediate impact	-.545[-0.729, -0.36]	-5.79	0	***
Time	.018[0.009, 0.027]	3.94	0	***
Sustained impact	-.01[-0.022, 0.001]	-1.77	.077	*

region = Eastern

	Coef.	t-value	p-value	Sig
Immediate impact	.118[-0.064, 0.3]	1.27	.203	
Time	-.018[-0.027, -0.009]	-3.85	0	***
Sustained impact	.032[0.02, 0,043]	5.18	0	***

region = Greater Accra

	Coef.	t-value	p-value	Sig
Immediate impact	-.009[-0.117, 0.158]	-0.11	.912	
Time	.009[0, 0.017]	2.06	.04	**
Sustained impact	-.012[-0.023, -0.002]	-2.27	.023	**

region = Northeast

	Coef.	t-value	p-value	Sig
Immediate impact	-.255[-0.634, 0.124]	-1.32	.187	
Time	.079[0.06, 0.099]	8.12	0	***
Sustained impact	-.104[-0.128, -0.8]	-8.36	0	***

region = Northern

	Coef.	t-value	p-value	Sig
Immediate impact	-.223[-0.411, -0.035]	-2.33	.02	**
Time	-.007[-0.016, 0.003]	-1.41	.158	
Sustained impact	-.011[-0.023, 0.001]	-1.74	.081	*

region = Oti

	Coef.	t-value	p-value	Sig
Immediate impact	-.403[-0.653, -0.154]	-3.16	.002	***
Time	-.036[-0.049, -0.024]	-5.69	0	***
Sustained impact	.083[0.067, 0.1]	10.03	0	***

region = Savannah

	Coef.	t-value	p-value	Sig
Immediate impact	.204[-0.056,0.463]	1.54	.124	
Time	-.019[-0.033, -0.006]	-2.90	.004	***
Sustained impact	.009[-0.008, 0.026]	1.03	.3	

region = Upper East

	Coef.	t-value	p-value	Sig
Immediate impact	.254[0.145, 0.363]	4.56	0	***
Time	-.018[-0.023, -0.013]	-6.71	0	***
Sustained impact	.013[0.004, 0.021]	3.00	.003	***

region = Upper West

	Coef.	t-value	p-value	Sig
Immediate impact	-.117[-0.274, 0.04]	-1.47	.143	
Time	-.008[-0.015, 0]	-1.99	.047	**
Sustained impact	.008[-0.004, 0.019]	1.26	.209	

region = Volta

	Coef.	t-value	p-value	Sig
Immediate impact	-.098[-0.279, 0.083]	-1.06	.289	
Time	-.011[-0.02, -0.002]	-2.46	.014	**
Sustained impact	-.001[-0.013, 0.011]	-0.20	.839	

region = Western

	Coef.	t-value	p-value	Sig
Immediate impact	.063[-0.095, 0.221]	0.78	.436	
Time	.006[-0.001, 0.014]	1.62	.105	
Sustained impact	.008[-0.002, 0.018]	1.55	.122	

region = Western North

	Coef.	t-value	p-value	Sig
Immediate impact	-.567[-1.057, -0.078]	-2.27	.023	**
Time	.043[0.018, 0.067]	3.44	.001	***
Sustained impact	-.018[-0.049, 0.014]	-1.11	.268	