

ENSIGN GLOBAL COLLEGE  
KPONG, EASTERN REGION-GHANA

ASSESSING THE PSYCHOLOGICAL IMPACT OF COVID-19 ON UNIVERSITY  
STUDENTS IN THE GREATER ACCRA REGION OF GHANA,  
A CASE STUDY OF CENTRAL UNIVERSITY, MIOTSO

BY

LOUISA OSEI-BONSU

(207100166)

JULY, 2022

ENSIGN GLOBAL COLLEGE  
KPONG, EASTERN REGION, GHANA

ASSESSING THE PSYCHOLOGICAL IMPACT OF COVID-19 ON UNIVERSITY  
STUDENTS IN THE GREATER ACCRA REGION OF GHANA,  
A CASE STUDY OF CENTRAL UNIVERSITY, MIOTSO

BY

LOUISA OSEI-BONSU

(207100166)

A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH,  
IN THE FACULTY OF PUBLIC HEALTH, ENSIGN GLOBAL COLLEGE  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR  
THE MASTER OF PUBLIC HEALTH DEGREE

JULY, 2022

## DECLARATION

I, Louisa Osei-Bonsu, do hereby declare that, except for reference to other works which have been properly acknowledged, this dissertation is my own work under the supervision of Dr. Stephen Manortey and has not been submitted elsewhere in part or whole for any other purpose.

Louisa Osei-Bonsu	.....	.....
(Student ID: 207100166)	Signature	Date

Certified by:

<b>Dr. Stephen Manortey</b>	.....	.....
(Supervisor's Name)	Signature	Date

Certified by:

<b>Dr. Stephen Manortey</b>	.....	.....
(Head of Academic Program)	Signature	Date

## **DEDICATION**

I dedicate this work to the Almighty God for his immense favour and grace to go through this program successfully. This is also especially dedicated to my family for their support and encouragement throughout this academic pursuit.

## **ACKNOWLEDGEMENT**

All thanks and adoration to God Almighty for His grace and mercies which has brought me this far. I am most grateful to my mom and my sister for their love, support, prayers, and encouragement throughout this journey. To my supervisor Dr. Stephen Manortey, I am grateful for your patience, guidance and corrections throughout the entire work. I recognize and thank the administration of the Central University for their assistance.

## **LIST OF ABBREVIATIONS**

<b>CDC</b>	–	Centre for Disease Control and Prevention
<b>CI</b>	–	Confidence Interval
<b>COVID-19</b>	–	Coronavirus Disease 2019
<b>DASS</b>	–	Depression, Anxiety and Stress Scale
<b>GHS</b>	–	Ghana Health Service
<b>HCWs</b>	–	Health Care Workers
<b>ICGC</b>	–	International Central Gospel Church
<b>IRB</b>	–	Institutional Review Board
<b>MERS</b>	–	Middle East Respiratory Syndrome
<b>OR</b>	–	Odds Ratio
<b>PHEIC</b>	–	Public Health Emergency of International Concern
<b>SARS</b>	–	Severe Acute Respiratory Syndrome
<b>WHO</b>	–	World Health Organization

## ABSTRACT

**Introduction:** COVID-19 has been reported to have psychological effects on the general population. It is known to impact the mental health of university students since it disrupted their academic journey. Students are considered a vulnerable population that experiences moderate to severe levels of depression, anxiety, stress and suicidal ideation among other psychological health issues due to their transition into adulthood. Closure of schools was implemented in Ghana to curb the spread of the virus. Studies from other countries have documented how this action affected students mentally. However, many of the documents in Ghana emphasized the impact of the pandemic on health care workers with little done on students.

**Objective:** The objective of this study was to assess the prevalence of depression, anxiety and stress among final year university students at the Central University due to the COVID-19 pandemic.

**Methods:** A cross-sectional quantitative study design was adopted for the study. A systematic sampling technique was used to select the study participants (351) and data was collected with a structured questionnaire (DASS-21) which was then entered into Microsoft Excel and exported to STATA version 17 for analysis. Descriptive statistics, bivariate and multivariate logistic regression were undertaken to derive the results. Logistic regression was assessed at a 0.05 level of statistical significance with a 95% Confidence Interval.

**Results:** The prevalence of depression, anxiety and stress was 66.7%, 57.8% and 20.5% respectively. More females reported having experienced these conditions compared to males. There was no significance between sex, ethnicity, religion and depression, anxiety and stress. The course of study was found to be significant at the alpha level of 0.05. Those

who study Arts and Social Science were 12.6 times more likely to experience depression compared to those who study Business. Likewise, those who study health sciences and engineering and technology were 2.5 and 4.9 times more likely to experience depression compared to Business students.

**Conclusion and Recommendation:** The study revealed a high prevalence of depression, anxiety and stress among students. Therefore, policy makers and mental health professionals should develop strategies to provide psychological support to students, especially during outbreaks. Further studies should be conducted to identify the factors that impact the psychological health of university students post-pandemic.



## TABLE OF CONTENT

DECLARATION .....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT .....	iv
LIST OF ABBREVIATIONS.....	v
ABSTRACT .....	vi
TABLE OF CONTENT .....	viii
LIST OF TABLES .....	xii
LIST OF FIGURES.....	xiii
CHAPTER ONE .....	1
INTRODUCTION .....	1
1.1 Background of the study .....	1
1.2 Problem Statement .....	7
1.3 Rationale of the Study.....	9
1.4 Conceptual Framework .....	10
1.5 Research Questions.....	12
1.6 General Objectives.....	12
1.7 Specific Objectives .....	12
1.8 Profile of the Study Area.....	12
1.9 Scope of Study.....	14
1.10 Organization of Report.....	14

CHAPTER TWO .....	15
LITERATURE REVIEW .....	15
2.1 Introduction .....	15
2.2 COVID-19.....	15
2.3 Etiology and Epidemiology.....	16
2.4 Clinical Manifestations (signs and symptoms).....	17
2.5 Prevention and Control .....	18
2.6 Effect of COVID-19 on education.....	18
2.7 COVID-19 and Psychological Health.....	19
2.8 Psychological Impact of COVID-19 on Students.....	20
2.9 Depression, Anxiety and Stress Scale (DASS) .....	21
CHAPTER THREE.....	22
METHODOLOGY .....	22
3.1 Introduction .....	22
3.2 Research Methods and Design .....	22
3.3 Data Collection Techniques and Tools .....	22
3.3.1 Measures on the DASS-21 .....	23
3.4 Study Population.....	24
3.4.1 Inclusion Criteria.....	24
3.4.2 Exclusion criteria.....	24
3.5 Sampling Technique and sample size .....	25

3.6 Pretesting .....	26
3.7 Data Handling.....	26
3.8 Data analysis.....	27
3.9 Ethical Considerations .....	28
3.10 Limitations of the Study .....	28
3.11 Assumptions of the Study .....	28
CHAPTER FOUR.....	29
RESULTS.....	29
4.1 Introduction .....	29
4.2 Socio-demographic characteristics of respondents.....	29
4.3 Prevalence of depression, anxiety and stress.....	31
4.4 Bivariate Analysis of the psychological impact and the independent variables. ....	32
4.5 Multivariate Logistic Regression.....	35
4.6 Multivariate Logistic Regression of Anxiety and Independent Variables.....	38
4.7 Multivariate Logistic Regression of Stress and Independent Variables .....	41
CHAPTER FIVE.....	44
DISCUSSION.....	44
5.1 Introduction .....	44
5.2 Socio-Demographics.....	44
5.3 Psychological Impact of COVID-19 (Depression, Anxiety, Stress) .....	45
5.4 Bivariate and Multivariate Analysis of Dependent and Independent Variables ....	46

CHAPTER 6 .....	49
CONCLUSIONS AND RECOMMENDATIONS .....	49
6.1 Conclusions .....	49
6.2 Recommendations.....	50
REFERENCES .....	52
APPENDICES .....	63
APPENDIX I: PARTICIPANT INFORMATION SHEET AND CONSENT FORM....	63
APPENDIX II: QUESTIONNAIRE .....	68

## LIST OF TABLES

TABLE 3.1 DASS RATING .....	23
TABLE 3.2 STUDY VARIABLES .....	24
TABLE 4.1 SOCIO-DEMOGRAPHICS CHARACTERISTICS OF .....	30
TABLE 4.3 BIVARIATE ANALYSIS OF PSYCHOLOGICAL IMPACT AND INDEPENDENT VARIABLES .....	34
TABLE 4.4 MULTIVARIATE ANALYSIS OF DEPRESSION AND INDEPENDENT VARIABLES ...	36
TABLE 4.5 MULTIVARIATE ANALYSIS OF ANXIETY AND INDEPENDENT VARIABLES .....	39
TABLE 4.6 MULTIVARIATE ANALYSIS OF STRESS AND INDEPENDENT VARIABLES .....	42

## LIST OF FIGURES

FIGURE 1.1 AUTHOR'S OWN CONCEPTUAL FRAMEWORK .....	11
FIGURE 1.2 – MAP OF THE CENTRAL UNIVERSITY, MIOTSO .....	13
FIGURE 4.1 DISTRIBUTION OF DEPRESSION, ANXIETY AND STRESS AMONG STUDENTS.....	31
FIGURE 4.2 RESPONSES TO INITIAL REACTION OF COVID-19.....	32

## LIST OF APPENDICES

APPENDIX I: PARTICIPANT INFORMATION SHEET AND CONSENT FORM....	63
APPENDIX II: QUESTIONNAIRE.....	68

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Over the past two years, the novel coronavirus has infected over 500 million people and claimed more than 6 million lives worldwide (WHO Coronavirus (COVID-19) Dashboard). The advent of the coronavirus disease (COVID-19) caused the world to experience an unexpected public health crisis. Emergency protocols were instituted according to the World Health Organization (WHO) guidelines to control the transmissibility of the virus within and across countries (Chaturvedi, Vishwakarma, and Singh, 2021) The novel coronavirus was first discovered in China and was epidemiologically linked to the Huanan Seafood Wholesale Market in Wuhan province where live animals are traded (Hui *et al.*, 2020). The virus was later identified as a new beta-coronavirus and thus was named 2019 novel coronavirus that is 2019-nCoV (Wu, Chen and Chan, 2020). The characteristics of the new coronavirus were like that of the 2003 severe acute respiratory syndrome (SARS-Cov) and 2012 Middle East Respiratory Syndrome (MERS-Cov) which occurred in Guangdong province in China and the Middle East, respectively. The disease was officially named COVID-19 by the WHO and, was declared a Public Health Emergency of International Concern (PHEIC) on 31st January 2020 (Kapata *et al.*, 2020). COVID-19 like other coronaviruses has a high infectivity rate which endangers a country's health and global economy. Patients with COVID-19, particularly those with underlying health conditions such as hypertension, diabetes, and other chronic diseases, may develop the disease in its severity and experience critical outcomes, exasperating the burden on healthcare systems' (Afriyie *et al.*, 2020).



Influenza viruses are usually transmitted directly from human to human with ease and create an alarming global pandemic (Abideen, Mohamad, and Hassan, 2020). One of the reasons for the rapid spread of the coronavirus may be due to the heavy transportation load during the Chinese Lunar New Year (on January 25) period. Chinese from other parts of the world travelled to their home country to observe this very important festivity and had person-to-person contact. As of February 6, 2020, after the festive season in China, a total of 28,276 confirmed cases and 565 deaths worldwide were documented by WHO, a compilation from at least 25 countries (Wu, Chen, and Chan, 2020).

The World Health Organization (WHO) declared COVID-19 a pandemic, with a record of over 118,000 cases of coronavirus infections in more than 110 countries and territories around the world with an increased risk of further global spread as of March 11, 2020 (Rutayisire *et al.*, 2020). Right after this declaration, the novel coronavirus welcomed itself on the Ghanaian soil after two travellers from Norway and Turkey were confirmed to harbour the virus (Kenu *et al.*, 2020) This information quickly made the headlines as every media house was already broadcasting news about the disease. With the information making the airwaves, many Ghanaians became fearful and concerned because there was a lot of misinformation about the virus since scientists were still investigating it. Questions of whether Ghana was going to adapt reduction measures used in other countries such as lockdown were raised. Business owners, traders, and students were thrown into a state of confusion and uncertainty.

Like many other countries, Ghana was quick to adapt to the situation and immediate measures were instituted to curtail the spread of the virus, considering the rapid spread in other countries. Some of the measures included wearing of face masks when stepping out, closure of churches, limitations on the number of people attending weddings and funerals,

and closure of all public places of gathering such as pubs and beaches. The government called for schools to be temporarily closed and learning to be done remotely (Lake, 2020). Students were to stay home until further notice. Scientists at this point were working tirelessly to develop vaccines that could probably bring the chaos to an abrupt end.

Global concerns were mostly about the long-term consequences of the virus due to its impact on different aspects of life (Kumar and Nayar, 2021). The rapid spread of the virus within and beyond borders impressed its impact on the economy, the global market, international travel, agriculture, and health. Many countries closed their borders and restrictions were placed on air travel across countries and continents. Many countries across the globe also restricted the movement of citizens with lockdown measures. From previous knowledge of other epidemics and pandemics, infectious diseases spread from person to person when there is a lot of movement, thus there was a need to hinder movement to limit the spread (Zhang *et al.*, 2020). The spread of the virus was inevitable; therefore, it was important that measures be put in place to limit the incidence of cases. Another sector that was greatly affected by the disease was education. From pre-school to tertiary, schools were paused, and students were sent home. The disease also spiked a lot of uncertainties and anxiety among individuals and groups of individuals.

Global pandemics provoke and dissipate risks of short-term and long-term economic effects which has caused healthcare systems to find novel and more efficient coping strategies and techniques (Abideen, Mohamad, and Hassan, 2020). Information from previous epidemic and pandemic experiences indicates that these happenings affect mental health just as much as they affect physical health and economic growth (Torales *et al.*, 2020). These effects may not be a result of the disease itself but the measures put in place to reduce its spread that is distancing, isolation and quarantine, and lockdowns. During the

MERS outbreak in Korea, victims who were treated in isolation reported significant levels of psychosocial stress (Torales *et al.*, 2020). During the genesis of the COVID-19 pandemic in China, a study was conducted to probe into how quarantine measures impact mental health of the general population and identified that quarantine and isolation measures increased the risk of the psychological impact of the virus on the general population (Yunhe Wang *et al.*, 2021). Another study conducted among Italians indicated that anxiety disorders, mood disorders, and suicidal ideation were the most common psychiatric manifestations during the COVID-19 pandemic. (Wang, Su, and Pariante, 2021). Generally, pandemics have significant psychological effects on various groups of people as much as they impact various sectors.

With the first discovery of the virus in China, various facets of the country were affected including education as already stated. Early data from Chinese studies suggest that the outbreak combined with the emergency government intervention exerted enormous psychological pressure on the people (Copeland *et al.*, 2021). There are records of pandemics in years past. These pandemics not only claimed lives but also caused fear and panic in populations amidst the economic crisis they come with.

Although there are vaccines with proven potency, the virus keeps spreading and infecting more people daily. As of May 2022, the number of confirmed cases and deaths from the coronavirus was 528,275,339 and 6,293,414 respectively (WHO Coronavirus (COVID-19) Dashboard).

According to scientists, the virus has the ability to mutate its genome into different variants. The African continent, just like any other continent, has ceased not to confirm and record additional cases of COVID-19. Effective treatment for COVID-19 has been experimented over time, however, there are vaccines that have proven to be more than

50% potent in protecting individuals against the virus even though the virus keeps spreading and has not changed its mode of transmission (Afriyie *et al.*, 2020).

The COVID-19 pandemic represents a severely stressful event with extensive disruptions, including loss of jobs which increased the prevalence of unemployment and housing challenges, among others that may have caused significant changes in mental health symptoms (Perzow *et al.*, 2021). A recent survey conducted by the Indian Psychiatric Society indicates that mental illness increased by 20% in India since the outbreak of the disease in the country (Loiwal, 2020). As a matter of fact, psychologists and mental health professionals postulated that the pandemic was going to cause more cases of depression, self-harm, and suicidal ideations (Kumar and Nayar, 2021). Educational arrangements globally were disrupted which led to the total closing of schools, colleges, and universities (Upoalkpajor and Upoalkpajor, 2020). The closing down of schools displaced students into forced isolation predisposing them to boredom and poor sleep patterns due to social media addiction as well as eating disorders which are all indications of the presence of some psychological effect. Investigations derived from previous outbreaks, such as the SARS epidemic disclosed adverse psychological effects on people (Paulino *et al.*, 2021). Related concerns over mental health are emerging with COVID-19, exposing various psychological symptoms in the general population (Yenan Wang *et al.*, 2021), which may be due to the spike in cases, the lockdown, pressure on the forefront workforce, circumscription to the house or health facility, inaccessible psychological services, exhaustive media coverage, and poor health information (Paulino *et al.*, 2021).

Psychological symptoms can be escalated by pre-existing depressive and anxiety disorders. Since the psychological effects of this novel virus are permeating and has the likelihood to disturb mental health presently and subsequently, it is essential that

immediate global researches prioritize the monitoring rates of anxiety, depression, and other mental health issues, across the general population, to fathom mechanisms and apprise interventions (Holmes *et al.*, 2020). Students have also been affected psychologically by the inception of the COVID-19 though many of them are finding various ways to cope with the situation (Moghe, Kotecha and Patil, 2020).

Mental health instability has been reported in various countries among the general population and specific groups as well. In China, accounts on the mental influence of the virus on the general population, medical staff, students, and older adults have been documented (Cao *et al.*, 2020). Some studies conducted in the US have also found that the general public and university students have significant levels of psychological effects due to the pandemic (Wang *et al.*, 2020; Browning *et al.*, 2021). The case of Africa is no different from the rest of the world as the continent has also become a hub for the virus. Much research has been conducted to assess how the pandemic is affecting various aspects of life including agriculture and education, among a few. Only a few of these studies delved into how the pandemic affected the students, precisely university students. For instance, the study conducted in Ethiopia looked at how students' psychological health was affected considering the measures instituted to curb the spread of the virus. The result of the study showed a lofty prevalence of depression, anxiety, and stress among the tertiary population that were sampled (Aylie, Mekonen and, Matiyas, 2020).

In Ghana, epidemic experience with infectious respiratory diseases is distant, thus the advent of the novel coronavirus in the country was a scare to many. Although measures were instituted to control the spread, the numbers kept increasing and thus affected the general population. Studies in Ghana have concentrated on the effect of the disease more on health workers and education in general (Ofori *et al.*, 2021). However, it is evident that

the disease has psychological effects on the general population and specific groups such as students as reported in other parts of the world.

## **1.2 Problem Statement**

Infectious diseases have the ability to wreak havoc in various spheres of life (Azer, 2020). Among these is the psychological distress they are accompanied by. Research undertaken in China during the onset of the pandemic revealed that prodromes of depression, anxiety, and stress were common psychological responses incited by the COVID-19 pandemic (Rajkumar, 2020). The 2019 coronavirus disease (COVID-19) pandemic is a global health loom and is on record the most far-reaching outbreak of the class of pneumonia since the severe acute respiratory syndrome (SARS) outbreak in 2003 (Wang *et al.*, 2019). The virus, whose origin has been traced to Wuhan, China in December 2019, is a shattering mishap that has transcended borders at a faster pace than expected similar to the speed of light (Sundarassen *et al.*, 2020). The first cases of COVID-19 in Ghana were recorded on March 12, 2020 (Ghana Health Service [GHS], 2020). Public health measures were adopted to curb the reach of the virus. Among these was the closing of schools (Henaku, 2020). The virus affected various aspects of human life mostly the health of individuals, agriculture, business, trade, travel, and education (Souilhi *et al.*, 2020; Iese *et al.*, 2021; Id and Dema, 2022) even with the production of vaccines. With the closure of schools in other countries across the world, there was a need to use an alternative means to keep students occupied while under lockdown. Although many countries were already utilizing the online platform for studies, many Ghanaian institutions traditionally delivered education via face-to-face (Henaku, 2020). The coronavirus was a wake-up call to all institutions to avert the alternative form of lesson delivery. It is obvious that the unwavering psychological and social impacts of the pandemic are inevitable, and it is

crucial to take steps in fostering buoyancy when dealing with such devastating repercussions of the COVID-19 outbreak (Kara, 2022).

Evidence has shown that there are damaging psychological implications that arise from outbreaks of communicable diseases such as severe acute respiratory syndrome (SARS) and equine influenza, (Sundarassen *et al.*, 2020). As the coronavirus pandemic spread across the globe, it caused widespread concern, fear, stress, and anxiety, definitive expected reactions to the altering and imminent situation that everyone is a part of (Kpotosu, 2020). There may be less control of the genesis of the virus and its devastating effect, however, taking charge of the effects and holistically tackling them is possible (Kpotosu, 2020).

According to research, university students are mostly identified as an assailable population that experiences higher levels of anxiety, depression, substance abuse, and disordered eating compared to the general population (Kara, 2022). Thus, when their educational experience is drastically altered due to an unexpected event, in this case, the coronavirus for which many governments restricted schooling due to lockdown as a public health measure to curb the spread of the virus, there is an escalation of the psychological effect within this vulnerable population. (Browning *et al.*, 2021). It is therefore imperative that attention is given to this population to help build resilience in them for them to manage their stress levels and be prepared for other similar future events (Kara, 2022). Many researchers around the world have investigated how this pandemic is psychologically affecting students at various levels (Tee *et al.*, 2020; Irfan *et al.*, 2021; Villani *et al.*, 2021; Voltmer *et al.*, 2021). Studies conducted in China, Malaysia, and the United States reported at least moderate levels of anxiety and stress because the disease was among the study participants (Batra *et al.*, 2021). Stress can be caused by any unexpected adjustment

and can sometimes last long and be intense. Mental health complications resulting from COVID-19 may be more prevalent in some populations, including those who are prone to biological and psychological stresses like the student population (McKague *et al.*, 2020). Research in Ghana has been focused primarily on health workers (Ofori *et al.*, 2021). Although it is a necessity for these researches to be done because healthcare workers (HWCs) have been more exposed to the virus for the past two years than any other group, it must be realized that students are a vulnerable population also greatly affected by outbreaks and other happenings (Alyoubi *et al.*, 2021). Evidence from other countries suggests that the COVID-19 pandemic has generally increased levels of stress and depression among the general public and particularly the student population, however, the impact on university students' psychological health in Ghana is not well documented, this constructs the backdrop for this research. Assessing that the disease is a potential causal factor of psychological stress on student populations and understanding the depth of the problem is imperative to prevent the condition from aggravating among the student population in Ghana.

### **1.3 Rationale of the Study**

Evidently, the current COVID-19 pandemic will not be the last pandemic to affect people and society considering the findings of research on how climate change will influence the incidence of infectious diseases (Upoalkpajor and Upoalkpajor, 2020). Many studies support the conclusion that the novel coronavirus has radically impacted the mental health and behaviour of various populations worldwide, with very few studies disputing this report (Browning *et al.*, 2021). Understanding associations between psychological strength and protective behaviours during respiratory infectious disease epidemics or pandemics can inform immediate communication and interventions in addressing

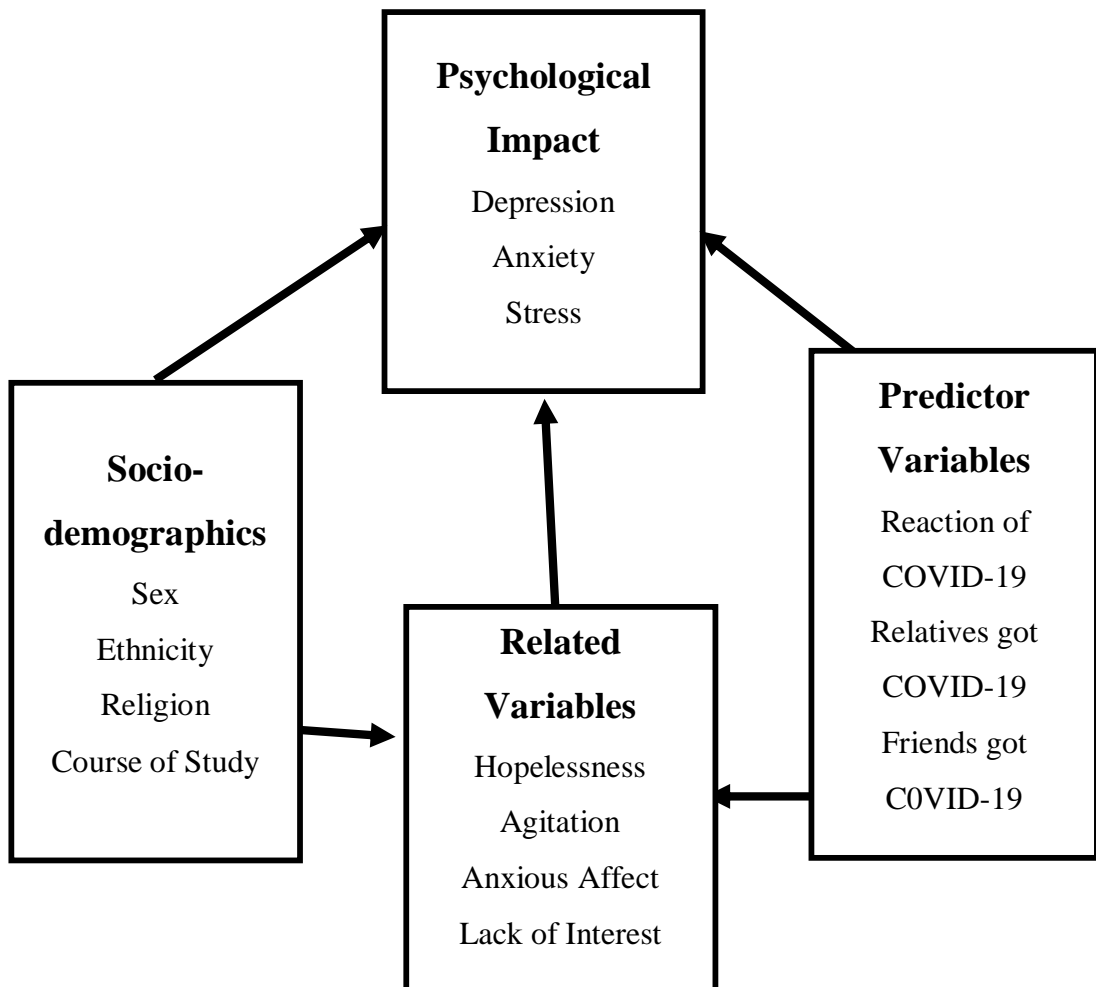


behaviour change (Liao *et al.*, 2014). The Centres for Disease Control (CDC) advocates that it is critical to recognize stress symptoms uprising from the disease and its preventive measures. (Sundarassen *et al.*, 2020). Many studies focused on mental health among the general population healthcare workers (Msn *et al.*, 2020; Ofori *et al.*, 2021). In Ghana, the student population has increased over the years yet little attention has been directed to how the pandemic has affected their psychological health. Their high risk of experiencing stress, anxiety and depression also predisposes them to a higher incidence of suicide. Therefore, the researcher needs to conduct this study as it aims to achieve provisional answers to confirm that there is currently an impact of the global pandemic on the psychological health of the student population in Ghana. Researchers need to investigate the impact of COVID-19 on students' mental health and the need for rapid mediation (Sundarassen *et al.*, 2020). Central University is by far the largest private university in Ghana and has students from various backgrounds and there is no record that such a study has been conducted there. The study will therefore be useful for policy making regarding psychological health care services within institutions especially schools and their accessibility. This global crisis needs to be tackled from all angles including its impact on the mental and psychological health of people. Finally, the findings of the study will add to existing knowledge of how infectious diseases and pandemics impact the psychological health of different groups in a population.

#### **1.4 Conceptual Framework**

“A conceptual framework is the end result of bringing together a number of related concepts to explain and give a broader understanding of the phenomenon under research” (Imenda, 2014). It is the organization of the central ideas and concepts which are retrieved from the review of literature on the related topic. It helps to collocate the key concepts in

a sequence to foster comprehension of the entire research while defining the focus and direction of the research (Shikalepo, 2020). Figure 1.1 shows the proposed association between psychological outcomes and the COVID-19 pandemic. The COVID-19 pandemic caused a halt in many facets of life that were unexpected. Its impact is reported to be of concern. It ignites feelings of agitation, hopelessness and lack of interest in activities or overindulgence which lead to depression, anxiety and stress. These psychological symptoms have been recorded at significant levels among student populations across the globe. Different people respond differently to the impact of the pandemic; thus sex, religion and ethnicity and course of study also have influence on mental health.



*Figure 1.1: Conceptual framework*

*Source: Author's construct*

### **1.5 Research Questions**

- 1) What is the prevalence of stress among students due to the presence of the novel coronavirus?
- 2) What is the prevalence of depression among students because of COVID-19?
- 3) What is the anxiety prevalence among students due to COVID-19?

### **1.6 General Objectives**

The general objective of the study is to assess the psychological impact of the COVID-19 disease on students at the Central University, Miotso, in the Greater Accra Region of Ghana.

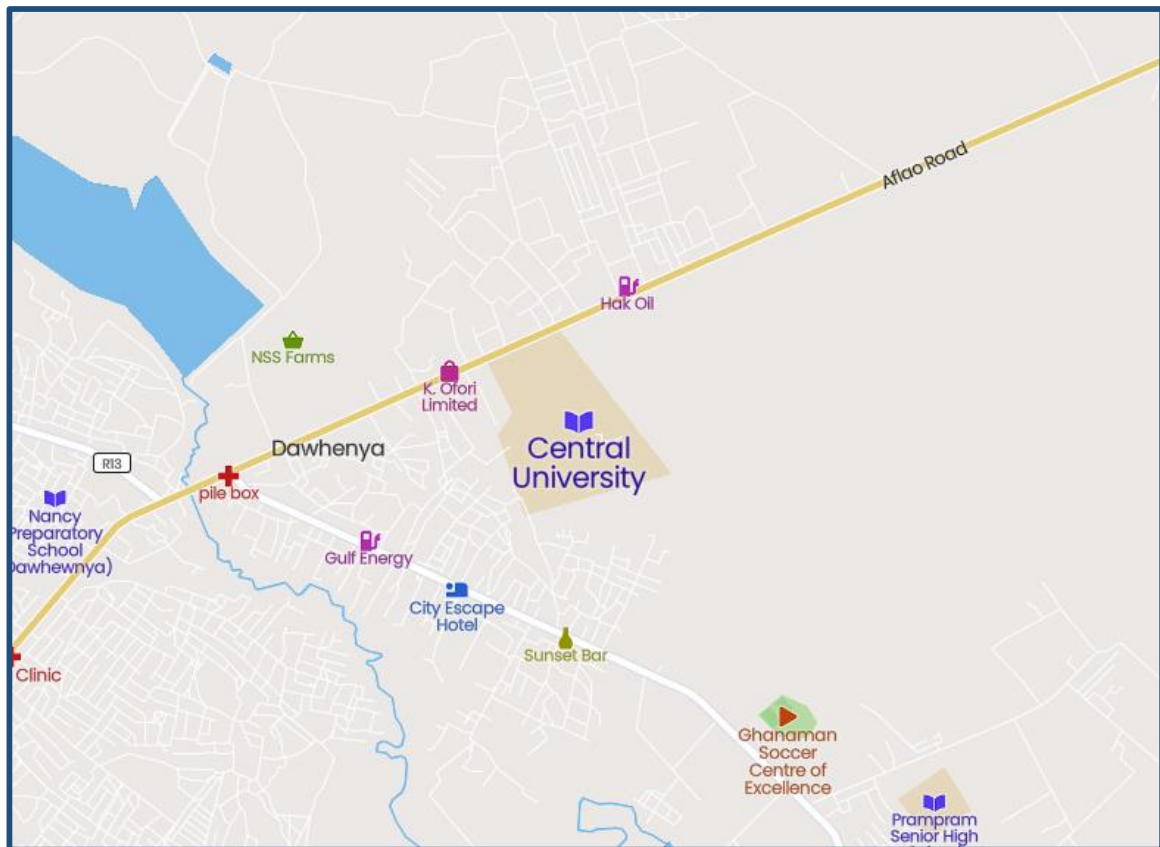
### **1.7 Specific Objectives**

- 1) To assess the prevalence of stress among students due to the presence of the novel coronavirus and its measures.
- 2) To evaluate the prevalence of depression among students because of COVID-19 and its measures.
- 3) To ascertain anxiety prevalence among students due to COVID-19 and its measures.

### **1.8 Profile of the Study Area**

The study seeks to examine the psychological impact of the world-stricken COVID-19 disease among students at Central University. The Central University was established in 1988 by the International Central Gospel Church (ICGC) as a Bible College. In 1998, it became known as the Central University College and in 2016 when it received a presidential charter, it was recognized as an autonomous institution thus becoming fully

known as Central University. It is the largest private university in the country and has four campuses in two regions namely Greater Accra (Miotso, Mataheko, and Christ Temple Graduate School Campus) and Kumasi in the Ashanti Region. Miotso campus, the site for the study is the most populated. It runs diploma, degree, and postgraduate courses ranging from the arts to the sciences. It is made up of students from various backgrounds, both local and international. The university has a student population of about nine thousand (9000). The institution is the choice of the population for the study because of its diversity in the student population which makes it more likely to be representative of university students across the country.



*Figure 1.2 – Map of the Central University, Miotso*

## **1.9 Scope of Study**

The world was at a phase of setting higher goals for development when suddenly a pandemic hit. The coronavirus pandemic usurped at a time the world was not prepared. Its inception has caused many disruptions around the world. With an increase in the number of confirmed cases almost daily, there has been a strain on every sector including education systems and the student population across the globe. The scope of the current study is restricted to the psychological impact the COVID-19 pandemic on university students since its onset with a focus on final year students of the Central University students in Ghana. The relevance of this is to enable the researcher to present evidence-based mental health data and recommend policy and interventions.

## **1.10 Organization of Report**

The study consists of six main chapters that address different aspects of the research. Chapter One introduces the topic under study. It outlines the background of the study, the problem statement, and rationale of study, objectives, research questions, and hypotheses. Chapter Two is the review of literature related to the topic under study. Chapter Three details the methodology adopted for the study. This includes the study design, study population, sampling, data handling and analysis, ethical considerations, and limitation of the study. Chapter Four presents the findings of the study in various forms including tables and graphs. Chapter Five discusses the results and compares them with existing work done by other researchers. Chapter Six concludes the study and makes recommendations to appropriate stakeholders.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Literature review examines existing work in a particular subject area within a time frame and it aims to update the reader on currently available literature on the topic under study (Ramdhani, Ramdhani, and Amin, 2014). It is also considered to be an objective analysis and summary of relevant information that is available in the study area (Cronin, Ryan and Coughlan, 2014). This chapter reviews existing literature related to the study topic and makes the effort to address specific variables related to the study. The literature is grouped into headings for clarification and each heading is discussed in detail. These variables include COVID-19, stress, depression, and anxiety. The review focuses on the ethology and epidemiology of the novel coronavirus, stress and its causes, anxiety and depression, and the causes. It also provides literature on recommendations made from various studies in support of the psychological health of students amidst the COVID-19 outbreak. Regarding the research objectives and questions, available literature was reviewed.

#### **2.2 COVID-19**

Coronaviruses are a large family of viruses that are known to cause a wide range of illnesses from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS) (Adhikari *et al.*, 2020). They affect people of all ages, although certain groups of people are at higher risk of contracting the disease. These include people with comorbidities such as diabetes mellitus, hypertension, and cardiovascular conditions (Azer, 2020). These non-communicable diseases have been associated with ageing; hence it is presumed that people above the age

of 60 are at a higher risk of infectivity. COVID-19 has been identified as the seventh member of the family of coronaviruses within which SARS-CoV and MERS-CoV also belong (Torales *et al.*, 2020). Similar to SARS and MERS, the disease-causing coronavirus is postulated to be of zoonotic origin, although transmitted through the respiratory tract, by direct contact with an infected person, or indirectly through contaminated excreta (Ouassou *et al.*, 2020). Age and sex have been associated with the severity of complications of COVID-19. The rates of hospitalization and death are less than 0.1% in children but increase to 10% or more in older patients, rates lower than SARS and MERS (Azer, 2020). From various investigations, it has been noticed that men are more likely to develop severe complications compared to women as a consequence of SARS-CoV-2 infection (Promislow, 2020). COVID-19 seems to be milder in severity, case fatality rate and transmissibility, increasing the number of asymptomatic cases (Hui *et al.*, 2020).

### **2.3 Etiology and Epidemiology**

Coronavirus is an enveloped, positive single-strand RNA virus. It belongs to the Orthocoronavirinae subfamily (Wu, Chen, and Chan, 2020). The coronavirus has a diameter of 80–120 nm and is single-stranded RNA. Four types of virus have been reported, which include  $\alpha$ -coronavirus,  $\beta$ -coronavirus,  $\delta$ -coronavirus, and  $\gamma$ -coronavirus (Rauf *et al.*, 2020). The spike protein of SARS-CoV-2 utilizes angiotensin-converting enzyme 2 (ACE2) as its cell surface receptor, and utilization influences the tropism of the virus (Azer, 2020). Coronaviruses can cause multiple system infections in various animals and mainly respiratory tract infections in humans (Chen *et al.*, 2020). Researchers and scientists since the onset of the outbreak have been involved in identifying the origin of the virus. Through these investigations, it was hypothesized that the bat was the natural reservoir for the virus, therefore when contact is made in any form with this animal, there

is a higher probability of infection (Wu, Chen and Chan, 2020). Epidemiologically, the COVID-19 virus has been traced to the wet market in Hubei. The first case of the virus was identified on December 1, 2019, according to Wu, Chen and Chan, (2020). Later in December, about 66% of the market staff had been infected causing the shutdown of the market after an epidemiologic alert by the local health authority on December 31, 2019 (Wu, Chen and Chan, 2020). Subsequently, contact with infected persons allowed for the transmission of the virus in no time due to lots of movement within and outside China (Adhikari *et al.*, 2020). The first case of infection imported from China was identified in Thailand on 13<sup>th</sup> January 2020 and it has been noticed that the transmittal rate of COVID-19 seems aggravated than that of SARS and MERS, this notion has been attributed to increased globalization (Rauf *et al.*, 2020).

#### **2.4 Clinical Manifestations (signs and symptoms)**

The novel coronavirus has an average incubation period of 5.2 days; with most developing symptoms within 11 to 15 days of infection (Azer, 2020). COVID-19 like other coronaviruses such as SARS and MERS present with similar clinical symptoms (Zhang *et al.*, 2020). Symptoms range from mild to severe with the most commonly reported ones being fever, cough, pneumonia and myalgia. There have also been records of headaches, diarrhoea and runny nose (Adhikari *et al.*, 2020). Less common clinical manifestations include dizziness, abdominal pain and nausea (Rauf *et al.*, 2020). Although the virus principally is deemed as an acute respiratory infection, current data demonstrate that 36% of infected people have neurological symptoms (Sekhar *et al.*, 2020).



## **2.5 Prevention and Control**

Preventive measures are the strategies implemented to reduce the number of incidental cases while control is efforts to reduce the number of infections. In the early stages of the pandemic, measures encouraged included frequent handwashing, wearing of face masks and social distancing (Rahmet Guner and Firdevs Aktas, 2020). Early screening, diagnosis, isolation, and treatment are also necessary to prevent further spread (Adhikari *et al.*, 2020). The production and availability of vaccines have also contributed to the prevention and control of the pandemic. Vaccines do not necessarily protect against the infection however; they protect individuals from the disease in its severity (CDC, 2022).

## **2.6 Effect of COVID-19 on education**

On March 11, 2020, WHO declared COVID-19 a pandemic since at this point, the virus had transcended beyond many borders (Moghe, Kotecha and Patil, 2020). Countries that had reported the detection of the virus had to adopt preventive measures outlined by WHO in order to control its spread. One of such measures was the closure of schools. In China, U.S and Europe, schools had been shut down and learning was to be done remotely. The case of Ghana was no different. When the virus was detected on the 13<sup>th</sup> of March, the government called for the closure of schools. Although school closure contributed to the effective control of the spread of the virus, it had its own implications (Upoalkpajor and Upoalkpajor, 2020). Many young people tend to be influenced by their social environment. This implies that learning is easier for them when they are with their social counterparts and a separation will negatively affect their learning and academic progress (Aucejo *et al.*, 2020). The closure of schools had a greater negative effect on students from the less privileged socioeconomic background because the limited access to digital resources and

high cost of internet connectivity to engage in online learning disrupted the academic lives of these students (Lee, 2020).

## **2.7 COVID-19 and Psychological Health**

Data gathered during the SARS and MERS outbreaks previously show that epidemics and pandemics have a significant impact on the mental health of populations and individuals at risk (Torales *et al.*, 2020). Evidence from previous studies recognized the implication of imposing measures on mental health. For instance, during the MERS outbreak in Saudi Arabia, it was identified that increased levels of anxiety were positively correlated with avoidance behaviours such as the ban on cross-border movement and visiting public places (Alyoubi *et al.*, 2021) In 2020, WHO iterated its concern about the mental health and psycho-social consequences of the pandemic. It stated that public health measures for prevention and control were likely to lead to loneliness, anxiety, depression and suicidal behaviour (Kumar and Nayar, 2021). This concern of the WHO was reiterated by psychologists and mental health professionals who also emphasized that there was going to increase in these psychological implications (Kumar and Nayar, 2021). The pandemic has impacted its psychological effect on diverse populations including health care workers and students. Students have been identified as a vulnerable population when it comes to mental distress (Wang *et al.*, 2020). These mental health problems tend to affect attention and understanding as well as impose a long-lasting effect on the overall well-being of this population. (Lijun Kang, Yi Li *et al.*, 2020). Age and sex are recognized risk factors for penurious mental health consequences during the pandemic. For instance, a study conducted in Canada found that younger adults had a higher prevalence of generalized anxiety disorder juxtaposed to older adults who were over the age of 60 (Nwachukwu *et al.*, 2020). Additionally, studies from different countries showed that females were at a

higher risk of developing mental health conditions compared to their male counterparts (Alyoubi *et al.*, 2021).

## **2.8 Psychological Impact of COVID-19 on Students**

Outbreaks are nothing distant from humanity, however, the COVID-19 pandemic is by far the largest outbreak humanity has experienced in decades. Studies have shown that a disruption in the natural occurrence of events such as natural disasters and pandemics exert an impact on the population in terms of economics, health and education (Yunhe Wang *et al.*, 2021), Kumar and Nayar, 2021). In a study conducted on pandemics and even natural disasters, one group of people that has been reported to experience the strain is students, particularly university students. This is because of the stage of development they find themselves in. A study conducted in Ethiopia to identify the psychological effects of the pandemic on universities using the DASS-21 as a data collection tool reported significant levels of depression and anxiety with p-values of 0.031 and 0.007 respectively (Aylie, Mekonen and Matiyas, 2020). Other studies on Chinese and American students also recorded significant levels of a psychological impact resulting from the pandemic and its associated measures. Similarly, in Bangladesh, Dhar and his colleagues researched the psychological impact of COVID-19 on university students. Their results indicated that out of 15,543 students, 44.59% were suffering from severe anxiety, whereas, 48.41% were moderately, and 3.82% were mildly suffering from anxiety. They discovered that academic delays, low social support and the economic situation were risk factors for the levels of anxiety.

## **2.9 Depression, Anxiety and Stress Scale (DASS)**

The Depression Anxiety and Stress Scales (DASS) by Lovibond and Lovibond is a widely used screening tool to assess symptoms of depression, anxiety, and stress in community settings. It was initially a 42-item scale and was later revised to 21. This instrument comprises three sub-scales: (1) the Depression sub-scale which measures hopelessness, low self-esteem, and low positive affect; (2) the Anxiety scale which assesses autonomic arousal, musculoskeletal symptoms, situational anxiety, and subjective experience of anxious arousal; and (3) the Stress scale which assesses tension, agitation, and negative affect (Tran *et al*, 2013). Each subscale has seven products, each of which is graded on a Likert scale from 0 to 3. Each subscale's total score is calculated by adding the item scores and multiplying them by two. A higher score means that the symptoms are more severe (Woon *et al.*, 2020). It is a widely used tool thus its validity has been measured through various studies. Such studies include 'The validity of the 21-item version of the Depression Anxiety Stress Scales as a routine clinical outcome measure' by Marie Ng and her colleagues.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter discusses the methods used in the study. It describes the study design, population, sample size calculation and sampling technique, data collection tools and procedures and pretesting of questionnaires. Additionally, it presents how data obtained was managed and analysed. Finally, it discusses the ethical issues observed and also outlines the limitations and assumptions. They are presented as follows:

#### **3.2 Research Methods and Design**

A quantitative cross-sectional descriptive design was used to assess the psychological impact of the novel coronavirus (COVID-19) among students of the Central University in Miotso. A cross-sectional study is a type of research in which data is obtained from a portion of the population to help address research questions of interest, and the data is collected at a single point in time (Oslen & St. George, 2004). The quantitative approach was chosen because it enabled the researcher to administer questionnaires to a cross-section of students from the entire student population participating in this study where the psychological impact was assessed and the findings were used to infer the situation across university students in the Greater Accra Region.

#### **3.3 Data Collection Techniques and Tools**

Data for the study was collected through the use of a structured questionnaire. The questionnaire had three sections. Section A consisted of demographic data such as age, ethnicity and religion while Section B consisted of data on depression, anxiety and stress

with the use of the Depression, Anxiety and Stress Scale (DASS-21) by Lovibond and Lovibond, 1995. DASS is a cross-culturally validated tool that has been used by various researchers to assess the psychological impacts of pandemic disease. There are 21 items and three subscales. Anxiety subscale (DASS-A), depression subscale (DASS-D), and stress subscale (DASS-S). There are seven items on each subscale. Section C consisted of COVID-19 related questions. The data was collected from final year undergraduate students of the Central University, Miotso. Participants spent approximately 5 to 10 minutes in answering the questionnaire.

### 3.3.1 Measures on the DASS-21

**Depression:** A score of 10 and above in DASS-D indicates the presence of depression while any score less than this indicates the absence of it.

**Anxiety:** A score below 8 is an indication of no anxiety and a score of 8 and above in DASS-A indicates the presence of anxiety.

**Stress:** A score ranging from 0 to 14 shows there is no stress whereas a score above 14 is an indication of the presence of stress

**Table 3.1 DASS Rating**

Rating	Depression	Anxiety	Stress
Normal (no impact)	0-9	0-7	0-14
Presence of Impact	10+	8+	15+

### 3.4 Study Population

The study population was the final year regular students at the Central University.

#### 3.4.1 Inclusion Criteria

Only level 400 students at the Miotso Central University were included in the study. The researcher intended to identify how those who had adjusted to the school system and were met with the pandemic have been affected psychologically, hence the inclusion criteria.

#### 3.4.2 Exclusion criteria

First, second- and third-year students, diploma and post graduate students were not included in the study. Teaching and non-teaching staff were also excluded.

**Table 3.2 Study Variables**

<b>Variables</b>	<b>Operational Definition</b>	<b>Scale of Measurement</b>
<b>Independent Variables</b>		
<b>Age</b>	Age of respondent at the time of taking the survey	Numerical (Discrete)
<b>Gender</b>	Sex of respondent	Binary (male and female)
<b>Ethnicity</b>	The tribe to which respondents belong	Categorical (nominal)
<b>Course of Study</b>	Program or subject respondent is studying at school for which a certificate will be received	Categorical (nominal)
<b>Religion</b>	Spiritual affiliation of the respondent	Categorical (nominal)

<b>Dependent Variable</b>		
<b>Psychological outcomes specifically; stress, depression and anxiety</b>	Mental sequelae identified during the onset of the pandemic categorized as no impact and presence of impact	Categorical (nominal)

### 3.5 Sampling Technique and sample size

A systematic sampling technique was used to select the sample from the study population for the study. The choice of using a systematic sampling approach is because of the large student population and the unavailability of a student database to the researcher.

The sample of a study is a portion of the population that is used for the study from which inference or projections to the general population can be made. The study of the psychological impact of the novel coronavirus is quite limited hence the difficulty in identifying the prevalence of the condition. Because of that, the 50/50 method of calculation was used to calculate the sample size for the study. The sample size was calculated using Cochran's formula as shown below.

$$n = \frac{Z^2 \times pq}{e^2}$$

Where,

$n$  = sample size (Cochran, 1977).

$Z$  = the z-score that corresponds with 95% confidence interval which is 1.96.

$p$  = 50% of the population experienced the psychological impact of COVID-19 which equals 0.50.

$q$  = 50% of the population who do not experience the psychological impact of COVID-19 equals  $1-0.50 = 0.50$ .



$e$  = Margin of error set at 5% (0.05).

Therefore,

$$n = \frac{(1.96)^2 \times (0.5 \times 0.5)}{(0.05)^2} \cong 384$$

A non-response rate of 10 % resulting in about 38 respondents was added to the minimum sample size to get 422 participants.

### **3.6 Pretesting**

The DASS-21 has been validated for use in different studies conducted recently to assess the psychological impact of the coronavirus on the general public and students. Pretesting of the questionnaire was conducted at the Mateheko Central University campus located in East Kaneshie, which has similar characteristics as that of students of the Miotso Central University campus. Results from the pretesting were excluded from the main study. Pretesting was done primarily to decide the length of time a respondent would spend on a questionnaire, the questionnaire's reliability, and an evaluation of respondents' interpretation of the questionnaire, as well as make any possible changes and corrections before the data collection began. A few questions were re-worded, and others were removed after the pretesting was completed.

### **3.7 Data Handling**

To arrive at excellent outcomes of the data analysis, it is incumbent that the data is handled and managed properly. For this reason, the researcher ensured that certain high standards were adhered to in order to achieve the purpose for which the data was gathered.

After manually screening for wholeness and errors, the completed questionnaires were hand-coded and inserted into Microsoft Excel. A research assistant and the principal researcher double-entered the data into Excel to ensure data consistency. The two data entries were then compared by the principal researcher. Errors and anomalies were identified, addressed, and corrected and the data was exported into STATA 17 for more cleaning. Running frequencies on each variable were used to clean the information. This searched for data that had been marked incorrectly. The data that were inconsistently coded were tested against raw data from the questionnaire and then fixed.

### **3.8 Data analysis**

All statistical analyses were performed using STATA statistical software package (StataCorp. 2015. *Stata Statistical Software: Version 17*. StataCorp LP, College Station, TX, USA).

Univariate analysis was carried out to obtain summary information on the demographic characteristics of the study participants and represented by tables and graphs. Odds ratios (OR), 95% confidence intervals (CIs) and the level of statistical significance was set at  $p < 0.05$  for all tests. Results were expressed as means, frequencies, and percentages and in graphs. Categorical variables were then expressed as absolute values (percentage) and continuous variables were expressed as mean value  $\pm$  (standard deviation). A Pearson Chi-Square test was also carried out to derive associations between independent and dependent variables and the p-values boldly stated. Multivariate logistic regression was also run with all the independent variables on the outcome variables to deduce the odds ratio and identify which variables were significant in predicting depression, anxiety and stress.

### **3.9 Ethical Considerations**

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Ensign Global College and administrative permission was sought from Central University, Miotso. Respondents were duly informed about the purpose of the study before they proceeded to take the survey. A consent was sought by respondents and were informed that participation was voluntary and they had every right to proceed or back out. Anonymity and confidentiality were maintained as participants did not have to disclose their identities.

### **3.10 Limitations of the Study**

The study is a cross-sectional study; thus, data were collected at one point in time and the main limitation of this study is that it is difficult to establish a cause-and-effect relationship among the study variables. This type of study also does not allow for follow-up of respondents. Data collected from one university across the country may not be representative of all tertiary students in Ghana. Also, data were collected from only final year students and this might limit its generalizability to students from all levels of study. There was also no data collected before the pandemic to allow comparison between pre-pandemic and post-pandemic. Again, this study is a retrospective study and is constrained by recall bias where students might have difficulty remembering events and how they unfolded.

### **3.11 Assumptions of the Study**

All responses from participants were considered to be given truthfully with all fairness in this analysis. Moreover, requirements imposed on the predictive models used in this study were met, enhancing the internal validity of the results.

## CHAPTER FOUR

### RESULTS

#### 4.1 Introduction

This chapter outlines the findings from the study. The results are presented in the form of tables and graphs. All the data was entered into Microsoft Excel and imported to STATA version 17.0 for the analysis using a series of tests to describe it including descriptive statistics and a multivariate logistic regression model.

#### 4.2 Socio-demographic characteristics of respondents

Four hundred and twenty-two (422) questionnaires were distributed to final year students of the Central University for the data collection. Of the 422 questionnaires distributed, three hundred and fifty-one (351) filled forms were retrieved. This represents a response rate of 83.2%.

Table 4.1 below describes the demographic characteristics of age, sex, ethnicity, religion and course of study of the study participants. The minimum age was 22 representing about 15.67% and the average age being  $23.41 \pm 0.96SD$ . Of the 351 respondents, 202 (57.55%) were females representing the majority. Akan (37.61%) was the majority ethnic group, others (24.22%) represented students from the northern part of Ghana and other nationalities including Nigerians and Beninois. Christians formed a larger portion of the respondents (82.34%) and only 6 respondents from other religions. Of the total participants, 122 (34.76%) were students from Engineering and Technology department, 100 (28.49%) from the Health Sciences, 52 (14.84%) from Business, 38 (10.83%) from Arts and Social Science and 39 (11.11%) from Architecture.

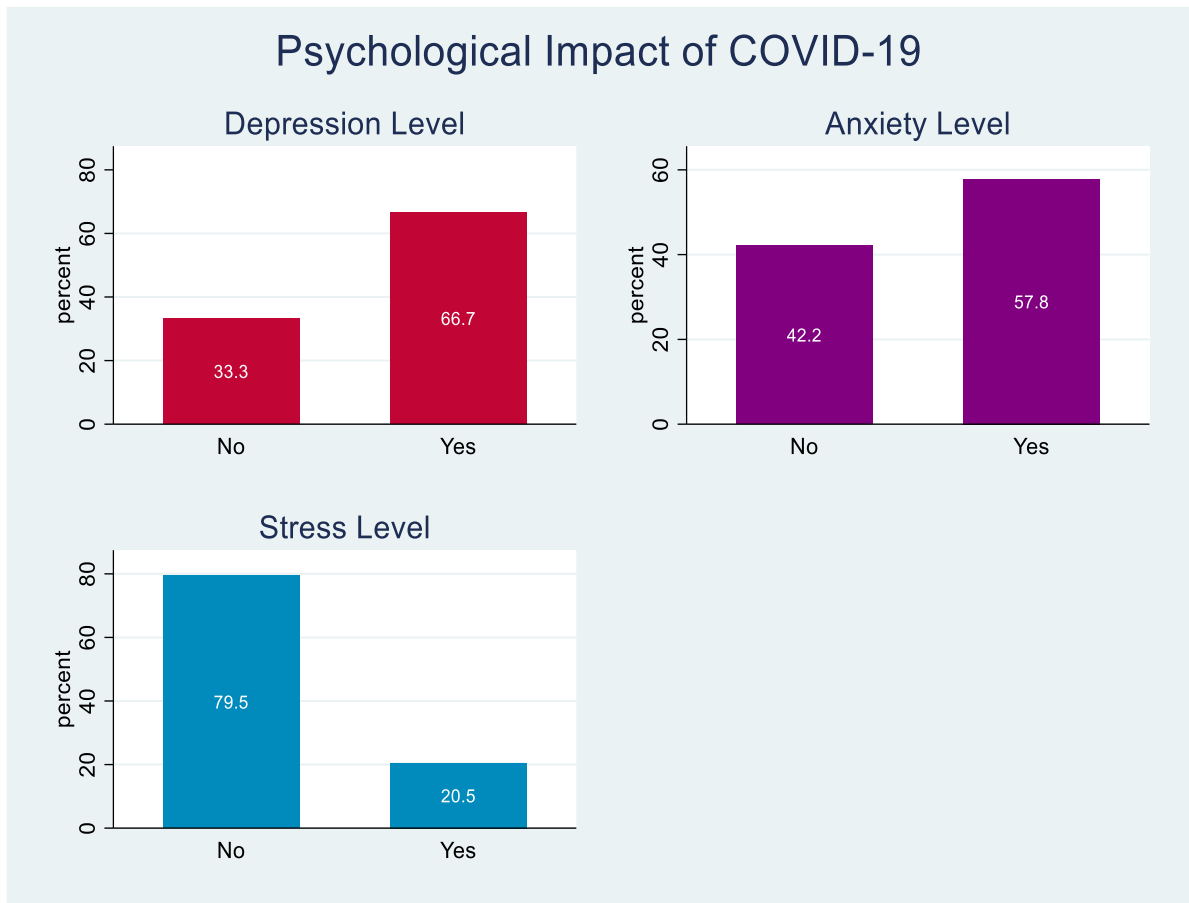
**Table 4.1** Socio-demographics characteristics of

<b>Characteristic</b>	<b>Frequency (N=351)</b>	<b>Percentage (%)</b>
<b>Age</b>		
22	55	15.67
23	145	41.31
24	112	31.91
25	27	7.69
26	12	3.42
<b>Sex</b>		
Male	149	42.45
Female	202	57.55
<b>Ethnicity</b>		
Akan	132	37.61
Ewe	54	15.38
Ga Dangme	80	22.79
Other	85	24.22
<b>Course of study</b>		
Architecture	39	11.11
Business	52	14.81
Engineering and Technology	122	34.76
Health Sciences	100	28.49
Arts and Social Science	38	10.83
<b>Religion</b>		
Christian	289	82.34
Muslim	59	16.81
Other	3	0.85

**Source:** *Field data, 2022*

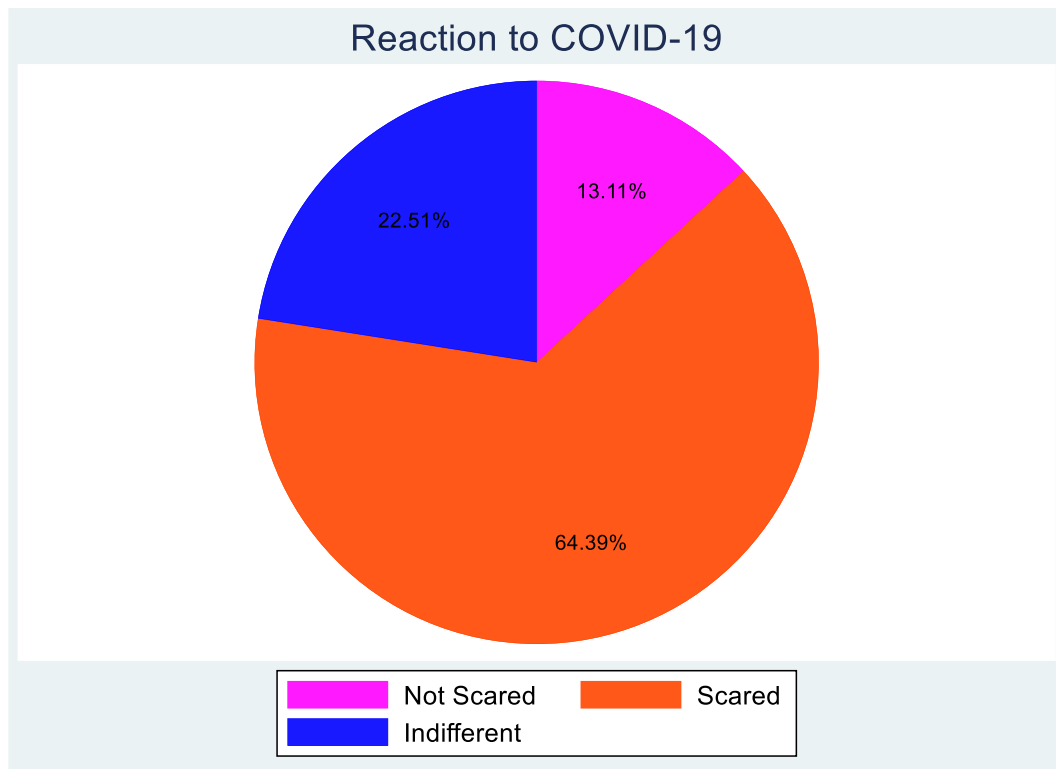
### 4.3 Prevalence of depression, anxiety and stress

To determine the prevalence of depression, anxiety and stress among the students, the DASS-21 was distributed to the participants and the results are shown below. With regards to depression, 66.7% (234) of the respondents indicated in the affirmative while 33.3% reported no signs of depression. The prevalence of anxiety among the students was reported to be 203 constituting 57.8% while the majority of the respondent (79.5%) did not experience any forms of stress, with only 72(20.5%) who responded to experiencing symptoms of stress during the pandemic.



*Figure 4.1 Distribution of Depression, Anxiety and Stress among students*

Participants were to indicate their initial reaction to the COVID-19 at its onset. 64.39% indicated that they were scared, 13.11% had no fears of the pandemic and the remaining 22.51% responded to being indifferent about the pandemic. This may be due to many reasons including false information about the pandemic and the strict measures put in place to curb the spread as well as the death toll from the pandemic in other countries.



*Figure 4.2 Responses to the initial reaction of COVID-19*

#### **4.4 Bivariate Analysis of the psychological impact and the independent variables.**

A Pearson's Chi-Square test was run individually on the three outcome variables (depression, anxiety, and stress) to assess the level of association in each with selected and independent variables (sex, ethnicity, religion and course of study). The results are presented in Table 4.3 below. More females (142) presented with depression than their male counterparts. In the same regard, many of them experienced anxiety (59.11%) and stress (58.3%) compared to males. The majority of respondents who experienced the

psychological impact were of the Christian faith. From the analysis, there was no observed association between sex, religion and ethnicity and the psychological impact (depression, anxiety and stress) since their p-values were greater than 0.05. On the other hand, the Course of Study was found to be statistically significant with depression, anxiety and stress,  $p\text{-value} < 0.05$ .



**Table 4.3 Bivariate Analysis of Psychological Impact and Independent Variables**

Variable	Depression			Anxiety			Stress		
	Yes (%)	No (%)	<i>p-value</i>	Yes (%)	No (%)	<i>p-value</i>	Yes (%)	No (%)	<i>p-value</i>
<b>Sex</b>									
Male	92(39.32)	57 (48.72)	<b>0.109</b>	83(40.89)	66(44.59)	<b>0.513</b>	30(41.67)	119(42.65)	<b>0.895</b>
Female	142(60.68)	60 (51.28)		120(59.11)	82(55.41)		42(58.33)	160(57.35)	
<b>Religion</b>									
Christian	191(81.62)	98(83.76)	<b>0.321</b>	168(82.76)	121(81.76)	<b>0.687</b>	55(76.39)	234(83.87)	<b>0.207</b>
Muslim	42(17.95)	17(14.53)		34(16.75)	25(16.89)		17(23.61)	42(15.05)	
Other	1(0.43)	2(1.71)		1(0.49)	2(1.35)		0(0.00)	3(1.08)	
<b>Ethnicity</b>									
Akan	87(37.18)	45(38.46)	<b>0.226</b>	71(34.98)	61(41.22)	<b>0.407</b>	20(27.78)	112(40.14)	<b>0.211</b>
Ewe	30(12.82)	24(20.51)		35(17.24)	19(12.84)		11(15.28)	43(15.41)	
Ga Dangme	56(23.93)	24(20.51)		44(21.67)	36(24.32)		19(26.39)	61(21.86)	
Other	61(26.07)	24(20.51)		53(26.11)	32(21.62)		22(30.56)	63(22.58)	
<b>Course</b>									
Architecture	17(7.26)	22(18.80)	<b>&lt;0.001*</b>	21(10.34)	18(12.16)	<b>&lt;0.001*</b>	6(8.33)	33(11.83)	<b>0.001*</b>
Business	23(9.83)	29(24.79)		21(10.34)	31(20.95)		2(2.78)	50(17.92)	
Health Sciences	64(27.35)	36(30.77)		43(21.18)	57(38.51)		24(33.33)	76(27.24)	
Arts and S. Sciences	34(14.53)	4(3.42)		28(13.79)	10(6.76)		5(6.94)	33(11.83)	
Engineering/ Tech	96(41.03)	26(22.22)		90(44.33)	32(21.62)		35(48.61)	87(31.18)	

#### **4.5 Multivariate Logistic Regression**

Sex, ethnicity, religion, course of study, relative got COVID-19 and reaction to COVID-19 were entered used for the multivariate logistic regression with depression, anxiety and stress. The results from the analysis showed that females were 1.3 times more likely to experience depression although the p-value was not significant at the 0.05 alpha level. The odds of experiencing depression as Muslim was 1.2 (95% CI=0.450-3.191), adjusting for all other variables even though there was no significance. Although there was no significance between an initial reaction to the pandemic and depression, those who had fears were 1.6 times more likely to be depressed while those who were indifferent had an odds ratio of 1.9 holding all other variables constant. For those whose relatives contracted the disease, they were 1.5 times more likely to get depressed compared to those who indicated that none of their relatives for COVID-19. The course of study was statistically significant with depression; students in the health sciences (p-value=0.028), arts and social sciences (p-value<0.001) and engineering and technology (p-value<0.001) were 2.5 (95% CI=1.101-5.573), 12.6 (95% CI=3.550-44.394) and 4.9(95% CI=2.166-11.070) times more likely to feel depressed than their mates in the field of architecture.

**Table 4.4 Multivariate Analysis of Depression and Independent Variables**

Variable	Categories	Depression		OR (95% CI)	<i>p-value</i>	AOR (95% CI)	<i>p-value</i>
		Yes (%)	No (%)				
Sex	Male	92(39.32)	57(48.72)	1		1	
	Female	142(60.68)	60(51.28)	1.5(0.937-2.294)	<b>0.094</b>	1.3(0.770-2.049)	<b>0.361</b>
Religion	Christian	191(81.62)	98(83.76)	1		1	
	Muslim	42(17.95)	17(14.53)	1.3(0.686-2.342)	<b>0.449</b>	1.2(0.450-3.191)	<b>0.718</b>
	Other	1(0.43)	2(1.71)	0.3(0.230-2.864)	<b>0.269</b>	0.3(0.023-4.374)	<b>0.391</b>
Ethnicity	Akan	87(37.18)	45(38.46)	1		1	
	Ewe	30(12.82)	24(20.51)	0.6(0.339-1.234)	<b>0.186</b>	0.5(0.256-1.059)	<b>0.072</b>
	Ga Dangme	56(23.93)	24(20.51)	1.2(0.663-2.196)	<b>0.538</b>	0.8(0.392-1.481)	<b>0.423</b>
	Other	61(26.07)	24(20.51)	1.3(0.726-2.381)	<b>0.367</b>	0.9(0.397-2.324)	<b>0.930</b>
Course	Architecture	17(7.26)	22(18.80)	1		1	
	Business	23(9.83)	29(24.79)	1.2(0.445-2.370)	<b>0.951</b>	1.1(0.458-2.641)	<b>0.832</b>
	Health Sciences	64(27.35)	36(30.77)	2.3(1.083-4.886)	<b>0.030*</b>	2.5(1.101-5.573)	<b>0.028*</b>

	Arts and S. Sciences	34(14.53)	4(3.42)	11(3.267-37.038)	<b>&lt;0.001*</b>	12.6(3.550-44.394)	<b>&lt;0.001*</b>
	Engineering/ Tech	96(41.03)	26(22.22)	4.8(2.219-10.289)	<b>&lt;0.001*</b>	4.9(2.166-11.070)	<b>&lt;0.001*</b>
Relatives got COVID	Yes	45(19.23)	189(80.77)	1.6(0.861-3.046)		1.5(0.761-2.969)	
	No	15(12.83)	102(87.18)	1	<b>0.135</b>	1	<b>0.240</b>
Initial reaction to COVID	Not Scared	26(11.11)	20(17.09)	1		1	
	Scared	154(65.81)	72(61.54)	1.6(0.862-3.141)	<b>0.131</b>	1.6(0.781-3.265)	<b>0.199</b>
	Indifferent	54(23.08)	25(21.37)	1.7(0.784-3.522)	<b>0.185</b>	1.9(0.839-4.517)	<b>0.121</b>

#### **4.6 Multivariate Logistic Regression of Anxiety and Independent Variables**

Females were again 1.1 times more likely to have anxiety than males, while Ewes and other tribes were 1.7 and 1.5 times more likely to have anxiety respectively. Albeit, there was no significance for these because the p-values were greater than 0.05. In adjusting for all other variables, students from the field of engineering and technology were 1.9 with no significance (p-value =0.104) although there was significance (p-value=0.021) for the unadjusted. Participants whose relatives got COVID-19 were 1.2 times more likely to be anxious while those who showed fear of the disease were 1.4 times more likely to be anxious compared to those who had no fears. Nonetheless, their p-values were  $> 0.05$ , hence there was no significance.

**Table 4.5 Multivariate Analysis of Anxiety and Independent Variables**

Variable	Categories	Anxiety		OR (95% CI)	<i>p-value</i>	AOR (95% CI)	<i>p-value</i>
		Yes	No				
Sex	Male	83(40.89)	66(44.59)	1		1	
	Female	120(59.11)	82(55.41)	1.2(0.758-1.786)	<b>0.488</b>	1.1(0.845-3.469)	<b>0.829</b>
Religion	Christian	168(82.76)	121(81.76)	1		1	
	Muslim	34(16.75)	25(16.89)	0.9(0.556-1.727)	<b>0.943</b>	0.9(0.399-2.417)	<b>0.968</b>
	Other	1(0.49)	2(1.35)	0.4(0.032-4.017)	<b>0.407</b>	0.7(0.058-8.462)	<b>0.781</b>
Ethnicity	Akan	71(34.98)	61(41.22)	1		1	
	Ewe	35(17.24)	19(12.84)	1.6(0.822-3.047)	<b>0.170</b>	1.7(0.845-3.465)	<b>0.136</b>
	Ga Dangme	44(21.67)	36(24.32)	1.1(0.601-1.834)	<b>0.864</b>	0.9(0.472-1.615)	<b>0.665</b>
	Other	53(26.11)	32(21.62)	1.4(0.816-2.482)	<b>0.214</b>	1.5(0.670-3.413)	<b>0.319</b>

Course	Architecture	21(10.34)	18(12.16)	1		1	
	Business	21(10.34)	31(20.95)	0.6(0.251-1.343)	<b>0.204</b>	0.5(0.201-1.171)	<b>0.108</b>
	Health Sciences	43(21.18)	57(38.51)	0.6(0.307-1.360)	<b>0.251</b>	0.5(0.223-1.104)	<b>0.086</b>
	Arts and S. Sciences	28(13.79)	10(6.76)	2.4(0.921-6.255)	<b>0.073</b>	2.3(0.834-6.243)	<b>0.108</b>
	Engineering /Tech	90(44.33)	32(21.62)	2.4(1.141-5.092)	<b>0.021*</b>	1.9(0.873-4.232)	<b>0.104</b>
Relatives got COVID	Yes	38(18.72)	22(14.86)	1.3(0.743-2.342)	<b>0.344</b>	1.2(0.652-2.273)	<b>0.537</b>
	No	165(81.28)	126(85.14)	1		1	
Initial reaction to COVID	Not Scared	25(12.32)	21(14.19)	1		1	<b>1</b>
	Scared	140(68.97)	86(58.11)	1.4(0.722-2.591)	<b>0.337</b>	1.4(0.687-2.691)	<b>0.378</b>
	Indifferent	38(18.72)	41(27.70)	0.8(0.376-1.614)	<b>0.501</b>	0.8(0.365-1.744)	<b>0.572</b>

#### **4.7 Multivariate Logistic Regression of Stress and Independent Variables**

With respect to stress, the majority of the students did not experience symptoms. The multivariate regression analysis showed that Muslims had an increased risk (OR=1.9, p-value >0.236) of being stressed although there was no statistical significance. There was an increased risk for stress in relation to ethnicity. With Akan as the reference, Ewes, Ga Dangmes and Others were 1.3, 1.7, 1.3 times more likely to have stress sequentially, although there was no significance in their p-values. For the course of study, health science students were 1.3 times more likely and engineering and technology students were also 1.8 times more likely to experience stress adjusting for all other variables, however, their p-values were not statistically significant. Females were however 0.1 times less likely to be stressed compared to males despite the non-significance of the p-value. Fear of COVID-19 (OR=1.1, p-value > 0.05) and having a relative who contracted the disease (OR=1.4, p-value=0.306) put students at a higher risk of experiencing stress even without a significant p-value.



**Table 4.6 Multivariate Analysis of Stress and Independent Variables**

Variable	Categories	Stress		OR (95% CI)	<i>p-value</i>	AOR (95% CI)	<i>p-value</i>
		Yes (%)	No (%)				
Sex	Male	30(41.67)	119(42.65)	1		1	
	Female	42(58.33)	160(57.35)	1.04(0.616-1.760)	<b>0.880</b>	0.9(0.499-1.529)	<b>0.637</b>
Religion	Christian	55(76.39)	234(83.87)	1		1	
	Muslim	17(23.61)	42(15.05)	1.7(0.912-3.251)	<b>0.094</b>	1.9(0.661-5.351)	<b>0.236</b>
	Other	0(0.00)	3(1.08)	1		1	
Ethnicity	Akan	20(27.78)	112(40.14)	1		1	
	Ewe	11(15.28)	43(15.41)	1.4(0.634-3.238)	<b>0.388</b>	1.3(0.557-3.014)	<b>0.549</b>
	Ga Dangme	19(26.39)	61(21.86)	1.7(0.865-3.516)	<b>0.120</b>	1.7(0.835-3.658)	<b>0.138</b>
	Other	22(30.56)	63(22.58)	2.0(0.991-3.859)	<b>0.053</b>	1.3(0.505-3.583)	<b>0.552</b>
Course	Architecture	6(8.33)	33(11.83)	1		1	

	Business	2(2.78)	50(17.92)	0.2(0.042-1.157)	<b>0.074</b>	0.2(0.035-1.026)	<b>0.054</b>
	Health Sciences	24(33.33)	76(27.24)	1.7(0.650-4.644)	<b>0.271</b>	1.3(0.473-3.713)	<b>0.593</b>
	Arts and S. Sciences	5(6.94)	33(11.83)	0.8(0.231-3.001)	<b>0.780</b>	0.7(0.175-2.486)	<b>0.539</b>
	Engineering/ Tech	35(48.61)	87(31.18)	2.2(0.852-5.746)	<b>0.103</b>	1.8(0.678-5.012)	<b>0.231</b>
Relatives got COVID	Yes	17(23.61)	43(15.41)	1.7(0.900-3.197)	<b>0.102</b>	1.4(0.729-2.736)	<b>0.306</b>
	No	55(76.39)	236(84.59)	1		1	
Initial reaction to COVID	Not Scared	8(11.11)	38(13.62)	1		1	
	Scared	51(70.83)	175(63.72)	1.4(0.607-3.155)	<b>0.439</b>	1.1(0.480-2.672)	<b>0.777</b>
	Indifferent	13(18.06)	66(23.66)	0.9(0.356-4.461)	<b>0.893</b>	0.9(0.323-2.425)	<b>0.813</b>

## **CHAPTER FIVE**

### **DISCUSSION**

#### **5.1 Introduction**

This section presents a discussion of the findings. The first part is a discussion of the socio-demographic characteristics of the respondents. The subsequent parts are discussed in relation to the study objectives with appropriate citations. The findings of this study are discussed in this chapter. The following sections make up the chapter: a review of the key results, a comparison of the major findings to current studies, an overview of the findings and a discussion of the study's strengths and shortcomings.

#### **5.2 Socio-Demographics**

Out of the 351 students who took the survey, 202 were females constituting 57.55% of the total respondents whereas the males were 149 representing 42.45%. The mean age was 23.41 with the minimum and maximum age being 22 and 26 respectively. With regards to religion, Christians constituted the majority. Also, many of the respondents were from the College of Engineering and Technology. This college offers courses such as computer science, information technology and civil engineering. The second largest respondents were from the health sciences offering courses such as pharmacy, nursing and physician assistantship. The minority of participants were from the faculty of architecture. A similar study conducted in Ethiopia also recorded more females partaking in the survey compared to males (Aylie, Mekonen and Matiyas, 2020). This is an indication of the opportunities that have been given to females in the quest to empower and educate them. Likewise, a U.S study (Wang et al, 2020) on the impact of the pandemic on college student's mental health recorded more females participating in the study than males and also most of their study participants were from the College of Engineering in the Texas A&M University,

just as in this study. Contrarily, Id and Dema, 2022 in their study reported having more males as participants than females.

### **5.3 Psychological Impact of COVID-19 (Depression, Anxiety, Stress)**

Since the advent of the coronavirus, various studies conducted to explore the psychological and mental health impact of the disease on university students have reported considerable degrees of depression, anxiety and stress among other psychological effects such as post-traumatic stress disorder (PTSD) and suicidal ideation (Batra *et al.*, 2021). Among the final year students of the Central University who took the survey, the prevalence of depression is reported to be 66.66% which ranging from mild to severe depression. Mild to extremely severe anxiety was reported to be 57.84% among the participants. Only 20.51% of the participants experienced stress as a result of the pandemic. A study conducted in Egypt using the DASS-21 reported high levels of depression among the students at a rate of 70.5%. Of this 70.5%, 24.6%, 36.3% and 9.7% were mild, moderate and severe depression respectively with no respondent reporting symptoms of extremely severe depression (Ghazawy *et al.*, 2021). In the same study, anxiety and stress were prevalent at rates of 53.6% and 47.8% respectively among the students. The Ethiopian study conducted among 322 university students recorded the prevalence of depression to be 21.3%, anxiety to be 27.1% and stress to be 32.5% (Aylie, Mekonen and Matiyas, 2020). Comparatively, the research recorded a higher prevalence of depression and anxiety than the study conducted in Ethiopia although stress among students was found to be lower in this particular study than that reported in Ethiopia. The Egyptian students had higher depression and stress prevalence than the current study though this study recorded a higher anxiety rate than the Egyptian study. Other studies conducted in China, Malaysia, Bhutan and Italy all reported moderate to severe depression, anxiety and stress even with the use of different scales such

as the Generalized Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire (PHQ-9).

#### **5.4 Bivariate and Multivariate Analysis of Dependent and Independent Variables**

The Pearson Chi<sup>2</sup> test showed no significant association between ethnicity and religion and depression. This is consistent with similar studies conducted in Ethiopia (Aylie, Mekonen and Matiyas, 2020) where there was no association between ethnicity, religion and depression. A study conducted in Brazil on graduate students found that students who practised religion were at a lower risk of experiencing depression and stress compared to those who did not identify with any religion (Scorsolini-comin *et al.*, 2021). Some studies in China and Saudi Arabia (Alyoubi *et al.*, 2021) excluded ethnicity and religion from the independent variables while others conducted in the U.S, and Malaysia included ethnicity but excluded religion.

Also, sex did not have any significance in students' experience of depression, anxiety and stress in the current study;  $p\text{-value} > 0.05$ . Similarly, Aylie *et al.*, 2020 found no association between sex and anxiety and stress although they found female students to have 2.1 times increased odds of developing depression compared to males in their study. In contrast, is the findings of Ghazawy *et al.*, 2021 whose analysis showed an association between sex and depression, anxiety and stress. According to their results, the odds of having depression, anxiety and stress as a female were correspondingly 1.67, 1.71 and 1.81 times higher at a 0.05 level of significance compared to their male counterparts. The study conducted in the UK with the use of the GAD-7 and PHQ-9 also reported that females had an increased risk of developing depression and anxiety with reference to male students (Chen and Lucock, 2022).

From the bivariate analysis run on the explanatory and outcome variables, the course of study was identified as statistically significant with depression, anxiety and stress as their  $p$ -values  $< 0.001$  at a 0.05 level of significance. On the multivariate analysis, students from the health sciences were 2.5 ( $p$ -value=0.028) times more likely to experience depression, those from the arts and social sciences were 12.6 ( $p$ -value  $< 0.001$ ) times more likely to have depression and those from engineering and technology had an odds ratio of 4.6 ( $p$ -value  $< 0.001$ ) This is consistent with a similar study done in Spain whose results showed that students studying social sciences and law, arts and humanities had increased risks of depression compared to those from their architecture and business faculties but reported that engineering and architecture students had increased rates of depression compared to students from the health sciences (Paula Odriozola-González, Álvaro Planchuelo-Gómez, María Jesús Irurtia, 2019). Another study in an Egyptian university (Ghazawy *et al.*, 2021) also showed that there was an increased odds for those in the medical sciences juxtaposed to those from the non-medical sciences In this current study also, there was no association between the course of study and stress and anxiety. This is in conformity with the research undertaken by Ghazawy *et al.*, 2021 in Egypt whose findings indicated no association between the course of study and anxiety and stress. Studies by Browning *et al.*, 2021 and Chen and Lucock, 2022 however did not report on the association between the psychological impact and course of study. They only reported on the level of study that is undergraduate or postgraduate.

From the bivariate and multivariate analysis, no association was found between a reaction to COVID-19, whether any relatives of the respondent got COVID and the psychological impact (depression, anxiety and stress). This contradicts many of the studies that found an association between these variables (Aylie, Mekonen and Matiyas, 2020; Cao *et al.*, 2020; Sundarassen *et al.*, 2020; Browning *et al.*, 2021). The contrast here may be due to the time

of study as these studies were conducted in the early days of the pandemic when vaccines were still in the experimental stages, while the current study is post-pandemic.

## CHAPTER 6

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

Generally, the pandemic which started in December 2019 has wreaked havoc worldwide (Lu and Lin, 2021). Studies have shown that public health emergencies tend to cause psychological distress in college students, in the form of depression, anxiety, fear, and worry, among others (Kara, 2022). This study aimed to identify the prevalence of depression, anxiety and stress among university students as a result of the COVID-19 pandemic and the study site was the Central University, Miotso. At the end of the study, it was observed that depression, anxiety and stress were prevalent in 234 (66.66%), 203 (57.84%) and 72 (20.51%) students respectively. Although there was no significant association between sex and the psychological impact, more females were identified to have symptoms of depression (142), anxiety (120) and stress (42) compared to their male counterparts.

The course of study, however, was found to have a positive association with depression. This may be due to the workload and the sudden transition online which the students were not accustomed to.

The study sought to identify the prevalence of the psychological impact of the pandemic, hence it did not include other variables that were included in the studies conducted in China, Malaysia, Brazil and Saudi Arabia among others.

In this study, the researcher limited the study population to only final year students albeit, in the studies from other countries, the researchers conducted the study on all students or all undergraduate students. Some of the studies also drew their sample from multiple



universities instead of just one institution. Compared to other studies, the sample size for this particular study was relatively small.

The findings of this study were discussed retrospectively since at the time of the study, students were back in school and COVID-19 measures were no longer strictly adhered to. The findings from this study are essential in understanding how sudden occurrences such as the COVID-19 can impact the psychological health of undergraduate students as reported in other studies conducted in the U.S, China, Malaysia, Ethiopia and Egypt.

## **6.2 Recommendations**

Mental health research among students should be given priority by the government to identify risk factors and understand the factors that impact mental or psychological health, especially during unexpected occurrences like pandemics. Gender differences in mental health among students should also be researched into by psychologists and other mental health researchers and professionals.

The Ghana Health Service and Ministry of Health should enhance mental health surveillance to identify the psychological health needs of the vulnerable student population and ensure the implementation of mental health support services.

The Ghana Psychological Council should liaise with institutions to offer psychological interventions during disruption in the academic journey of students and such interventions must be timely to offer support when needed most.

Remote learning should be inculcated into the school schedule so that students can have hands-on experience to make the complete transition during outbreaks easy and smooth.

For future studies, the researcher suggests that studies such as these (preferably qualitative) must be undertaken in time to capture the depth of the problem. Also, other variables such as family economic status, availability of support systems and pre-existing health conditions should be factored in future research as studies across the globe on this subject have captured some of these variables to positively correlate with depression, anxiety and stress.

Again, future research on the student population should employ a larger sample size to make the generalizability of the results easier.

It is also very likely that these psychological issues may still be prevalent among university students but might have different or other causes, therefore, the researcher beseeches those further studies to be conducted to identify the factors that impact the mental health of students post-pandemic.

## REFERENCES

- Abideen, A. Z., Mohamad, F. B. and Hassan, M. R. (2020) 'Mitigation strategies to fight the COVID-19 pandemic—present, future and beyond', *Journal of Health Research*, 34(6), pp. 547–562. doi: 10.1108/JHR-04-2020-0109.
- Adhikari, S. P., Meng, S., Wu, Y., Mao, Y., Ye, R., Wang, Q., Sun, C., Sylvia, S., Rozelle, S., Raat, H. and Zhou, H. (2020) 'Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease ( COVID-19 ) during the early outbreak period : a scoping review', pp. 1–12.
- Afriyie, D. K., Asare, G. A., Amponsah, S. K. and Godman, B. (2020) 'COVID-19 pandemic in resource-poor countries : challenges, experiences and opportunities in Ghana', pp. 3–8. doi: 10.3855/jidc.12909.
- Alyoubi, A., Halstead, E. J., Zambelli, Z. and Dimitriou, D. (2021) 'The Impact of the COVID-19 Pandemic on Students ' Mental Health and Sleep in Saudi Arabia'.
- Aucejo, E. M., French, J., Paola, M., Araya, U. and Zafar, B. (2020) 'The impact of COVID-19 on student experiences and expectations : Evidence from a survey ☆', *Journal of Public Economics*. Elsevier B.V., 191, p. 104271. doi: 10.1016/j.jpubeco.2020.104271.
- Aylie, N. S., Mekonen, M. A. and Matiyas, M. R. (2020) 'The Psychological Impacts of COVID-19 Pandemic Among University Students in Bench-Sheko Zone, South-west Ethiopia : A Community-based Cross-sectional Study', *Psychology Research and Behavior Management*, 13, p. 9.
- Azer, S. A. (2020) 'COVID-19: pathophysiology, diagnosis, complications and

- investigational therapeutics’, *New Microbes and New Infections*. Elsevier Ltd, 37(M), p. 100738. doi: 10.1016/j.nmni.2020.100738.
- Batra, K., Sharma, M., Batra, R. and Singh, T. P. (2021) ‘Assessing the Psychological Impact of COVID-19 among College Students : An Evidence of 15 Countries’, pp. 1–18.
- Browning, M. H. E. M., Larson, L. R., Sharaievska, I., Rigolon, A., McAnirlin, O., Mullenbach, L., Cloutier, S., Vu, T. M., Thomsen, J., Reigner, N., Metcalf, E. C., D’Antonio, A., Helbich, M., Bratman, G. N. and Alvarez, H. O. (2021) ‘Psychological impacts from COVID-19 among university students: Risk factors across seven states in the United States’, *PloS one*, 16(1), p. e0245327. doi: 10.1371/journal.pone.0245327.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X. and Dong, J. (2020) ‘The psychological impact of the COVID-19 epidemic on college students in China’, (January).
- Chaturvedi, K., Vishwakarma, D. K. and Singh, N. (2021) ‘Children and Youth Services Review COVID-19 and its impact on education, social life and mental health of students : A survey’, *Children and Youth Services Review*. Elsevier Ltd, 121(July 2020), p. 105866. doi: 10.1016/j.childyouth.2020.105866.
- Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., Qiu, Y., Wang, J., Liu, Y., Wei, Y., Xia, J. and Yu, T. (2020) ‘Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China : a descriptive study’, *The Lancet*. Elsevier Ltd, 395(10223), pp. 507–513. doi: 10.1016/S0140-6736(20)30211-7.
- Chen, T. and Lucock, M. (2022) ‘The mental health of university students during the

- COVID-19 pandemic: An online survey in the UK', *PLoS ONE*, 17(1 January), pp. 1–17. doi: 10.1371/journal.pone.0262562.
- Cochran, W. C. (1977) 'Snedecor G W & Cochran W G. Statistical methods applied to experiments in agriculture and biology. 5th ed. Ames, Iowa: Iowa State University Press, 1956.', *Citation Classics*, 19(19), p. 1.
- Copeland, W. E., McGinnis, E., Bai, Y., Adams, Z., Nardone, H., Devadanam, V., Rettew, J. and Hudziak, J. J. (2021) 'Impact of COVID-19 Pandemic on College Student Mental Health and Wellness', *Journal of the American Academy of Child & Adolescent Psychiatry*. Elsevier Inc, 60(1), pp. 134-141.e2. doi: 10.1016/j.jaac.2020.08.466.
- Cronin, P., Ryan, F. and Coughlan, M. (2014) 'Undertaking a literature review : a step-by-step approach', (May). doi: 10.12968/bjon.2008.17.1.28059.
- Ghazawy, E. R., Ewis, A. A., Mahfouz, E. M., Khalil, D. M., Arafa, A., Mohammed, Z., Mohammed, E. F., Hassan, E. E., Hamid, S. A., Ewis, S. A. and Mohammed, A. E. S. (2021) 'Psychological impacts of COVID-19 pandemic on the university students in Egypt', (December 2020), pp. 1116–1125. doi: 10.1093/heapro/daaa147.
- Henaku, E. A. (2020) 'COVID-19 : Online Learning Experience of College Students : The Case of Ghana COVID-19 : Online Learning Experience of College Students : The Case of Ghana', (July).
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A.,

- Worthman, C. M., Yardley, L., Cowan, K., Cope, C., Hotopf, M. and Bullmore, E. (2020) 'Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science', *The Lancet Psychiatry*, 7(6), pp. 547–560. doi: 10.1016/S2215-0366(20)30168-1.
- Hui, D. S., I Azhar, E., Madani, T. A., Ntoumi, F., Kock, R., Dar, O., Ippolito, G., Mchugh, T. D., Memish, Z. A., Drosten, C., Zumla, A. and Petersen, E. (2020) 'The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health — The latest 2019 novel coronavirus outbreak in Wuhan, China', *International Journal of Infectious Diseases*, 91, pp. 264–266. doi: 10.1016/j.ijid.2020.01.009.
- Id, K. T. and Dema, K. (2022) 'Psychological impact during COVID-19 pandemic : A web-based cross-sectional study among students studying at College of Science and Technology ( CST ), Phuentsholing ', pp. 1–11. doi: 10.1371/journal.pone.0263999.
- Iese, V., Wairiu, M., Hickey, G. M., Ugalde, D., Hinge Salili, D., Walenenea, J., Tabe, T., Keremama, M., Teva, C., Navunicagi, O., Fesaitu, J., Tigona, R., Krishna, D., Sachan, H., Unwin, N., Guell, C., Haynes, E., Veisa, F., Vaike, L., Bird, Z., Ha'apio, M., Roko, N., Patolo, S., Dean, A. R., Kiran, S., Tikai, P., Tuiloma, J., Halavatau, S., Francis, J. and Ward, A. C. (2021) 'Impacts of COVID-19 on agriculture and food systems in Pacific Island countries (PICs): Evidence from communities in Fiji and Solomon Islands', *Agricultural Systems*. Elsevier Ltd, 190, p. 103099. doi: 10.1016/j.agsy.2021.103099.
- Imenda, S. (2014) 'Is There a Conceptual Difference between Theoretical and Conceptual Frameworks?', *Journal of Social Sciences*, 38(2), pp. 185–195. doi: 10.1080/09718923.2014.11893249.

- Irfan, M., Shahudin, F., Hooper, V. J., Akram, W. and Ghani, R. B. A. (2021) ‘The Psychological Impact of Coronavirus on University Students and its Socio-Economic Determinants in Malaysia’, 58, pp. 1–7. doi: 10.1177/00469580211056217.
- Kapata, N., Ihekweazu, C., Ntoumi, F., Raji, T., Chanda-Kapata, P., Mwaba, P., Mukonka, V., Bates, M., Tembo, J., Corman, V., Mfinanga, S., Asogun, D., Elton, L., Arruda, L. B., Thomason, M. J., Mboera, L., Yavlinsky, A., Haider, N., Simons, D., Hollmann, L., Lule, S. A., Veas, F., Abdel Hamid, M. M., Dar, O., Edwards, S., Vairo, F., McHugh, T. D., Drosten, C., Kock, R., Ippolito, G. and Zumla, A. (2020) ‘Is Africa prepared for tackling the COVID-19 (SARS-CoV-2) epidemic. Lessons from past outbreaks, ongoing pan-African public health efforts, and implications for the future’, *International Journal of Infectious Diseases*, 93, pp. 233–236. doi: 10.1016/j.ijid.2020.02.049.
- Kara, B. (2022) ‘Understanding the psychological impact of the COVID-19 pandemic on university students’, 9(January), pp. 1–4. doi: 10.3934/medsci.2022001.
- Kenu, E., Odikro, M. A., Malm, K. L., Asiedu-bekoe, F., Charles, L., Frimpong, J. A., Calys-tagoe, B. and Koram, K. A. (2020) ‘Epidemiology of COVID-19 outbreak in Ghana, 2020’, 54(4), pp. 5–15.
- Kpotosu, C. (2020) ‘the Impact of Covid-19 Outbreak on Mental Health in Ghana ( 2020 ) the Impact of Covid-19 Outbreak on Mental Health in Ghana’, (June). doi: 10.13140/RG.2.2.22519.85923.
- Kumar, A. and Nayar, K. R. (2021) ‘COVID 19 and its mental health consequences’, *Journal of Mental Health*. Routledge, 30(1), pp. 1–2. doi:

10.1080/09638237.2020.1757052.

Lake, M. A. (2020) 'What we know so far: COVID-19 current clinical knowledge and research', *Clinical Medicine, Journal of the Royal College of Physicians of London*, pp. 124–127. doi: 10.7861/clinmed.2019-coron.

Lee, J. (2020) 'Reflections Features Mental health effects of school closures during COVID-19', *The Lancet Child and Adolescent Health*. Elsevier Ltd, 4(6), p. 421. doi: 10.1016/S2352-4642(20)30109-7.

Liao, Q., Cowling, B. J., Lam, W. W. T., Ng, D. M. W. and Fielding, R. (2014) 'Anxiety, worry and cognitive risk estimate in relation to protective behaviors during the 2009 influenza A/H1N1 pandemic in Hong Kong: Ten cross-sectional surveys', *BMC Infectious Diseases*, 14(1), pp. 1–11. doi: 10.1186/1471-2334-14-169.

Lijun Kang, Yi Li, S. H., Min Chen, Can Yang, B. X. Y., Ying Wang, Jianbo Hu, J. L., Xiancang Ma, Jun Chen, L. G., Gaohua Wang, H. M. and Liu, \*Zhongchun (2020) 'The mental health of Wuhan , China dealing with the 2019 novel coronavirus', *thelancet.com/psychiatry* V, 7(March), p. 2020. doi: 10.1016/S2215-0366(20)30047-X.

Lu, X. and Lin, Z. (2021) 'COVID-19, Economic Impact, Mental Health, and Coping Behaviors : A Conceptual Framework and Future Research Directions', 12(November), pp. 1–9. doi: 10.3389/fpsyg.2021.759974.

Moghe, K., Kotecha, D. and Patil, M. (2020) 'COVID-19 and mental health: A study of its impact on students', *medRxiv*. doi: 10.1101/2020.08.05.20160499.

Msn, H. C., Nurse, Supervisor, Sun, L., Nurse, Senior, Nurse, H., Du, Z., Doctor, A., Zhao,



- L., Nurse, Supervisor, Nurse, H., Msn, L. W. and Nurse, C. S. (2020) ‘A cross-sectional study of mental health status and self- psychological adjustment in nurses who supported Wuhan for fighting against the COVID-19’, (July), pp. 4161–4170. doi: 10.1111/jocn.15444.
- Nwachukwu, I., Nkire, N., Shalaby, R., Hrabok, M., Vuong, W., Gusnowski, A., Surood, S., Urichuk, L., Greenshaw, A. J. and Agyapong, V. I. O. (2020) ‘COVID-19 Pandemic : Age-Related Differences in Measures of Stress , Anxiety and Depression in Canada’, pp. 1–10.
- Ofori, A. A., Osarfo, J., Agbeno, E. K., Manu, D. O. and Amoah, E. (2021) ‘Psychological impact of COVID-19 on health workers in Ghana : A multicentre , cross-sectional study’. doi: 10.1177/20503121211000919.
- Ouassou, H., Kharchoufa, L., Bouhrim, M., Daoudi, N. E., Imtara, H., Bencheikh, N., Elbouzidi, A. and Bnouham, M. (2020) ‘Review Article The Pathogenesis of Coronavirus Disease 2019 ( COVID-19 ): Evaluation and Prevention’, 2020.
- Paula Odriozola-González\*, Álvaro Planchuelo-Gómezb, María Jesús Irurtiaa, R. de L.-G. (2019) *Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish. University of Valladolid, Valladolid, Spain.*
- Paulino, M., Dumas-diniz, R., Brissos, S., Brites, R., Simões, M. R., Silva, C. F., Paulino, M., Dumas-diniz, R., Brissos, S. and Brites, R. (2021) ‘COVID-19 in Portugal : exploring the immediate psychological impact on the general population COVID-19 in Portugal : exploring the immediate psychological’, *Psychology, Health & Medicine*. Taylor & Francis, 26(1), pp. 44–55. doi: 10.1080/13548506.2020.1808236.

- Perzow, S. E. D., Hennessey, E.-M. P., Hoffman, M. C., Grote, N. K., Davis, E. P. and Hankin, B. L. (2021) 'Mental health of pregnant and postpartum women in response to the COVID-19 pandemic.', *Journal of affective disorders reports*. Elsevier B.V., p. 100123. doi: 10.1016/j.jadr.2021.100123.
- Promislow, D. E. L. (2020) 'A Geroscience Perspective on COVID-19 Mortality', 75(9), pp. 30–33. doi: 10.1093/gerona/glaa094.
- Rahmet Guner, İ. H. and Firdevs Aktas (2020) 'COVID-19: Prevention and control measures in community', *Turkish Journal Of Medicine*, pp. 571–577. doi: 10.3906/sag-2004-146.
- Rajkumar, R. P. (2020) 'COVID-19 and mental health : A review of the existing literature', (January).
- Ramdhani, A., Ramdhani, M. A. and Amin, A. S. (2014) 'Writing a Literature Review Research Paper : A step-by-step approach Writing a Literature Review Research Paper : A step - by - step approach', (July).
- Rauf, A., Abu-izneid, T., Olatunde, A., Khalil, A. A., Alhumaydhi, F. A., Tufail, T., Shariati, M. A. and Rebezov, M. (2020) 'COVID-19 Pandemic : Epidemiology , Etiology , Conventional and Non-Conventional Therapies'.
- Rutayisire, E., Nkundimana, G., Mitonga, H. K. and Boye, A. (2020) 'What works and what not work in response to COVID-19 prevention and control in Africa', (January).
- Scorsolini-comin, F., Augusto, P., Flores, W. and Hohendorff, J. Von (2021) 'Mental health and coping strategies in graduate students in the COVID-19

pandemic'. doi: 10.1590/1518-8345.5012.3491.

Sekhar, C., Akimoto, M., Fan, X., Bivolarova, M., Liao, C., Lan, L. and Wargocki, P. (2020) 'SARS-CoV-2 journey to the brain with a focus on potential role of docosahexaenoic acid bioactive lipid mediators', *Building and Environment*. Société Française de Biochimie et Biologie Moléculaire (SFBBM), 184(August), p. 107229. doi: 10.1016/j.biochi.2021.02.012.

Shikalapo, E. E. (2020) 'Defining a Conceptual Framework in Educational Research Defining a Conceptual Framework in Educational Research', *Namibia University of Science and Technology*, 1(2), pp. 1–8. doi: 10.13140/RG.2.2.26293.09447.

Souilhi, A., Gabsi, A., Letaief-Ksontini, F., Chraiet, N., Yahiaoui, Y., Mghirbi, F., Mokrani, A., Meddeb, K., Ayadi, M., Rais, H. and Mezlini, A. (2020) 'Psychological impact of the COVID-19 pandemic on health care workers in oncology in Tunisia', *Annals of Oncology*, 31. doi: 10.1016/j.annonc.2020.08.2055.

Sundarasan, S., Chinna, K., Kamaludin, K., Nurunnabi, M., Baloch, G. M., Khoshaim, H. B., Hossain, S. F. A. and Sukayt, A. (2020) 'Psychological impact of covid-19 and lockdown among university students in malaysia: Implications and policy recommendations', *International Journal of Environmental Research and Public Health*, 17(17), pp. 1–13. doi: 10.3390/ijerph17176206.

Tee, M. L., Tee, C. A., Anlacan, J. P., Aligam, K. J. G., Wincy, P., Reyes, C., Kuruchittham, V. and Ho, R. C. (2020) 'Psychological impact of COVID-19 pandemic in the Philippines', *Journal of Affective Disorders*. Elsevier B.V.,

277(August), pp. 379–391. doi: 10.1016/j.jad.2020.08.043.

Torales, J., O’Higgins, M., Castaldelli-Maia, J. M. and Ventriglio, A. (2020) ‘The outbreak of COVID-19 coronavirus and its impact on global mental health’, *International Journal of Social Psychiatry*, 66(4), pp. 317–320. doi: 10.1177/0020764020915212.

Upoalkpajor, J.-L. N. and Upoalkpajor, C. B. (2020) ‘The Impact of COVID-19 on Education in Ghana’, *Asian Journal of Education and Social Studies*, (September), pp. 23–33. doi: 10.9734/ajess/2020/v9i130238.

Villani, L., Pastorino, R., Molinari, E., Anelli, F., Ricciardi, W., Graffigna, G. and Boccia, S. (2021) ‘Impact of the COVID-19 pandemic on psychological well-being of students in an Italian university: a web-based cross-sectional survey’. *Globalization and Health*, pp. 1–14.

Voltmer, E., Kösllich-strumann, S., Walther, A., Kasem, M., Obst, K. and Kötter, T. (2021) ‘The impact of the COVID-19 pandemic on stress, mental health and coping behavior in German University students – a longitudinal study before and after the onset of the pandemic’. *BMC Public Health*, pp. 1–15.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S. and Ho, R. C. (2019) ‘Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease ( COVID-19 ) Epidemic among the General Population in China’.

Wang, S., Su, K. and Pariante, C. M. (2021) ‘Brain Behavior and Immunity The three frontlines against COVID-19 : Brain, Behavior, and Immunity’, *Brain Behavior and Immunity*. Elsevier Inc., (2). doi: 10.1016/j.bbi.2021.01.030.

- Wang, X., Hegde, S., Son, C., Keller, B. and Sasangohar, F. (2020) 'Investigating Mental Health of US College Students During the COVID-19 Pandemic : Cross-Sectional Survey Study Corresponding Author ', 22. doi: 10.2196/22817.
- Wang, Yenan, Di, Y., Ye, J. and Wei, W. (2021) 'Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China', *Psychology, Health and Medicine*, 26(1), pp. 13–22. doi: 10.1080/13548506.2020.1746817.
- Wang, Yunhe, Shi, L., Que, J., Lu, Q., Liu, L., Lu, Z., Xu, Y., Liu, J., Sun, Y., Meng, S., Yuan, K., Ran, M., Lu, L., Bao, Y. and Shi, J. (2021) 'The impact of quarantine on mental health status among general population in China during the COVID-19 pandemic', *Molecular Psychiatry*. Springer US, 26(9), pp. 4813–4822. doi: 10.1038/s41380-021-01019-y.
- Wu, Y. C., Chen, C. S. and Chan, Y. J. (2020) 'The outbreak of COVID-19: An overview', *Journal of the Chinese Medical Association*, 83(3), pp. 217–220. doi: 10.1097/JCMA.0000000000000270.
- Zhang, X., Huang, H., Zhuang, D., Nasser, M. I., Yang, M. and Zhu, P. (2020) 'Biological , clinical and epidemiological features of COVID-19 , SARS and MERS and AutoDock simulation of ACE2'. *Infectious Diseases of Poverty*, 6, pp. 1–11.

## **APPENDICES**

### **APPENDIX I: PARTICIPANT INFORMATION SHEET AND CONSENT FORM**

**MASTER OF PUBLIC HEALTH**

**FACULTY OF PUBLIC HEALTH**

**DEPARTMENT OF COMMUNITY HEALTH ENSIGN GLOBAL COLLEGE**

**KPONG, EASTERN REGION, GHANA**

#### **CONSENT INFORMATION FOR RESPONDENTS**

I am Louisa Osei Bonsu and a Student at Ensign Global College, Kpong. I am researching **The Psychological Impact of the COVID-19 Outbreak on University Students, A retrospective study at the Central University.** I would be grateful if you could spare some time to be part of this study.

#### **PURPOSE OF RESEARCH**

You are invited to participate in a research study which intends to examine the psychological impact of COVID-19 among university students. You are being selected as a possible participant in this study because you meet our selection criteria. This study is looking for a minimum of 422 participants.

#### **VOLUNTARY PARTICIPATION**

Your participation in this study is entirely voluntary. Your decision not to participate will not have any negative effect on you or on your relation. During the study you can withdraw anytime you want to, without any consequences.

## **DURATION OF STUDY INVOLVEMENT**

This research study is expected to take approximately 4 weeks to administer research questionnaire to selected participants and to collect the data. Responses will be put together and analysed in the first week of the preceding month. The final report should be ready by the end of May, 2022. It is estimated that each participant will spend at most 10 minutes when filling out questionnaire

## **PROCEDURES**

If you choose to participate, the research assistant will explain all the procedures to be followed in a language you understand. You will be given the opportunity to ask all questions you may have, and further explanations will be given. Kindly direct all your queries to the research assistant prior to responding to the questions in the questionnaire hence your consent is needed before it commences.

## **SIGNING OR THUMB PRINTING OF QUESTIONNAIRE**

If you agree to participate, you will be requested to sign a consent form or thumb print if you wish to indicate that you fully agree to take part. This will be done after understanding the purpose of study and agreeing to be part of study

## **ADMINISTRATION OF QUESTIONNAIRE**

A set of questions will be asked by the research assistant for which you will be requested to provide genuine answers as much as possible. You can however decide not to answer questions you feel uncomfortable with. Each questionnaire will take less than 30 minutes to complete.

## **RISKS**

There are no risks attached to responding to the questionnaires. Your identity will not be disclosed whatsoever in this study; however, for purposes of data analysis each form will be coded

## **PARTICIPANT RESPONSIBILITIES**

As a participant, your responsibilities include:

- Follow the instructions of the research assistant.
- Complete your questionnaires as instructed.
- Ask questions as you think of them.
- Tell the research assistant if you change your mind about staying in the study.

## **WITHDRAWAL FROM STUDY**

If you first agree to participate and later change your mind, you are free to withdraw your consent and discontinue your participation in the study. Your decision will not affect you in any way.

## **POSSIBLE RISKS, DISCOMFORTS, AND INCONVENIENCES**

The study involves no risks; however, discomfort is anticipated given the sensitive nature of the topic. Questions will be asked about your characteristics, sociodemographic, economic, family and mental state related to the topic. You should talk with the research assistant if you have any such discomforts and ask questions whenever you want for clarification. You are also free to skip any question you are not comfortable answering.



## **POTENTIAL BENEFITS**

There is no direct benefit to the participant of this study, however, the information you will provide will contribute to examining the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID- 19 outbreak in Ghana. This information will help to assess depression, anxiety, and stress of HCWs using Depression Anxiety Stress Scales. We further hope that the outcome of this study would be used to advise on policies that will support the mental state of healthcare workers more during crises.

## **PARTICIPANT'S RIGHTS**

You should not feel obligated to agree to participate. Your questions should be answered clearly and to your satisfaction. If you decide not to participate, please inform the research officer.

## **CONFIDENTIALITY**

We would like to assure you that whatever information you provide will be handled with strict confidentiality, will be used purely for research purposes, and will never be used against you. Data analysis will be done at the cumulative level to ensure anonymity. Your name or personal identifying information will not be published in any report. Some staff of the research team may sometimes review the research records, but no unauthorized individual(s) will be able to access your information. The results of this study may be presented at scientific or public health meetings or published in scientific or public health journals. No response given will be disclosed to any unauthorized persons. Neither your name nor any identity traceable to you or your relation will be indicated on the survey forms.

## CONTACT INFORMATION

Questions, Concerns, or Complaints: If you have any questions, concerns or complaints about this research study, its procedures or risks and benefits, you should ask the research assistant.

Independent Contact: If you are not satisfied with how this study is being conducted, or your questions/ concerns etc. are not satisfactorily answered by the research assistant or if you have further concerns, complaints, or general questions about the research or your rights as a participant, please contact:

Dr. Stephen Manortey (Supervisor) Faculty of Public Health; Ensign Global College,

Kpong

Tel: 0248855374; [steve.manortey@ensign.edu.gh](mailto:steve.manortey@ensign.edu.gh)

Louisa Osei- Bonsu; (MPH student), Ensign Global College, Kpong

Tel: 0542360764; [Louisa.oseibonsu@st.ensign.edu.gh](mailto:Louisa.oseibonsu@st.ensign.edu.gh)

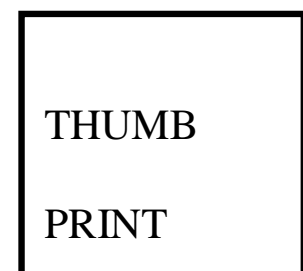
## STATEMENT OF CONSENT

I have read this consent form, or it has been read and explained to me. I have had the opportunity to discuss this research study with ----- I have had my questions answered in a language I understand. The risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statement or implied statements. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study. I understand that information regarding my personal identity/ that of my relation will be kept confidential. By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study

Participant signature \_\_\_\_\_

Date \_\_\_\_\_

(Day / month / year)



## APPENDIX II: QUESTIONNAIRE

### SECTION A- SOCIO-DEMOGRAPHICS

*(Please circle the appropriate answer)*

- 1) Age:
- 2) Sex: a) Male b) Female
- 3) Ethnicity 1. Akan 2. Ga 3. Ewe 4. Others, please specify .....
- 4) Course of Study .....
- 5) Religion: a) Christian b) Muslim c) Traditional d) Other specify .....
- 6) Did any of your relatives get COVID-19? a) Yes b) No
- 7) Did any of your friends get COVID-19? a) Yes b) No
- 8) What was your initial reaction to COVID-19? a) Scared b) Not Scared c)  
Indifferent

**SECTION B: Depression, Anxiety and Stress Scale (DASS-21)**

For each statement below, please circle the number in the column that best represents how you mostly felt, following the onset of the COVID-19 pandemic and the lockdown.

Statement		<i>Did not apply to me at all</i>	<i>Applied to me to some degree, or some of the time</i>	<i>Applied to me to a considerable degree, or a good part of time</i>	<i>Applied to me very much, or most of the time</i>
1	I found it hard to wind down (relax after stress)	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	could not seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g., in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt downhearted and blue	0	1	2	3

14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I was not worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason.	0	1	2	3
21	I felt that life was meaningless	0	1	2	3