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UNIVERSITY OF GHANA

School of Public Health

Title of Thesis

DEPRESSION, ANXIETY AND STRESS SYMPTOMS AMONG HEALTHCARE WORKERS WHO RECOVERED FROM COVID-19 INFECTION IN SELECTED HEALTHCARE FACILITIES IN THE ACCRA METROPOLIS.

BY
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Student's Department
(DEPARTMENT OF BIOLOGICAL, ENVIRONMENTAL AND OCCUPATIONAL HEALTH)

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DECLARATION

I, Riches Esiape, do hereby declare that I wrote this thesis by myself and that it has not submitted, in whole or in part, in any previous application for a degree. Except where stated by reference or acknowledgment, the work is presented entirely as my own.

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DEDICATION

I dedicate this dissertation to my supportive family.

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ACKNOWLEDGEMENT

My utmost gratitude goes to the Supreme God for his guidance and strength.

I am also grateful to Dr Paul Kingsley Botwe whose encouragement, availability and expert guidance saw to the completion of this work. I am also sincerely grateful to Dr Emmanuel Asampong who helped design this dissertation.

I am also indebted to my colleagues and friends in all the hospitals who were very helpful in data collection and to all the participants who voluntarily took part in the study.

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STATEMENT OF COMPLIANCE TO ETHICAL CLEARANCE

The author declares that the study was self-financed and has no conflicts of interest. All procedures involved in data collection from human participants was in accordance with the ethical standards of the ethical review committee of the Ghana Health Service (GHS) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Permission was also sort from all the institutions that were selected for the study. Informed consent was obtained from all individual participants involved in the study. This work did not involve studies on animals.

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ABSTRACT

Background: The Coronavirus pandemic is causing devastating effects worldwide. While very few studies have shown the effect the pandemic has on the psychological well-being of people, these studies have focused largely on the general human population, neglecting healthcare workers who are at the frontline of the fight against Covid-19. Thus, studies that examine how these pandemic and associated factors affect psychological well-being of healthcare workers who recovered from Covid-19 infection, particularly in a developing country such as Ghana is important for managers to establish or strengthen support systems for these workers.

Aim: This study sought to investigate the psychological disorders of heath care workers (HCWs) who recovered from COVID-19 infection in selected healthcare facilities in the Accra Metropolitan area.

Method: This study was a cross-sectional one. A standardized questionnaire was used to take information from 120 healthcare professionals at five selected healthcare facilities in the Accra Metropolitan Area of the Greater Accra Region. Multiple logistic regression analysis was conducted to examine factors that were associated with the development of depression, anxiety and stress (psychological disorders). Additionally, test of proportions was conducted to compare psychological experiences among vaccinated and unvaccinated groups.

Results: The results of this study show that the prevalence of healthcare workers who survived COVID-19 infection in the study with depressive, anxiety and stress symptoms were 20.8%, 28.3% and 29.1% respectively. Sex, age, marital status, parity average monthly income and having co-morbidities were found to be significantly associated with depressive symptoms, while sex, age, marital status and persistent symptoms of COVID-19 disease were significantly associated with

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anxiety symptoms. Additionally, sex, marital status, average monthly income and persist symptoms of COVID-19 disease were the factors associated with stress symptoms. Further, healthcare workers who were unvaccinated were more likely to develop anxiety ($p<0.05$) compared to the vaccinated group but there was no statistically significant association between vaccination status and the development of depression and stress ($p>0.05$).

Conclusion: This study has revealed that the proportion of healthcare workers with depressive, anxiety and stress symptoms was high. This has serious implications on health care delivery in the country. Therefore, consensus efforts should be made by the Ministry of Health and Ghana Health Service to provide mental health support and services for healthcare workers who recover from COVID-19.

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TABLE OF CONTENT

DECLARATION.. ii

STATEMENT OF COMPLIANCE TO ETHICAL CLEARANCE....................................... v

ABSTRACT.. vi

TABLE OF CONTENT.. viii

LIST OF FIGURES.. xii

LIST OF TABLES.. xiii

LIST OF ABBREVIATION.. xiv

CHAPTER ONE.. 1

INTRODUCTION.. 1

1.0 Background 1

1.1 Problem statement 2

1.2 Justification 3

1.3 Research questions 4

1.4 Study Objectives 4

1.4.1General Objectives 4

1.4.2 Specific Objectives 4

1.5 Conceptual framework..5

1.6 Narrative of the Conceptual Framework..5

CHAPTER TWO.. 7

LITERATURE REVIEW.. 7

2.0 Introduction 7

2.1 Theoretical Underpinnings 7

2.2 General Adaptation Syndrome 7

2.2.1 Alarm stage.. 8

University of Ghana http://ugspace.ug.edu.gh

2.2.2 Resistance stage 8
2.2.3 Exhaustion stage 8
2.3 Background of Coronavirus Disease 9
2.3.1 Transmission of COVID-19 9
2.3.2 Signs and Symptoms of COVID-19 9
2.3.3 Diagnosis of COVID-19 9
2.3.4 Management of COVID-19 10
2.3.5 Burden of COVID-19 10
2.3.6 Economic Burden 10
2.3.7 Environment Burden 11
2.3.8 Physical Impact 12
2.3.9 Psychological Impact 13
2.4 Predictors of psychological disorders following a disease outbreak 14
2.5 Depression, Anxiety and Stress 15
2.6 Psychometric Tools 17
CHAPTER THREE 19
METHODOLOGY 19
3.1 Study Design 19
3.2 Study Population 19
3.3 Study site description 19
3.4 Sampling Method and Sample Size 19
3.5 Data Collection Method and Tools 20
3.5 Inclusion and Exclusion Criteria 21
3.5.1 Inclusion Criteria 21
3.5.2 Exclusion Criteria 21

University of Ghana http://ugspace.ug.edu.gh

3.6 Study Variables 21

3.6.1 Dependent Variables 21

3.6.2 Independent Variables 21

3.7 Data Analysis 21

3.8 Quality control 22

3.9 Ethical Issues 23

3.9.1 Informed Consent 23

3.9.2 Privacy and Confidentiality 23

3.9.3 Risk and Benefits 21

3.9.4 Data storage and usage 23

3.9.5 Declaration of conflict of interest 23

CHAPTER FOUR 24

RESULTS 24

4.1 Socio-demographic characteristics of respondents 24

4.2 Bivariate association between demographic data and Depressive Symptoms 27

4.3 Multiple Logistic Regression of factors influencing Depressive Symptoms 29

4.4 Bivariate association between demographic data and Anxiety Symptoms 32

4.5 Multiple Logistic Regression of factors influencing Anxiety Symptoms 34

4.6 Bivariate association between demographic data and Stress Symptoms 37

4.7 Multiple Logistic Regression of factors influencing Stress Symptoms 39

4.8 Differences in psychological disorders between vaccinated and unvaccinated groups.......43

CHAPTER FIVE 44

DISCUSSION 44

5.1 Prevalence of Depression, Anxiety and Stress symptoms. 44

University of Ghana http://ugspace.ug.edu.gh

5.2 Factors that are associated with depression, anxiety and stress symptoms. 45

5.3 Differences in psychological disorders between vaccinated and unvaccinated groups. 47

5.4 Limitations of the study…………………………………………………………………48

CHAPTER SIX 49

CONCLUSION AND RECOMMENDATIONS 49

6.1 Conclusion 49

6.2 Recommendations 49

References 65

University of Ghana http://ugspace.ug.edu.gh

LIST OF FIGURES

Figure 1: Conceptual framework showing factors hypothesized to impact on psychological health of healthcare workers who contracted Covid 19 infection and survived………………..………..5

Figure 2: Interconnectedness of Depression, Stress and Anxiety. 16

University of Ghana http://ugspace.ug.edu.gh

LIST OF TABLES

Table 1. Some psychometric tools showing their strengths and limitations. 18

Table 2: Socio-demographic characteristics of respondent's (N=120)....................................... 25

Table 3: Other related characteristics of respondent's (N=120) 26

Table 4: Prevalence of Depression, Anxiety and Stress among HCWs who survived COVID-19 infection……………………………………………………………………………….26

Table 5: Association between demographic data and depressive symptoms 28

Table 6: Association between related factors and depressive symptoms 29

Table 7: Multiple Logistics regression of the factors associated with depressive symptoms 31

Table 8: Association between demographic data and anxiety symptoms.................................... 33

Table 9: Association between related factors and anxiety symptoms 34

Table 10: Multiple Logistics regression of the factors associated with anxiety symptoms.......... 36

Table 11: Association between demographic data and stress symptoms 38

Table 12: Association between related factors and stress symptoms 39

Table 13: Multiple Logistics regression of the factors associated with Stress symptoms 41

Table 14: Comparing depression, anxiety and stress symptoms among vaccinated and unvaccinated groups………………………………………………………………………...43

University of Ghana http://ugspace.ug.edu.gh

LIST OF APPENDICES

Appendix 1: Two sample test of proportions for depression…………………………………......51

Appendix 2: Two sample test of proportions for anxiety……………………………………..52

Appendix 3: Two sample test of proportions for stress………………………………………..53

Appendix 4: Depression, Anxiety and Stress (DASS-21) Psychometric Tool ………………..…54

Appendix 5: Questionnaire ……………………………………………………………..……..56

Appendix 6: Ghana Health Service Ethical Clearance…………………………………………..62

Appendix 7: Approval from Ghana Health Service ……………………………………..…63

Appendix 8: Approval from Cocoa Clinic……………………………………………………..…64

Appendix 9: Approval from Faith Evangelical Mission Hospital………………………………..…65

University of Ghana http://ugspace.ug.edu.gh

LIST OF ABBREVIATIONS

CDC - Centers for Disease Control and Prevention.

COVID -19 - Coronavirus disease 2019.

DASS-21 - Depression, Anxiety and Stress Scale - 21 Items

DSM-5 - Diagnostic and Statistical Manual of Mental Disorders, 5th Edition.

GAD-7 - General Anxiety Disorder - 7 Items

GAS - General Anxiety Syndrome.

GDP - Gross Domestic Product.

GHS - Ghana Health Service.

HADS - Hospital Anxiety and Depression Scale

HCW(s) - Healthcare Worker(s).

IES-R - Impact of Event Scale – Revised.

IMF - International Monetary Fund.

MERS - Middle East Respiratory Syndrome.

MERS CoV - Middle East Respiratory Syndrome Coronavirus

PCL-5 - PTSD Checklist for DSM-5

PHQ-9 - Patient Health Questionnaire (PHQ) – 9 Items

PPE - Personal Protective Equipment.

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PTSD - Post-traumatic Stress Disorder.

PTSS - Post-traumatic Stress Symptoms.

RT-PCR - Real Time-Polymerase Chain Reaction.

SARS-CoV-2 - Severe Acute Respiratory Syndrome Coronavirus 2.

SSRI - Selective serotonin reuptake inhibitor.

STATA-16 - South Texas Art Therapy Association Statistical Tool, 16th Version.

UNICEF - United Nations Children's Fund.

WHO - World Health Organization.

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CHAPTER ONE

INTRODUCTION

1.0 Background

The Coronavirus disease-2019 (COVID-19) which emerged in 2019 is caused by a new strain of the corona viruses, named Severe Acute Respiratory Syndrome Coronavirus 2 - SARS-CoV-2 (Zhu et al., 2020). This disease was declared a pandemic on the 11th March, 2020 by WHO (WHO, 2020). It has had ravaging effects on families, lives, economies, businesses and the environment (Castelnuovo et al., 2021; Fernandes, 2020; Zambrano-Monserrate et al., 2020).Studies have been done to describe the psychological impact of covid-19 among HCWs across the world and in Ghana (García-Reyna et al., 2020; Johnson et al., 2020; Lai et al., 2020; Ofori et al., 2021; Zhang et al., 2020). Some of these findings have been severe enough to fall under psychiatric morbidities (Taquet et al., 2021). However, there is paucity of information on studies conducted in Ghana to assess the proportion of psychological disorders - depression, anxiety and stress - among HCWs who contracted and recovered from the disease and the factors that are associated with the development of these disorders.

Vaccination plays a key role in the management of this condition by reducing sever disease (Feikin et al., 2021). With news of widespread COVID-19 mortalities and the attendant negative mental health impact it has on the population, the potential role of vaccination to reduce these effects has also not been established.

HCWs have a critical frontline role to play in health education and promotion to fight the coronavirus disease. Therefore, psychologically affected HCWs can compromise their abilities to contribute significantly to the fight against the contagion (Y. Bao et al., 2020; Holmes et al., 2020).

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Therefore, it is imperative to explore what proportion of HCWs, who recovered from the disease, have depression, anxiety and stress symptoms, what factors are associated with the development of these disorders and whether, or not, vaccination status is associated with reduction in these psychological disorders.

1.1 Problem statement

There are mental health challenges associated with disease outbreaks. For example, among Ebola survivors, the prevalence of anxiety, depression and PTSD were 24.9%, 47.2% and 21.8% respectively (Bah et al., 2020). Lee et al. (2018) also showed that survivors of SARS in Hong Kong had higher levels of stress compared with controls, even one (1) year after their experiences. In addition, they found out that these survivors also had significant levels of depression, anxiety, and posttraumatic symptoms. Likewise, the COVID-19 pandemic has been shown to be associated with significant neurological and psychiatric illnesses among survivors in the general population (Taquet et al., 2021).

Several HCWs have been affected globally (Bandyopadhyay et al., 2020), just like in previous outbreaks of Ebola, SARS-CoV-1 and MERS-CoV infections (Chan & Chan, 2004; Suwantarat & Apisarnthanarak, 2015). Professor Shekhar Saxena of Harvard University averred that, HCWs have a higher global prevalence of mental health issues such as depression and suicide than the general population (Smith, 2020).

In Ghana, Ofori et al. (2021) showed that 21.1%, 27.8% and 8.2% of HCWs suffered COVID-19-related depression, anxiety and stress. What hasn't been described is the psychological experiences of HCWs who contracted and recovered from the disease. This is very important because, the longer the duration of untreated psychological or psychiatric illnesses, the poorer the outcome (Altamura et al. , 2010). Unearthing and managing these mental health issues of HCWs who

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recovered from the infection is critical in the fight against this pandemic and, generally, in the delivery of quality healthcare service.

1.2 Justification

The COVID-19 pandemic is new to us. The mental health complications it leaves behind, for HCWs who recovered from the infection, is unexplored. Untreated mental health issues negatively impact performance. Also, the longer mental health issues are left undetected and untreated, the worse their prognosis. This study, therefore, is expected to reveal the prevalence of depression, anxiety and stress symptoms among HCWs who contracted and recovered from COVID-19. Secondly, it will also reveal how demographic factors and other related factors are associated with the development of these psychological disorders. Furthermore, it is expected to reveal whether there are differences in psychological disorders between vaccinated and unvaccinated groups.

These are important to help policymakers, administrators and health practitioners to come out with effective interventions to prevent and/or manage the mental health issues associated with contagions like COVID-19. This is critical to improve quality of life of HCWs, assure optimal mental health to improve healthcare delivery and to better equip them to fight future pandemics.

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1.3 Research questions

1. What is the prevalence of depression, anxiety and stress symptoms among HCWs who survived COVID-19 infection?

2. What factors are associated with depression, anxiety and stress symptoms among HCWs who survived COVID-19 infection?

3. Do psychological disorders differ among COVID-19 vaccinated and unvaccinated groups?

1.4 Study Objectives

1.4.1General Objectives

To investigate the psychological disorders of COVID-19 infection among HCWs who survived the disease.

1.4.2 Specific Objectives

1. To estimate the prevalence of depression, anxiety and stress symptoms among HCWs who survived COVID-19 infection.

2. To assess the factors associated with depression, anxiety and stress symptoms among HCWs who survived COVID-19 infection.

3. To investigate whether there are differences in psychological disorders between vaccinated and unvaccinated groups.

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1.5 Conceptual framework

Following the traumatic event, the conceptual construct for the development of depression, anxiety or stress constitutes the interplay of demographic factors such as age, sex, employment, parity,

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marital status, monthly income and educational level. Other factors include persistence of symptoms, co-morbidities and number of years of work.

After contracting COVID-19, not all show the same outcome in depression, anxiety and stress. As shown in Fig. 1, individual differences in age, gender, marital status, length of symptoms, occupation, admission status etc. have been shown to be associated with different levels of psychological experiences.

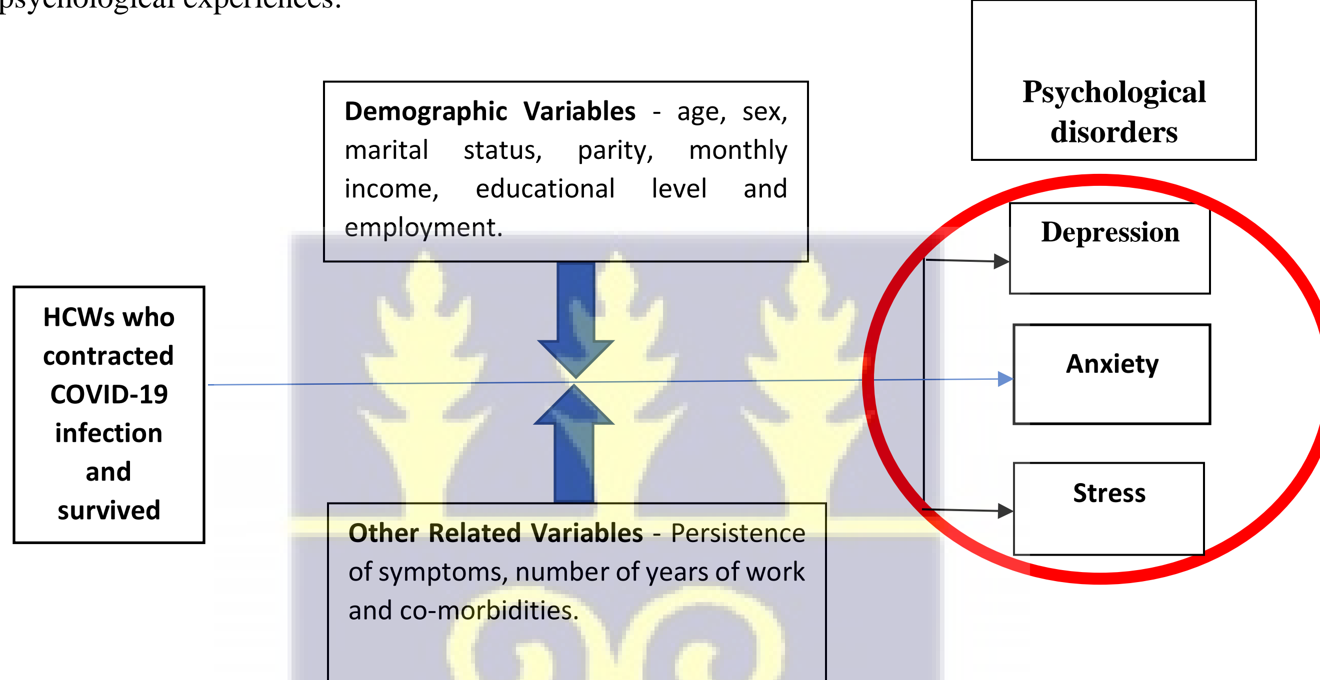

Figure 1: Conceptual framework showing factors hypothesized to impact on psychological health of health care workers who contracted Covid 19 infection and survived (Source: Author's Compilation, 2021).

1.6 Narrative of conceptual framework

Gender influences the extent to which one develops a psychiatric disorder following an outbreak. Matsumoto and colleagues (2021), in researching the factors affecting mental health in hospital workers treating COVID-19, showed that the female gender and older age are more likely to

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develop depression, social stress and anxiety. In contrast, other researchers have also shown that during an outbreak, the development psychological distress is more likely in younger people (Taylor et al., 2008). They also showed that a lower educational level was associated with more psychological distress. Other variables that have been shown to influence the development of psychological disorders include low socioeconomic status, pre-existing medical conditions, being single (Wang, 2020), persistent clinical symptoms of a disease (Janiri et al., 2021) and levels of income (Vyas et al., 2016). In terms of the kind of employment within the healthcare space, nurses were found to be more at risk of than doctors in the development of psychological disorders (Brook, 2018) when there are outbreaks.

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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews some related and relevant studies on Covid-19 and its general effects. It then narrows down on the psychological experiences of HCWs. The theoretical and empirical literature reviewed will critically and analytically help interpret the observations and findings that represent the psychological impact of covid-19 among surviving health-care workers. The review is further categorized under various themes which are: the overview of COVID-19, transmission of covid-19, covid-19 signs and symptoms, diagnosis and management of covid-19 and Impact of Covid-19. As part of psychological disorders, depression, anxiety and stress would be highlighted.

2.1 Theoretical Underpinnings of Psychological Stress

In evaluating the psychological impact of Covid-19 in surviving HCWs, it is important to apply, at least, a theory in explaining the phenomenon of interest. Several theories exist but the General Adaption Syndrome (GAS) theory fits well in explaining the psychological distress that affected persons go through.

2.2 General Adaptation Syndrome of Stress

This stress model developed by Hands Selye in 1936 has been studied by many other scientists.

He described the pattern of changes that occur in the body following exposure to some form of stress. This model describes three (3) stages. These are the alarm, resistance and exhaustion stages (Rice, 2002).

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2.2.1 Alarm stage of the General Adaptation Syndrome

This is also referred to as a shock phase. This occurs when an individual initially recognizes something as stressful (stressor). This alerts the hypothalamus of a state of emergency and the subsequent activation of the autonomic nervous system. The body at that stage then initiates the fight-or-flight reactions, also known as the stress responses, resulting in the body to action quickly (Rice, 2002; *The Stress Response | Disease Prevention and Healthy Lifestyles*, n.d.).

2.2.2 Resistance stage of the General Adaptation Syndrome

In the face of continuous or persistent stress, the body continuous in this state of stimulation but at a higher level to ensure an adaptation to and existence with the stressor. However, this stage depletes the body of its resources over some time period and pushes it to the final level of exhaustion (Rice, 2002).

2.2.3 Exhaustion stage of the General Adaptation Syndrome

When the resistance stage does not return to normal, exhaustion sets in resulting in a heightened level of endocrine function which has negative repercussions on organ systems in the body. This stage can lead to several diseases that include diabetes, depression, anxiety, heart diseases etc. This stage also causes weakening of the immune system with associated susceptibility to other stress-related illnesses (Rice, 2002; *The Stress Response | Disease Prevention and Healthy Lifestyles*, n.d.).

There are other forms of theories that seek to explain specifically the posttraumatic stress disorder - Stress response theory, theory of shattered assumptions, conditioning theory, information-processing theories, anxious apprehension model – but these are earlier theories. Current theories include emotional processing theory, dual representation theory and the Ehlers and Clark's cognitive model (Brewin & Holmes, 2003).

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2.3 Background of Coronavirus Disease

The novel coronavirus disease emerged in Wuhan, China, in December, 2019. Subsequently, it was declared a pandemic on 11th March, 2020. It was named COVID-19 for short from **CO**rona **VI**rus **D**isease 20**19** The disease is caused by a new variant of the already known coronaviruses called severe acute respiratory syndrome coronavirus 2 - SARS-CoV-2 (Asselah et al., 2021; World Health Organization, 2020).

2.3.1 Transmission of COVID-19

Several studies have demonstrated that the infection can be transmitted from person to person (Arons et al., 2020; J. F. W. Chan et al., 2020). The mechanism of transmission is through direct contact with the respiratory droplets of a person who is infected with the virus. These droplets are generated through sneezing and coughing. People can also contract the infection by touching surfaces on which the virus has fallen through respiratory droplets and touching their faces especially, the mouth, eyes and nose (WHO, IFRC, & UNICEF, 2020).

2.3.2 Signs and Symptoms of COVID-19

COVID-19 has a wide spectrum of clinical presentations. The common once are fever, fatigue and cough. Other less common ones include chills, shortness of breath or difficulty breathing, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, diarrhea, skin rashes, conjunctivitis etc. (Dennison Himmelfarb & Baptiste, 2020; *Symptoms of COVID-19 | CDC*, n.d.)

2.3.3 Diagnosis of COVID-19

COVID-19 diagnostic testing can be grouped mainly into nucleic acid amplification tests, serological tests and antigen tests. The gold standard is the nuclei acid amplification test. Several of such kind exists but the Reverse Transcription Polymerase Chain Reaction (RT-PCR) test, using

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is most widely use worldwide. (Asselah et al., 2021; CDC, 2020). Samples can be taken from the anterior nares, oropharyngeal and mid-turbinate but the nasopharyngeal specimen is the most preferred choice for testing (Asselah et al., 2021).

2.3.4 Management of COVID-19

There is currently no cure for COVID-19. Following RT-PCR confirmation of the disease, patients are quarantined to minimize the spread of the infection and clinicians give supportive treatment to the patients. The core management of Covid-19 is through antivirals, which prevent multiplication of the virus, immune modulators, whose role is to stop the immune system from wildly over-reacting at the expense of the body and/or anti-inflammatory medications (Asselah et al., 2021; Robinson, 2021). Prevention and transmission control measures include wearing of face masks, frequent washing of hands with soap and under running water and social distancing are of extreme importance in the fight against the pandemic (WHO, 2020)

2.3.5 Burden of COVID-19

That the COVID-19 pandemic has affected many aspects of lives cannot be debated. Apart from the effects of the disease on physical bodies and psychosocial health, the disease has had effects on global economies and, even, the environment. The spread, management and complications of COVID-19 has direct and indirect cost to patients, health institutions and nations (Ghaffari Darab et al., 2021).

2.3.6 Economic Burden

While the exact global economic impact of the pandemic may be difficult to estimate, economists agree that there would be certainly a negative significant impact. In the United states, for instance, the pandemic is estimated to cause a loss of more than $16 trillion by the end of 2021 (Cutler & Summers, 2020) while in the United Kingdom, the deficit is expected to be around £394bn in

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2020/21 (Pope et al., 2021) and $311bn to the Australian economy (*The 2021 Federal Budget Reveals Huge $311bn Cost of Covid to Australian Economy | Australian Budget 2021 | The Guardian*, n.d.). The global Gross Domestic Product (GDP) in 2020 decreased by 3.4 percent, while 2021 has been forecasted to see growth of about 2.9 percent GDP (Statista, 2020). The IMF, however, projects 6% growth in 2021 and 4.4% in 2022. The many efforts to reduce poverty across the globe has seen significant derailment to the extent that an additional 95 million people are estimated to have pushed into the category of extreme poverty in 2020 and 80 million more people also undernourished as compared to the pre-pandemic period (International Monetary Fund, 2021). Many countries are reeling under the economic effect of COVID-19. To help countries rebuild their economies, the IMF has secured a $1million lending capacity to help its members out of the economic doldrums (Georgieva, 2020).

In Ghana, the first 2 months of COVID-19 saw 42,000 persons losing their jobs and the hospitality industry lost about $171 million in the period of the lockdown (Aduhene & Osei-Assibey, 2021). In addition about 770,000 workers who represent about 25.7% of the total workforce in Ghana had their wages reduced (World Bank, 2020). Children in Ghana have also suffered immensely from the pandemic with loss of significant school time, increased exposure to abuse, violence and exploitation, increased poverty, nutritional challenges and also mental and physical health issues (UNICEF, 2021).

2.3.7 Environment Burden

The COVID-19 pandemic has afforded the environment many benefits. These include a reduction in the killing of wildlife (Bíl et al., 2021; Łopucki et al., 2021), reduction in air, water and noise pollution (R. Bao & Zhang, 2020; Basu et al., 2021; Yunus et al., 2020), boosting of endangered aquatic animals (Bates et al., 2020), etc. However, these appear to be temporary benefits as these

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gains can quickly be reversed with the resumption of normal human activity. Negative and long-term complications of COVID-19 pandemic comes rather into sharp focus as these would be the issues to deal with in the future. For example, plastic pollution has been on the increase mainly because of disposal of the single-use personal protective equipment (PPE). As a result of COVID-19 pandemic, it has been estimated globally, that approximately 3.4 billion single-use facemasks or face shields are thrown away daily and different forms of chemicals such as chloroxylenol, chlorine and hydrogen peroxide have been released into the environment (Ankit et al., 2021; Benson et al., 2021). According to Hiemstra et al. (2021), the disposal of such plastic PPEs in the environment is, in many ways, directly harming the animals around us.

2.3.8 Physical Impact

COVID-19 symptoms can persist for many months. The virus has the capability of affecting all organ systems in the body leaving in its trail many long-term complications (Mayo Clinic, 2020). How long these complications take is unknown. The commonest damage following COVID-19 Pneumonia is the destruction of the alveoli leaving scar tissues in the lungs which results in breathing difficulties (Salehi et al., 2020). The disease also causes lasting damages to the cardiac muscles that increases the risk of cardiac failure and other heart diseases (Mitrani et al., 2020; Yancy & Fonarow, 2020). When the central nervous system is affected the COVID-19 disease causes anosmia, paralysis, seizures, strokes, encephalopathy, meningitis etc that result in damages that increase the risk of developing Alzheimer's disease and Parkinson's disease (Fotuhi et al., 2020) . There is no clarity on how COVID-19 will affect people over time. There are therefore ongoing prospective studies to understand this better (Mayo Clinic, 2020). The above underlining damages have contributed to the persistence of many symptoms like general weakness especially after exertion, difficulty breathing or shortness of breath or cough, palpitations, memory,

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concentration or sleep problems, anosmia or dysgeusia, myalgia, chest pain, arthralgia etc. (Mayo Clinic, 2020)

2.3.9 Psychological Impact

As mentioned before, there has been significant effect of Covid-19 on the mental health of both infected persons and non-infected persons. The regular media bombardment of increasing death rate and rapid spread of the disease has made people afraid, anxious, worried and mentally distressed around the world (Su et al., 2021). Even more serious is the existence of suicidal ideations or suicide (Elbogen et al., 2021; Fortgang et al., 2021; Gunnell et al., 2020).

It is of no doubt that HCWs are more likely to be affected with the coronavirus disease since they are more exposed to the virus than other workers (Shah et al., 2020). In fact, HCWs are seven times (7x) more likely to develop severe disease than other workers (Mutambudzi et al., 2021). To this end, HCWs are not immune from the physical and mental health effects of COVID-19.

A systematic review and meta-analysis on the mental health impact of COVID-19 among healthcare workers and the general population revealed that 33% had anxiety and 28% had depression (Luo et al., 2020). In a cross-sectional study conducted among HCWs in three hospitals in the Ashanti Region of Ghana, Ofori et al. (2021), found out that more than 40% of HCWs had fear, 21.1% had depression, 27.8% had anxiety and 8.2% had stress. Persons who had been admitted for the disease were found to have had post-traumatic stress disorder. A total of 10.4% of respondents had questionnaire-based diagnosis of PTSD while 8.6% were classified under subthreshold PTSD, which can cause significant levels of distress and impairment of function.

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2.4 Predictors of psychological disorders following a disease outbreak

Previous studies have mentioned age, sex, marital status, occupation, admission status and persistent of symptoms as some of the factors that influence the development of the depression, anxiety and stress following an epidemic. Several studies have shown that females have been psychologically affected more than their male counterparts in this current pandemic and previous ones (Al Omari et al., 2020; Mazza et al., 2020; Özdin & Bayrak Özdin, 2020; Tam et al., 2004; Tasnim et al., 2021).

Younger age was associated with higher levels of depression, anxiety, stress, stigma and symptoms of PTSS following a disease outbreak (Jassim et al., 2021; Lancee et al., 2008; Nwachukwu et al., 2020; Reynolds et al., 2008). However, Bah et al. (2020), found out that older survivors of Ebola were more likely to develop depressive and anxiety symptoms than younger survivors.

In terms of occupation, nurses have been found to be more prone to mental disorders than other professions within the hospital setting in this current pandemic and previous SARS epidemics (Huang et al., 2020; Maunder et al., 2004; Tam et al., 2004).

Research in previous outbreaks of SARS or MERS have and the current pandemic have shown that HCWs who were quarantined or isolated where also more at risk of developing symptoms of PTSD, depression, stigma, and distress. (Bai et al., 2004; Bo et al., 2021; Jassim et al., 2021; Lee et al., 2018; Reynolds et al., 2008; Wu et al., 2009).

According to A. O. M. Chan & Chan (2004), those who were unmarried were adversely more affected than the married in previous outbreaks. On the contrary, Sim et al. (2004), found than married persons more positively correlated with the development of PTSD symptoms. A recent case control study involving HCWs dealing with the COVID-19 pandemic revealed also that

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married, divorced or widowed persons were more vicariously traumatized as compared to unmarried HCWs (Z. Li et al., 2020).

Another factor that is associated with the development of depression and PTSD is the persistence of symptoms of COVID-19 (Janiri et al., 2021; Liyanage-Don et al., 2021). Pers et al. (2017) also showed that persistent symptoms in Ebola patients was associated with a highly likelihood of developing depression. In a cross-sectional study by Janiri et al. (2021), they also found out that those who had suggestive symptoms of PTSD also reported persistent symptoms of COVID-19.

2.5 Depression, Anxiety and Stress

According to WHO, depression, which is a psychological disorder affects over 260 million people globally. Its main features are persistence of sadness and lack of interest or pleasure in activities that were formerly rewarding or enjoyable. Persons who are depressed may have anorexia, disturbed sleep, fatigue and poor concentration. If left untreated, depression can lead to poor productivity at work, disturbed relationships with family and friends and self-isolation from any form of community participation (WHO, n.d.). It has also been shown that depression is associated with cardiovascular morbidity (Dhar & Barton, 2016).

Anxiety is also a psychological disorder that involves emotions characterized by worried thoughts, feelings of tension, and physical changes such as raised blood pressure, trembling, perspiration, rapid heartbeat and dizziness. Persons living with anxiety disorders commonly present with intrusive thoughts that are recurrent (America Psychological Association, n.d.).

As defined by Lazarus and Folkman (1979), psychological stress is “a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being”.

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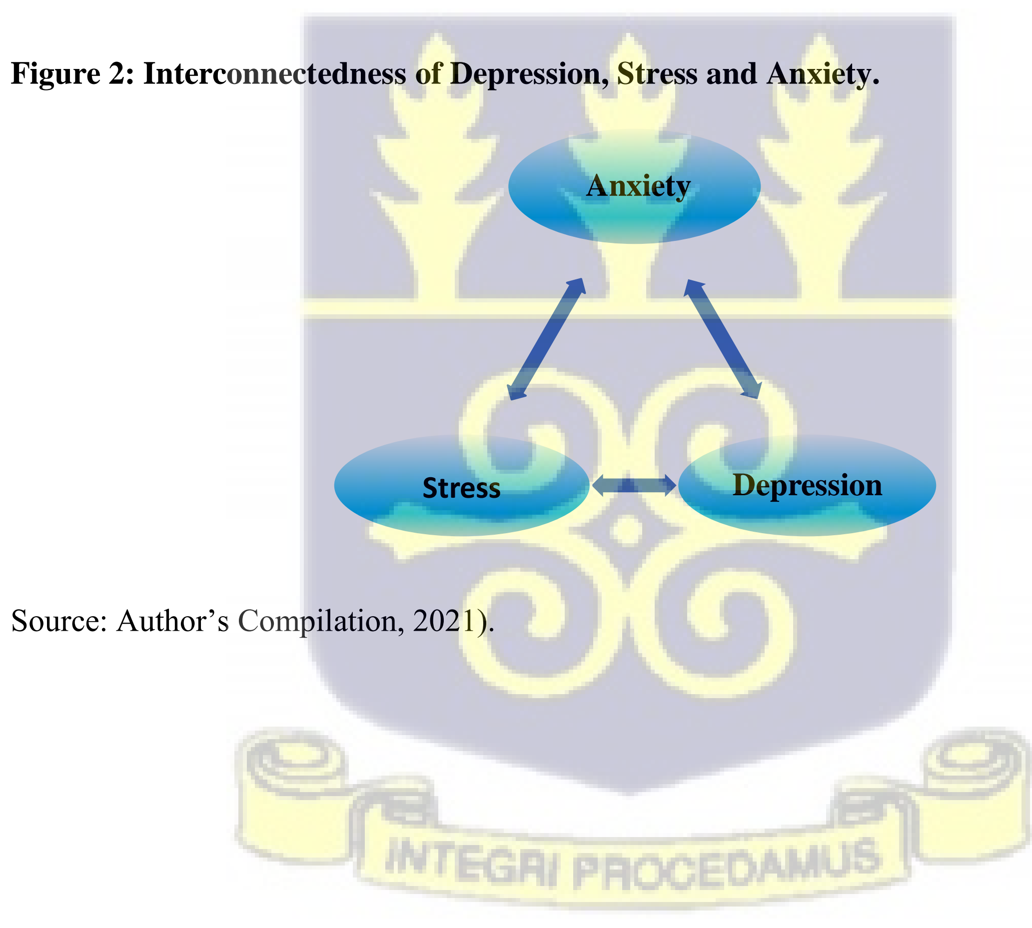
It has been shown that these three (3) – stress, anxiety and depression – are interrelated (Fig. 2). Each may contribute to the development of the other and/or may exist concurrently (Bartlett et al., 2017; Hasin et al., 2018; Konstantopoulou et al., 2020; Slavich & Irwin, 2014). Stressful life events have been shown to be associated with the development of anxiety in adolescents and adults (McLaughlin & Hatzenbuehler, 2009). Anxiety, which is poorly recognized by physicians, leads to depression when left untreated. Therefore, the earlier it is identified, the more cases of depression are avoided (Stern, 2014). Yang and his colleagues (2015) also showed, through neurobiological mechanisms in animal models, that psychological stress influenced the development of depression.

Figure 2: Interconnectedness of Depression, Stress and Anxiety.



Source: Author's Compilation, 2021).

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2.6 Psychometric Tools used to assess depression, anxiety and stress

Several validated psychometric tools have been deployed by researchers in the past with their respective strengths and weaknesses. Some address a specific psychological disorder while others address more than one. As shown in Table 1.0 below, the DASS-21 was chosen because it accessed all three (3) psychological disorders – depression, anxiety and stress - that the researcher is interested in.

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Table 1: Some psychometric tools showing their strengths and limitations.

Psychometric Tool	References	Strengths	Limitations
IES-R	(Weiss, 2007)	Assesses only PTSD.	Specific only for PTSD. Does not measure depression, anxiety and general stress.
PCL-5	(Blevins et al., 2015)	Assesses only PTSD.	Specific only for PTSD. Does not measure depression, anxiety and general stress.
DASS-21	(Lovibond, S.H. & Lovibond, 1995)	Measures depression, anxiety and stress.	Does not address PTSD.
PHQ-9	(Kroenke & Spitzer, 2002)	Measures only depression.	Does not measure anxiety and stress.
GAD-7	(Spitzer et al., 2006)	Measures only anxiety.	Does not measure depression and stress.
HADS	(Zigmond & Snaith, 1983)	Measures anxiety and depression only.	Does not measure stress.

Source: Author's Compilation (2021). Abbreviations in Table 1 mean "IES-R": Impact of Event Scale – Revised; "PCL-5": Posttraumatic Stress Disorder Checklist; "PTSD": Post-traumatic Stress Disorder; "DASS-21": Depression Anxiety Stress Scale; "GAD-7": General Anxiety Disorder-7 Scale; "PHQ": Patient Health Questionnaire; "HAD": Hospital Anxiety and Depression Scale.

INTEGRI PROCEDAMUS

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CHAPTER THREE

METHODOLOGY

3.1 Study Design

This study employed a quantitative cross-sectional design by sampling and analyzing data on HCWs who recovered from Covid 19 infection.

3.2 Study Population

The targeted population was healthcare workers (HCWs) who had contracted and recovered from the COVID-19 infection. Here, recovered HCWs are defined as those who, after a confirmed PCR positive test, completed the fourteen (14) days of quarantine, re-tested and PCR confirmed negative and had resumed work.

3.3 Study site description

The study sites are Cocoa Clinic, Kaneshie Polyclinic and Faith Mission Hospital which are in the Okaikoi South Sub-Metropolitan District, Achimota Hospital which is in the Okaikoi North Municipal District, Ga West Municipal Hospital, which is in the Ga West Municipal District. These districts are all in the Greater Accra Region, which were hotspots of Covid-19 infections in the country. Though these facilities did not have appropriate treatment sites, all facilities were hard hit by Covid-19 infections.

3.4 Sampling Method and Sample Size

These facilities were sampled using the convenience sampling method. This is because it was relatively easier to get information from these facilities and, also, these facilities were known to have recorded many cases of COVID-19. The sampling approach used in this study was a census. Within each facility, the total number of HCWs who have been reported to have recovered from Covid 19 as of 15th December, 2021 as were used as my sample size. Thus, for those facilities:

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Cocoa Clinic – 35, Kaneshie Polyclinic - 28, Faith Mission Hospital - 26, Ga West Hospital – 45 and Achimota Hospital – 35, making a total of 169 recovered Covid 19 HCWs. However, out of this total, only 120 availed themselves to participate in the study. Thus, the final sample size was 120 participants.

3.5 Data Collection Method and Tools

3.5.1 Pretest of Questionnaire

Twenty (20) participants were selected at random, and questionnaires pretested on them, and the necessary changes made. Those 20 HCWs were not part of the 120.

3.5.2 Data collection

Questionnaire was uploaded to Kobo collect toolbox version 1.0, an electronic survey administration platform to minimize the need for direct human physical contact. The link to the survey was designed to permit only one response per devise, thus limiting the likelihood of duplication. The links to the electronic survey was shared with respondents who had possession of smart phones. Those that had no smartphones were contacted using a phone survey to complete the questionnaire. This method of data collection was necessitated due to the constraints imposed on human interactions because of COVID 19 pandemic. The validated Depression, Anxiety and Stress Scale (DASS-21) (Appendix 3) was incorporated into the questionnaire to measure the psychological disorder of HCWs following COVID-19 infection. The questionnaire was not separately vaccinated for this specific study.

The questionnaire (Appendix 2) contained five (5) parts - Parts A, B, C and D. Part A consisted of the demographics, Part B dealt with when respondents had the infection, whether they were admitted or not and whether there are still some persistent symptoms of COVID-19. Part C

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assessed levels of depression, anxiety and stress before respondents got infected with COVID-19. Part D assesses the levels of depression, anxiety and stress after respondents got infected with COVID-19. Data was collected from 15th December, 2021 to 7th January, 2022.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

1. Healthcare workers (both permanent and temporary staff) who had PCR-confirmed COVID-19 diagnosis.
2. Affected healthcare workers (both permanent and temporary staff) who had completed their mandatory quarantine (or discharged from admission), gotten re-tested and showed a negative PCR confirmed Covid results, and had resumed work.

3.6.2 Exclusion Criteria

1. Those infected healthcare workers still under quarantine, including admissions.
2. Those with no evidence of a PCR-confirmed diagnosis.

3.7 Study Variables

3.7.1 Dependent Variables

The dependent variables are depression, anxiety and stress.

3.7.2 Independent Variables

Demographic factors such as age, gender, marital status and occupation; other factors include admission status, underlying medical condition and persistence of symptoms.

3.8 Data Analysis

Data from the questionnaire was cleaned, coded and entered into Microsoft Excel data sheet. Data analysis was done by vetting the questionnaire and was finally imported into STATA software

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package version 16 for statistical analysis. Descriptive analysis such as the mean, standard deviation, 95% confidence intervals, percentages and frequencies of different variables were computed.

3.8.1 Prevalence of depression, anxiety and stress among HCWs who recovered from Covid-19

Percentages were calculated for HCWs who met the criteria for had depression, anxiety and stress according to DASS-21 (Appendix 3).

3.8.2 Factors associated with the development of depression, anxiety and stress among HCWs

Bivariate analysis using the chi-Square was conducted to determine if there is any significant association between dependent and independent variables. Where one of the cell frequencies was less than 5, Fisher's exact test was used. Multiple logistic regression was conducted on all related factors at the bivariate level. Crude Odds Ratio (cOR) and Adjusted Odds Ratio (AOR) was determined for each of the independent variables and statistical significance was accepted at ($p<0.05$).

3.9 Differences in psychological disorders between vaccinated and unvaccinated groups

Tests of proportions was conducted to compare two groups of unequal sizes – those vaccinated and those unvaccinated before COVID-19 infection – to determine statistical significance of any differences in psychological disorders.

3.10 Quality control

Pre-testing of the questionnaire was done at Urgent Care Hospital, a private facility at Achimota, with 20 questionnaires. This was to ensure that the words and sentences in the questionnaire are

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well understood by respondents to generate the correct responses. Questions which appear not to elicit appropriate responses were re-visited or eliminated.

3.11 Ethical Issues

Ethical Clearance was sought from the Ethical Review Committee of the Ghana Health Service before the commencement of the project.

3.11.1 Informed Consent

Informed consent was obtained from the respondents before they participated in the study. Their participation in this study was voluntary. Additionally, they were at liberty to withdraw from the study or stop the interview at any time.

3.11.2 Privacy and Confidentiality

This study ensured that privacy and confidentiality of the individuals who participate in the study were protected by avoiding collection of identifiable information in the questionnaire. I assured all participants that whatever information they provided would be handled with strict confidentiality and was entirely going to be used for research purposes. Their name or personal identifying information were not collected nor published in any report.

3.11.3 Data storage and usage

Data collected in this study was strictly for research purposes. The data was stored with passwords on electronic media and in safely locked boxes. Anonymity was ensured in dissemination of findings from this study since participants were not to be identified by their names.

3.11.4 Declaration of conflict of interest

The researcher as the principal investigator does hereby declare no conflict of interest in this study.

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CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of respondents

The demographic data of the respondents are illustrated in Table 4.1. A total of 169 respondents were interviewed. However, only 120 returned the questionnaire giving a response rate 71%. The results showed that 45.8 % were males while 54.2 % were females. Most respondents were between the ages of 18-30 years (38.3%). More than half of respondents (58.3%) had had tertiary education, 26.7% had SHS education, and 15.0% had JHS education. Concerning parity, 26.7% had three children and formed the majority. Most respondents had worked for a period between 11-17 years representing 31.7%. Respondents who had medical conditions or co-morbidities represented 29.2%. About 72.5% of respondents have been vaccinated with any of the COVID-19 vaccine. Majority (76.9%) still had symptoms of the disease persisting (Table 4.2).

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Table 2: Socio-demographic characteristics of respondents

Variable	Frequency (N=120)	%Number
Socio-demographic Variables		
Age of respondents (years)		
18-30	46	38.3
31-40	39	32.5
41-50	21	17.5
>50	14	11.7
Mean ± SD 28.1± 2.65 (95% CI: 25.2-32.4)		
Sex		
Male	55	45.8
Female	65	54.2
Marital Status		
Single	37	30.8
Married	54	45.0
Divorced	12	10.0
Widowed	17	14.2
Educational level		
JSS/JHS	18	15.0
SSS/SHS	32	26.7
Tertiary	70	58.3
Parity		
None	25	20.0
1	28	23.3
2	32	26.7
3	19	15.8
≥4	16	14.2
Number of years worked (years)		
0-5	18	15.0
6-10	29	24.2
11-15	38	31.7
>15	35	29.1
Occupational status		
Medical Doctor	18	15.0
Nurse	65	54.2
Pharmacist	10	8.3
Janitor/Cleaner	12	10.0
Others	15	12.5
Average monthly income		
GHS 0-500	12	10.0
GHS 501-1,000	9	7.5
GHS 1001-1500	7	5.8
GHS 1600-2000	31	25.8
GHS>2000	61	50.9

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Table 3: Other related characteristics of respondent's (N=120)

Variable	Frequency	%
Other Related Characteristics		
Satisfaction with job		
No	22	18.3
Yes	98	81.7
Do you have any medical condition (co-morbidities)?		
No	85	70.8
Yes	35	29.2
Were you vaccinated before you contracted COVID-19 disease?		
No	33	27.5
Yes	87	72.5
Were you admitted?		
No	99	35.0
Yes	21	65.0
Do you still have persistent symptoms of the disease		
No	92	76.7
Yes	28	23.3

4.2 Prevalence of depression, anxiety and stress among HCWs

The results showed that 21% exhibited symptoms of depression, 28% suffered from anxiety and 29% were stressed (Table 4).

Table 4: Prevalence of Depression among HCWs who survived COVID-19 infection.

Psychological disorders	Number of persons with the symptoms	Number of persons without the symptoms	Total	Prevalence of persons who had the symptoms
Depression	25	95	120	20.8%
Anxiety	34	86	120	28.3%
Stress	35	85	120	29.1%

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4.2 Bivariate association between demographic data and Depressive Symptoms

A bivariate analysis was conducted to find out if there is any statistically significant association between the demographic data and other associated factors and experiences of depressive symptoms among healthcare workers who survived COVID-19 infections. Statistically, this was analyzed using 5% level of significance. The findings showed that, age ($\chi2$=3.872; p=0.028), sex ($\chi2$=4.852; p=0.002), marital status ($\chi2$=7.294; p=0.012), parity ($\chi2$=5.428; p=0.001), average monthly income ($\chi2$=5.928; p=0.015), having comorbidities ($\chi2$=6.842; p=0.022) were the factors found to be significantly associated with experiencing depressive symptoms at the bivariate level. Educational level, employment status and number of years worked as well as other related factors were analyzed but were found not to be significantly associated with experiencing depressive symptoms ($p > 0.05$) [Table 4.3 and 4.4].

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Table 5: Association between demographic data and Depressive Symptoms

	Depressive Symptoms N (%)				
	Present	**Absent**	**Total**	χ2 value	**p-value**
Age of respondents (Yrs.)				3.872 Ψ	**0.028***
18-30	4 (16.0)	42(44.2)	46(38.3)		
31-40	5 (20.0)	34(35.8)	39(32.5)		
41-50	9 (36.0)	12(12.6)	21(17.5)		
>50	7(28.0)	7(7.4)	14 (11.7)		
Sex				4.852	**0.002***
Male	7 (28.0)	48 (50.5)	55 (45.8)		
Female	18 (72.0)	47 (49.5)	65 (54.2)		
Marital status				7.294 Ψ	**0.012***
Single	8 (32.0)	29 (30.5)	37 (20.8)		
Married	12 (48.0)	42 (44.2)	54 (45.0)		
Divorced	2 (8.0)	10 (10.5)	12 (10.0)		
Widowed	3 (12.0)	14 (14.8)	17 (14.2)		
Educational level				3.374	0.283
JSS/JHS	8 (32.0)	10(10.5)	18(15.0)		
SSS/SHS	11(44.0)	21(22.1)	32(26.7)		
Tertiary	6(24.0)	64 (67.4)	70(58.3)		
Parity					
None	2(8.0)	23(24.2)	25 (20.0)	5.428 Ψ	**0.001***
1	3(12.0)	25 (26.3)	28 (23.3)		
2	5(20.0)	27(28.4)	32 (26.7)		
3	7(28.0)	12(12.6)	19 (15.8)		
≥4	8(32.0)	8(8.5)	16 (14.2)		
Occupational status				3.472 Ψ	0.328
Medical Doctor	8 (32.0)	10 (10.5)	18(15.0)		
Nurse	10 (40.0)	55(57.9)	65(54.2)		
Pharmacist	2(8.0)	8(8.4)	10(8.3)		
Janitor/Cleaner	3(12.0)	9(9.5)	12(10.0)		
Others	2(8.0)	13(13.7)	15(12.5)		
Number of years worked (Yrs.)				3.275 Ψ	0.272
0-5	3(12.0)	15(15.8)	18(15.0)		
6-10	9 (36.0)	20(21.1)	29(24.2)		
11-15	8(32.0)	30 (31.6)	38(31.7)		
>15	5(20.0)	30 (31.5)	35(29.1)		
Average monthly income				5.928 Ψ	**0.032***
GHS 0-500	8(32.0)	4 (4.2)	12(10.0)		
GHS 501-1,000	5(20.0)	4 (4.2)	9(7.5)		
GHS 1001-1500	4(16.0)	3 (3.1)	7(5.8)		
GHS 1600-2000	2(8.0)	29 (30.5)	31(25.8)		
GHS>2000	6(24.0)	55 (58.0)	61 (50.9)		

***:** statistically significant at $p<0.05$; Values with Ψ represents Fisher's Exact test, and those without symbols represent Chi-square.

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Table 6: Association between related factors and Depressive Symptoms

	Depressive Symptoms N (%)				
	Present	Absent	Total	χ2 value	p-value
Satisfaction with Job				2.872	0.128
No	12(48.0)	10 (10.5)	22 (18.3)		
Yes	13(52.0)	85 (89.5)	98 (81.7)		
Do you have any medical conditions?				6.842	**0.022***
No	17 (68.0)	68 (71.6)	85 (70.8)		
Yes	8 (32.0)	27 (28.4)	35 (29.2)		
Were you vaccinated before you contracted COVID-19?				3.294	0.275
No	14 (56.0)	19 (20.0)	33 (27.5)		
Yes	11 (44.0)	76 (80.0)	87 (72.5)		
Were you admitted?				4.732	0.090
No	10 (40.0)	89 (93.7)	99 (82.5)		
Yes	15 (60.0)	6 (6.30)	21 (17.5)		
Do you still have persistent symptoms of the disease				2.711	0.329
No	13 (52.0)	79 (83.2)	92 (76.7)		
Yes	12 (48.0)	16 (6.80)	28 (23.3)		

***:** statistically significant at p<0.05

4.3 Multiple logistic regression of factors influencing Depressive Symptoms

Multiple logistic regression analysis was conducted on all demographic and other related characteristics (Table 4.5). All the factors were put in the regression model. The results revealed that sex, age, marital status, parity and average monthly income were the precipitating factors found to be significantly associated with experience of depressive symptoms at 95% confidence level. With regards to sex, adjusting for all other factors, females were 2.44 times more likely to have depressive symptoms compared to their male counterparts (AOR= 2.44; 95% CI=1.042-6.852, *p*=0.015).

Adjusting for all other factors, respondents that were between the ages of 41-50 years had an increased odds of having depressive symptoms compared to those between the age group of 18-30 years (AOR= 5.63; 95% CI=2.229-14.334, p=0.035).) Moreso, respondents that were above 50

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years also had an increased odds of having depressive symptoms compared to those between the age group of 18-30 years (AOR= 4.82; 95% CI=2.172-11.342, p=0.003).

The study further revealed that respondents who were married were less likely or had 12% reduced odds of having depressive symptoms compared to those who are single (AOR= 0.88; 95% CI=0.286-0.985, p=0.002).

The results further showed that as the number of children of respondents increases, the odds of having depressive symptoms also increases. For instance, respondents who had at least 4 children were 6.4 times more likely to have depressive symptoms compared to those who have none (AOR= 6.42; 95% CI=3.188-14.965, p=0.032).

With regards to average monthly income, respondents who have an average monthly income of at least GHS2000 were less likely or had 89% reduced odds of having depressive symptoms compared to those who earned between GHS 0 - 500 (AOR= 0.11; 95% CI=0.012-0.723, p=0.022).

The study further revealed that respondents who had comorbidities were approximately two times more likely to have depressive symptoms compared to those who have no medical conditions (AOR= 2.32; 95% CI=1.049-5.255), p=0.012).

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Table 7: Multiple logistics regression of the factors associated with depressive symptoms

Variable	Present	Absent	cOR (95%CI)	AOR (95%CI)	p-value
Age (yrs)					
18-30	4 (16.0)	42(44.2)	1.0 (ref)	1.0 (ref)	
31-40	5 (20.0)	34(35.8)	1.54 (0.011- 4.135)	1.42(0.152-5.831)	0.328
41-50	9 (36.0)	12(12.6)	7.8 (1.267-12.484)	5.63 (2.229-14.334)	**0.035***
>50	7(28.0)	7(7.4)	6.0 (2.472-10.484)	4.82 (2.172-11.342)	**0.003***
Sex					
Male	7 (28.0)	48 (50.5)	1.0 (ref)	1.0 (ref)	
Female	18 (72.0)	47 (49.5)	2.63 (1.021-5.922)	2.44 (1.042-6.852)	**0.015***
Marital status					
Single	8 (32.0)	29 (30.5)	1.0 (ref)	1.0 (ref)	
Married	12 (48.0)	42 (44.2)	1.03 (0.272-3.422)	0.88 (0.286-0.985)	**0.002***
Divorced	2 (8.0)	10 (10.5)	0.70 (0.352-2.782)	0.72 (0.512-3.802)	0.284
Widowed	3 (12.0)	14 (14.8)	0.78 (0.228-4.669)	0.52(0.128-4.367)	0.292
Educational level					
JSS/JHS	8 (32.0)	10 (10.5)	1.0 (ref)	1.0 (ref)	
SSS/SHS	11(44.0)	21(22.1)	0.65 (0.023-2.792)	0.77 (0.225-3.872)	0.274
Tertiary	6(24.0)	64 (67.4)	0.12 (0.042-3.382)	0.22 (0.132-0.583)	0.286
Parity					
None	2 (8.0)	23 (24.2)	1.0 (ref)	1.0 (ref)	
1	3(12.0)	25 (26.3)	1.38 (1.035-3.982)	1.48 (1.018-4.623)	**0.028***
2	5 (20.0)	27(28.4)	2.12 (1.172-4.982)	2.32 (1.282-5.726)	**0.017***
3	7(28.0)	12 (12.6)	6.71 (2.326-9.885)	5.82 (2.019-9.594)	**0.002***
≥4	8(32.0)	8 (8.5)	7.22 (3.228-14.927)	6.42 (3.188-14.965)	**0.032***
Occupational status					
Medical Doctor	8 (32.0)	10 (10.5)	1.0 (ref)	1.0 (ref)	
Nurse	10 (40.0)	55 (57.9)	0.22 (0.167-1.519)	0.82 (0.282-3.72)	0.217
Pharmacist	2 (8.0)	8 (8.4)	0.35 (0.229-2.885)	0.28 (0.119-2.392)	0.328
Janitor/Cleaner	3 (12.0)	9 (9.5)	0.41 (0.445-3.582)	0.62 (0.028-3.373)	0.277
Others	2(8.0)	13(13.7)	0.72 (0.182-2.262)	0.58 (0.312-4.723)	0.262
Average monthly income					
GHS 0-500	8 (32.0)	4 (4.2)	1.0 (ref)	1.0 (ref)	
GHS 501-1,000	5(20.0)	4 (4.2)	0.62 (0.167-2.519)	0.88 (0.266-3.794)	0.319
GHS 1001-1500	4(16.0)	3 (3.1)	0.70 (0.229-0.885)	0.85 (0.229-0.992)	**0.027***
GHS 1600-2000	2(8.0)	29 (30.5)	0.03 (0.001-0.0632)	0.07 (0.028-0.0775)	**0.002***
GHS>2000	6(24.0)	55 (58.0)	0.04 (0.022-0.773)	0.11 (0.012-0.723)	**0.022***

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Table 7: Multiple logistics regression of the factors associated with depressive symptoms Cont'd

Variable	Present	Absent	cOR (95%CI)	AOR (95%CI)	p-value
Satisfaction with Job					
No	12(48.0)	10 (10.5)	1.0 (ref)	1.0 (ref)	
Yes	13(52.0)	85 (89.5)	0.13 (0.018- 4.239)	0.22 (0.152-5.531)	0.269
Do you have any medical condition?					
No	17 (68.0)	68 (71.6)	1.0 (ref)	1.0 (ref)	
Yes	8 (32.0)	27 (28.4)	2.52 (1.051-5.531)	2.32 (1.049-5.255)	**0.012***
Were you vaccinated before you contracted COVID-19 disease?					
No	14(56.0)	19 (20.0)	1.0 (ref)	1.0 (ref)	
Yes	11 (44.0)	76 (80.0)	0.19 (0.022-3.386)	0.29 (0.183-0.3.87)	0.184
Were you admitted?					
No	10 (40.0)	89 (93.7)	1.0 (ref)	1.0 (ref)	
Yes	15 (60.0)	6 (6.30)	0.76 (0.229-3.352)	0.68 (0.375-6.848)	0.348
Do you still have persistent symptoms of the disease					
No	13 (52.0)	79 (83.2)	1.0 (ref)	1.0 (ref)	
Yes	12 (48.0)	16 (16.8)	0.22 (0.167-1.519)	0.82 (0.282-3.72)	0.217

***:** statistically significant at p<0.05

4.4 Bivariate association between demographic data and Anxiety Symptoms

The analysis showed that; age ($\chi2$=5.236; *p*=0.001), the sex ($\chi2$=7.164; *p*=0.019), marital status ($\chi2$=6.217; *p*=0.002) and parity ($\chi2$=5.428; *p*=0.001) were the factors found to be significantly associated with experiencing higher levels of anxiety symptoms at 95% confidence level (p<0.05) (Table 4.6).

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Table 8: Association between demographic data and Anxiety Symptoms

	Anxiety Symptoms N (%)			$\chi 2$ value	p-value
	Present	Absent	Total		
Age of respondents (Yrs.)				5.236	**0.001***
18-30	4(11.8)	42 (48.8)	46 (38.3)		
31-40	5(14.7)	34(39.6)	39(32.5)		
41-50	16(47.1)	5(5.8)	21(17.5)		
>50	9 (26.4)	5 (5.8)	14 (11.7)		
Sex				7.164	**0.019***
Male	10(29.4)	45 (52.3)	55 (45.8)		
Female	24 (70.6)	41 (47.7)	65 (54.2)		
Marital status				6.217	**0.002***
Single	7 (20.6)	30 (34.9)	37 (20.8)		
Married	15 (44.1)	39 (45.3)	54 (45.0)		
Divorced	5 (14.7)	7 (8.1)	12 (10.0)		
Widowed	7 (20.6)	10 (11.7)	17 (14.2)		
Educational level				4.528	0.378
JSS/JHS	5 (14.7)	13 (15.1)	18(15.0)		
SSS/SHS	11(32.4)	21(24.4)	32(26.7)		
Tertiary	18(52.9)	52 (60.5)	70(58.3)		
Parity					
None	2(5.9)	23(26.7)	25 (20.0)	5.428 Ψ	**0.025***
1	4(11.8)	24 (27.9)	28 (23.3)		
2	5(14.7)	27(31. 4)	32 (26.7)		
3	11(32.4)	8 (9.3)	19 (15.8)		
≥4	12(35.2)	4(4.7)	16 (14.2)		
Occupational status				2.286	0.419
Medical Doctor	6 (17.6)	12 (13.9)	18(15.0)		
Nurse	12 (35.3)	53 (61.6)	65(54.2)		
Pharmacist	5(14.7)	5 (5.8)	10(8.3)		
Janitor/Cleaner	7 (20.6)	5 (5.8)	12(10.0)		
Others	4(11.8)	11 (12.9)	15(12.5)		
Number of years worked (Yrs.)				2.291 Ψ	0.382
0-5	3 (8.8)	15(17.4)	18 (15.0)		
6-10	8 (23.5)	21 (24.4)	29 (24.2)		
11-15	9 (26.5)	29 (33.7)	38 (31.7)		
>15	14 (41.2)	21 (24.5)	35 (29.1)		
Average monthly income				3.729 Ψ	0.285
GHS 0-500	7(20.6)	5(5.8)	12(10.0)		
GHS 501-1,000	3(8.8)	6 (6.9)	9(7.5)		
GHS 1001-1500	2(5.9)	5 (5.8)	7(5.8)		
GHS 1600-2000	18(52.9)	13 (15.1)	31(25.8)		
GHS>2000	4 (11.8)	57 (66.4)	61 (50.9)		

***:** Statistically significant at $p<0.05$, Values with Ψ represents Fisher's Exact test, and those without symbols represent Chi-square.

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Table 9: Association between related factors and Anxiety Symptoms

	Anxiety Symptoms N (%)				
	Present	Absent	Total	χ2 value	p-value
Satisfaction with Job				3.475	0.286
No	18 (52.9)	4 (4.70)	22 (18.3)		
Yes	16 (47.1)	82 (95.3)	98 (81.7)		
Do you have any medical condition?				8.237	**0.001***
No	22 (64.7)	63 (73.3)	85 (70.8)		
Yes	12 (35.2)	23 (26.7)	35 (29.2)		
Were you vaccinated before you contracted COVID-19 disease?				3.294	0.275
No	19 (55.9)	14 (16.3)	33 (27.5)		
Yes	15 (44.1)	72 (83.7)	87 (72.5)		
Were you admitted?				2.816	0.138
No	18 (52.9)	81 (94.2)	99 (82.5)		
Yes	16 (47.1)	5 (5.80)	21 (7.50)		
Do you still have persistent symptoms of the disease				3.107	0.164
No	20 (58.8)	72 (94.7)	92 (76.7)		
Yes	14 (41.2)	14 (5.30)	28 (23.3)		

*: statistically significant at p<0.05

4.5 Multiple logistic regression of factors influencing Anxiety Symptoms

Multiple logistic regression analysis was conducted on all demographic and other related characteristics. The results revealed that sex, age marital status and parity were the factors found to be significantly associated with experience of anxiety symptoms (Table 4.7). With regards to sex, adjusting for all other factors, females had an increased odds of experiencing anxiety symptoms compared to their male counterparts (AOR=3.22; 95% CI=1.118-8.371, *p*=0.002). Adjusting for all other factors, respondents that were between the ages of 41-50 years had an increased odds of experiencing anxiety symptoms compared to those between the age group of 18-30 years (AOR= 4.3; 95% CI=1.238-7.852, p=0.014).

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The study further revealed that respondents who were married were approximately 1.3 times more likely of experiencing anxiety symptoms compared to those who are single (AOR= 1.28; 95% CI=01.029-6.415, p=0.029).

The results further showed that respondents who had at least 4 children were approximately 4 times more likely to have anxiety symptoms compared to those who have no child (AOR= 4.42; 95% CI=2.180-11.842, p=0.022).

Lastly, respondents who had symptoms of the diseases persisting had an increased odds of experiencing anxiety symptoms compared to those who did not have persisting symptoms (AOR= 5.2; 95% CI=3.394-11.529, *p*=0.027).

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Table 10: Multiple logistics regression of the factors associated with Anxiety symptoms

Variable	Present	Absent	cOR (95%Cl)	AOR (95%CI)	p-value
Age (yrs)					
18-30	4(11.8)	42 (48.8)	1.0 (ref)	1.0 (ref)	
31-40	5(14.7)	34(39.6)	1.50 (0.229- 3.534)	1.52 (0.168-4.502)	0.226
41-50	16(47.1)	5(5.8)	5.9 (2.283-9.414)	4.3 (1.238-7.852)	**0.014***
>50	9 (26.4)	5 (5.8)	2.9 (1.383-6.225)	1.82 (1.102-8.342)	0.082
Sex					
Male	10 (29.4)	45 (52.3)	1.0 (ref)	1.0 (ref)	
Female	24 (70.6)	41 (47.7)	2.60 (1.273-7.529)	3.22 (1.118-8.371)	**0.002***
Marital status					
Single	7 (20.6)	30 (34.9)	1.0 (ref)	1.0 (ref)	
Married	15 (44.1)	39 (45.3)	1.64 (1.070-5.372)	1.28 (1.029-6.415)	**0.029***
Divorced	5 (14.7)	7 (8.1)	3.0 (0.352-2.782)	0.72 (0.512-3.802)	0.284
Widowed	7 (20.6)	10 (11.7)	0.78 (0.228-4.669)	0.52(0.128-4.367)	0.292
Educational level					
JSS/JHS	5 (14.7)	13 (15.1)	1.0 (ref)	1.0 (ref)	
SSS/SHS	11(32.4)	21(24.4)	1.36 (0.429-6.417)	1.28 (0.397-7.953)	0.348
Tertiary	18(52.9)	52 (60.5)	0.90 (0.427-5.212)	0.88 (0.358-6.829)	0.194
Parity					
None	2(5.9)	23(26.7)	1.0 (ref)	1.0 (ref)	
1	4(11.8)	24 (27.9)	1.92 (1.391-5.592)	1.75 (0.276-4.985)	0.429
2	5(14.7)	27(31. 4)	2.12 (1.177-7.042)	2.53 (1.396-8.286)	**0.019***
3	11(32.4)	8 (9.3)	4.82 (1.336-7.287)	3.79 (2.019-8.595)	**0.003***
≥4	12(35.2)	4(4.7)	5.28 (3.218-9.927)	4.42 (2.180-11.842)	**0.022***
Occupational status					
Medical Doctor	6 (17.6)	12 (13.9)	1.0 (ref)	1.0 (ref)	
Nurse	12 (35.3)	53 (61.6)	0.45 (0.132-2.513)	0.55 (0.188-4.629)	0.194
Pharmacist	5(14.7)	5 (5.8)	2.00 (0.386-5.115)	2.52 (0.278-5.482)	0.247
Janitor/Cleaner	7 (20.6)	5 (5.8)	2.80 (0.445-3.582)	0.62 (0.028-3.373)	0.274
Others	4(11.8)	11 (12.9)	0.72 (0.195-3.669)	0.88 (0.282-5.323)	0.267
Average monthly income					
GHS 0-500	7(20.6)	5(5.8)	1.0 (ref)	1.0 (ref)	
GHS 501-1,000	3(8.8)	6 (6.9)	0.36 (0.155-4.522)	0.42(0.144-3.498)	0.229
GHS 1001-1500	2(5.9)	5 (5.8)	0.28 (0.019-3.845)	0.39 (0.229-5.932)	0.189
GHS 1600-2000	18(52.9)	13 (15.1)	0.98 (0.016-3.280)	0.73 (0.017-04.838)	0.424
GHS>2000	4 (11.8)	57 (66.4)	0.05 (0.027-3.592)	0.19 (0.016-4.725)	0.283

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Table 10: Multiple logistics regression of the factors associated with Anxiety symptoms Cont'd

Variable	Present	Absent	cOR (95%CI)	AOR (95%CI)	p-value
Satisfaction with Job					
No	18(52.9)	4 (4.70)	1.0 (ref)	1.0 (ref)	
Yes	16 (47.1)	82 (95.3)	0.04 (0.006- 3.164)	0.19 (0.023-4.835)	0.165
Do you have any medical condition					
No	22 (64.7)	63 (73.3)	1.0 (ref)	1.0(ref)	
Yes	12 (35.2)	23 (26.7)	0.67 (0.028-4.621)	0.77 (0.019-5.755)	0.082
Were you vaccinated before you contracted COVID-19 disease?					
No	19 (55.9)	14 (16.3)	1.0 (ref)	1.0 (ref)	
Yes	15 (44.1)	72 (83.7)	0.15 (0.033-2.285)	0.19 (0.013-3.478)	0.295
Were you admitted?					
No	18 (52.9)	81 (94.2)	1.0 (ref)	1.0 (ref)	
Yes	16 (47.1)	5 (5.80)	0.34 (0.127-4.201)	0.54 (0.225-5.848)	0.238
Do you still have persistent symptoms of the disease					
No	20 (58.8)	40 (90.9)	1.0 (ref)	1.0 (ref)	
Yes	14 (41.2)	4 (9.10)	7.0 (2.133-9.515)	5.2 (3.394-11.529)	**0.027***

***: statistically significant at p<0.05**

4.6 Bivariate association between demographic data and Stress Symptoms

The findings showed that; age ($\chi2=7.832$; $p=0.028$), the sex ($\chi2=5.286$; $p= 0.003$), marital status ($\chi2=4.265$; $p=0.019$) and parity ($\chi2=8.173$; $p=0.001$) were the factors found to be significantly associated with experiencing stress symptoms at 95% confidence level ($p<0.05$) (Table 4.8).

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Table 11: Association between demographic data and Stress Symptoms

	Stress Symptoms N (%)				
	Present	Absent	Total	χ2 value	p-value
Age of respondents (Yrs.)				7.832 Ψ	**0.028***
18-30	3 (8.6)	43 (50.6)	46 (38.3)		
31-40	6 (17.1)	33 (38.8)	39(32.5)		
41-50	16 (45.7)	5 (5.9)	21(17.5)		
>50	10 (28.6)	4(4.7)	14 (11.7)		
Sex				5.286	**0.003***
Male	21 (60.0)	34 (40.0)	55 (45.8)		
Female	14 (40.0)	51 (60.0)	65 (54.2)		
Marital status				4.265	**0.019***
Single	5 (14.3)	32 (37.6)	37 (20.8)		
Married	19 (54.3)	35 (41.2)	54 (45.0)		
Divorced	5 (14.3)	7 (8.2)	12 (10.0)		
Widowed	6 (17.1)	11 (13.0)	17 (14.2)		
Educational level				3.272	0.292
JSS/JHS	7 (20.0)	11 (12.9)	18(15.0)		
SSS/SHS	12 (34.3)	20 (23.6)	32(26.7)		
Tertiary	16(45.7)	54 (63.5)	70(58.3)		
Parity					
None	5 (14.3)	20 (23.5)	25 (20.0)	8.173 Ψ	**0.001***
1	4(11.4)	24 (28.2)	28 (23.3)		
2	5 (14.3)	27 (31.7)	32 (26.7)		
3	7 (20.0)	12 (14.1)	19 (15.8)		
≥4	14(54.3)	2 (2.5)	16 (14.2)		
Occupational status				3.749	0.328
Medical Doctor	6 (17.1)	12 (14.1)	18(15.0)		
Nurse	12 (34.3)	53 (62.4)	65(54.2)		
Pharmacist	4(11.4)	6 (7.1)	10(8.3)		
Janitor/Cleaner	8 (22.9)	4 (4.7)	12(10.0)		
Others	5 (14.3)	10 (11.7)	15(12.5)		
Number of years worked (Yrs.)				3.529 Ψ	0.382
0-5	3 (8.6)	15(17.6)	18 (15.0)		
6-10	13(37.1)	16 (18.8)	29 (24.2)		
11-15	11 (31.4)	27 (31.8)	38 (31.7)		
>15	8(22.9)	27 (31.8)	35 (29.1)		
Average monthly income				6.254 Ψ	0.288
GHS 0-500	5(14.3)	7 (8.2)	12(10.0)		
GHS 501-1,000	4(11.4)	5 (5.9)	9(7.5)		
GHS 1001-1500	5(14.3)	2 (2.4)	7(5.8)		
GHS 1600-2000	8(22.9)	23 (27.1)	31(25.8)		
GHS>2000	13 (37.1)	48 (56.4)	61 (50.9)		

***:** significant at $p<0.05$, Values with Ψ represents Fisher's Exact test, and those without symbols represent Chi-square**.**

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Table 12: Association between related factors and Stress Symptoms

	Stress Symptoms N (%)			χ2 value	p-value
	Present	Absent	Total		
Satisfaction with Job				4.920	0.183
No	13 (37.1)	9 (10.6)	22 (18.3)		
Yes	22 (62.9)	76 (89.4)	98 (81.7)		
Do you have any medical condition				3.852	0.082
No	19 (54.3)	66 (77.6)	85 (70.8)		
Yes	16 (45.7)	19 (22.4)	35 (29.2)		
Were you vaccinated before you contracted COVID-19 disease?				2.663	0.358
No	18 (51.4)	15 (17.6)	33 (27.5)		
Yes	17 (48.6)	70 (82.4)	87 (72.5)		
Admitted at hospital				2.649	0.129
No	22 (62.9)	77 (90.6)	99 (82.5)		
Yes	13 (37.1)	8 (9.40)	21 (7.50)		
Do you still have persistent symptoms of the disease				3.490	0.284
No	24 (68.6)	72 (84.7)	96 (80.0)		
Yes	11 (31.4)	13 (15.3)	24 (20.0)		

*****: statistically significant at p<0.05

4.7 Multiple logistic regression of factors influencing Stress Symptoms

The results revealed that sex, marital status, average monthly income and persistence of symptoms of the disease were the factors found to be significantly associated with experience of stress symptoms (Table 4.10). With regards to sex, adjusting for all other factors, females had 28% reduced odds of experiencing stress symptoms compared to their male counterparts (AOR= 0.72; 95% CI=0.253-0.836, *p*=0.017).

Respondents who were married were approximately 2.8 times more likely of experiencing stress symptoms compared to those who are single (AOR= 2.81; 95% CI=1.275-5.418, p=0.025).

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The results further showed that respondents who earn an average monthly income above GHS 2000 were less likely or have 61% reduced odds of experiencing stress symptoms compared to those who earn between GHS 0 - 500 (AOR= 0.29; 95% CI=0.163-0.855, p=0.024).

Lastly, respondents who had symptoms of the COVID-19 disease persisting had an increased odds of experiencing stress symptoms compared to those who did not have persisting symptoms (AOR= 1.82; 95% CI=1.290-7.569, *p*=0.017).

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Table 13: Multiple logistics regression of the factors associated with Stress symptoms

Variable	Present	Absent	cOR (95%CI)	AOR (95%CI)	p-value
Age (yrs)					
18-30	3 (8.6)	43 (50.6)	1.0 (ref)	1.0 (ref)	
31-40	6 (17.1)	33 (38.8)	2.61 (0.172- 4.319)	3.22 (0.287-5.714)	0.185
41-50	16 (45.7)	5 (5.9)	4.52 (0.293-7.416)	4.85 (0.186-8.521)	0.259
>50	10 (28.6)	4 (4.7)	2.30 (0.373-6.744)	2.72 (0.828-7.427)	0.295
Sex					
Male	21 (60.0)	34 (40.0)	1.0 (ref)	1.0 (ref)	
Female	14 (40.0)	51 (60.0)	0.67 (0.176-0.7238)	0.72 (0.253-0.836)	**0.017***
Marital status					
Single	5 (14.3)	32 (37.6)	1.0 (ref)	1.0 (ref)	
Married	19 (54.3)	35 (41.2)	3.47 (1.175-4.292)	2.81 (1.275-5.418)	**0.025***
Divorced	5 (14.3)	7 (8.2)	4.60 (0.286-4.772)	3.32 (0.528-6.225)	0.284
Widowed	6 (17.1)	11 (13.0)	1.82 (0.542-4.742)	2.26 (0.273-5.262)	0.529
Educational level					
JSS/JHS	7 (20.0)	11 (12.9)	1.0 (ref)	1.0 (ref)	
SSS/SHS	12 (34.3)	20 (23.6)	0.94 (0.372-6.422)	1.28 (0.416-5.229)	0.365
Tertiary	16(45.7)	54 (63.5)	0.47 (0.427-5.212)	0.52 (0.238-6.429)	0.238
Parity					
None	5 (14.3)	20 (23.5)	1.0 (ref)	1.0 (ref)	
1	4(11.4)	24 (28.2)	0.67 (0.288-3.21)	0.72 (0.256-4.173)	0.172
2	5 (14.3)	27 (31.7)	0.74 (0.144-2.049)	0.81 (0.226-3.271)	0.276
3	7 (20.0)	12 (14.1)	2.35 (0.285-4.523)	2.82 (0.011-5.742)	0.143
≥4	14(54.3)	2 (2.5)	3.22 (0.228-6.922)	3.71 (0.187-7.118)	0.092
Occupational status					
Medical Doctor	6 (17.1)	12 (14.1)	1.0 (ref)	1.0 (ref)	
Nurse	12 (34.3)	53 (62.4)	0.45 (0.132-2.513)	0.55 (0.188-4.629)	0.174
Pharmacist	4(11.4)	6 (7.1)	1.33 (0.346-4.225)	1.41(0.288-5.821)	0.224
Janitor/Cleaner	8 (22.9)	4 (4.7)	1.71 (0.425-4.681)	2.22 (0.286-5.378)	0.774
Average monthly income					
GHS 0-500	5(14.3)	7 (8.2)	1.0 (ref)	1.0 (ref)	
GHS 501-1,000	4(11.4)	5 (5.9)	1.12 (0.228-3.621)	1.27 (0.136-4.299)	0.119
GHS 1001-1500	5(14.3)	2 (2.4)	3.50 (0.173-3.215)	2.83 (0.224-6.312)	0.228
GHS 1600-2000	8(22.9)	23 (27.1)	0.48 (0.175-0.685)	0.53 (0.218-0.733)	**0.032***
GHS>2000	13 (37.1)	48 (56.4)	0.38 (0.277-3.252)	0.29 (0.163-0.855)	**0.024***

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Table 13 Multiple logistics regression of the factors associated with Stress symptoms Cont'd

Variable	Present	Absent	cOR (95%CI)	AOR (95%CI)	p-value
Satisfaction with Job					
No	13 (37.1)	9 (10.6)	1.0 (ref)	1.0 (ref)	
Yes	22 (62.9)	76 (89.4)	0.20 (0.072- 4.522)	0.27 (0.013-4.995)	0.172
Do you have any medical condition?					
No	19 (54.3)	66 (77.6)	1.0 (ref)	1.0 (ref)	
Yes	16 (45.7)	19 (22.4)	0.34 (0.128-4.882)	0.42 (0.197-5.155)	0.227
Were you vaccinated before you contracted COVID-19 disease?					
No	18 (51.4)	15 (17.6)	1.0 (ref)	1.0 (ref)	
Yes	17 (48.6)	70 (82.4)	0.20 (0.011-3.645)	0.25 (0.019-4.413)	0.262
Were you admitted?					
No	22 (62.8)	77 (90.6)	1.0 (ref)	1.0 (ref)	
Yes	13 (37.2)	8 (5.40)	1.05 (0.133-3.621)	1.17 (0.193-4.871)	0.128
Do you still have persistent symptoms of the disease					
No	24 (68.6)	72 (84.7)	1.0 (ref)	1.0 (ref)	
Yes	11 (31.4)	13 (15.3)	2.30 (1.034-6.235)	1.82 (1.290-7.569)	**0.017***

*: statistically significant at p<0.05

4.8 Differences in psychological disorders between vaccinated and unvaccinated healthcare workers who survived covid-19.

The result showed that 87 respondents were vaccinated for COVID-19 before they contracted the disease while the rest, 33, had not been vaccinated [Table 14]. Of the 87 who were vaccinated, 15 showed symptoms of depression, 14 showed symptoms of anxiety and 20 showed symptoms of stress. Out of the 33 who were not vaccinated, 8 demonstrated symptoms of depression, 13 of them had symptoms of anxiety and 12 of these respondents showed symptoms of anxiety. Percentage wise, though with unequal sizes, a higher percentage of persons who were unvaccinated showed more symptoms of depression i.e., 24.2% against 17.2%. Again, in respect of anxiety, the

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unvaccinated showed more symptoms i.e., 39.4% against 18.4% in the vaccinated group. psychological experiences. Also, 36.4% of unvaccinated group demonstrated stress symptoms against 22.9% in the vaccinated group.

However, the picture was different when the data was subjected to statistical scrutiny. Although the proportion of HCWs who showed symptoms of depression among those who were unvaccinated before contracting COVID-19 was 7.0% more than those who were vaccinated,

this difference was not statistically significant (P-value = 0.3840) [Appendix 1]. However, in respect of anxiety, the higher proportion of anxiety symptoms in the unvaccinated group (39.4%) compared to the vaccinated (18.4%) was found to be statistically significant (P-value < 0.05) [Appendix 2]. Lastly, even though the proportion of respondents who had stress symptoms in unvaccinated group was 13.5% more, compared to the vaccinated group, it was not statistically significant (P-value = 0.135) [Appendix 3].

Table 14: **Comparing depression, anxiety and stress symptoms among vaccinated and unvaccinated groups**

Group	Total number of Healthcare Workers	Proportion with symptoms of Depression n *(%)*	Proportion with symptoms of Anxiety n *(%)*	Proportion with symptoms of Stress n *(%)*
Vaccinated before contracting COVID-19	**87**	**15** ***(17.2)***	**14** ***(18.4)***	**20** ***(22.9)***
Unvaccinated before contracting COVID-19	**33**	**8** ***(24.2)***	**13** ***(39.4)***	**12** ***(36.4)***

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CHAPTER FIVE

DISCUSSION

5.1 Prevalence of Depression, Anxiety and Stress symptoms.

The World Health Organization asserted that depression, anxiety and stress as a psycho-social phenomenon affects nearly over 260 million people worldwide. In this current study, the proportion of healthcare workers who survived COVID-19 infection and had depressive symptoms present was 20.8%. This proportion is lower compared to a study conducted on the mental health impact of COVID-19 among healthcare workers in Somalia which revealed that 33% had depressive symptoms (Luo et al., 2020). This finding is also consistent with the findings of Ofori et al. (2021), who conducted a cross-sectional study among healthcare workers in three hospitals in the Ashanti Region of Ghana, and reported that 21.1% had depressive symptoms. The implication of the finding is that there is the need for careful monitoring and assessment of stress levels and psychological state among healthcare workers who survived the infection as they were likely to exhibit significant levels of depressive symptoms during this COVID-19 pandemic.

Anxiety is also a psychological disorder that involves emotions characterized by worried thoughts, feelings of tension, and physical changes such as raised blood pressure, trembling, perspiration, rapid heartbeat and dizziness (Özdin & Bayrak Özdin, 2020). The results in this study revealed that the proportion of healthcare workers who survived COVID-19 Infection and had anxiety symptoms present was 28.3 %. This finding agrees with the finding of Ofori et al. (2021) who reported that 28% of healthcare workers had anxiety symptoms present. The findings is also consistent with the findings of (Luo et al., 2020) who reported in a study that 27.8% of healthcare workers had anxiety symptoms.

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Moreso, the proportion of healthcare workers who survived COVID-19 infection in this study with stress symptoms present was 29.1%. The proportion was significantly lower than that of a multi-country study carried out in by Ghaleb et. al., (2021) where 57.5% had depression, 42.0% had stress, and 59.1% had anxiety. The difference between this current study and that of this multi-country study could be attributed to sample size. This current study used a sample size of 120 healthcare workers whilst they used 1448 healthcare workers. Besides, it involved nine (9) countries and healthcare workers who were responding to COVID-19 and not necessarily infected with COVID-19. This might have accounted for the differences in proportion. The implication of the finding in this current study suggests that healthcare workers in the studied healthcare facilities are at risk to developing stress, anxiety and depression in the long run if effective mental health management processes are not put in place. The proportion that had stress in this study is, however, far higher than the study of Ofori et al. (2021) who reported stress symptoms of 8.2% among health care workers in the Ashanti region of Ghana. It is important to state also that the proportions that had depression (21.1%), and anxiety (27.8%) were similar.

5.2 Factors that are associated with depression, anxiety and stress symptoms.

In this current study, the results revealed that sex, age marital status, parity and average monthly income were the precipitating factors found to be significantly associated with experience of depressive symptoms. Previous studies have mentioned age, sex, marital status, occupation, admission status and persistent of symptoms as some of the factors that influence the development of the depression, anxiety and stress following an epidemic which is consistent with the findings of this study (Özdin & Bayrak Özdin, 2020; Tam et al., 2004; Tasnim et al., 2021).

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In this study, females were more likely to have depressive symptoms compared to their male counterparts. This findings is consistent with the findings of several studies where females have been psychologically affected more than their male counterparts in pandemics (Al Omari et al., 2020; Mazza et al., 2020; Özdin & Bayrak Özdin, 2020; Tam et al., 2004; Tasnim et al., 2021). The implications of this findings might be attributed to the fact that males are emotionally stronger compared to females. Research have shown that gender represents one of the main biological determinants of vulnerability to psychosocial stress factors. Women, in fact, tend to be more sensitive to anxiety and depressive symptoms and are more likely to develop more lasting stress conditions over time compared to their male counterparts (Mazza et al., 2020; Tasnim et al., 2021). This might have accountered for why females were more likely to experience psycho-social effects more than their male counterparts.

With respect to age, respondents that were older had an increased odds of having depressive symptoms compared to those that were younger. This finding disagrees with the study of some researchers who found that younger people had higher symptoms compared to those who are older following a disease outbreak (Jassim et al., 2021; Lancee et al., 2008; Nwachukwu et al., 2020; Reynolds et al., 2008). However, Bah et al. (2020), found out that older survivors of Ebola were more likely to develop depressive and anxiety symptoms than younger survivors which is consistent with the findings of this current study.

Marital status was found to be significantly associated with experience of depressive, stress and anxiety symptoms. The study further revealed that respondents who were married had reduced odds of having depressive symptoms compared to those who are single. According to Chan & Chan (2004), those who were unmarried were adversely more affected than the married in an outbreaks which is consistent with the findings of this current study. On the contrary, Sim et al.

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(2004), found than married persons more positively correlated with the development of depressive, anxiety and stress symptoms. A recent case control study involving healthcare workers dealing with the COVID-19 pandemic revealed also that married, divorced or widowed persons were more vicariously traumatized as compared to unmarried (Li et al., 2020).

Persistence of symptoms of the disease was found to be significantly associated with experience of stress symptoms. This finding is consistent with the findings of Janiri et al., (2021) and Liyanage-Don et al., (2021) who found association between development of depression and stress symptoms and the persistence of symptoms of COVID-19. Pers et al. (2017) also showed that persistent symptoms in Ebola patients was associated with a highly likelihood of developing depression and stress. In a cross-sectional study by Janiri et al. (2021), they also found out that those who had suggestive symptoms of stress and anxiety also reported persistent symptoms of COVID-19.

5.3 Differences in psychological disorders between vaccinated and unvaccinated groups.

In this current study, although healthcare workers who were vaccinated had developed fewer anxiety symptoms, the same could not be established for depression and stress symptoms. however, the association was not statistically significant. This finding partly agrees with de Quervain et al., (2021), who did not find an association between vaccination status and stress. However, Perez-Arce et al., (2021), found that vaccination reduced the odds of developing mental health issues, especially, depression. Part of these findings were also inconsistent with the findings of Palgi et al., (2021) who demonstrated that unvaccinated persons who had vaccine hesitancy, were more at risk of developing anxiety. They showed also that these persons also were more likely to develop depression and peri-traumatic stress, which is at variance with our findings.

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5.4 Limitations of the Study

1. The convenience sampling method adopted does not allow for generalization.
2. Since the respondents self-selected themselves following the invitation to be participants, a self-selection bias can lead to a non-representative sample.
3. Self-administration of the Kobo Collect electronic questionnaire may lead to inaccurate and invalid answers.
4. Though the psychometric tool adopted (DASS-21) has been validated and well-known, the questionnaire for this specific study was not validated.

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CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study sought to determine the prevalence of depression, anxiety and stress symptoms among healthcare workers who survived COVID-19 infection, assess the factors that are associated with depression, anxiety and stress symptoms and investigate whether there are differences in psychological disorders between vaccinated and unvaccinated groups among healthcare workers in selected hospitals, Greater Accra region.

The proportion of healthcare workers who survived COVID-19 infection and had depressive, anxiety and stress symptoms was all above 20% which implies the proportions are high. The sex, age, marital status, parity and average monthly income were the precipitating factors found to be significantly associated with experience of depressive and anxiety symptoms. Moreso, sex, marital status, average monthly income and persistence of symptoms of the disease were the factors found to be significantly associated with experience of stress symptoms. Healthcare workers who are vaccinated were less likely to develop anxiety symptoms. However, the development of depression and stress was not found to be associated with vaccination status. The study therefore accentuates the need for the Ministry of health and Ghana Health Service to provide the necessary access to mental healthcare and to ensure that affected healthcare workers are assessed by mental health specialists or practitioners.

6.2 Recommendations

The following recommendations are made based on the findings of this thesis:

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6.2.1 Clinical/Policy

1. The Ministry of Health should ensure that all health workers who get Covid-19 have mental health assessment after recovery. This is critical to identify and address mental health issues among health care workers who are supposed to offer optimal healthcare.
2. The Ministry of Health should also provide adequate support, logistics and resources, including PPEs and education, to healthcare workers to help improve the implementation of infection prevention and control measures. This is necessary to reduce the proportion of healthcare workers who get infected or re-infected with COVID-19 which may contribute to mental health issues.

6.2.2 Research

1. I recommend a prospective study to be undertaken to look at the mental state of persons who have recovered from COVID-19 to see how their mental health evolves over the next 5 years.
2. I also recommend a study that will assess the impact of these psychological changes on clinical performance.

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APPENDICES

Appendix 1: Two sample test of proportions for depression.

```
Two-sample test of proportions                  x: Number of obs =       87
                                                y: Number of obs =       33
------------------------------------------------------------------------------
             |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .172   .0404594                       .092701    .251299
           y |       .242   .0745565                       .095872    .388128
-------------+----------------------------------------------------------------
        diff |       -.07   .0848271                      -.236258    .096258
             |  under Ho:   .0804048    -0.87   0.384
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -0.8706
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.1920         Pr(|Z| > |z|) = 0.3840          Pr(Z > z) = 0.8080
```

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Appendix 2: Two sample test of proportions for anxiety.

```
Two-sample test of proportions                   x: Number of obs =       87
                                                 y: Number of obs =       33
------------------------------------------------------------------------------
            | Mean    Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
          x | .184    .0415427                      .1025779    .2654221
          y | .394    .0850604                      .2272847    .5607153
------------+-----------------------------------------------------------------
       diff |-.21     .0946629                     -.3955359   -.0244641
            |under Ho:.0875313   -2.40   0.016
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -2.3991
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
Pr(Z < z) = 0.0082         Pr(|Z| > |z|) = 0.0164          Pr(Z > z) = 0.9918
```

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Appendix 3: Two sample test of proportions for stress.

```
Two-sample test of proportions                  x: Number of obs =       87
                                                y: Number of obs =       33
------------------------------------------------------------------------------
         |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
       x |       .229    .045049                       .1407056    .3172944
       y |       .364   .0837572                       .1998389    .5281611
---------+--------------------------------------------------------------------
    diff |      -.135   .0951036                      -.3213995    .0513995
         |under Ho:.0903499         -1.49   0.135
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                z =  -1.4942
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
Pr(Z < z) = 0.0676         Pr(|Z| > |z|) = 0.1351          Pr(Z > z) = 0.9324
```

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Appendix 4: Depression, Anxiety and Stress (DASS-21) Psychometric Tool

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers.

The rating scale is as follows:

0 - Did not apply to me at all

1 - Applied to me to some degree, or some of the time

2 - Applied to me to a considerable degree or a good part of time

3 - Applied to me very much or most of the time

1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g., in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt downhearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3

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18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	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 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

Recommended cut-off scores for conventional severity labels (normal, moderate, severe) are as follows:

NB: Scores on the DASS-21 will need to be multiplied by 2 to calculate the final score.

	Depression	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

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Appendix 5: Questionnaire

Assessment of depression, anxiety and stress symptoms among healthcare workers who recovered from COVID-19 Infection in selected healthcare facilities in the Accra Metropolis.

Section A: Demographic Characteristics

1. Age: (a) 18 - 30[ ] above 30 – 40 [ ] above 40 - 50[ ] above 50[ ]
2. Sex: ……………………….………………………...……(a) Male [ ] (b) Female [ ]
3. Marital Status: (a) Single [ ] (b) Married [ ] (c) Divorced [ ] (d) Widow/er [ ] (e) Co-habiting [ ]
4. How many children do you have? (a) None [ ] (b)1 [ ] (c) 2 [ ] (d) 3 [ ] (e) 4 [ ] (f) 5 [ ] (e) above 5 [ ]
5. Occupation: Doctor [ ] Nurse [ ] Pharmacist [ ] Pharmacy Assistant [ ] Physician/Medical Assistant[ ] Nurse Assistant[ ] Security [ ] Driver [ ] Caterer [ ] Administrative personnel (Administrators, Accountants, Auditors, HR practitioners, Secretaries, Records Officers, Cashiers) [ ], Janitor/Cleaner [ ] Others [ ] (specify) ……………………
6. How long have you been working? (a) up to 5 years[ ] (b) above 5years – 10years[ ] (c) above 10 – 15 years[ ] (d) above 15 – 20 years[ ] (e) above 20years[ ]
7. Are you satisfied with your job?...Yes [ ] No [ ]
8. Do you have any medical condition? …………………………………..Yes [ ] No [ ]
9. If yes to Question 7, please specify it?...
10. What is your income level (in GHS)? (a) 0 - 500 [ ] (b) 501 – 1,000 [ ] (c) 1,001 – 1,500 [ ] (d) 1,501 – 2,000 [ ] (e) 2,001 - 2,500 [ ] (f) 2,501 and above [ ]

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Section B: COVID-19

11. Have you been vaccinated with any of the COVID-19 Vaccines? Yes [ ] No [ ]

12. If yes, did you get infected **before** or **after** vaccination? Before [ ] After [ ]

13. Were you admitted? Yes [ ] No [ ]

14. Do you still have persistent symptoms of the disease? Yes [ ] No [ ]

15. If Yes in Question 12, which symptom(s) is/are persistent? ……………….....................

Section C: **Before COVID-19 Infection Assessment of Depression, Anxiety and Stress**.

Depression, Anxiety and Stress Scale – 21 (Adopted and modified from Lovibond, S.H. & Lovibond, 1995).

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **before COVID-19 infection**.

The rating scale is as follows:

0 - Did not apply to me at all

1 - Applied to me to some degree, or some of the time

2 - Applied to me to a considerable degree, or a good part of time

3 - Applied to me very much, or most of the time

DEPRESSION SCALE

17.	I couldn't seem to experience any positive feeling at all	0	1	2	3
18.	I found it difficult to work up the initiative to do things	0	1	2	3

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19	I felt that I had nothing to look forward to	0	1	2	3
20.	I felt downhearted and sad.	0	1	2	3
21.	I was unable to become enthusiastic about anything	0	1	2	3
22	I felt I wasn't worth much as a person	0	1	2	3
23	I felt that life was meaningless	0	1	2	3

ANXIETY SCALE

24	I was aware of dryness of my mouth	0	1	2	3
25	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
26	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
27	I experienced trembling (e.g., in the hands)	0	1	2	3
28	I felt I was close to panic	0	1	2	3
29	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
30	I felt scared without any good reason	0	1	2	3

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STRESS SCALE

31	I found it hard to relax.	0	1	2	3

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32	I felt that I was using excess energy from being nervous or anxious.	0	1	2	3
33	I found myself getting agitated	0	1	2	3
34	I felt that I was easily upset or angered.	0	1	2	3
35	I tended to over-react to situations	0	1	2	3
36	I found it difficult to relax	0	1	2	3
37	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3

Section D: <u>After</u> COVID-19 Infection Assessment of Depression, Anxiety and Stress.

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **<u>over the past week.</u>**

DEPRESSION SCALE

38.	I couldn't seem to experience any positive feeling at all	0	1	2	3
39.	I found it difficult to work up the initiative to do things	0	1	2	3
40.	I felt that I had nothing to look forward to	0	1	2	3
41.	I felt downhearted and sad	0	1	2	3

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42.	I was unable to become enthusiastic about anything	0	1	2	3
43	I felt I wasn't worth much as a person	0	1	2	3
44	I felt that life was meaningless	0	1	2	3

ANXIETY SCALE

45	I was aware of dryness of my mouth	0	1	2	3
46	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
47	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
48	I experienced trembling (e.g., in the hands)	0	1	2	3
49	I felt I was close to panic	0	1	2	3
50	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
51	I felt scared without any good reason	0	1	2	3

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STRESS SCALE

52	I found it hard to relax.	**0**	**1**	**2**	**3**
53	I felt that I was using excess energy from being nervous or anxious	**0**	**1**	**2**	**3**
54	I found myself getting agitated	**0**	**1**	**2**	**3**
55	I felt that I was easily upset or angered.	**0**	**1**	**2**	**3**
56	I tended to over-react to situations.	**0**	**1**	**2**	**3**
57	I found it difficult to relax.	**0**	**1**	**2**	**3**
58	I was intolerant of anything that kept me from getting on with what I was doing.	**0**	**1**	**2**	**3**

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Appendix 6: Ghana Health Service Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this letter should be quoted.

My Ref. GHS/RDD/ERC/Admin/App
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel. +233-302-681109
Fax + 233-302-685424
Email: ethics.research@ghsmail.org
25th November, 2021

Riches Esiape
P. O. Box AT 966,
Achimota.

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 050/09/21**
Study Title	Psychological Experiences of Healthcare Workers who Recovered from Covid-19 Infection
Approval Date	25th November, 2021
Expiry Date	24th November, 2022
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED...........................
Dr. James Akazili
(Head, Ethics & Research Management Department)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

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Appendix 7: Ghana Health Service approval

In case of reply the number and date of this letter should be quoted.

My Ref. No. **GHS/GARHD/001/21**

Your Ref. No.

GHANA HEALTH SERVICE
REGIONAL HEALTH DIRECTORATE
GREATER ACCRA
P. O. BOX 184
ACCRA

Tel: +233-0302-248997

14th December, 2021

THE MEDICAL SUPERINTENDENTS
- GA WEST MUNICIPAL HOSPITAL
- ACHIMOTA HOSPITAL

THE MEDICAL OFFICER IN-CHARGE
- KANESHIE POLYCLINIC

RE: PERMISSION TO COLLECT DATA FROM SELECTED GHS FACILITIES

Kindly find attached a letter dated 6th December, 2021 from Riches Esiape on the above subject matter for your information and necessary support.

Thank you.

DR. (MRS.) CHARITY SARPONG
REGIONAL DIRECTOR OF HEALTH SERVICE
GREATER ACCRA

Cc: Acting Deputy Director, Clinical Care

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Appendix 8: Cocoa Clinic Approval for data collection

GHANA COCOA BOARD

COCOA HOUSE
P. O. BOX 933
ACCRA
GHANA

TEL: 233-302-661752/661872/
661757/678916/678972
FAX: 233-302-667104/669808
E-mail: cocobod@cocobod.gh
WEBSITE: www.cocobod.gh
CABLE: COCOBOD, ACCRA.

IN YOUR REPLY

PLEASE QUOTE: CC/A1135/V15/119

DATE: 15/11/21

THE HEAD
DEPARTMENT OF BIOLOGICAL, ENVIRONMENTAL
AND OCCUPATIONAL HEALTH
COLLEGE OF PUBLIC HEALTH
UNIVERSITY OF GHANA
P. O. BOX LG 13
LEGON - ACCRA

RE: LETTER OF INTRODUCTION – RICHES ESIAPE (10876414)

We acknowledge receipt of your letter dated 7th September, 2021 on the above subject and inform you that Management has granted approval for Dr. Riches Esiape to collect data from Cocoa Clinic, Accra for his research work.

Dr. Esiape is however requested to follow rules and regulations pertaining to data collection at the Clinic. Kindly inform him to report to the undersigned for further directives.

We count on your co-operation.

AUGUSTA NYAKO (MRS.)
HOSPITAL ADMINISTRATOR
FOR: DIRECTOR (HEALTH)

cc: Director (Health)
Deputy Director (Health)
Heads of Units
Dr. Riches Esiape

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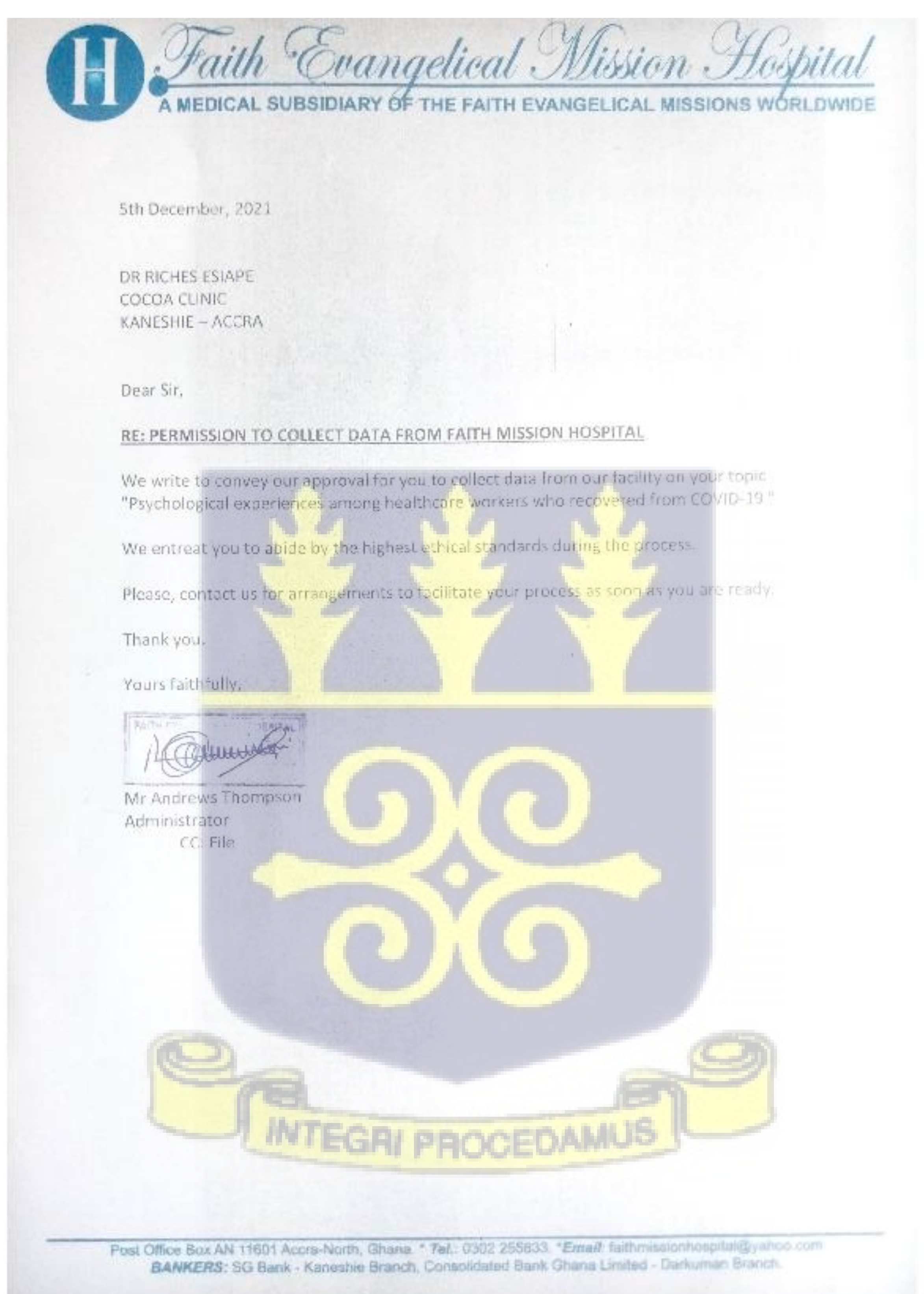
Appendix 9: Approval from Faith Evangelical Mission Hospital.



Faith Evangelical Mission Hospital
A MEDICAL SUBSIDIARY OF THE FAITH EVANGELICAL MISSIONS WORLDWIDE

5th December, 2021

DR RICHES ESIAPE
COCOA CLINIC
KANESHIE – ACCRA

Dear Sir,

RE: PERMISSION TO COLLECT DATA FROM FAITH MISSION HOSPITAL

We write to convey our approval for you to collect data from our facility on your topic "Psychological experiences among healthcare workers who recovered from COVID-19."

We entreat you to abide by the highest ethical standards during the process.

Please, contact us for arrangements to facilitate your process as soon as you are ready.

Thank you.

Yours faithfully,

Mr Andrews Thompson
Administrator
CC: File

Post Office Box AN 11601 Accra-North, Ghana. * Tel.: 0302 255633. *Email: faithmissionhospital@yahoo.com
BANKERS: SG Bank - Kaneshie Branch, Consolidated Bank Ghana Limited - Darkuman Branch.

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