ASSESSMENT OF THE MENTAL HEALTH STATUS OF HEALTHCARE WORKERS DURING COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN-CITY: A COMPARATIVE STUDY

BY

OLAADURA THEODORA ODUBOTE MED1404715

DEPARTMENT OF COMMUNITY HEALTH
COLLEGE OF MEDICAL SCIENCES
UNIVERSITY OF BENIN
BENIN CITY

BEING A ONE YEAR PROJECT PRESENTED TO THE DEPARTMENT OF COMMUNITY HEALTH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE

JUNE 2023

DECLARATION

I hereby declare that this project work titled "**ASSESSMENT OF THE MENTAL HEALTH STATUS OF HEALTHCARE WORKERS DURING COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN-CITY: A COMPARATIVE STUDY"** is original except otherwise stated. It has neither been presented nor published anywhere else in part or in full for any other purpose.

_____

OLAADURA THEODORA ODUBOTE

MED1404715

+2348179586116

theodoraolaadura@gmail.com

CERTIFICATION

This is to certify that this research study titled "**ASSESSMENT OF THE MENTAL HEALTH STATUS OF HEALTHCARE WORKERS DURING COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN-CITY: A COMPARATIVE STUDY"** was carried out by **OLAADURA THEODORA ODUBOTE** with matriculation number **MED1404715** under my supervision in the Department of Community Health, College of Medicine, University of Benin, Benin City as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS).

_____ _____

DR. A. I. OBI

HEAD OF DEPARTMENT

MBBS, MWACP, MPH, FMCPH, CERT. EPID. (North Carolina)

Associate Professor/ Consultant

Department of Community Health,

School of Medicine,

University of Benin,

Benin-City, Edo State, Nigeria

DR. (MRS) E. O. OGBOGHODO

PROJECT SUPERVISOR

MBBS, MPH, FMCPH, FWACP, FRSPH, DIPC

Senior Lecturer/Consultant

Department of Community Health,

School of Medicine,

University of Benin,

Benin City, Edo State, Nigeria

DEDICATION

This work is dedicated to God Almighty for His grace and unconditional provisions for the completion of this project.

ACKNOWLEDGEMENTS

I wish to acknowledge God Almighty for keeping me in good health throughout this work. I also wish to express my profound gratitude to the Department of Community Health, University of Benin for the opportunity to carry out this study. I would like to express my special gratitude to my teacher- Dr. (Mrs) E.O. Ogboghodo for her guidance and patience in the supervision of this project and Dr. U. C. Mokogwu for his supervision and effort towards this project.

I want to acknowledge my parents Mr. and Mrs. M. O. Odubote, my ever-present and loving husband - Dr. (Engr.) E. J. Adams and my mentors, Engr. and Dr. (Mrs) Oluwarinde, Pastor and Rev. (Mrs) Adedeji, Dr. Ibifunke Pegba-Otemolu and Dr. L. Idenene for their prayers and support. I am appreciative for your guidance, care, love and affection which saw me through this project and Medical school as a whole. I pray that God continue to bless you. I also wish to express my profound gratitude to my lovely younger sister, Miss Oluwafunmilayo Odubote, for her support and love. I also want to appreciate my friends, junior colleagues and every other person who in one way or the other contributed to the actualization of this project. I pray for God's love and blessings upon your lives.

TABLE OF CONTENT

LIST OF TABLES

LIST OF TABLES CONT'D

LIST OF TABLES CONT'D

LIST OF FIGURES

LIST OF ABBREVIATIONS

ARD	Acute Respiratory Distress
GHQ	General Health Questionnaire
HCWs	Health Care Workers
ICU	Intensive Care Unit
ICP	Infection Control Protocol
IDs	Infectious Diseases
LMICs	Low and Middle Income Countries
MERS-CoV	Middle East Respiratory Syndrome Coronavirus
NCDC	Nigerian Center for Disease Control
PHOEC	Public Health Emergency Operation Centers
PPE	Personal Protective Equipment
PTSD	Post-Traumatic Stress Disorders
RNA	Ribonucleic Acid
SARS-CoV	Severe Acute Respiratory Syndrome Coronavirus
SPSS	Statistical Package for Social Sciences
UBTH	University of Benin Teaching Hospital
WHO	World Health Organization

DEFINITION OF TERMS

Anxiety: An emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure.

Asymptomatic: A person producing or showing no symptoms of a disease or infection.

Carrier: A person or animal that harbors a specific infectious agent without discernible clinical disease and serves as a potential source of infection.

Casualty: A person suffering from or badly affected by an event, situation or disease.

Crisis: An unstable situation involving an abnormal change.

Depression: A mood disorder characterized by feeling of sadness and lack of interest or pleasure in previously rewarding or enjoyable activities.

Disease: A disorder of structure or function that produces specific symptoms or that affects specific location and is not simply a direct result of physical injury.

Etiology: Refers to origination, causation or manner of origination of a disease or condition.

Frontline Health Workers: Any member of staff in the healthcare facility involved in the provision of care for a COVID-19 patient, the same area as the patient and those who may not have provided direct care to the patient but who have had contact with the patient's body fluids, potentially contaminated items or environmental surfaces.

Fomites: Any inanimate object or material which when contaminated with or exposed to infectious agents can transfer disease to a new host.

DEFINITION OF TERMS CONT'D

Infection: The entry and development or multiplication of an infectious agent in an organism, including the body of humans and animals.

Isolation: A complete separation from others of a person suffering from a contagious disease.

Mental Health: A state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community.

Mortality: Number of deaths in a certain group.

Novel: A new strain; not resembling something formerly known before.

Pandemic: An outbreak of infectious diseases that encompass a large geographic area i.e a country or continent, causing significant demand for medical assistance, supplies rationing, high mortality, and intense overload on health care workers.

Psychological Stress: A state of emotional suffering associated with stressors and demands that are difficult to cope with in daily life.

Quarantine: The separation and restriction of movement of people who have potentially been exposed to a contagious disease to ascertain if they become unwell, thereby reducing the risk of transmitting it to others.

Syndrome: A group of signs and symptoms that occur together and characterize a particular abnormality or condition.

Transmission: A passage or transfer of a disease from one individual to another.

ABSTRACT

BACKGROUND: Globally, COVID-19 pandemic emerged as a major public health concern and has had severe, wide-reaching effects on the functioning of societies, economies, social and healthcare systems worldwide. In addition to the ongoing health crisis, mental health crisis has been unfolding. During the COVID-19 pandemic, healthcare workers had high workload and exposure to multiple psychosocial stressors. The psychological impact of the pandemic on healthcare workers has been assessed worldwide, but there are limited data on how health care workers have been affected in Low and Middle Income Countries (LMICs).

OBJECTIVES: The objectives of this study were to assess and compare the knowledge, attitude, prevalence and effect of COVID-19 on the mental health status of Frontline and Non-Frontline Health Workers of University of Benin Teaching Hospital (UBTH) and also to identify their coping strategies.

METHODOLOGY: A comparative cross-sectional study was conducted from August 2021 through June 2023 among Frontline Health Workers and Non-Frontline Health Workers of University of Benin Teaching Hospital, Benin-City using a systemic random sampling technique. The sample size was calculated using the formula for estimating two proportions for a comparative cross-sectional study. Ethical approval was obtained from the Ethics and Research Committee, University of Benin Teaching Hospital. Data was collected using a structured self-administered questionnaire adapted and modified from the World Health Organization (WHO) Interim Guidance document on the knowledge, attitude and practice of health care workers during COVID-19 pandemic, General Health Questionnaire (GHQ-12) and the Brief-COPE Strategy scale. Data was analyzed with IBM SPSS version 25.0 and the level of significance was set at $p < 0.05$. Data presentation was done using graphs, frequency tables and prose.

RESULT: A total of 500 respondents with mean age (SD) of 37.5 ± 5.6 and 39.9 ± 6.2 years for Frontline and Non-Frontline Health Workers participated in this study respectively. Findings from the World Health Organization (WHO) Interim Guidance document on the knowledge, attitude and practice of health care workers during COVID-19 used to assess knowledge and attitude of respondents revealed that: majority 145 (86.8%) and 191 (57.4%) of the Frontline and Non-Frontline Health Workers had overall good knowledge of COVID-19 ($p < 0.001$, 0.006 respectively) and a high proportion 134 (80.2%) and 284 (85.3%) of the Frontline and Non-Frontline Health Workers had overall positive attitude towards COVID-19 ($p = 0.054$, 0.096 respectively).

The General Health Questionnaire (GHQ-12) tool used to assess the mental health status of respondents showed that majority 148 (88.6%) of the Frontline Health Workers experienced depression, anxiety and PTSD while 286 (85.8%) of the Non-Frontline Health Workers experienced depression, anxiety and psychological distress ($p = 0.240$, 0.547 respectively). Being more aware (good knowledge), Frontline Health Workers were 24.7% times more likely to be psychologically affected (depression, anxiety and PTSD) by COVID-19 compared to Non-Frontline Health Workers. This was statistically significant ($p= 0.762$ OR: 1.247, 95% CI: 0.298 – 5.230).

As a result of positive attitude, Frontline Health Workers were 85.5% times more likely to be psychologically affected (depression, anxiety and PTSD) by COVID-19 compared to Non-Frontline Health Workers. This was also statistically significant ($p= 0.444$, OR: 1.855, 95% CI: 0.381 – 9.021).

The Brief-COPE Strategy scale used to assess coping styles of respondents showed that most 137 (82.0%) of the Frontline Health Workers coping styles were religion, getting support from

people, making fun and being positive of the situation while 255 (76.6%) of the Non-Frontline Health Workers coping styles were getting support from people, concentrating on their work and use of drugs and alcohol (p = 0.128, p= 0.162 respectively). Coping styles were effective for both categories.

Frontline Health Workers with tertiary level of education were 10.3% times less likely to be psychologically affected (depression, anxiety and PTSD) by COVID-19 compared to Non-Frontline Health Workers. This was however not statistically significant (p= 0.082, OR: 0.897, 95% CI: 0.216 – 3.734).

CONCLUSION: From this study, respondents had overall good knowledge of COVID-19. Good knowledge was higher among Frontline Health Workers than in Non-Frontline Health Workers.

Majority of the respondents had positive attitude towards COVID-19, and it was observed to be higher among Frontline Health Workers than in Non-Frontline Health Workers.

About half of the respondents tested positive to COVID-19. Positive test was higher in Frontline Health Workers than Non-Frontline Health Workers.

Higher proportion of the population were affected mentally. Negative mental health effect was noticed to be higher among Frontline Health Workers compared to Non-Frontline Health Workers. Domains such as depression, anxiety, PTSD and psychological distress were identified as areas responsible for the psychological symptoms.

Good knowledge of COVID-19, positive attitude towards COVID-19 and religion were predictors of coping styles among Non-Frontline Health Workers while knowledge of COVID-19, attitude towards COVID-19, level of education and marriage were identified as predictors of coping styles of Frontline Health Workers.

Timely identification and implementation of an appropriate support to vulnerable groups would effectively mitigate the mental health impact of future pandemics on Health Care Workers.

KEYWORDS: COVID-19, Health Care Workers, Mental Health, Depression, Anxiety, PTSD, coping strategies.

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND

In recent decades, several new diseases have emerged in different geographical areas, with pathogens including Ebola virus, Zika virus, Nipah virus, and Coronaviruses (CoVs).[1] The end of 2019 brought a new challenge for mankind, the Coronavirus disease 2019 (COVID-19).[2] This virus, a new type of viral infection[1] having origins in the Wuhan city, gradually spread throughout China and became a global health threat.[1,2] On 31st December 2019, a cluster of cases of pneumonia of unknown etiology[3] whose initial genomic sequencing data do not match with previously sequenced CoVs, suggesting a novel CoV strain (2019-nCoV),[1] which has now been termed Severe Acute Respiratory Syndrome CoV-2 (SARS-CoV-2) was noticed to be linked with epidemiologically related contact with a seafood market and untraced contacts[2,4] was detected in Wuhan City, Hubei Province, China. On 7th January 2020, the Chinese authorities identified and announced a novel type of coronavirus as the cause of the disease.[4] China was the first country to be affected by the pandemic of COVID-19, caused by SARS-CoV-2.[5] COVID-19 is a complex respiratory disease, characterized by human-to-human transmission, asymptomatic carrier transmission, high transmission, efficiency, and involvement of multiple organs.[6] COVID-19 is caused by the Severe Acute Respiratory Distress Syndrome Coronavirus-2 (SARS-CoV-2), a novel strain from the Coronaviridae family, first isolated in Wuhan (China) after a cluster of outbreaks. SARS-CoV-2 is a positive-sense, single-stranded enveloped RNA virus that is transmitted via respiratory droplets and fomites. The virus causes a disease spectrum ranging from asymptomatic to severe Acute Respiratory Distress Syndrome (ARDS), and death.[7] The two major coronaviruses that had attracted public health attention globally were Severe Acute

Respiratory Syndrome Coronavirus (SARS-CoV) in 2003, and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in 2009. These viruses have high mortality and infectivity and were restricted to Asia, the Middle East, and spread to a few countries via the movement of people.[8] Genomic sequence analyses revealed that SARS-CoV-2 and other SARS-CoV are 94.6% similar in amino acid sequence and 80% nucleotide sequence similarity. However, SARS CoV-2 is more related to bat SARS-CoV (96.2% nucleotide similarity) than human SARS-CoV (79.0%). Because of these similarities, the novel coronavirus was named SARS-CoV-2.[9] The clinical symptoms of COVID-19 include fever, body pain, dry cough, tiredness, sore throat, difficulty breathing, chest pain or pressure, loss of speech or movement, and gastrointestinal syndrome, with people presenting the asymptomatic form of the disease in Nigeria and other African countries.[8,9] There are various risk factors that predispose individuals to more fatal forms of the disease. Recent studies done have shown that individuals above the age of 60 years and those who are immunocompromised such as individuals with co-morbidities like diabetes, cardiovascular diseases, chronic respiratory diseases, cancers, renal and hepatic diseases have a higher risk of contracting the disease.[10,11]

Several unique characteristics of COVID-19 epidemic patterns and its management policy prompted a heightened public mental health crisis. The World Health Organization (WHO) in January 2020 declared the outbreak of the novel coronavirus disease (COVID-19) caused by SARS-CoV-2, a Public Health Emergency of International Concern.[5] Novel Coronavirus disease 2019 (COVID-19) was crowned as the second pandemic of the twenty-first century by the World Health Organization (WHO) on March 11th, 2020. Globally, report from Worldometer on the 27th May revealed that the virus had spread in 212 countries around the world with a total of 5,709,551 confirmed cases with 2,451,226 recoveries and 352,753 deaths.[5,6]

As of 3rd November, 2020, a total of 47,093,222 cases and 1,207,290 deaths of confirmed COVID-19 infection have been reported globally by the World Health Organization (WHO). As of the reference date, Nigeria had recorded 63,036 COVID-19 cases and 1,147 deaths.[11]

Africa accounts for 2.18% of the global cases.[12] Africa is faced with increased crisis and concern in the public health sector as cases of COVID-19 rise daily. As at 27th May 2020, the continent had 119,454 cases, 48,607 recoveries and 3,592 deaths, indicating the need to rise to the challenges that the pandemic is placing across the continent.[5] The first COVID-19 case in Africa was reported in Egypt on the 14th of February, 2020. Nigeria was the first sub-Saharan African country to report a COVID-19 confirmed case. Most of the identified imported cases in Africa arrived from Europe and the United States rather than from China. Africa recorded her first fatality of COVID-19 in Burkina Faso on March 18th 2020 in a female patient aged 62 years old, with underlying diabetes mellitus.[7]

The first case of COVID-19 in Nigeria was confirmed on 27th February, 2020. The case was that of a 44-year old Italian citizen who arrived Nigeria through the Muritala Mohammed International Airport, Lagos, on a flight via Milan, Italy. This index case led to the activation of COVID-19 Public Health Emergency Operation Centers (PHEOC) at national and sub-national levels, with associated active case finding via contact tracing. By 9th March 2020, 217 contacts were linked to this index case, out of which 136 (63.0%) were under follow-up, with one contact confirmed positive. The 14-day follow-up for contacts of the index case ended on 12th March 2020. During this period, two additional unlinked cases were reported in Nigeria. In addition, 42 suspected cases were identified across seven states in Nigeria namely the Federal Capital Territory (FCT), Edo, Kano, Lagos, Ogun, Rivers and Yobe.[4] The most affected state in Nigeria is Lagos and it is regarded as the epicenter of COVID-19.[6] The COVID-19 pandemic has exerted

immense pressure on health systems worldwide saddling many with the enormous task of dual-tracking health services by ensuring the provision of regular care while simultaneously addressing COVID-19 case management.[13]

The number of cases was slow to rise in Africa but later increased exponentially resulting to a threat in the already weak health structure. Globally, as at April 2021, there have been 133,552,774 confirmed cases of COVID-19, including 2,894,295 deaths reported to the World Health Organization (WHO) and a total of 669,248,795 vaccine doses have been administered.[14] In Nigeria, 163,581 cases have been confirmed, 154,005 cases have been discharged and 2,058 deaths have been recorded in the 36 states including the Federal Capital Territory (FCT). Currently, the vaccine (both first and second doses) has been administered to the frontline health workers, other health workers and the general population.[15]

Aside the strain on health infrastructure, human resource and equipment deficit it places on health systems, it has been shown that COVID-19 and other infectious disease outbreaks underlie psychological issues such as anxiety that affects the population's general health and mental well-being.[12] The effect of these on HCWs ranges from fear caused by perceived vulnerability to psychological manifestations of acute stress such as burnout, Post-Traumatic Stress Disorder (PTSD), depression, insomnia, anxiety and chronic stress. In anticipation of a pandemic, medical staff–especially those working in hospitals–expect an increase in job strain and stress.[11]

Health workers are usually at the forefront in these epidemic crises and constitute a vulnerable population with an increased risk of infection, stress, despair, depression and fear as compared to the general population. These outcomes include higher likelihood of infection, changing guidelines and protocols; understaffing and increased workload; stigma, temporal separation

from families, and re- deployment of non-specialist nurses and physicians to infectious disease units.[12]

The increasing number of confirmed cases and deaths, work burden, inadequate personal protective equipment (PPE), media coverage, lack of specific treatment, vulnerability to infection and having to stay in quarantine, as well as feelings of being inadequately supported in the workplace, can contribute to the mental burden of health workers.[11,12,17]

More than 170,000 frontline medical workers joined the battle against COVID-19 in China.[16] Furthermore, 45,322 medical workers from other provinces were recruited to help reduce the pressure on healthcare personnel in Wuhan. Among them, 38,478 (84.90%) doctors and nurses worked alongside their Wuhan local colleagues.[16] The extreme exposure due to their profession, a great number of cases, dying patients, shortage of Personal Protection Equipment (PPE), having to put on heavy isolation suits as well as the lack of effective drugs and treatment strategies has put all medical staff at a high risk of infection and even death compared to other professions. They were also overworked and had to reduce contact with their families. Thus, COVID-19 may induce mental stress including anxiety, insomnia, depression, and Post-Traumatic Stress Disorder (PTSD), all of which lasts for even a long time.[13,16]

Existing studies have investigated the impact of the current SARS-CoV-2 outbreak on the mental health of medical staff. These studies have reported high levels of psychological stress as well as greater levels of fear, anxiety, and depression among medical staffs compared to non-medical staffs. These same studies found staff to more frequently feel stressed when working in departments that are particularly frequented by COVID-19 patients when compared to non-COVID-19 staffs.[18, 26]

Recent studies including systematic reviews have reported up to 46%, 71%, 50.4% and 39% prevalence of anxiety, stress, depression and insomnia among health workers in relation to the COVID-19 pandemic and with a preponderance in females.[7-10] In addition to the health-related and socio-economic concerns associated with COVID-19, the effect on mental health of the disease has also attracted considerable attention. In March 2020, the World Health Organization released mental health guidelines to support the psychological and mental well-being of the general population.[12] These mental health effects must be identified and addressed as they have potential of impairing cognitive functioning and possibly performance.[12]

The impact of COVID-19 is ubiquitous to all cohorts of the society but its effect on the mental health status is most felt by HCWs who are affected by being directly infected with the disease or indirectly via caring for the relatives, burnout and psychological stress due to loosing too many patients compared to the general public. Globally, about 1.29 million HCWs have been infected, more than 115,000 died. Number of infected HCWs accounted for 8% of cases, the median age of health worker cases was 42 years, and 68% were women.[17]

The prevalence of COVID-19 among HCWs varies across the world at different geographical locations compared to the general populace. An interim analysis carried out in Mumbai from 6th April to 20th August 2020 showed a total of 3,711 HCWs (frontline, 74.32%, non-frontline, 25.68%) working at Mumbai. About 11% prevalence of SARS-CoV-2 infection occurred among HCWs, 4% co-infection and 1% mortality.[19,20,21]

In Africa, the number of infected frontline workers have increased from 2,217 on the 26th May to 4830 as of the 7th of June 2020 in 36 countries. By August 15th, data collected from 37 countries found that nearly 300,000 HCWs had been infected with COVID-19 with over 2500 deaths. However, the most relevant evidence to date is not conclusive as to the prevalence of risk

factors for SARS-CoV-2 infection between patient-facing and non-patient-facing frontline HCWs according to specific clinical settings, thereby restricting the possibility of developing effective preventive measures to reduce occupational transmission of the virus, and consequently transmitting it to their household, workplace contacts across clinical settings, or both.[22,23,24]

Mental health issues have become one of the predominant Public Health concerns as a result of COVID-19 outbreak. It has affected the ability of most HCWs to combat everyday life stressors. Given the contagion, severity, and mortality characteristics of the disease, the COVID-19 outbreak has led to clinical, organizational, and technical challenges. Recent studies reported the negative psychological impact of the COVID-19 outbreak on HCWs. One study reported that 50.4% of healthcare workers presented symptoms of depression, 44.6% anxiety, 34.0% insomnia, and 71.5% distress. These impacts were particularly important among nurses, who tend to report more severe symptoms of insomnia and emotional distress.[25,26] Most importantly, studies also reported that working on the frontline is a risk factor for worse mental health outcomes. Previous studies have also reported negative psychological impacts of the SARS outbreak.[26,27,28,29]

The management of COVID-19 implies high-risk work environment in terms of stress, contagion, or increased workload for HCWs.[26] However, it is a well-known fact that occupational chronic stress with emotionally intense work load/demands in a context where resources are inadequate and can result in HCWs' burnout and mental health instability during the COVID-19 outbreak are thus a critical public health issue and have to be studied more precisely.[27] Several studies have been published on the psychological impact of the COVID-19 outbreak on healthcare workers. However, few studies have assessed potential differences in mental health among COVID-19 HCWs and non-COVID-19 HCWs. When they did, they generally compared groups of workers at high or low risk of being in contact with patients with COVID-19.[26-28]

The high risk of exposure, increased workload, shortage of personal protective equipment, anxiety of getting infected, antisocial behavior from patients, conditions requiring ethically difficult decisions on the rationing of care and fear of spreading the virus to family and friends all compound to cause mental health issues for most HCWs.[30] Studies have found social/physical distancing, self-isolation and quarantine measures used in curbing the spread of COVID-19 to cause considerably mental health issues. Consequently, mental health issues like severe fatigue, stress, sleep disturbance, depression, anxiety, phobia and trauma has been on the increase among HCWs.[31]

Pandemics, such as COVID-19, threatens the physical and mental well-being of people. The HCWs, who are directly involved in the diagnosis, treatment, and care of patients with COVID-19, may be at risk of developing mental health symptoms such as anxiety while some anxiety levels are needed for performance compared to non-COVID-19-facing HCWs. The ever-increasing number of confirmed and suspected cases, overwhelming workload, depletion of personal protective equipment (PPE), widespread media coverage, and fear of acquiring the infection or transmitting it to their family members have been observed to contribute to the high rate of anxiety in the HCWs.[31]

The psychological stress experienced by HCWs, frontline essential workers, and individuals in the general public varies depending on each individual's particular situation, experiences, and the stresses that they face. Healthcare and Frontline workers may experience heightened anxiety and depression symptoms, and thus heightened psychological stress, consequent to a constant potential exposure to COVID-19.[32,33]

In Nigeria, there is no measure/strategy put in place between the Federal Ministry of Health and State Ministry of Health to regulate the mental health effects of HCWs however, WHO released mental health and psychosocial consideration guidelines.[34]

1.2 STATEMENT OF THE PROBLEM

Historically, emergence and re-emergence of large-scale infectious diseases (IDs) have had civilization-altering consequences. In addition to physical problems, a variety of psychosocial problems also emerges mainly due to the lack of sufficient knowledge about these IDs. Initially, the fear, anxiety and hysteria in people are observed that lead to stigma – irrational response to the disease – in the society. Recent examples in this context include stigmatization of HIV/AIDS, SARS, H1N1 and Ebola. Such impulsive reactions reveal the enormous psychological distress consequential of emerging diseases particularly when it is unfamiliar, highly contagious and fatal such as ongoing COVID-19 pandemic.[35] In addition to the public health concerns raised by the outbreak of COVID-19, the negative mental health effects are tremendous and worrisome. A disease outbreak as well as an Infection Control Measure (ICM) such as quarantine has overwhelming effects on people's mental health. Findings in the general population have demonstrated relationship between quarantine, disease outbreak, and psychological distress.[36] Healthcare workers such as doctors, nurses, intensivists, laboratory scientists and technicians especially those in direct contact with COVID-19 patients and/or their body fluids are vulnerable to developing psychological symptoms during and in post COVID-19 compared to the administrative staff in the same health institution.[37]

Due to the prevalence of COVID-19, healthcare providers caring for patients with COVID-19 are exposed to special stress and Post-Traumatic Stress Disorder in the workplace. Research has shown that COVID-19 develops anxiety, anger and various degrees of psychological crisis in the

medical staff compared to the general populace, and it increases the need for psychological protective measures to reduce its psychological effects on HCWs.[38] Another survey showed that 13.47% of the respondents had reported moderate-high levels of depression and 4.98% had reported moderate-high levels of anxiety since the outbreak of COVID-19 in China found that the prevalence of PTSS among Chinese people was 4.6% one month after the COVID-19 prevalence also found that healthcare providers had significant concerns about the disease, which could lead to psychological disorders compared to the general population. To the best of our knowledge, there are many unknowns about the psychological effects of the COVID-19 that need to be realized in future studies. Therefore, due to the prevalence of COVID-19 in Iran and the need to investigate the effects of COVID-19 on frontline nurses,[39] health workers directly involved in the care of COVID-19 patients have been reported to have higher risks of depression, anxiety and stress compared to those with more indirect roles i.e non-frontline HCWs. Factors such as improper use of personal protective equipment (PPE), infected family members and inadequate facilities for handwashing were noted to affect adversely health workers' mental health while provision of adequate information on COVID-19 transmission, availability and trained use of PPEs, practicing response roles, implementing infection prevention and control (IPC) measures and movement restrictions, the safety of family members and positive attitudes of work colleagues among others helped to reduce COVID-19-related stress among health workers and enabled better coping.[39]

Mortality rate among HCWs is significantly higher than among other professions. Men who worked in health care occupations had statistically higher rate of death involving COVID-19 (44.9 deaths per 100,000 males) when compared with the rate of COVID-19 among men of same

age in the population; the rate among women who worked in health care occupations (17.3 deaths per 100,000 females) was statistically similar to the population.[40]

The current COVID-19 disease has an evidently higher mortality rate in adults, unlike the human rhinoviruses and human adenoviruses which are prevalent in children. Frontier HCWs are mandated to control and manage epidemics based on their professional oaths of conduct and codes of regulation.[27] Due to its high infection rate, the WHO has recommended strategic infection prevention and control (IPC) measures among HCWs. Ideally, these would reduce the rate of infection considering their high vulnerability to the virus. Furthermore, the public expects HCWs to reduce the burden amid the crisis.[41] However, the crisis may be severe in developing countries where most health facilities are challenged with inadequate staffing, medical facilities, medical supplies, diagnostic equipment, and reagents. In that regard, the unprecedented influx of COVID-19 cases may further stretch the already inadequate human resource for health.[41]

Consequently, HCWs may be working for long hours in stressful environments, which may lead to fatigue, anxiety, and depression. In China, a psychological impact report of the COVID-19 pandemic on the HCWs and the general public has provided insightful facts. Therefore, HCWs in developing countries like Kenya should expect similar effects and perhaps severe due to other challenges such as inadequate budgetary allocation to healthcare services, out-of-pocket spending for healthcare services, inadequacies in healthcare infrastructure and systemic challenges due to challenges in implementation of key policies set by the government.[42] Although there have been studies on the prevalence of self-medication among HCWs and the general public before and during the COVID-19 pandemic attributed to the current pandemic, to the best of our knowledge and by the time of publication of this manuscript, there are no detailed

studies on the levels of anxiety and depression among HCWs in Kenya due to the current COVID-19 pandemic.[43]

At the wake of COVID-19 outbreak in China, HCWs had recorded depression, anxiety, and insomnia respectively. Mental health implications of pandemics like COVID-19 are likely to result into a persistent mental issue for most HCWs compared to the administrative staff in the same health institution.[12] The high contagious rate of COVID-19 may also result to stigma for HCWs by other population group with little or no exposure risk to COVID-19.[38] In late July, 2020 Nigeria had recorded 36,663 confirmed cases of COVID-19 with 789 deaths. Edo State recorded 1,165 confirmed cases and 40 deaths and University of Benin Teaching Hospital recorded deaths.[30]

Previous viral outbreaks have shown that frontline and non-frontline HCWs are at increased risk of infection and other adverse physical health outcomes compared to other professions. Furthermore, HCWs reported mental health problems putatively associated with healthcare workers' occupational activities during and up until years after epidemics, including symptoms of post-traumatic stress, burnout, depression and anxiety. Likewise, reports of the mental toll on HCWs have persistently appeared significant during the current global health crisis as compared to the world at large.[38]

The extreme exposure due to their profession, a great number of cases, dying patients, shortage of PPE, having to put on heavy isolation suits as well as the lack of effective drugs and treatment strategies has put all medical staff at a high risk of infection and even death.[39] They were also overworked and had to reduce contact with their families. Thus, COVID-19 may induce mental stress including anxiety, insomnia, depression, and Post-Traumatic Stress Disorder (PTSD) all of

which lasts for even a long time. Nevertheless, there was no investigation on the incidence of mental health negative outcomes in healthcare workers after the first wave of COVID-19 in Hubei.[41]

1.3 JUSTIFICATION OF THE STUDY

During the COVID-19 outbreak, HCWs, who were at the forefront are the first contact with patients experienced psychological stress, anxiety and were confronted with mounting challenges that have not been faced before from the overwhelming burden of the disease. Decisions have to be made fast, ranging from efficiently triaging and isolating patients with suspicion of infection, to deciding whether to shut down departments and operating theatres when a patient or staff tests positive; all these whilst being on limited resources due to lack of materials to conduct screening tests and other events contributed to PTSDs.[44]

The pressure to act timely and to successfully diagnose, isolate and treat has been overwhelming, especially amid intense public and media scrutiny. The role of frontline healthcare providers is therefore indispensable in the combat against COVID-19.[14] This is in concordance with experience in other health institutions. In addition, due to the increased risk of exposure to the virus, frontline doctors, nurses and healthcare workers fear that they may contract COVID-19 themselves. They worry about bringing the virus home and passing it on to their loved ones and family members - elderly parents, newborns and immunocompromised relatives.[15] Healthcare staff also had increased stress levels when dealing with patients unwilling to cooperate or not adhering to safety instructions, and feelings of helplessness when dealing with critically ill patients, in the context of limited intensive care beds and resources.[45] The use of protective equipment for long periods causes difficulties in breathing and limited access to toilet and water, resulting in subsequent physical and mental fatigue.[30] The severity of the disease, the

unavailability of a vaccine, little evidence on the effectiveness of potential therapeutic agents, and no presumably pre-existing immunity in the population make everyone potentially susceptible and fearful about contracting the infection.[46]

As essential workers who are expected to carry out professional obligations to provide patients with the best treatment possible, many HCWs may feel the strain of watching patients die or suffer anxiety from the risk of infecting patients as asymptomatic carriers.[6]

From an ethical perspective, Frontline HCWs may experience moral injury or trauma as they must balance their perceived responsibility to safeguard patient's welfare with the fear and anxiety of risk of infection and the spread of the infection outside of the hospital setting than the non-frontline HCWs.[6] The continuous spread of the disease, conspiracy theories, myths, misconceptions, blame games, stimulus funds and political propagandas and contexts, sensational media reporting of COVID-19, frustration and boredom, implementation of social lockdown are some of the main risk factors significantly influencing the mental health of the HCWs especially those in contact with infected patients.[15] There have been reports on the psychological impact of the epidemic on the HCWs.[45]

Nonetheless, there is a paucity of information around how to best prevent effects of the pandemic on mental health of HCWs, and what steps are needed to mitigate harm to HCWs' wellbeing.[19] In Nigeria, no study has been done to compare the mental health status of frontline health workers and other HCWs. With the paucity of data, this study will add to the knowledge and serve as a baseline study for the study population (HCWs) to which other studies can be compared with.

This study will also assess the main findings from literatures evaluating and comparing the effect of the COVID-19 pandemic on the mental health status of frontline health workers and other HCWs in the University of Benin Teaching Hospital, Benin-City, Edo State. It aims to assess the adverse psychological outcomes, anxiety, depression and Post-Traumatic Stress experienced by the Health Workers during the COVID-19 pandemic, knowledge, prevalence and coping strategies to better understand the effect and provide measures of developing interventions and mental health programs to alleviate and address the psychological stress of this population.

Outcome of the study would not only inform governments and policy makers on the specific socio-culturally sensitive policies required to safeguard the wellbeing of the limited frontline health workers but would as well prompt frontline health workers on what they could do at the personal level to mitigate their susceptibility to the virus whilst taking care of COVID-19 patients. However, to my knowledge, no studies have assessed the effect of COVID-19 on frontline health workers and other HCWs in University of Benin Teaching Hospital (UBTH). The mental health toll in workplaces especially in the health sector has been of major Public Health concern. Therefore, the present study is going to be conducted to assess and compare the effect of COVID-19 on the mental health status of frontline health workers and other HCWs in University of Benin Teaching Hospital (UBTH) and their coping strategies. In the context of the COVID-19 pandemic, this timely review is both relevant and urgent. It is imperative that those working at the frontline with infected patients or in afflicted regions have the necessary strategies and resources to endure various challenges.

Findings from this study will also guide recommendations to be made to bridge the “knowledge translation” and “implementation” gaps in reducing psychological outcomes. These recommendations will emphasize on the need for effective method of early detection,

counselling and therapy sessions amongst HCWs. The further implementation of these interventions would in turn bring about the restructuring of health services for HCWs by taking into cognizance the global impact and the rapidly changing epidemiological pattern of the psychological symptoms.

1.4 RESEARCH QUESTIONS

1. What is the knowledge of COVID-19 among HCWs in University of Benin Teaching Hospital?

2. What is the attitude of HCWs towards the COVID-19 pandemic in University of Benin Teaching Hospital?

3. What is the prevalence of COVID-19 infection among HCWs in University of Benin Teaching Hospital?

4. What is the mental health status of Frontline HCWs and other HCWs in University of Benin Teaching Hospital?

5. What are the coping strategies among HCWs during the COVID-19 pandemic in University of Benin Teaching Hospital?

1.5 OBJECTIVES OF THE STUDY

GENERAL OBJECTIVE

To assess and compare the Mental Health Status of frontline health workers and other health workers during the COVID-19 Pandemic in University of Benin Teaching Hospital, Benin-City, Edo State with a view to reduce negative Mental Health effects and to protect the Mental Health of HCWs by making appropriate recommendations to the Hospital Management for interventions.

SPECIFIC OBJECTIVES

1. To assess and compare the knowledge of COVID-19 among HCWs in the University of Benin Teaching Hospital.

2. To assess and compare the attitude of HCWs towards the COVID-19 pandemic in the University of Benin Teaching Hospital.

3. To assess and compare the prevalence of COVID-19 infection among HCWs in the University of Benin Teaching Hospital.

4. To assess and compare the mental health status of frontline HCWs and other HCWs in the University of Benin Teaching Hospital.

5. To identify the coping strategies among HCWs during the COVID-19 pandemic in the University of Benin Teaching Hospital.

CHAPTER TWO

LITERATURE REVIEW

The outbreak of the COVID-19 disease really hit the world hard as it brought the world to a stand-still. It caused a halt in various sectors and industries including the economic, political, educational and increased burden in the health sector. The severity and deaths associated with the disease caused a lot of anxiety and fear among a lot of people especially HCWs worldwide and this affected their mental health status. Public health crises such as infectious disease outbreaks, in the form of either epidemic or pandemic, can often bring about high levels of acute and chronic stress in both the victims and frontline HCWs. Relevant studies have examined and summarized the mental health impact of previous public health emergencies on frontline HCWs and other HCWs, which has shed light on how the COVID-19 pandemic may similarly contribute to detrimental effects among health workers in UBTH.[47,49]

Among recent infectious disease crises, the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 is arguably the best studied in terms of its impact on psychological distress among healthcare workers. Studies from China, Canada and Singapore have shown that HCWs generally suffered from decreased vitality, poorer emotional and social functioning, and experienced worsening mental health than non-HCWs. One study found that during the month after the end of SARS outbreak, 93.5% of healthcare workers perceived SARS as stressful, 19.3% of them presented with PTSD symptoms and 47.8% had minor psychiatric morbidity.[48] Another study, conducted 3 years after the SARS outbreak, showed that 14% of HCWs still reported moderate depressive symptoms, while 8.8% of them presented with a high depressive symptom level, while another study, similarly conducted 3 years post-SARS, showed a 10% PTSD symptom prevalence among HCWs.[49] For insomnia and sleep quality-related assessment, HCWs in the SARS units had the highest insomnia rate at 50%, followed by SARS ICUs at 23%.

These studies suggest that even after the SARS outbreak, negative psychiatric symptoms persisted for some HCWs, highlighting that it can also become a chronic debilitating illness that limits life qualities for an extended period of time. Burnout is yet another long-term consequence of the SARS outbreak. It was shown that 1–2 years following the epidemic, 30.4% of the HCWs reported a high level of burnout, particularly in the EE dimension. Similar to the SARS outbreak, the 2014–2016 Ebola outbreak in Sierra Leone also left a deep psychological impact on frontline health workers, including obsession-compulsion, interpersonal sensitivity, depression and paranoia. Another study found that providers who worked in Primary Health Care facilities during the Ebola outbreak reported feelings of loneliness, ostracization, fear and other negative emotional well-being. Furthermore, in many LMICs during response to public health crises, frontline HCWs such as CHWs often take on more than what they are certified to do in order to compensate for shortages of healthcare professionals; thus, evaluations of both the short-term and long-term psychological health outcomes could be critical in guiding how structural support should be offered to CHWs to ensure productive continuations of their work and to prevent burnout and minimize exhaustion.[47]

Among the common mental effects of the pandemic are anxiety, panic, depression, anger, confusion, ambivalence and financial stress. HCWs were observed to experience similar problems during previous pandemics especially those at the Frontline.

2.1 KNOWLEDGE OF COVID-19 PANDEMIC AMONG HEALTHCARE WORKERS

A cross-sectional and anonymous online population-based survey was conducted on February 27th, 2020 using a semi-structured and self-reported questionnaire to assess the knowledge of staff at Taleghani Hospital, Kermanshah in Iran. Sample size included 191 HCWs (118 females (61.8%) and 73 males 38.2%). Fortunately, the majority of participants (93.3%) were well aware

that even a person with mild symptoms could transmit the disease during the incubation period and 14% of HCWs were unaware of Coronavirus symptoms. Findings showed that majority of respondents had excellent level of knowledge of COVID-19.[48] Study is commendable however, the sample technique was not stated, sample size was inadequate as only one hospital was involved and findings may not be generalizable.

A prospective web-based cross-sectional study was conducted in Asia using a survey instrument to obtain responses from HCWs globally during the first week of March 2020. The survey covered the domains of HCWs' characteristics, awareness, information sources, knowledge and perceptions related to COVID-19. A sample size of 529 HCWs participated, 453 of whom completed the study questionnaire (85.6% response rate), including 234 (51.6%) men and 219 (48.3%) women. Almost all participants agreed that they had heard about COVID-19 (97.8%).[49] The study is commendable because of the large sample size however, sampling technique was not stated.

Another cross-sectional study was performed between January 2020 and February 2020 at District 2 Hospital, Ho Chi Minh City, China using systematic random sampling strategy for data collection. Self-administered questionnaire was utilized to assess the knowledge of HCWs regarding COVID-19 with 327 participants. Findings showed good knowledge, however, approximately two thirds of the participants knew the mode of transmission, the isolation period and treatment (67.0%, 65.8%, and 58.4%, respectively). The majority of HCWs had good knowledge toward COVID-19. However, the level of knowledge among some health workers are lower than that expected for their level towards COVID-19.[50]

Another cross-sectional survey was conducted among HCWs in a tertiary care hospital with a 1000-bed capacity in Riyadh, Saudi Arabia. Data were collected between 5th and 16th February

2020 from 582 participants using a web-based pilot-validated, self-administered questionnaire. The knowledge scores on COVID-19 were higher in the current cohort than the previous MERS-CoV outbreak cohort (68% vs. 79.7%, $P < 0.001$). HCWs from the current cohort who felt greater anxiety from COVID-19 compared to MERS-CoV were less likely to have been exposed to MERS-CoV infected/suspected cases and were less likely to have attended the hospital awareness campaign on COVID-19. Results revealed there was associated increase in knowledge and adherence to protective hygienic practices, and reduction of anxiety towards COVID-19.[51] The study is commendable because of the large sample size however the duration of study was quite short. Also, sampling technique utilized was not stated.

An Institution-based cross-sectional study was conducted from the mid of March to the end of April 2020 in the Central Gondar zone, Northwest Ethiopia, Addis Ababa with 420 participants using a multistage sampling technique. A pretested and structured self-administered questionnaire was used to collect the data. Findings from the study revealed that good knowledge was found to be 73.8%. Three hundred eighty-six (94.6%), 348 (85.3%), and 335 (82.1%) professionals mentioned fever, cough, and shortness of breath as commonest symptoms of COVID-19.[52] Study is worthy of commendation.

A cross-sectional study was performed between April and May 2020 at Seti Zonal Hospital, Nepal with purposive sampling technique and self-administered questionnaire of the knowledge of HCWs regarding COVID-19. A total of 230 HCWs (92% response rate) had good knowledge. Majority (94.7%) were familiar with the sign and symptoms, agreed that chronic diseases patients and HCWs are at a higher risk (97%) and (87.8%) respectively while knowledge related to COVID-19 vaccination, isolation period and treatment by antibiotics was poor.[53] The sample size was small and sampling technique is not scientific as it is subject to bias.

A web-based cross-sectional study conducted over one month from 16th April to 12th May 2020 in Anambra State, South- East, Nigeria during the lockdown period. An online, self-administered semi-structured questionnaire was utilized. A sample size of 402 was obtained using the multi-stage technique. Three hundred and fifty-seven (88.59%) of the participants had good knowledge of COVID-19. [54] Study is excellent because it gave a detailed analysis about sources and factors associated with knowledge compared to other literatures.

2.2 ATTITUDE OF HEALTHCARE WORKERS TOWARDS COVID-19

An institution-based cross-sectional study was conducted in the Central Gondar zone, Northwest Ethiopia from the mid of March to the end of April 2020 among 408 participants who were selected using a multistage sampling technique. Pretested and structured self-administered questionnaire was used to collect data. Results showed that 65.7% of health care providers had a positive attitude while 34.3% had negative attitude towards COVID-19.[52] The study is commendable however self-administered questionnaires could have affected the result.

A cross-sectional online population-based survey conducted over a span of two weeks from April 1st to April 14th, 2020, among HCWs from various health institutions located in Chitwan district of Nepal to assess the prevalence of the attitude of HCWs towards COVID-19 using a self-reported questionnaire was circulated online with 353 responses analyzed. Findings revealed that majority of the HCWs had positive attitude scores (n = 90.93%) towards COVID-19.[53] Study is commendable because of the large sample size and the involvement of various health institutions however, sampling technique was not stated.

Findings from a descriptive cross-sectional study conducted among HCWs working in the National Health Insurance Scheme (NHIS) Clinic of UBTH, Benin City, Edo State, Nigeria showed variations of attitude rate with respect to their occupation. The study which was carried

out in the month of June, 2020 with forty-nine (49) respondents revealed that majority of the respondents (61.2%) do not feel safe and secure at work. More respondents had positive attitude (34.7%), while 26.5% had negative attitude.[34] Study is commendable, however sample size is small.

An analytic cross-sectional online population-based survey was performed between March 11th and March 25th, 2020 using a semi-structured and self-reported questionnaire to assess the attitudes of HCWs towards COVID-19 prevention in Karachi, Pakistan with 304 HCWs. The level of attitude was categorized using modified Bloom's cut off point. Study revealed 75% of the respondents had positive attitude. The study revealed a relatively good level of attitude among respondents.[54] Study is commendable however sample technique used was not stated.

A cross-sectional study conducted among two local private colleges in the province of Davao del Sur, Southern Philippines, from April 25th – May 8th, 2020 using the snowball sampling technique. A self-administered semi structured questionnaire was used to collect data from 530 students. Findings revealed students' attitudes toward COVID-19 vaccination. The vast majority of student respondents (431/530 or 81.32%) stated that they were willing to be vaccinated against COVID-19, while only 18.68% (99/530) said they wouldn't be. This is comparable to the findings of the study of Influenza pandemic, which revealed that the main concerns of college students are related to the vaccination's safety during the pandemic influenza A/H1N1.[55] The study gave a detailed analysis of the different attitudes towards COVID-19. The sampling technique used might have introduced bias and the result is not generalizable.

Another cross-sectional study conducted in Enugu Maximum Security Custodial Center, located in Enugu metropolis, South East Nigeria between 24th and 31st March, 2020. All male inmates remanded in custody between 24th and 31st March, 2020 were quarantined in the first cell, while

those remanded between 1st and 8th April, 2020, were quarantined in the second cell. In order to minimize frequent contact between the researchers and the participants, were interviewer-administered and were read aloud for each participant. Sample size was 66 inmates. Findings revealed that 63 (95.5%) of them were male inmates, while the remaining 3 (4.5%) were female inmates. A total of 35 (53%) of the participants had negative attitude towards COVID-19, while only 21 (31.8%) had positive attitude. Of the participants, 14 (21.2%) were recidivists, and 61 (92.4%) were awaiting-trial inmates.[31] Sample size is quite small.

A web based, cross-sectional study conducted over one month from 16th April to 12th May 2020 in Anambra State, South- East, Nigeria during the lockdown period. An online, self-administered semi-structured questionnaire was utilized and 402 responses were obtained using the multi-stage technique. Generally, attitude to work in the COVID-19 era was either poor (n = 101, 25.06%), or indifferent (n = 233, 57.82%).[56] Study is excellent because it gave a detailed analysis about factors associated with attitude compared to other literatures.

2.3 PREVALENCE OF COVID-19 INFECTION AMONG HEALTHCARE WORKERS

A web-based cross-sectional online population-based survey was conducted from 1st May to 31st August, 2020 using a semi-structured and self-reported questionnaire to assess the exposure to health risks of COVID-19 among frontline HCWs in government hospitals and health centers of the Amhara Region, Ethiopia. Data were collected using online data collection tools, e-mail, and social media platforms. And pretested with 5% of the sample size before data collection. A sample size of 418 HCWs participated in the study with a response rate of 99.1%. Of the surveyed health workers, over half, 237(56.7%), of the health professionals didn't have face-to-face contact (within 1 meter) with a confirmed COVID-19 patient. Regarding exposure status; about 78(18.7%) of the study participants have reported that they had confirmed exposure to

COVID-19.[57] The study is commendable because the questionnaire was pre-tested however, pre-test population is rather low.

A descriptive cross-sectional study of all HCWs identified from surveillance for COVID-19 from March 31st to August 31st, 2020 was conducted in UBTH using the HCWs were categorized as high risk and low risk using an adapted WHO Risk Assessment tool. Sample size of 1,466 HCWs was obtained using an online-based self-administered questionnaire. On risk assessment, 328 (22.4%) were adjudged high risk. Following testing, 78 (5.3%) in the high-risk category were confirmed to have COVID-19. There was no record of COVID- 19 in HCWs adjudged low risk. Forty-four (56.4%) cases were epidemiologically linked to the community, 20 (25.7%) to patients, and 14 (17.9%) to other HCW.[11] Study is commendable because of large sample size however questionnaires were not pre-tested.

A prospective observational cohort study of the general community was conducted using the COVID Symptom Study which includes frontline HCWs beginning on March 24th (King's College London, United Kingdom, U.K.) and March 29th (Massachusetts General Hospital, United States, U.S.) through April 23rd, 2020. Among 2,035,395 community individuals and 99,795 frontline HCWs, 5,545 incident reports of a positive COVID-19 test over 34,435,272 person-days was documented. Compared with the general community, frontline HCWs had an aHR of 11·6 for reporting a positive test. Compared with HCWs reporting adequate PPE, the aHRs for reporting a positive test were 1·46 for those reporting PPE reuse and 1·31 for reporting inadequate PPE.[58] Frontline HCWs had a significantly increased risk of COVID-19 infection, highest among HCWs who reused PPE or had inadequate access to PPE. However, adequate supplies of PPE did not completely mitigate high-risk exposures.

Findings from a descriptive cross-sectional study conducted among HCWs working in the National Health Insurance Scheme (NHIS) Clinic of UBTH, Benin City, Edo State, Nigeria showed variations of attitude rate with respect to their occupation. The study which was carried out in the month of June, 2020 with forty-nine (49) respondents revealed that majority of the respondents (61.2%) do not feel safe and secure at work. There was a slight female preponderance (55.1%) with a male-female ratio of 1: 1.2. Pharmacists were the most prevalent HCWs (28.6%) followed by medical doctors (26.5%). Most of the respondents (83.7%) had not been infected with the novel coronavirus (SARS-CoV-2), however, a minority (14.3%) were not sure and only 2.0% had previously been infected.[34] Study is worthy of commendation because of it gave detailed analysis of the different rates of infection however sample size is quite low.

Similarly, findings from a qualitative study conducted in the United Kingdom to assess the prevalence of COVID-19 among HCWs circulated for 1 month from 10th April until 10th May 2020. Sample size of 612 participants engaged in the survey. Many participants were terrified of contracting COVID-19 or passing it on to vulnerable loved ones, especially if infants and young children in the household. For those not on the frontline, there was a sense of guilt, whether absent due to illness, isolating due to testing positive for COVID-19, immunosuppressed or near retirement, which one participant described as feeling 'like a soldier missing the war'.[59] Study is commendable because of large sample size however the researcher did not use descriptive statistics to analyze the data.

Another descriptive cross-sectional design using convenience sampling technique was conducted among 386 undergraduate students of the University of Ibadan, studying under the regular mode. An online self-administered questionnaire was utilized. Prevalence of contracting the COVID-19 infection were 41.5% and 31.9% respectively. There was a higher prevalence of contracting the

COVID-19 infection among university students living in a state with a high incidence of COVID-19 and having a chronic illness.[60] Study is commendable, however only one tertiary institution was involved hence results cannot be used as general inference.

2.4 MENTAL HEALTH STATUS OF HEALTHCARE WORKERS

Another cross-sectional study conducted in Hubei, China, hospital-based and convenience sampling online survey via a multi-region-stratified sampling from May 15th to 31st, 2020 which assessed the prevalence of anxiety, insomnia, depression, and post‐traumatic stress disorder (PTSD). Sample size of 1805 medical workers was obtained. A total of 1,091 responses (33% male and 67% female) were valid for statistical analysis. The prevalence was anxiety 53%, insomnia 79%, depression 56%, and PTSD 11%. Healthcare workers in Wuhan were more likely to face risks of anxiety (56% vs. 52%, P = 0.03) and PTSD (15% vs. 9%, P = 0.03) than those in other cities of Hubei. In terms of educational attainment, those with doctoral and masters' (D/M) degrees may experience more anxiety and PTSD than those with lower educational degrees.[61] The study is commendable however, the response rate of this study was over 60%, the existence of response bias still probable mainly because those with severe mental diseases may have difficulty accepting and disclosing emotions and be unwilling to fill the online form.

A cross-sectional study design was employed in Jaramogi Oginga Odinga Teaching Hospital, Kenya among 476 frontier HCWs using the stratified sampling technique from 16th April to 16th June, 2020. Data was collected through random sampling from each stratum using self-administered questionnaire. Approximately 53.6% had mild depression while 9.2% had severe depression. About 62.6% of HCWs had been trained, and only 9% were confident in managing COVID-19 cases. A large proportion, 98% had concerns about the availability of PPEs. The study findings indicated that the majority of healthcare workers had mild anxiety and depression.

Also, levels of anxiety and depression differed across different cadres of HCWs.[62] Study is commendable, however, it did not explore the prevalence of other negative psychological outcomes amongst HCWs.

Another cross sectional study with a sample size of 894 HCWs working in 9 general hospitals in Alborz province, Iran, in the field of diagnostic and treatment care of patients with COVID-19 were selected using multistage sampling method. The study was conducted from March 20th to April 3rd, 2020. Questionnaire was self-administered. Overall, 71.4% of the participants were women and 46.9% in front line staff. The prevalence of intrusion, avoidance and hypervigilance symptoms was 44.2% (95%), 31.8% (95%), and 37.7% (95%), respectively. The prevalence of PTSS is high among HCWs during COVID-19 pandemic and it is associated with some demographic characteristics of HCWs.[63] Study population is commendable because of involvement of several hospitals as well as the analysis however, the study duration is quite short.

In a web-based cross-sectional study done in Dhaka, Bangladesh conducted from 8th to 25th April, 2020. A sample size of 3,388 respondents took part in the survey, 834 were frontline HCPs (About 6.1% of the total participants had suicidal behavior, with no detectable differences within the groups (i.e., general population and HCPs). Of the total 3,388 sample, 51.8% were females; majority of the participants were married (60.8%), without child (57.8%), and with elderly person at their home (66.1%). Moreover, more than half (56.2%) of them sometimes had fear of death due to COVID-19. Besides, 75.4% of the total sample was general people and rest of them was HCPs. The present findings identified the substantial proportion of the HCPs and general population had COVID-19 related suicidal behavior.[64] Study is worthy of commendation because of large sample size and it made use of standardized questionnaire used from a previous research work.

An analytical cross-sectional survey was conducted among health workers in three hospitals in the Ashanti Region of Ghana from 11th July 2020 to 12th August 2020. Participants included HCWs of St. Martin's Catholic Hospital, Agroyesum (SMHA) in the Amansie South district, St. Michael's Catholic Hospital, Pramso (SMHP) in the Bosomtwe district and Ashanti Mampong Government Hospital (MGH)) in the Ashanti Mampong municipality, respectively. The study population comprised all health staff at the study hospitals. A sample size of 300 was obtained and distributed equally among the three study facilities. Over 40% of respondents had fear while 21.1%, 27.8% and 8.2% had depression, anxiety and stress, respectively.[65] Study is commendable because it involved several health institutions hence, inference is generalizable. However, sampling technique used was not stated.

An anonymous online questionnaire-based cross-sectional study conducted between June 1st, 2020 and July 31st, 2020 among HCWs at Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Ebonyi State, Nigeria. The sample size of 315 was obtained. The prevalence of mental health outcome for different categories was 47% (n = 148) for flourishing, 28.3% (n = 89) for moderate and 24.7% (n = 78) for languishing mental health. Results showed that over half (54%) of the participants reported working for longer hour every day whereas 29.8% reported experiencing conditions requiring ethically difficult decision on the rationing of care. Participants reported experience of antisocial behavior from SARS-CoV-2 patients occurred in 11.1% of the participants. Nearly two-thirds (64.4%) of the participants agreed that self-isolation and quarantine measures can cause considerably mental health issues and commonest reason (34.5%) was due to depression associated with it. The predictors of languishing mental health outcome were being married, a physician, a nurse, limited access to personal protective equipment and self-isolation and quarantine due to SARS-CoV-2 infection.[13] The study made use

of self-administered questionnaires which could have negatively affected responses. Also, that sampling technique utilized was not stated.

In another study conducted with a cross-sectional design in several LMICs. The findings from the included studies reveal consistent trends related to the psychological impact of the pandemic on frontline health workers. In one study, the prevalence of PTSD was shown to be 9.1% among respondents, while the prevalence of depressive symptoms was 25.2% among HCWs. Another study whose participants included mostly HCWs in Wuhan, the epicenter of the pandemic, found a much higher proportion of reported depression at 50.4%, anxiety at 44.6%, insomnia at 34.0% and post-traumatic stress symptoms at 71.5%. Another study, however, showed a relatively consistent rate of insomnia at 38.4%, but lower depression and anxiety prevalence, at 13% and 12.2% respectively. A meta-analysis of multiple studies showed pooled prevalence of depression, anxiety and insomnia at 22.8%, 23.2% and 38.9% respectively. Additionally, a higher prevalence of affective symptoms was observed among female health workers than in their male counterparts, and similarly among nurses compared to medical staff. All of these studies were conducted in the cultural background of China, and generalizability to populations in other parts of the world remains to be explored.[47] Commendably, the survey is excellent as it included several literatures.

2.5 COPING STRATEGIES AMONG HEALTHCARE WORKERS

The COVID-19A cross-sectional study was conducted in Japan between April and May 2020 by using an online, web-based questionnaire, which was distributed to HCWs from 32 countries using the non-random convenience sampling method. Sample size of 2166 was obtained. Among them, 36% were doctors, 24% were nurses and 40% worked in other healthcare sectors. More than 70% of the respondents answered that “getting family support” and “positive thinking” were

coping methods for them during the COVID-19 pandemic. Approximately half of the respondents worshiped according to their belief and conducted prayers (58.4%) and had adequate sleep and food intake (48.2%).[66]

An analytical cross-sectional survey was conducted among health workers in three hospitals in the Ashanti Region of Ghana from 11th July 2020 to 12th August 2020. Participants included HCWs of St. Martin's Catholic Hospital, Agroyesum (SMHA) in the Amansie South district, St. Michael's Catholic Hospital, Pramso (SMHP) in the Bosomtwe district and Ashanti Mampong Government Hospital (MGH)) in the Ashanti Mampong municipality, respectively. A sample size of 300 was obtained and distributed equally among the three study facilities. Exercising regularly, watching movies and reading for leisure were commonly reported ways of coping with the threat of the COVID-19 pandemic. Though more than half of respondents reported praying more often than they used to as a way of coping (54.62%, 148/271), less than one-third (26.94%, 73/271) have resorted to talking to their religious leaders more often than previously. About two-thirds either disagreed or strongly disagreed to seeking help from a psychologist and avoiding news about COVID-19 and related deaths as coping strategies.[65] Study is commendable because it involved several health institutions hence, inference is generalizable. However, sampling technique used was not stated.

A cross-sectional survey was conducted in China for 7 days from 30th April, 2020 using a web-based questionnaire. Data from 661 participants were analyzed, and 440 participants (66.6%) showed poor mental health (GHQ-12 $\geq$ 4). Also, the result showed that 56.5 % of the female gender have lower levels of communication with friends, and high anxiety were associated with poorer mental health. About 70% of the study participants chose an escape-avoidance coping strategy, and 62.3% of the participants with worse mental health were more likely to adopt

seeking social support as a coping strategy. These results may support HCWs to cope with mental health problems associated with the COVID-19 pandemic.[67]

An online semi-structured survey was administered to students from Shaanxi, Hubei, Beijing, Heilongjiang and Guangdong in China from May 26th to June 3rd. The study had a total of 559 respondents. In total, 66.90% of the students reported experiencing "normal" anxiety, and 23.80% reported it as "severe to extreme". Four coping strategies were assessed: "Seek social support," "Avoidance," "Mental disengagement" and "Humanitarian" were tested. Overall, the students practiced more mental engagement strategies and fewer social support strategies.[68] Thus, findings should not be generalized to the overall student group.

A cross-sectional survey was conducted, and multi-stage sampling technique employed to recruit 433 eligible respondents. Validated online self- administered, semi-structured questionnaire was used to collect relevant information from respondents. In all, 55.0% of the respondents had decreased psychological wellbeing because of the lockdown. Protective factors against decreased mental wellbeing included online chatting with friends/watching films (95%), and participating in online vocational training (95%). The mental health impacts of COVID-19 on the Nigerian students is huge.[68] Thus, psychological wellbeing of the Nigerian students should be taken into cognizance and prioritized in the post-COVID-19 national rebuilding strategies.

A cross-sectional study conducted among two local private colleges in the province of Davao del Sur, Southern Philippines, from April 25th – May 8th, 2020. A snowball technique was used to determine 530 respondents who answered the online survey. The majority of the students belong to the age (94.72%), with below ten thousand Philippine peso monthly family income (350 or 66.04%). Moreover, the majority of the students' courses were in the field of law enforcement

(121 or 22.83%). About 90.19% (478) followed strict personal protective measures and about 80% avoid going out in public places to reduce exposure from COVID-19.[55]

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY AREA

The study was carried out among frontline and non-frontline HCWs in the University of Benin Teaching Hospital (UBTH). UBTH is one of the tertiary health facilities in Benin City. Benin City is home to 3 tertiary facilities which include; University of Benin Teaching Hospital, Federal Neuro-psychiatric Hospital and Stella Obasanjo Women and Children Hospital.[69]

University of Benin Teaching Hospital (UBTH) is a tertiary health facility located in Egor Local Government Area, Ugbowo ward, the Ugbowo-Lagos road, Benin-City, Edo State, 6.3897ºN, 5.6095ºE[70] in Southern Nigeria, and was established in 1973 following the enactment of Edict No. 12th April, 1971 of the Nigerian National Health Act as the sixth of the first generation Teaching Hospitals to complement her sister institution, University of Benin and to provide secondary and tertiary care to the then Midwestern region (now Edo and Delta State), part of Kogi and Ondo state which largely forms its catchment area and sometimes further away.[71] On 1st April, 1975, it was taken over by the Federal Government as the fifth teaching hospital coming after University College Hospital, Ibadan and Lagos Teaching Hospital with an initial bed capacity of 360 when it was officially opened on 12th May, 1973, the UBTH of today boasts of a bed capacity of over 860 as at August 2017 and still increasing with a multiplicity of departments offering a wide range of services all of which combined to make the institution the center of excellence as it stands today.[71]

In areas of training and research, UBTH is at the forefront in West Africa. After 35 years of remarkable healthcare advances, UBTH has continued to spearhead innovation in research, clinical services and compassionate care.

This 860-bed facility provides promotive, preventive, curative and rehabilitative services in various departments, including internal medicine, surgery, pediatrics, mental health, community

health, obstetrics and gynecology, radiology, ear, nose and throat, anesthesiology, ophthalmology, family medicine and dentistry.[32]

The UBTH currently has a staff strength of over 4,000 workers. The UBTH is one of the three public hospitals designated as an isolation facility for the management of COVID-19 patients by Edo State government. The isolation infrastructure in the hospital is composed of a 24-bed isolation ward, an 18-bed isolation annex for asymptomatic and mild cases, a 2-bed level III intensive care unit dedicated to the COVID-19 patients, an 18-bed holding bay for suspected cases. The UBTH also houses one of the three molecular testing laboratories in the state accredited by the Nigerian Centre for Disease Control (NCDC) for diagnosis of COVID-19 by real-time reverse transcriptase PCR. The first two COVID-19 cases in the facility were recorded on March 31st, 2020. A risk stratification tool was adapted to identify vulnerable staff who were re-deployed to non-clinical areas or asked to work from home.[32]

In addition to increasing the purchase and availability of face masks, gloves and eye googles (necessary for standard precautions and transmission-based precautions), relevant hospital departments embarked on the local production of plastic aprons, coveralls and face shields. Also, information and communication posters on COVID-19 were placed at strategic locations, and advisories were regularly communicated to staff. A "No facemask No entry" policy was subsequently adopted to mitigate the spread of COVID-19 within the facility.[32,72]

3.2 STUDY DESIGN

A comparative cross-sectional study design was used to conduct the study.

3.3 STUDY POPULATION

The study was carried out amongst the Frontline HCWs and non-Frontline HCWs in UBTH.

3.4 SELECTION CRITERIA

3.4.1 Inclusion Criteria

I. All HCWs who consented to the study.

II. All HCWs (frontline and non-frontline) at the UBTH who worked in the isolation facility.

3.4.2 Exclusion Criteria

I. All HCWs with a history of mental condition were excluded from the study.

II. All House Officers and Intern nurses who had not spent up to a year were excluded from the study.

3.5 STUDY DURATION

The study was carried out over a period of 2 years from August 2021 to June 2023.

3.6 SAMPLE SIZE DETERMINATION

The sample size was calculated using the formula for comparing proportions[51]: N ¼ Zα 2 P(1-P)/d2, where α was 0.05, Z_α was 1.96 (at the 95% confidence level) and the estimated acceptable margin of error for proportion d was 0.05.[56]

$$n = n_1 + n_2 = 4 \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (P)(1-P)}{d^2}$$

Where n = Total sample size

n_1, n_2 = minimum sample size for both proportions.

$Z_{1-\alpha/2}$ = (Z-score of α) = standard normal deviate.

$Z_{1-\beta}$ = (Z -score of β) = 1-β = power of study

P = (P1 + P2)/2 = Proportion of the Population

d = degree of accuracy/allowable error (0.05).

P_1 = proportion in target population (Frontline HCWs) estimated to have a particular characteristic.

P_2 = proportion in target population (non-frontline HCWs) estimated to have a particular characteristic.[56]

Therefore,

P_1 = 93.5% prevalence of respondents who were aged 51-60years from a study conducted to determine the knowledge, attitude, practices, and impact among HCWs in Anambra state.[56]

P_2 = 85.4% prevalence of respondents who had less than 5years work experience from a study conducted to determine the knowledge, attitude, practices, and impact among HCWs in Anambra state.[56]

$Z1-\alpha/2$ = 1.96 for 95% confidence limit.

$Z\ 1-\beta$ = power which is set at 80% = 0.842

d = Rate of precision ($P_1 - P_2$)

$P = (P_1 + P_2)/2$

$= (0.935+0.854)/ 2$

$= 0.8945$

$d = P_1 - P_2 = 0.935 - 0.854$

$= 0.081$

$$n = \frac{4(Z_{1-\alpha/2} + Z_{1-\beta})^2 (P)(1-P)}{d^2}$$

$$= \frac{4(1.96+0.842)^2 \times 0.8945 \times (1-0.8945)}{0.081^2}$$

$$= 451.7 \sim 452$$

In order to provide an allowance for non-response, a ten percent (10%) margin will be given;

$$\mathbf{n_f} = \frac{\mathbf{n}}{\mathbf{1 - nr}}$$

n = Minimum sample size = 452

nr = Non-response rate = 10% = 0.10

n_f = Final Minimum sample size

Non-response = 45.2

thus, n = 452 + 45.2

= 497.2 ~ 498

The total minimum sample size for this study is 498 however, 526 samples was used. Participants were proportionally shared using 1:2.

3.7 SAMPLING TECHNIQUE

Stratified sampling method was utilized in selecting respondents using the already existing professional group data which forms the basis of each stratum obtained from UBTH. A sampling interval was obtained using the formula: Total number of HCWs in each stratum (N) / Sample size (n). Thus, in each stratum, every respondent chosen participated in the study.

Systematic sampling technique was used to select respondents from each strata using the calculated sampling interval. A simple random sampling technique by balloting (lucky dip approach) was used to select the first respondent between numbers 1 to 3, then subsequently

every third respondent was selected. In any strata where there were more than one eligible HCWs, lucky dip approach was applied to select one respondent. The process was continued until the required number of respondents was obtained.

A total of 1,708 clinical and 2,079 non-clinical staffs work at UBTH.[32] Selection was done by choosing from the FHWs data obtained from the Head of Rapid Response Team, UBTH (Doctors had a total of 574, nurses – 845, laboratory scientists – 144, others – 145) and NFHWs summary data was obtained from the Human Resource Department, UBTH (non-clinical staffs – 2,079). Within each stratum, a systematic random sampling method was used to select the respondents by determining the sampling interval using the sampling fraction until the required sample size was achieved. This was obtained by calculating the sampling fraction so as to proportionally allocate the number of respondents from each stratum. Hence, doctors – 59, nurses – 87, laboratory scientist – 15 and others – 14 (FHWs made a total of 175) and non-clinical (NFHWs) were 351: audit – 45, finance – 83, clerical staff – 47, record officers – 117 and data clerks - 59.

SELECTION OF FRONTLINE RESPONDENTS:

Sampling fraction = n/N

Where n = minimum sample size = 175 (Frontline HCWs group)

N = average number of Frontline HCWs = 1,708

Sampling fraction =175/1708 = 0.103

Applying proportionate allocation, the number of respondents that were selected from each department was determined by multiplying the average population of FHWs by the sampling fraction as shown in the table below:

Frontline HCWs	Average population of Frontline HCWs	Population of Frontline HCWs x Sampling Fraction	Proportionate allocation
Doctors	574	574 x 0.103	59
Nurses	845	845 x 0.103	87
Laboratory personnel	144	144 x 0.103	14
Paramedics	64	64 x 0.103	6
Porters	42	42 x 0.103	4
Cleaners	29	29 x 0.103	4

SELECTION OF NON-FRONTLINE RESPONDENTS:

Sampling fraction = n/N

Where, n= minimum sample size = 351 (Non-Frontline HCWs group)

N = average number of non-Frontline HCWs = 2,079

Sampling fraction = 351/2079 = 0.169

Applying proportional allocation, the number of respondents that were selected from each department of the NFHWs was determined by multiplying the average population of non-frontline HCWs by the sampling fraction as shown in the table below:

Non-Frontline HCWs	Average population of non-frontline HCWs	Population of non-frontline HCWs x sampling fraction	Proportionate allocation
Audit	266	266 × 0.169	45
Finance	491	491 × 0.169	83
Clerical Staff	278	278 x 0.169	47
Records Officer	692	692 x 0.169	117
Data Clerk	349	349 x 0.169	59

3. 8 DATA MANAGEMENT

3.8.1 TOOLS FOR DATA COLLECTION

Quantitative tools involving questionnaire was used to collect data to answer the objectives of the study.

Questionnaire: The research instrument that was used for collecting data is a structured questionnaire containing both open and closed ended questions. The questionnaire was adapted and modified from WHO Interim Guidance document on COVID-19 on the Knowledge, Attitude and Practices of HCWs[57], the General Health Questionnaire (GHQ) and Brief-COPE strategy questionnaire. Knowledge of COVID-19 assessed the following domains: awareness, source of information, respondents' knowledge of the causative agent of COVID-19, its route of transmission, common symptoms of the disease and the preventive and treatment measures available for the disease. Attitude assessed perceived risk and efficacy belief of COVID-19, personal hygiene practices and social safety. Prevalence of COVID-19 was assessed using a question on the outcome of COVID-19 test.

The General Health Questionnaire 12 (GHQ-12) is a screening tool for identifying minor psychiatric disorders in the general population and within community of non-psychiatric clinical settings. The GHQ was developed by Goldberg to measure levels of psychological distress.

For the purpose of the present study, the GHQ-12 was chosen as a screening tool for psychological wellbeing since it has been extensively used by researchers and has been found to be reliable, well-validated both globally [74,75] and nationally in Nigeria[51,52,53,76] and is the shortest version commonly used as a screening tool in a public setting. The first GHQ-12 validity and reliability study done in Indonesia assessed 3 factors: anxiety, depression, and psychological distress with a Cronbach's $\alpha = 0.863$ hence, it is valid and reliable.[52,53] The 4-point scale (from 0-3) was utilized as this method was believed to help eliminate any bias which might result from the respondents who tend to choose extreme responses.[54] The Brief-COPE Strategy Scale is a 28-item self-report questionnaire designed to measure the coping styles in a stressful life event however it was modified to 10-item questions (by choosing from each subscales such as problem-focused coping (4), avoidant coping (4), and emotion-focused coping (2), with each category) i.e:

1. Problem-focused coping: positive reframing, planning, active coping.
2. Avoidant coping: denial, substance use, venting, self-distraction, behavioural disengagement, self-distraction.
3. Emotion-focused: humor, venting, acceptance, emotional support, religious ways of coping with stress.

A previous study done in Malaysia to establish reliability and validity of the scale indicated a high Cronbach's α value of 0.82.[55] The questionnaire covered the set of objectives for the study which were broadly divided into sections as follows:

SECTION A: Sociodemographic data of respondents.

This section sought for responses to respondents' age, sex, marital status, religion, tribe, number of children, work experience, type of health work, average monthly income.

SECTION B: Assessment of knowledge status of respondents.

Knowledge of COVID-19 among respondents was assessed using the 7-close ended questions.

SECTION C: Assessment of attitude towards COVID-19 pandemic.

Attitude towards how the respondents' felt about the COVID-19 disease was assessed using 14 close ended questions.

SECTION D: Prevalence of COVID-19 among HCWs and NFHWs.

Exposure of respondents' to COVID-19 was assessed using 1 question to determine prevalence.

SECTION E: Assessment of Mental Health Status of Respondents.

Mental health status screened for four indexes: anxiety, depression, psychological distress and PTSD using 12 close ended questions.

SECTION F: Coping strategies among HCWs during COVID-19 pandemic.

Coping styles was assessed using 10 close ended questions.

3.8.2 METHOD OF DATA COLLECTION

Questionnaire was self-administered in the University of Benin, Teaching Hospital, Benin-City, Edo State. Written consent and verbal informed consent were obtained from the respondents before administering the questionnaires. They were informed that they had the right to withdraw from the study at any point and withdrawal poses no loss or harm. Also, they were assured of confidentiality.

3.8.3 DATA ANALYSIS

Data collected was collated, screened for completeness, numbered serially and entered into IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 25.0 software. Data was presented in prose, frequency tables, and charts.

Socio-demographic characteristics:

- Age of respondents was grouped using a 10-year interval, with age range 20 to < 60 years as 20-29, 30–39, 40–49, 50-59.
- Religion was grouped into Christian, Islam, African Traditional Religion and others.
- Work experience was grouped into <5years to >10years.
- Marital status was grouped as single, married, divorced, separated or co-habiting.

SCORING SYSTEM

KNOWLEDGE SCORE

A total of 7 questions with 46 responses addressing awareness, source of information and all knowledge domains (cause, route of transmission, symptoms, prevention and treatment). A score of 1 was given for correct response and 0 for incorrect response giving a maximum achievable score of 46 and a minimum of 0. The scores were converted to percentages and grouped as follows:

- Good Knowledge: scores ≥ 50%
- Poor Knowledge: scores < 50%

ATTITUDE TOWARDS COVID-19

A total of 14 questions using a 5-point Likert scale was used to assess respondents' attitude towards COVID-19. A score of 5, 4, 3, 2, and 1 was given for strongly agree, agree, undecided,

disagree and strongly disagree respectively, giving a maximum score of 70 and a minimum score of 14.

Scores were converted to percentages and grouped as follows:

Positive attitude: Scores: ≥ 50%

Negative attitude: < 50%

PREVALENCE OF COVID-19 AMONGST THE EXPOSED AND UNEXPOSED HCWs.

A close-ended question was used to assess the prevalence of COVID-19 among respondents. This was determined by either a positive or negative response.

ASSESSMENT OF MENTAL HEALTH STATUS OF HCWs

General Health Questionnaire (GHQ-12)

A total of 12 questions using a 4-point Likert scale was used to assess the effect of COVID-19 on the mental health status of respondents. A score of 0,1,2, and 3 was given for "better than usual", "same as usual", "less than usual", and "much less than usual". The total maximum score of 36 and a minimum score of 0 was obtained.[55] The scores were grouped as follows:

Absent mental disorder: ≤ 10

Typical/ presence of mental disorder: 11-14

PTSD: 15 – 19

Psychological distress: ≥ 20

COPING STRATEGIES OF RESPONDENTS

A total of 10 questions using 4-point Likert scale was used to assess coping styles of respondents. Each question is a 4-Likert item i.e 1, 2, 3, and 4 from "I haven't been doing this at all" to "I've been doing this a lot". (1 = I haven't been doing this at all, 2 = I've been doing this a lot, 3 = I've

been doing this a medium amount, 4 = I've been doing this a lot) giving a maximum score of 40 and a minimum score of 10.[58] The scores were converted into converted into percentages:

Effective: ≥ 50%

Ineffective: <50%

Univariate analysis was carried out on socio-demographic data and presented as frequencies and percentages. Bivariate analysis was carried out for parametric and non-parametric data. Chi-square statistical test of association was done for non-parametric data and used to compare associations. The association between socio-demographics characteristics of respondents and dependent/outcome variables (knowledge, attitude, prevalence, effect on mental health status and coping strategies) was analyzed.

Multivariate analysis using binary logistic regression was carried out to further determine the significant predictors of outcome variables such as knowledge, attitude, prevalence, and the effect of COVID-19 pandemic on the Mental Health status and coping strategies of Frontline and non-Frontline HCWs. Explanatory variables that were associated with the outcome variable in univariate analysis was included in the initial logistic models of multivariable analysis. The crude and adjusted odds ratio together with their corresponding 95% confidence intervals was computed.

The level of significance for all statistical association was set at $P < 0.05$. The data was presented into tables and charts.

3.9 ETHICAL CONSIDERATION

Ethical clearance and approval was obtained from the University of Benin Teaching Hospital Ethical committee (ADM/E 22/A/VOL. VII/148 31249). Permission of the study was sought from the various selected departments of healthcare chosen in UBTH for the study. Written consent was obtained from the respondents after they have been educated on the purpose of the study and confidentiality of the information assured.

3.10 LIMITATION OF STUDY

Data collected from the respondents was self-reported which may introduce reporter bias, and this was solved by assuring respondents of the confidentiality of information provided.

CHAPTER FOUR

RESULTS

A total of 526 health workers participated in this study. 500 questionnaires were retrieved with a response rate of 95.1% (167 frontline health workers and 333 non-frontline health workers). The results are presented in the following sessions in line with the specific objectives:

SECTION A: Sociodemographic and socio-economic characteristics of respondents.

SECTION B: Awareness and knowledge of COVID-19 among respondents.

SECTION C: Attitude of respondents towards COVID-19.

SECTION D: Prevalence of COVID-19 among respondents.

SECTION E: Effects of COVID-19 on the mental health status of respondents.

SECTION F: Coping strategies of respondents of COVID-19.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	**NFHW(n=333) Frequency (%)**
Age group (years)		
20 – 29	13 (7.8)	30 (9.0)
30 – 39	116 (69.5)	147 (44.1)
40 – 49	34 (20.4)	144 (43.2)
50 – 59	4 (2.4)	12 (3.6)
Mean ± SD	**37.5 ± 5.6 years**	**39.9 ± 6.2 years**
t = -4.208, p =0.043		
Sex		
Female	112 (67.1)	154 (46.2)
Male	55 (32.9)	179 (53.8)
χ^2 =19.363, p < 0.001		
Marital status		
Married	138 (82.6)	267 (80.2)
Single	27 (16.2)	41 (12.3)
Separated/divorced	2 (1.2)	18 (5.4)
Widowed	0 (0.0)	7 (2.1)
χ^2 = 9.961, p = 0.015		
Religion		
Christianity	156 (93.4)	304 (91.3)
Islam	8 (4.8)	25 (7.5)
ATR	3 (1.8)	4 (1.2)
Fisher's exact= 1.647, p = 0.469		
Ethnicity		
Benin	64 (38.3)	144(43.2)
Esan/Etsako	54 (32.3)	117(35.1)
Yoruba	22 (13.2)	28(8.4)
Igbo	16 (9.6)	23(6.9)
Others	11 (6.6)	21(6.3)
χ^2 = 4.461, p = 0.347		

Key: Others: Isoko, Hausa, Tiv, Ijaw, Ikwere, Ika.

The predominant age group among respondents was 31 – 39 years. Mean age for frontline health workers was 37.5 ± 5.6 years compared to 39.9 ± 6.2 years for non-frontline health workers and the difference in the mean age was statistically significant (p = 0.043).

More than two-third 112 (67.1%) of frontline health workers were females compared to 154 (46.2%) of non-frontline health workers who were females. More than half 179 (53.8%) of non-frontline health workers were males compared to 55 (32.9%) frontline health workers who were males. This difference was also statistically significant ($p < 0.001$).

Majority 138 (82.6%) of frontline health workers were married compared to 267 (80.2%) non-frontline health workers respectively. Similarly, vast majority 156 (93.4%) and 304 (91.3%) of frontline and non-frontline health workers were Christians.

A higher proportion 64 (38.3%) and 144 (43.2%) of frontline and non-frontline health workers were Benin, followed by Etsako/Esan 54 (32.3%) and 117 (35.1%) respectively. Respondents from other ethnic groups such as Isoko, Hausa, Tiv, Ikwere and Ijaw constituted the lowest proportions 11 (6.6%) and 21 (6.3%) of frontline and non-frontline health workers respectively.

TABLE 2: SOCIO-ECONOMIC CHARACTERISTICS AND WORK EXPERIENCES OF RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	NFHW(n=333) Frequency (%)
Level of education		
Primary	7 (4.2)	15 (4.5)
Secondary	3 (1.8)	45 (13.5)
Tertiary	157 (94.0)	273 (82.0)
$\chi^2 = 7.473$, p = 0.024		
Occupation		
Record Officer	0 (0.0)	114 (22.8)
Finance	0(0.0)	79 (15.8)
Data Clerk	0(0.0)	57 (11.4)
Clerical Officer	0(0.0)	42(8.4)
Audit	0(0.0)	41(8.2)
Nurses	86 (51.6)	0 (0.0)
Medical doctor	58 (34.9)	0 (0.0)
Laboratory scientist	12 (7.5)	0 (0.0)
Others	10 (6.0)	0 (0.0)
Monthly income (₦)		
< 50,000	5 (3.0)	1 (0.3)
50,000 – 99,999	60 (35.9)	305 (91.6)
100,000 – 149,999	42 (25.1)	27 (8.1)
≥ 150,000	60 (35.9)	0 (0.0)
Fisher's exact = 196.979, p <0.001		
Work experience (years)		
< 5	17 (10.2)	41 (12.3)
5 – 9	70 (41.9)	56 (16.8)
≥ 10	80 (47.9)	236 (70.9)
$\chi^2 = 37.523$, p <0.001		

A higher proportion of 157 (94.0%) of frontline health workers had tertiary level of education compared to 273 (82.0%) of non-frontline health workers who had tertiary level of education and 45 (13.5%) who had secondary level of education.

Nurses and doctors accounted for majority 144 (86.5%) of frontline health worker compared to record officers and financial analysts 114(22.8%) and 79(15.8%) of the NFHWs respectively. The average monthly income of majority 305 (91.6%) of non-frontline health workers ranged

between ₦50,000 – ₦99,000 compared to frontline health workers who earned significantly higher ($p < 0.001$). Eighty (47.9%) of frontline health workers had more than 9 years of work experience compared to majority 236 (70.9%) of non-frontline health workers with similar years of work experience ($p < 0.001$).

SECTION B: AWARENESS AND KNOWLEDGE OF COVID-19 AMONG RESPONDENTS

TABLE 3: AWARENESS OF COVID-19 AND SOURCE OF INFORMATION AMONG RESPONDENTS

Variable	Respondents' group	
	FHW (n=167) Frequency (%)	NFHW(n=333) Frequency (%)
Awareness		
Yes	167 (100.0)	333 (100.0)
No	0 (0.0)	0 (0.0)
Source of information*		
Television	162 (97.0)	332 (99.7)
Health facility	154 (92.2)	331 (99.4)
Internet	162 (97.0)	318 (95.5)
Radio	139 (83.2)	332 (99.7)
Friends	137 (82.0)	332 (99.7)
Newspaper	127 (76.0)	248 (74.5)
Religious centers	127 (76.0)	172 (51.0)

*Multiple responses

All respondents were aware of COVID-19. Television was the source of information in majority 162 (97.0%) and 332 (99.7%) of frontline compared to non-frontline health workers respectively. Health facility, Internet, Radio, friends and newspapers also accounted for the source of information in majority 154 (92.2%), 162 (97.0%), 139 (83.2%), 137 (82.0%) and 127 (76.0%) respectively among frontline health workers compared to 331 (99.4%), 318 (95.5%), 332 (99.7%), 332 (99.7%) and 248 (74.5%) respectively among non-frontline health workers.

TABLE 4A: KNOWLEDGE DOMAINS OF COVID-19 AMONG RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	NFHW(n=333) Frequency (%)
Cause of COVID-19		
Virus	165 (98.8)	329 (98.8)
Curse from God	0 (0.0)	4 (1.2)
Bacteria	1 (0.6)	0 (0.0)
Does not exist	1 (0.6)	0 (0.0)
Fisher's exact = 8.038, p = 0.012		
Route of transmission of COVID-19*		
Inhalation of respiratory droplets	161 (96.4)	329 (98.8)
Touching eyes, nose with contaminated hands	159 (95.2)	326 (97.9)
Contact with bare skin	42 (25.1)	300 (90.1)
Sexually transmitted	9 (5.4)	28 (8.4)
Blood transfusion	2 (1.2)	28 (8.4)
Feco-oral	4 (2.4)	20 (6.0)
Insect bites	4 (2.4)	1 (0.3)
χ^2 = 0.493, p = 0.555		
Symptoms of COVID-19*		
Cough	165 (98.8)	332 (99.7)
Fever	159 (95.2)	332 (99.7)
Generalized body weakness	159 (95.2)	259 (77.8)
Difficulty with breathing	159 (95.2)	259 (77.8)
Headache	149 (89.2)	222 (66.7)
χ^2= 73.503, p = <0.001		

*Multiple responses

Equal proportion 165 (98.8%) and 329 (98.8%) of frontline and non-frontline health workers respectively attributed the cause of COVID-19 to a virus. Majority 161 (96.4%) and 329 (98.8%) of frontline and non-frontline health workers stated that COVID-19 could be transmitted through inhalation of respiratory droplets. Cough, fever, generalized body pain, difficulty with breathing and headache were stated as symptoms of COVID-19 in majority 165 (98.8%), 159 (95.2%), 159 (95.2%), 159 (95.2%) and 149 (89.2%) respectively among frontline health workers compared to 332 (99.7%), 332 (99.7%), 259 (77.8%), 259 (77.8%) and 22 (66.7%) respectively among non-frontline health workers ($p < 0.001$).

TABLE 4B: KNOWLEDGE DOMAINS OF COVID-19 AMONG RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	**NFHW(n=333) Frequency (%)**
Prevention of COVID-19*		
Use of sanitizer	161 (96.4)	326 (97.9)
Regular hand washing with soap and water	163 (97.6)	324 (97.3)
Vaccination	157 (94.0)	314 (94.3)
Social distancing	153 (91.6)	315 (94.6)
Taking Ivermectin	95 (56.9)	147 (44.1)
Use of natural herbs	5 (3.0)	86 (25.8)
Earing ginger and garlic	11 (6.6)	73 (21.9)
Taking vitamins	1 (0.6)	5 (1.5)
χ^2 = 21.788, p = <0.001		
Treatment of COVID-19*		
No treatment	77 (46.1)	125 (37.1)
Use of antiviral agents	72 (43.1)	117 (35.1)
Use of antibiotics	2 (1.2)	58 (17.4)
Use of steroids	10 (6.0)	9 (2.7)
Blended ginger and garlic	3 (1.8)	10 (3.0)
Exposure to sunlight	2 (1.2)	9 (2.7)
Use of herbs	1 (0.6)	5 (1.5)
Fisher's exact = 41.187, p = <0.001		

*Multiple responses

About 161(96.4%), 163(96.7%), 157(94.0%) and 153(91.6%) of the FHWs stated that COVID-19 can be prevented through the use of sanitizers, handwashing with soap and water, vaccination and social distancing respectively compared to 326(91.6%), 324(97.3%), 314(94.3) and 315(94.6%) of the NFHWs with similar opinion. About 77 (46.1%) of FHWs stated that there was no treatment for COVID-19 compared to 125 (37.1%) of NFHWs with similar opinion. However, 72 (43.1%), 2 (1.2%) and 10 (6.0%) of FHWs stated that COVID-19 could be treated with antiviral agents, antibiotics and steroids respectively as opposed to 117 (35.1%), 58 (17.4%) and 9 (2.7%) of NFHWs with similar view (p <0.001).

TABLE 5: KNOWLEDGE DOMAINS OF COVID-19 AMONG RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	NFHW(n=333) Frequency (%)
Cause of COVID-19		
Good	165 (98.8)	329 (98.8)
Poor	2(1.2)	4 (1.2)
Fisher's exact < 0.001, p > 0.999		
Route of transmission of COVID-19		
Good	114 (68.3)	7 (2.1)
Poor	53 (31.7)	326 (97.9)
χ^2 = 265.409, p < 0.001		
Symptoms of COVID-19		
Good	143 (85.6)	152 (45.6)
Poor	24 (14.4)	181 (54.4)
χ^2 = 73.503, p < 0.001		
Prevention of COVID-19		
Good	149 (89.2)	264 (79.3)
Poor	18 (10.8)	69 (20.7)
χ^2 = 7.650, p = 0.006		
Treatment of COVID-19		
Good	72 (43.1)	117 (35.1)
Poor	95 (56.9)	216 (64.9)
χ^2 = 3.011, p = 0.83		

Majority 165 (98.9%) and 329 (98.8%) of frontline health workers and non-frontline health workers respectively had good knowledge of causes of COVID-19. Nearly two-third 143 (68.3%) of frontline health workers had good knowledge of route of transmission of COVID-19 compared to 7 (2.1%) of non-frontline health workers with good knowledge ($p < 0.001$).

Similarly, majority 143 (85.6%) and 149 (89.2%) of frontline health workers had good knowledge of symptoms and prevention of COVID-19 respectively as opposed to 152 (45.6%) and 264 (79.3%) of non-frontline health workers with good knowledge of symptoms and prevention of COVID-19 respectively ($p<0.001$ and 0.006 respectively).

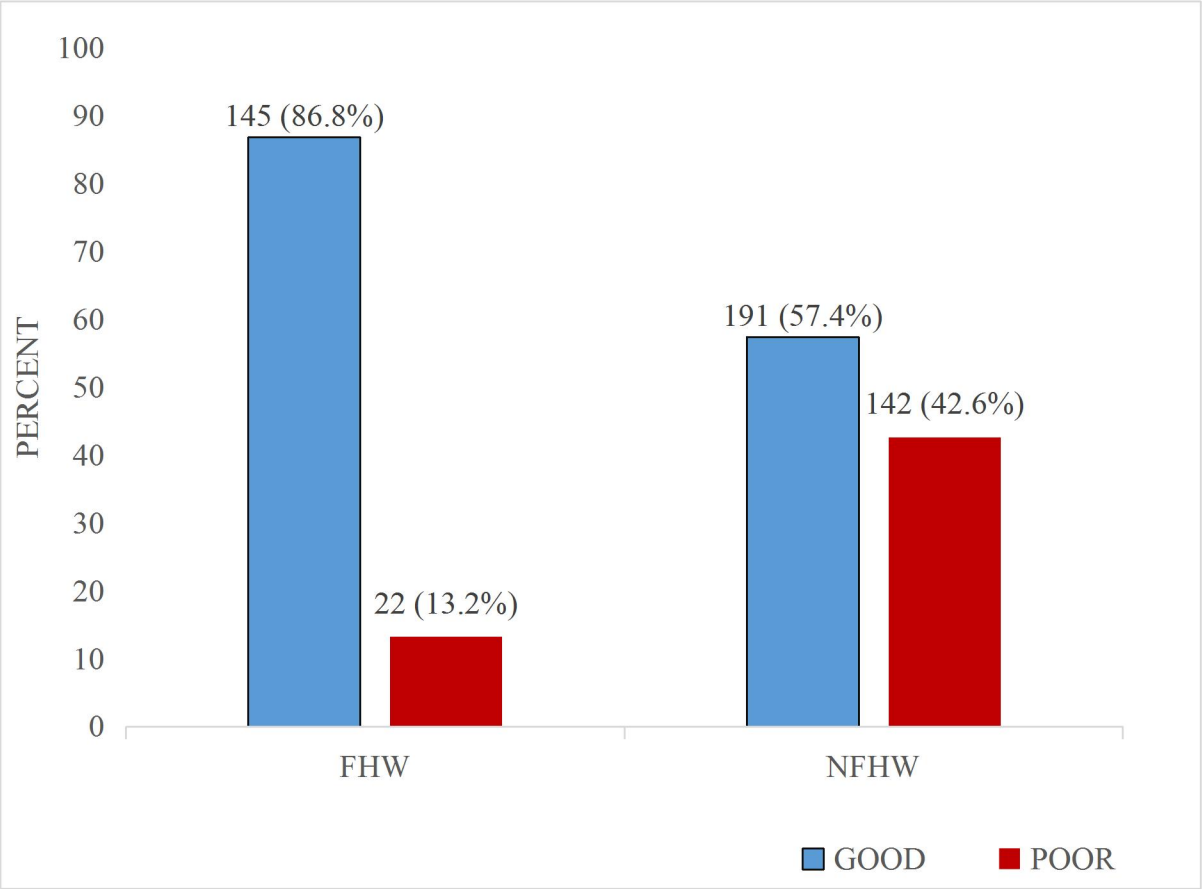

FIGURE 1: OVERALL KNOWLEDGE OF COVID-19 AMONG RESPONDENTS

Majority 145 (86.8%) of frontline health workers had good knowledge of COVID-19 compared to 191 (57.4%) of non-frontline health workers with good knowledge ($p<0.001$ and 0.006 respectively).

TABLE 6: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND KNOWLEDGE OF COVID-19

Variable	Overall knowledge			
	FHW		NFHW	
	Good (n=145) Freq (%)	Poor (n=22) freq (%)	Good (n=191) freq (%)	Poor (n=142) freq (%)
Age group (years)				
20 – 29	8 (5.5)	5 (22.7)	21 (11.0)	9 (6.3)
30 – 39	103 (71.0)	13 (59.1)	72 (37.7)	75 (52.8)
40 – 49	32 (22.1)	2 (9.1)	94 (49.2)	50 (35.3)
50 – 59	2 (1.4)	2 (9.1)	4 (2.1)	8 (5.6)
	Fisher's exact = 11.577, p = 0.005		**χ^2 = 12.704 , p = 0.005**	
Sex				
Female	99 (68.3)	13 (59.1)	84 (44.0)	70 (49.3)
Male	46 (31.7)	9 (40.9)	107 (56.0)	72 (50.7)
	χ^2 =0.730, p < 0.393		**χ^2 = 0.926 , p = 0.336**	
Marital status				
Married	120 (82.8)	18 (81.8)	151 (79.1)	116 (81.7)
Single	23 (15.9)	4 (18.2)	27 (14.1)	14 (9.9)
Separated/divorced	2 (1.3)	0 (0.0)	11 (5.8)	7 (4.9)
Widowed	0 (0.0)	0 (0.0)	2 (1.0)	5 (3.5)
	Fisher's exact = 0.400, p = 0.820		**Fisher's Exact = 3.630 , p = 0.301**	
Religion				
Christianity	136 (93.8)	20 (91.0)	175 (91.6)	129 (90.8)
Islam	7 (4.8)	1 (4.5)	15 (7.9)	10 (7.1)
ATR	2 (1.4)	1 (4.5)	1 (0.5)	3 (2.1)
	Fisher's exact = 1.086, p = 0.396		**Fisher's Exact = 1.789 , p = 0.458**	
Ethnicity				
Benin	52 (35.9)	12 (54.5)	85 (44.5)	59 (41.5)
Esan/Etsako	48 (33.1)	6 (27.3)	57 (29.8)	60 (42.4)
Yoruba	20 (13.8)	2 (9.1)	17 (8.9)	11 (7.7)
Igbo	16 (11.0)	0 (0.0)	17 (8.9)	6 (4.2)
Others	9 (6.2)	2 (9.1)	15 (7.9)	6 (4.2)
	Fisher's Exact = 4.930 , p = 0.298			**χ^2 = 8.141 , p = 0.087**

The rate of good and poor knowledge of COVID-19 among frontline health workers increased with age reaching a peak at age group 31 –39 years which accounted for the highest proportions 103 (71.0%) and 13 (59.1%) of frontline health workers with good and poor knowledge respectively. The association between age group and knowledge of frontline health workers was statistically significant (p = 0.005).

Similar trend was observed among non-frontline health workers who also showed an age -related increase in the rate of good and poor knowledge of COVID-19 but reaching a peak at age group 41 – 49 years and 31 – 49 years respectively (p = 0.005). A higher proportion 99 (68.3%) and 13 (59.1%) of frontline health workers with good and poor knowledge of COVID-19 were females (p = 0.393) compared to non-frontline health workers where males constituted the highest proportions 107 (56.0%) and 72 (50.7%) of those with good and poor knowledge respectively (p = 0.336).

Majority 120 (82.8%) and 18 (81.8%) of frontline health workers and 151 (79.1%) and 116 (81.7%) of non-frontline health workers with good and poor knowledge respectively were married. There was no significant statistical association between knowledge and marital status of respondents (p = 0.820 and 0.301 respectively). Similar trend was noticed for Christians (p = 0.396 and 0.458 for frontline and non-frontline health workers respectively).

About half 52 (35.9%) and 12 (54.5%) of frontline health workers and 85 (44.5%) and 59 (41.5%) of non-frontline health workers with good and poor knowledge respectively were from Benin. There was no significant statistical association between knowledge and ethnicity of respondents (p = 0.298 and 0.087 respectively).

TABLE 7: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS AND KNOWLEDGE OF COVID-19

Variable	Overall knowledge			
	FHW		NFHW	
	Good (n=145) Freq (%)	Poor (n=22) freq (%)	Good (n=191) freq (%)	Poor (n=142) freq (%)
Level of education				
Primary	18 (12.4)	7 (31.8)	17 (8.9)	8 (5.6)
Secondary	32 (22.1)	4 (18.2)	47 (24.6)	42 (29.6)
Tertiary	95 (65.5)	11 (50.0)	127 (66.5)	92 (64.8)
	Fisher's exact = 5.663, p = 0.059		**χ^2 = 1.946, p = 0.378**	
Monthly income (₦)				
< 50,000	2 (1.4)	3 (13.6)	0 (0.0)	1(0.7)
50,000 – 99,999	45 (31.0)	15 (68.2)	171 (89.5)	134 (94.4)
100,000 – 149,999	42 (29.0)	0 (0.0)	20 (10.5)	7 (4.9)
≥ 150,000	56 (38.6)	4 (18.2)	0 (0.0)	0 (0.0)
	Fisher's exact = 25.515, p <0.001		**Fisher's exact = 4.538, p = 0.067**	
Work experience (years)				
< 5	13 (9.0)	4 (18.2)	27 (14.2)	14 (9.9)
5 – 9	59 (40.7)	11 (50.0)	19 (9.9)	37 (26.1)
≥ 10	73 (50.3)	7 (31.8)	145 (75.9)	91 (64.1)
	χ^2 = 3.358, p = 0.187		**χ^2 = 15.387, p = < 0.001**	

The proportion of respondents with good knowledge of COVID-19 was noticed to increase with increasing level of education among frontline and non-frontline health workers with respondents with tertiary level of education accounting for the largest proportions 95 (65.5%) and 127 (66.5%) respectively. The association between knowledge and level of education among frontline and non-frontline health workers was however not statistically significant (p = 0.059 and 0.378 respectively).

With increasing monthly income, the proportion of frontline health workers with good knowledge increased compared to non-frontline health workers which recorded a decrease in rate of good knowledge with increasing monthly income. Frontline health workers who earned ₦150,000 and above accounted for the highest proportion 56 (38.6%) of those with good knowledge while non-frontline health workers who earned between ₦50,000 – ₦ 99,000

constituted the highest proportion 171 (89.5%) of those with good knowledge. The association between knowledge and monthly income of frontline health workers was statistically significant ($p<0.001$) as opposed to that of non-frontline health workers which did not show any statistical significance ($p = 0.067$).

The level of good and poor knowledge among respondents increased with increasing years of work experience. Respondents with 10 or more years of work experience had the highest proportions 73 (50.3) and 145 (75.9) of respondents with good knowledge among frontline and non-frontline health workers respectively. The association between knowledge and work experience of frontline health workers was not statistically significant ($p = 0.187$) in contrast to that of non-frontline health workers which was statistically significant ($p<0.001$).

TABLE 8: PREDICTORS OF KNOWLEDGE OF COVID-19 AMONG RESPONDENTS

Predictors	B (regression co-efficient)	P-Value	Odds ratio	95% CI for OR	
				Lower	Upper
FHW					
Age	-0.118	0.084	0.888	0.776	1.016
Sex					
Female	1.037	0.113	2.820	0.781	10.177
Male*	1				
Marital status					
Ever married	-0.431	0.601	0.650	0.129	3.269
Never married*	1				
Religion					
Christianity	0.346	0.705	1.414	0.236	8.464
Islam and ATR*	1				
Level of education	0.927	**0.024**	2.527	1.131	5.644
Monthly income	1.419	0.001	4.134	2.111	8.097
Work experience (years)					
≥ 10	0.591	0.419	1.807	0.431	7.575
< 10*	1				
NFHW					
Age	-0.035	0.262	0.965	0.908	1.027
Sex					
Female	-0.081	0.728	0.922	0.582	1.460
Male*	1				
Marital status					
Ever married	-0.754	0.095	0.674	0.194	1.140
Never married*	1				
Religion					
Christianity	0.262	0.705	1.414	0.578	2.919
Islam and ATR*	1				
Level of education	-0.031	0.901	0.970	0.597	1.575
Monthly income	0.959	0.053	0.848	0.989	6.885
Work experience (years)					
≥ 10	1.060	**0.002**	2.886	1.458	7.575
< 10*	1				

R^2 = Reference Category, CI= Confidence Interval.

Older FHWs were 0.88 times more likely to have good knowledge compared to the NFHWs. With increasing age, the rate of good knowledge decreased by 0.965 times among the NFHWs. This was not statistically significant (p =0.084, 0.262 respectively).

Female NFHWs were 2.820 times more likely to have good knowledge compared to the female NFHWs. This was also not statistically significant (p = 0.113, 0.728 respectively). Marital status and religion also did not show any significant association with knowledge.

With increasing level of education, the likelihood of good knowledge of FHWs significantly increased by 0.927 with an odds ratio of 2.527 (p = 0.024). In contrast, the likelihood of having good knowledge decreased by -0.031 with an odds ratio of 0.970 among non-frontline health workers. This was however not statistically significant (p = 0.901).

Respondents with 10 or more years of work experience were more likely to have good knowledge. FHWs with 10 or more years work experience were 1.8 times more likely to have good knowledge compared to NFHWs who were 2.8 times likely to have good knowledge and it was statistically significant (p = 0.419, 0.002).

SECTION C: ATTITUDE OF RESPONDENTS TOWARDS COVID-19

TABLE 9: ATTITUDE OF FRONTLINE HEALTH WORKERS TOWARDS COVID-19 PANDEMIC

Variable	STA* Freq (%)	Agree Freq (%)	Undecided Freq (%)	Disagree Freq (%)	STD* Freq (%)
COVID-19 is real	93 (55.7)	65 (38.9)	5 (3.0)	1 (1.6)	3 (1.8)
COVID-19 is a hoax	135(80.8)	30 (18.0)	2 (1.2)	0 (0.0)	0 (0.0)
COVID-19 is due to 5G	3 (1.8)	7 (4.2)	58 (34.7)	60 (34.9)	39 (23.4)
COVID-19 vaccines are dangerous	2 (1.2)	4 (2.4)	24 (14.4)	92 (55.1)	45 (26.9)
I would take COVID-19 vaccine	27 (16.2)	55 (32.9)	37 (22.2)	26 (15.6)	22 (13.2)
Face mask should be worn at all times	52 (31.1)	87 (52.1)	21 (12.6)	6 (3.6)	1 (0.6)
Disposable face mask should be reused	19 (11.4)	61 (36.5)	27 (16.2)	34 (20.4)	26 (15.6)
Important to wash hand with soap and water	90 (53.9)	58 (34.7)	17 (10.2)	2 (1.2)	0 (0.0)
Important to test people for COVID-19	64 (38.3)	93 (55.7)	9 (5.4)	1 (0.6)	0 (0.0)
Important to sanitize surfaces of objects	79 (47.3)	82 (49.1)	6 (3.6)	0 (0.0)	0 (0.0)
Public places should restrict gatherings	52 (31.1)	80 (47.9)	28 (16.8)	7 (4.2)	0 (0.0)
Practice social distancing only when convenient	9 (5.4)	35 (21.0)	26 (15.6)	79 (47.3)	18 (10.8)
Isolate if I notice symptoms	39 (23.4)	111 (66.5)	13 (7.8)	3 (1.8)	1 (0.6)
COVID-19 precaution is my responsibility	52 (31.1)	107 (64.1)	5 (3.0)	2 (1.2)	1 (0.6)

n = 167, Cronbach's alpha = 0.716

*STA – Strongly Agree, STD – Strongly Disagree

Higher proportions 93 (55.7%), 90 (53.9%) of respondents strongly agreed that COVID-19 was real and that it was important to wash hands with soap and water. Also, large proportions 87 (52.1%), 61 (36.5%), 93 (55.7%), 82 (49.1%) 80 (47.9%), 111 (66.5%) and 107 (64.1%) agreed that face mask should be worn in public, disposable facemask should be worn and reused, important to test people for COVID-19, important to sanitize surfaces of objects, public places should restrict number of people gathering, isolate if symptoms are noticed and taking precautions against COVID-19 is their responsibility respectively. However, 4 (2.4%) of respondents agreed that COVID-19 vaccines are dangerous and can cause death.

TABLE 10: ATTITUDE OF RESPONDENTS TOWARDS COVID 19 PANDEMIC (NFHW)

Variable	STA* Freq (%)	Agree Freq (%)	Undecided Freq (%)	Disagree Freq (%)	STD* Freq (%)
COVID-19 is real	211 (63.4)	103 (30.9)	16 (4.8)	2 (0.6)	1 (0.3)
COVID-19 is a hoax	164 (49.2)	144 (43.2)	19 (5.7)	6 (1.8)	0 (0.0)
COVID-19 is due to 5G	16 (4.8%)	48 (14.4)	60 (18.0)	165 (49.5)	44 (13.2)
COVID-19 vaccines are dangerous	10 (3.0)	27 (8.1)	66 (19.8)	168 (50.5)	62 (18.6)
I would take COVID-19 vaccine	18 (5.4)	113 (33.9)	118 (35.4)	60 (18.0)	24 (7.2)
Face mask should be worn at all times	89 (26.7)	180 (54.1)	33 (9.9)	26 (7.8)	5 (1.5)
Disposable face mask should be reused	16 (4.8)	74 (22.2)	51 (15.3)	154 (46.2)	38 (11.4)
Important to wash hand with soap and water	78 (23.4)	190 (57.1)	41 (12.3)	17 (5.1)	7 (2.1)
COVID-19 test is important	77 (23.1)	231 (69.4)	19 (5.7)	6 (1.8)	0 (0.0)
Important to sanitize surfaces of objects	95 (28.5)	206 (61.9)	25 (7.5)	5 (1.5)	2 (0.6)
Public places should restrict gatherings	75 (22.5)	211 (63.4)	43 (12.9)	4 (1.2)	0 (0.0)
Practice social distancing	18 (5.4)	33 (9.9)	104 (31.2)	142 (42.6)	36 (10.8)
Isolate if I notice symptoms	103 (30.9)	203 (61.0)	21 (6.3)	6 (1.8)	0 (0.0)
COVID-19 precaution is my responsibility	133 (39.9)	175 (52.6)	21 (6.3)	4 (1.2)	0 (0.0)

n = 333, Cronbach's alpha = 0.716

*STA – Strongly Agree, STD – Strongly Disagree.

About two-third 211 (63.4%) of respondents strongly agreed that COVID-19 was real. While half 168 (50.5%) of respondents disagreed that COVID-19 vaccines were dangerous and could cause death. Only18 (5.4%) and 113 (33.9%) strongly agreed and agreed respectively to take the vaccine. Larger proportions 180 (54.1%), 190 (57.1%), 231 (69.1%) 211 (63.4%) and 203 (61.0) of respondents agreed that face mask should be worn at all times in public places, handwashing and testing people for COVID-19 are important, sanitize surfaces of objects, restrict number of people gathering in public places and isolate if they noticed symptoms. About one-tenth agreed that social distancing should be practiced only when convenient while slightly more than half 175 (52.6%) agreed that it was their responsibility to take precautions against COVID-19.

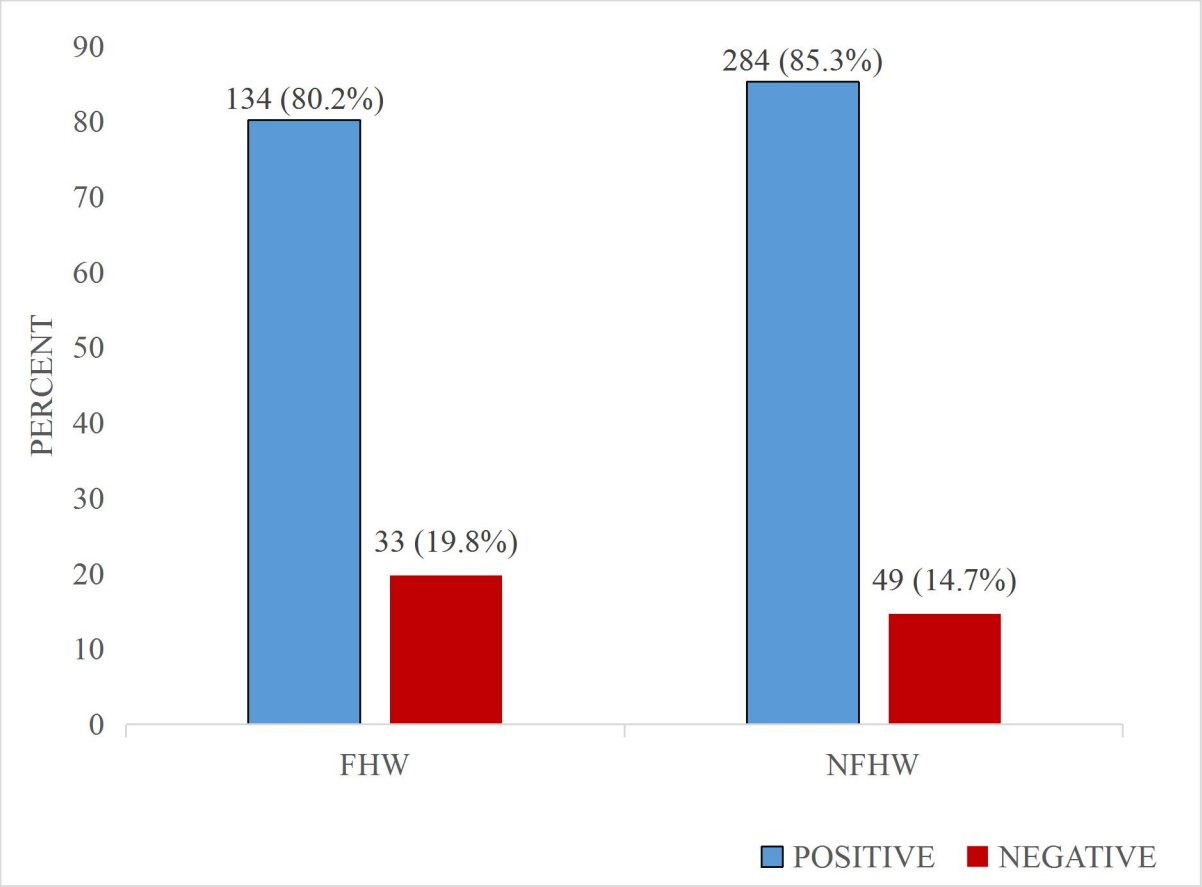

FIGURE 2: OVERALL ATTITUDE OF RESPONDENTS TOWARDS COVID-19

Majority 134 (80.2%) of frontline health workers had positive attitude towards COVID-19 compared to a higher proportion 284 (85.3%) of non-frontline health workers with positive attitude. Negative attitude was higher 33 (19.8%) among frontline health workers than in non-frontline health workers 49 (14.7%). The difference in the attitude of frontline and non-frontline health workers was not statistically significant ($p = 0.096$).

TABLE 11: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND ATTITUDE TOWARDS COVID-19

Variable	Overall attitude			
	FHW		NFHW	
	Positive (n=134) Freq (%)	Negative (n=33) freq (%)	Positive (n=284) freq (%)	Negative (n=49) freq (%)
Age group (years)				
20 – 29	13 (9.7)	0 (0.0)	26 (9.2)	4 (8.2)
30 – 39	96 (71.7)	20 (60.6)	130 (45.8)	17 (34.7)
40 – 49	22 (16.4)	12 (36.4)	116 (40.8)	28 (57.1)
50 – 59	3 (2.2)	1 (3.0)	12 (4.2)	0 (0.0)
	Fisher's exact = 8.785, p = 0.023			**χ^2 = 5.845, p = 0.119**
Sex				
Female	86 (64.2)	26 (78.8)	131 (46.1)	23 (46.9)
Male	48 (35.8)	7 (21.2)	153 (53.9)	26 (53.1)
		χ^2 = 2.558, p = 0.110		**χ^2 = 0.111, p = 0.916**
Marital status				
Married	110 (82.1)	28 (84.8)	232 (81.7)	35 (71.5)
Single	22 (16.4)	5 (15.2)	38 (13.4)	3 (6.1)
Separated/ Divorced	2 (1.5)	0 (0.0)	10 (3.5)	8 (16.3)
Widowed	0 (0.0)	0 (0.0)	4 (1.4)	3 (6.1)
	Fisher's exact = 0.284, p = 0.999		**Fisher's Exact = 19.432, p = 0.001**	
Religion				
Christianity	126 (94.0)	30 (90.9)	263 (92.6)	41 (83.7)
Islam	5 (3.8)	3 (9.1)	18 (6.3)	7 (14.3)
ATR	3 (2.2)	0 (0.0)	3 (1.1)	1 (2.0)
	Fisher's exact = 2.036, p = 0.306		**Fisher's Exact = 4.560, p = 0.077**	
Ethnicity				
Benin	54 (40.3)	10 (30.3)	127 (44.7)	17 (34.8)
Esan/Etsako	41 (30.6)	13 (39.4)	102 (35.9)	15 (30.6)
Yoruba	18 (13.4)	4 (12.1)	22 (7.7)	6 (12.2)
Igbo	11 (8.2)	5 (15.2)	17 (6.0)	6 (12.2)
Others	10 (7.5)	1 (3.0)	16 (5.6)	5 (10.2)
	Fisher's Exact = 3.313, p = 0.500		**Fisher's exact = 6.392, p = 0.161**	

Respondents within age group 31 – 39 years constituted the highest proportions 96 (71.7%) and 20 (60.6%) of frontline health workers with positive and negative attitudes respectively compared to respondents within similar age group which accounted for the greatest proportion 130 (45.8%) of non-frontline health workers with positive attitude, those with negative attitude were predominant 96 (71.7%) among respondents within age group 41 – 49 years. The

association between attitude and age was statistically significant among frontline health workers ($p = 0.023$) compared to that of the non-frontline health workers ($p = 0.119$).

Female respondents constituted the largest proportion 86 (64.2%) of frontline health workers with positive attitude compared to non-frontline health workers where higher proportion 153 (53.9%) of those with positive attitude were males. The association between attitude and sex among frontline and non-frontline health workers was not statistically significant ($p = 0.110$ and 0.916 respectively).

There was a significant statistical association between attitude and marital status ($p = 0.001$) of non-frontline health workers as majority 232 (81.7%) of respondents with positive attitude were married while respondents who were widowed accounted for the least proportion 4 (1.4%) of those with positive attitude. Similar trend was observed among frontline health workers but the association was not statistically significant ($p = 0.999$).

Religion did not show any significant statistical association with attitude among frontline and non-frontline health workers though majority of respondents with positive and negative attitudes in both categories of respondents were Christians and Benin.

Ethnicity did not show any significant statistical association with attitude among frontline and non-frontline health workers though majority of respondents with positive and negative attitudes in both categories of respondents were Benin and Esan/Etsako.

TABLE 12: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS AND ATTITUDE TOWARDS COVID-19

Variable	Overall attitude			
	FHW		NFHW	
	Positive (n=134) Freq (%)	Negative (n=33) freq (%)	Positive (n=284) freq (%)	Negative (n=49) freq (%)
Level of education				
Primary	22 (16.4)	3 (9.1)	19 (6.7)	6 (12.2)
Secondary	31 (23.1)	5 (15.2)	78 (27.5)	11 (22.5)
Tertiary	81 (60.5)	25 (75.7)	187 (65.8)	32 (65.3)
		χ^2 = 2.710, p = 0.258		**χ^2 = 2.113, p = 0.348**
Monthly income (₦)				
< 50,000	5 (3.7)	0 (0.0)	0 (0.0)	1 (2.0)
50,000 – 99,999	49 (36.6)	11 (33.3)	258 (90.8)	47 (96.0)
100,000 – 149,999	26 (19.4)	16 (48.5)	26 (9.2)	1 (2.0)
≥ 150,000	54 (40.3)	6 (18.2)	0 (0.0)	0 (0.0)
	Fisher's exact = 13.818, p = 0.005		**Fisher's exact = 6.684, p = 0.030**	
Work experience (years)				
< 5	14 (10.4)	3 (9.1)	37 (13.0)	4 (8.2)
5 – 9	58 (43.3)	12 (36.4)	51 (18.8)	5 (10.2)
≥ 10	62 (46.3)	18 (54.5)	196 (69.0)	40 (81.6)
		χ^2 = 0.729, p = 0.695		**χ^2 = 3.236, p = 0.198**

There was an increase in the level of positive and negative attitude with increasing level of education among both categories of respondents as those with tertiary levels of education accounted for the highest proportions 81 (60.5%) and 25 (75.7%) of respondents with positive and negative attitude respectively among frontline health workers, compared to 187 (65.8%) and 52 (65.3%) for positive and negative attitude respectively among non-frontline health workers. The association between attitude and level of education was however not statistically significant (p = 0.258 and 0.384 for frontline and non-frontline health workers respectively).

The rate of positive attitude among frontline health workers increased with increasing monthly income with respondents earning ₦150,000 and above constituting a greater proportion 54

(40.3%) of those with positive attitude compared to non-frontline health workers where majority 258 (90.8%) of respondents with positive attitude earned between ₦50,000 – ₦99,999. The association between attitude and average monthly income was statistically significant (p = 0.005 and 0.030 for frontline and non-frontline health workers respectively).

There was no significant statistical association between attitude and work experience (p = 0.695 and 0.198 for frontline and non-frontline health workers respectively) although a higher proportion 62 (46.3%) and 196 (69.0%) of FHWs with good had 10 or more years of work experience compared to non-frontline health workers.

TABLE 13: KNOWLEDGE OF RESPONDENTS AND ATTITUDE TOWARDS COVID-19

Variable	Overall attitude			
	FHW		NFHW	
	Positive (n=134) Freq (%)	Negative (n=33) freq (%)	Positive (n=284) freq (%)	Negative (n=49) freq (%)
Knowledge				
Good	113 (84.3)	32 (97.0)	165 (58.1)	26 (53.1)
Poor	21 (15.7)	1 (3.0)	119 (41.9)	23 (46.9)
		$\chi^2 = 3.699$, p = 0.054		**$\chi^2 = 0.434$, p = 0.510**

Majority 113 (84.3%) of frontline health workers with positive attitude had good knowledge compared to 165 (58.1%) of non-frontline health workers with positive attitude who also had good knowledge of COVID-19. The association between knowledge and attitude towards COVID-19 was however not statistically significant among frontline and non-frontline health workers (p = 0.054 and 0.510 respectively).

TABLE 14: PREDICTORS OF ATTITUDE TOWARDS COVID-19 AMONG FHWs

Predictors	B (regression co-efficient)	p-value	Odds ratio	95% CI for OR	
				Lower	Upper
Age	-0.168	0.004	0.846	0.754	0.948
Sex					
Female	-0.114	0.851	0.892	0.273	2.919
Male*	1				
Marital status					
Ever married	0.583	0.377	1.791	0.492	6.521
Never married*	1				
Religion					
Christianity	0.495	0.514	1.641	0.370	7.273
Islam and ATR*	1				
Level of education	0.252	0.559	1.287	0.552	2.998
Monthly income	0.477	0.160	1.611	0.829	3.130
Work experience (years)					
≥ 10	0.730	0.214	2.075	0.657	6.554
< 10*	1				
Knowledge					
Good knowledge	-2.650	**0.033**	0.071	0.006	0.811
Poor knowledge	1				

***Reference category = R^2, CI= Confidence Interval.**

TABLE 15: PREDICTORS OF ATTITUDE TOWARDS COVID-19 AMONG NFHWs

Predictors	B (regression co-efficient)	p-value	Odds ratio	95% CI for OR	
				Lower	Upper
Age	-0.101	**0.022**	0.904	0.754	0.948
Sex					
Female	0.077	0.817	1.080	0.273	2.919
Male*	1				
Marital status					
Ever married	-0.534	0.473	0.586	0.492	6.521
Never married*	1				
Religion					
Christianity	0.730	0.139	2.075	0.370	7.273
Islam and ATR*	1				
Level of education	0.697	0.048	2.007	0.552	2.998
Monthly income	2.627	0.017	13.829	0.829	3.130
Work experience (years)					
≥ 10	-0.279	0.590	0.756	0.657	6.554
< 10*	1	1			
Knowledge					
Good knowledge	0.157	0.631	0.616	0.006	0.811
Poor knowledge	1				

***Reference category = R^2, CI= Confidence Interval**

A year increase in age reduced the likelihood of positive attitude by 0.168 with odds ratio of 0.846 for FHWs compared to NFHWs with odds ratio 0.101. This was statistically significant (p = 0.004, 0.022 respectively).

Female FHWs were 0.8 times less likely to have positive attitude compared to female NFHWs who were 1.08 times more likely to have positive attitude. This was also not statistically significant (p = 0.817). This was not statistically significant (p = 0.851, 0.817 respectively). Marital status and religion were not significant determinants of positive attitude.

With increasing level of education, the likelihood of positive attitude among FHWs increased by 0.252 with odds ratio 1.287 compared to an increase by 0.697 with odds ratio 2.627 for NFHWs.

Similar trend was noted with positive attitude and monthly income of respondents as the likelihood of positive attitude increased by 0.477 with odds ratio of 1.611. This was statistically significant among non-frontline health workers ($p = 0.048$).

Frontline health workers with 10 or more years of work experience were 2 times more likely to have positive attitude compared to NFHWs with less years of work experience and are 0.7 times less likely to have positive attitude ($p= 0.214$, 0.590 for FHWs and NFHWs respectively).

Frontline health workers with good knowledge were 0.071 less likely to have positive attitude. This was statistically significant ($p= 0.033$) compared to NFHWs who were 1.17 times more likely to have positive attitude with poor knowledge. This was however not statistically significant ($p= 0.631$).

SECTION D: PREVALENCE OF COVID-19 AMONG RESONDENTS

TABLE 16: PREVALENCE OF COVID-19 AMONG RESPONDENTS

Variable	Respondents' group	
	FHW (n =167) Frequency (%)	NFHW(n=333) Frequency (%)
Tested for COVID-19		
Yes	78 (46.7)	44 (13.2)
No	89 (53.3)	289 (86.8)
$\chi^2 = 67.504$, p = 0.001		
Test outcome (n = 122)		
Positive	26 (33.3)	6 (13.6)
Negative	52 (66.7)	38 (86.4)
$\chi^2 = 5.640$, p = 0.018		

Nearly half 78 (46.7%) of frontline health workers had tested for COVID-19 of which 26 (33.3%) were positive compared to slightly above one-tenth 44 (13.2%) of non-frontline health workers who had tested for COVID-19 of which 6 (13.6%) were positive. The difference between frontline and non-frontline health workers who tested for COVID-19 and test outcome was statistically significant (p = 0.001 and 0.018 respectively).

SECTION E: EFFECTS OF COVID-19 ON MENTAL HEALTH STATUS OF RESPONDENTS

TABLE 17: EFFECT OF COVID-19 ON MENTAL HEALTH STATUS OF RESPONDENTS (FHW)

Variable	Better than usual Freq (%)	Same as usual Freq (%)	Less than usual Freq (%)	Much less than usual Freq (%)
Able to concentrate on activity	21 (12.6)	121 (73.1)	23 (13.8)	1 (0.6)
Lost much sleep over worry?	34 (20.4)	83 (49.7)	47 (28.1)	3 (1.8)
Felt you were playing a useful part in things?	61 (36.5)	76 (45.5)	28 (16.8)	2 (1.2)
Felt capable of making decisions about things?	38 (22.8)	103 (61.7)	21 (12.6)	5 (3.0)
Felt constantly under strain?	34 (20.4)	80 (47.9)	48 (28.7)	4 (2.5)
Felt you couldn't overcome your difficulties?	18 (10.8)	82 (49.1)	41 (24.6)	26 (15.6)
Been able to enjoy your normal day-to-day activities?	14 (8.4)	74 (44.3)	54 (32.3)	25 (15.0)
Been able to face up to your problems?	44 (26.3)	87 (52.1)	31 (18.6)	5 (3.0)
Been feeling unhappy and depressed?	14 (8.4)	110 (65.9)	31 (18.6)	12 (7.2)
Been losing confidence in yourself?	39 (23.4)	79 (47.3)	37 (22.2)	12 (7.2)
Been thinking of yourself as a worthless person?	14 (8.4)	81 (48.5)	48 (28.7)	24 (14.4)
Been feeling reasonably happy, all things considered	23 (13.8)	110 (65.9)	27 (16.2)	7 (4.2)

n = 167, Cronbach's alpha = 0.749

The ability of majority 121 (73.1%) of respondents to concentrate on activity was same as usual while nearly half 83 (49.7%) had lost much sleep over worry about COVID-19. A higher proportion 103 (61.7%) stated that their ability to make decision was same as usual while about one-third 54 (32.3%) felt that their ability to enjoy their normal day to day activity was less than usual. About one-fifth 34 (20.4%) and 44 (26.3%) of respondents felt constantly under strain and are able to face up to their problems better than usual. Less than one-tenth 12 (7.2%) stated they were feeling unhappy and depressed as well as losing confidence in themselves much less than usual.

TABLE 18: EFFECT OF COVID-19 ON MENTAL HEALTH STATUS OF RESPONDENTS (NFHW)

Variable	Better than usual Freq (%)	Same as usual Freq (%)	Less than usual Freq (%)	Much less than usual Freq (%)
Able to concentrate on activity	75 (22.5)	206 (61.9)	48 (14.4)	3 (0.9)
Lost much sleep over worry?	31 (9.3)	190 (58.0)	85 (25.5)	24 (7.2)
Felt constantly under strain?	42 (12.6)	193 (58.0)	68 (20.4)	30 (9.0)
Felt you couldn't overcome your difficulties?	73 (21.9)	200 (60.1)	36 (1.0.8)	23 (6.9)
Been able to enjoy your normal day-to-day activities?	57 (17.1)	186 (55.9)	83 (24.9)	7 (2.1)
Been able to face up to your problems?	88 (26.4)	209 (62.8)	30 (9.0)	5 (1.5)
Been feeling unhappy and depressed?	46 (13.8)	160 (48.0)	84 (25.2)	43 (12.9)
Been losing confidence in yourself?	38 (11.4)	172 (51.7)	77 (23.1)	46 (13.8)
Been thinking of yourself as a worthless person?	20 (6.0)	187 (56.2)	70 (21.0)	56 (16.8)
Been feeling reasonably happy, all things considered	43 (12.9)	228 (68.5)	39 (11.7)	23 (6.9)

n = 333, Cronbach's alpha = 0.749

The ability to concentrate on activity and decision making was same as usual in a higher proportion 206 (61.9%) and 201 (60.4%) of respondents respectively. Similarly, 228 (68.5%) of respondents have been feeling reasonably happy all things considered as same as usual. However, very lower proportions 7 (2.1%) and 5 (1.5%) have been enjoying their day-to-day activities and able to face up to their problems respectively much less than usual.

TABLE 19: EFFECT OF COVID-19 ON THE MENTAL HEALTH STATUS OF RESPONDENTS

Variable	Respondents' group	
	FHWs (n=167) Frequency (%)	**NFHWs (n=333) Frequency (%)**
Mental Disorder Present	148(88.6)	286(85.8)
Mental Disorder Absent	19(11.4)	47(14.2)
	$\chi^2 = 0.727$, p = 0.240	

Mental disorders were present in 148 (88.6%) of FHWs compared to 236 (85.8%) of NFHWs. Few 19 (11.4%) of the FHWs had no mental disorders compared to 66 (13.2%) NFHWs with similar mental health status. This was not statistically significant (p = 0.240).

TABLE 20: TYPES OF MENTAL HEALTH DISORDERS AMONG RESPONDENTS

Variable	Respondents' group	
	FHWs (n=148) Frequency (%)	**NFHWs(n=286) Frequency (%)**
Typical mental disorder**	73 (49.3%)	149 (52.2%)
PTSD	66 (44.6%)	80 (27.9%)
Psychological distress	9 (6.1%)	57 (19.9%)
	χ^2= 0.727, p= 0.394	

**Typical Mental Disorder – Depression and anxiety.

About half 73 (49.3%), 66 (44.6%), 9 (6.1%) of the FHWs compared to 149 (52.2%), 80 (27.9%), 57 (19.9%) NFHWs had typical mental disorders, PTSD and psychological distress respectively. The association between healthcare workers and mental health disorder was not statistically significant (p= 0.394)

TABLE 21A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND EFFECTS OF COVID-19 ON MENTAL HEALTH STATUS

Variable	FHW			
	Absent mental disorder (n=19) Freq. (%)	Typical mental** disorder (n=73) Freq. (%)	PTSD (n=66) Freq.(%)	Psychological distress (n= 9) Freq. (%)
Age group				
20 – 29	2 (15.4)	7 (9.5)	3 (4.5)	3(33.3)
30 – 39	15 (12.9)	58(79.5)	48(72.7)	6(66.7)
40 – 49	1 (2.9)	6(8.3)	15(22.7)	0 (0.0)
50 – 59	1 (25.0)	2(2.7)	1(1.5)	0 (0.0)
	χ^2= 8.345	**p= 0.500**		
Sex				
Male	8 (14.5)	34 (61.8)	11 (20.0)	2 (3.6)
Female	11 (9.8)	62 (55.4)	35 (31.3)	4 (3.6)
	χ^2= 2.687	**p= 0.442**		
Marital status				
Single	3 (11.1)	15 (55.6)	6 (22.2)	3 (11.1)
Married	16 (11.6)	79 (57.2)	60 (29.0)	3 (2.2)
Separated	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)
	χ^2= 6.908	**p= 0.329**		
Religion				
Christianity	18 (11.5)	89 (57.1)	44 (28.2)	5 (3.2)
Islam	0 (0.0)	5 (62.5)	2 (25.0)	1 (12.5)
ATR	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)
	χ^2= 5.078	**p= 0.534**		
Level of education				
Primary	4 (16.0)	18 (72.0)	2 (4.0)	2 (8.0)
Secondary	5 (13.9)	25 (69.4)	5 (13.9)	1 (2.8)
Tertiary	10 (9.4)	53 (50.0)	40 (37.7)	3 (2.8)
	χ^2= 16.921	**p= 0.010***		
Type of health work				
Medical doctor	8 (13.8)	37 (63.8)	11 (19.0)	2 (3.4)
Nurse	7 (8.0)	43 (49.4)	35 (40.2)	2 (2.3)
Laboratory scientist	3 (25.0)	8 (66.7)	0 (0.0)	1 (8.3)
Others	1 (10.0)	8 (80.0)	0 (0.0)	1 (10.0)
	χ^2= 20.557	**p= 0.015***		

**Typical Mental Disorder – Depression and anxiety.

A higher proportion 68 (58.6%) and 28 (24.1%) of FHWs who experienced typical mental disorder and PTSD respectively were within age group 30 - 39 years. Majority 62 (55.4%), 35 (31.3%) and 11 (9.8%) of the FHWs had typical mental disorder, PTSD and psychological

distress respectively were female and 34 (61.8%), 11 (20.0%) and 8 (14.5%) were males. There is no statistical significance.

About 79 (57.2%) and 60 (29.0%) of FHWs who experienced typical mental disorder and PTSD were married while 15 (55.6%) and 6 (22.2%) who had typical mental disorder and PTSD respectively were single. There was no statistical association.

Majority 89 (57.1%) and 44 (28.2%) of the FHWs had typical mental disorder and PTSD were Christians. A higher proportion 53 (50.0%) and 40 (37.7%) of FHWs had tertiary level of education. Level of education increased with mental health affectation. There was however no statistical significance.

About half 37 (63.8%) and 11 (19.0%) of the FHWs who had typical mental disorder and PTSD respectively were doctors while 43 (49.4%) and 35 (40.2%) who had typical mental disorders and PTSD were nurses. This was statistically significant.

TABLE 21B: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND EFFECTS OF COVID-19 ON MENTAL HEALTH STATUS

Variable	FHW			
	Absent mental disorder (n=19) n (%)	**Typical mental** disorder (n=73) n (%)**	**PTSD (n=66) n (%)**	**Psychological distress (n= 9) n (%)**
Work experience				
<5	2 (11.8)	12 (70.6)	3 (17.6)	0 (0.0)
5-9	12 (17.1)	38 (54.3)	17 (24.3)	3 (4.3)
≥10	5 (6.3)	46 (57.5)	26 (32.5)	3 (3.8)
	χ^2= 6.826	**p= 0.337**		
Monthly income				
< 50,000	0 (0.0)	5 (100.0)	0 (0.0)	0 (0.0)
50,000 – 99,999	7 (11.7)	32 (53.3)	17 (28.3)	4 (6.7)
100,000 – 149,999	4 (9.5)	20 (47.6)	18 (42.9)	0 (0.0)
≥150,000	8 (13.3)	39 (65.0)	11 (18.3)	2 (3.3)
	χ^2= 14.047	**p= 0.121**		

**Typical Mental disorder – Depression, anxiety.

A higher proportion 46 (57.5%), 26 (32.5%) and 3 (3.8%) of FHWs experienced typical mental disorder, PTSD and psychological distress respectively had 10 or more work experience. Majority of the FHWs 39 (65.0%), 11 (18.3%) and 8 (13.3%) had typical mental disorder, PTSD and absent mental disorder respectively earned 150,000 or more. A lower proportion of FHWs 32 (53.3%), 17 (28.3%) and 7 (11.7%) had typical mental disorder, PTSD and absent mental disorder respectively earned between 50,000 - 99,000 respectively. Monthly income increased with mental health affectation. This was however not statistically significant.

TABLE 22: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND EFFECTS OF COVID-19 ON MENTAL HEALTH STATUS

Variable	NFHW			
	Absent mental disorder (n=47) n (%)	Typical mental** disorder (n=182) n (%)	PTSD (n=70) n (%)	Psychological distress (n= 34) n (%)
Age group				
20 – 29	2 (6.7)	19 (63.3)	6 (20.0)	3 (10.0)
30 – 39	28 (19.0)	69 (46.9)	34 (23.1)	16 (10.9)
40 – 49	16 (11.1)	88 (61.1)	28 (19.1)	12 (8.3)
50 – 59	1 (8.3)	6 (50.0)	2 (16.7)	3 (25.0)
	χ^2= 11.817	**p= 0.224**		
Sex				
Male	18 (10.1)	112 (62.6)	32 (17.9)	17 (9.5)
Female	29 (18.8)	70 (45.5)	38 (24.7)	17 (11.0)
	χ^2= 10.966	**p= 0.012***		
Marital status				
Single	2 (4.9)	29 (70.7)	7 (17.1)	3 (7.3)
Married	42 (15.7)	135 (50.6)	60 (22.5)	30 (11.2)
Widowed	1 (14.3)	5 (71.4)	0 (0.0)	1 (14.3)
Separated	2 (11.1)	13 (72.2)	3 (16.7)	0 (0.0)
	χ^2= 11.990	**p= 0.214**		
Religion				
Christianity	42 (13.8)	164 (53.9)	66 (21.7)	32 (10.5)
Islam	5 (20.0)	14 (56.0)	4 (16.0)	2 (8.0)
ATR	0 (0.0)	4 (100.0)	0 (0.0)	0 (0.0)
	χ^2= 4.506	**p= 0.609**		
Level of education				
Primary	1 (4.0)	16 (64.0)	4 (16.0)	4 (16.0)
Secondary	19 (21.3)	39 (43.8)	20 (22.5)	11 (12.4)
Tertiary	27 (12.3)	127 (58.0)	46 (21.0)	19 (8.7)
	χ^2= 10.481	**p= 0.106**		
Work experience				
<5	3 (7.3)	25 (61.0)	9 (22.0)	4 (9.8)
5-9	11 (19.6)	22 (39.3)	16 (28.6)	7 (12.5)
≥10	33 (14.0)	135 (57.2)	45 (19.1)	23 (9.7)
	χ^2= 7.868	**p= 0.248**		
Monthly income				
< 50,000	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)
50,000 – 99,999	40 (13.1)	168 (55.1)	65 (21.3)	32 (10.5)
100,000 – 149,999	7 (25.9)	13 (48.1)	5 (18.5)	2 (7.4)
	χ^2= 4.258	**p= 0.642**		

**Typical mental disorder – Depression, anxiety.

A higher proportion 88 (61.1%), 28 (19.1%), 16 (11.1%) of NFHWs who experienced typical

mental disorder and PTSD respectively were within age groups 40 - 49 years. About two-thirds 112 (62.6%), 32 (17.9%) and 18 (10.1%) of NFHWs who experienced who experienced typical mental disorder, PTSD and psychological distress were males while 70 (45.5%), 38 (24.7%) and 29 (18.8%) who experienced typical mental disorder, PTSD and psychological distress were females.

More than two-thirds 135 (50.6%), 60 (22.5%), 42 (15.7%) and 30 (11.2%) of NFHWs who experienced typical mental disorder, PTSD, absent mental disorder and psychological distress respectively were married. There was no statistical association.

Majority 164 (59.9%), 66 (21.7%), 42 (18.8%) and 32 (10.5%) of the NFHWs who had typical mental disorder, PTSD, absent mental disorders and psychological distress respectively were Christians. A higher proportion 127 (58.0%), 46 (21.0%), 27 (12.3%) of NFHWs had tertiary level of education. A lower proportion 39 (43.8%), 20 (22.5%), 19 (21.3%) and 11 (12.4%) of NFHWs who had typical mental disorder, PTSD, absent mental disorders and psychological distress respectively had secondary level of education. Level of education increased with mental health affectation. There was however no statistical significance.

About half 135(57.2%), 45(19.1%), 33(14.0%) and 23(9.7%) of the NFHWs who had typical mental disorder, PTSD, absent mental disorders and psychological distress respectively had 10 or more years of work experience. This was statistically significant.

Majority of the NFHWs 168(55.1%), 65(21.3%) and 40(13.1%) had typical mental disorder, PTSD and absent mental disorder respectively earned 50,000 – 99,000. A lower proportion of NFHWs 13(48.1%), 7(25.9%) and 5(18.5%) had typical mental disorder, absent mental disorder,

PTSD respectively earned between 100,000 - 149,999 respectively. Monthly income decreased with mental health affectation. This was however not statistically significant.

TABLE 23: PREDICTORS OF EFFECT OF COVID-19 ON MENTAL HEALTH STATUS OF RESPONDENTS

Predictors	B (regression co-efficient)	P-Value	Odds ratio	95% CI for OR	
				Lower	Upper
FHWs					
Level of education	-0.108	0.082	0.897	0.216	3.734
Knowledge	0.221	0.762	1.247	0.298	5.230
Attitude	-0.618	0.444	1.855	0.381	9.021
NFHWs					
Level of education	0.614	0.883	2.418	0.871	28.201
Knowledge	0.471	0.184	1.601	0.799	3.207
Attitude	-0.330	0.466	0.719	0.297	1.744

***Reference category, R^2 = 3.0% - 6.1% and 9.5% -14.5 %, CI= Confidence Interval.**

The likelihood of being affected with level of education increased by 0.897 among frontline health workers with odds ratio 0.897 compared to NFHWs with 0.614 and odds ratio of 2.418. This was not statistically significant (p = 0.883, 0.082 respectively).

FHWs with good knowledge were 0.221 with odds ratio of more 1.247 likely to be affected compared to NFHWs with 0.471 and odds ratio of 0.184. This was also not statistically significant (p= 0.762, 0.184 respectively).

FHWs with positive attitude were -0.618 times more likely to be affected compared to NFHWs with -0.330. This was also not statistically significant (p= 0.444, 0.466 respectively).

SECTION F: COPING STRATEGIES OF RESPONDENTS WITH COVID-19

TABLE 24: COPING STRATEGIES OF RESPONDENT WITH COVID-19 (FHW)

Variable	I usually don't do this Freq (%)	I do this alot Freq (%)	I usually do this moderately Freq (%)	I have been doing this alot Freq (%)
Worked on other activities	42 (25.1)	62 (37.1)	34 (20.4)	29 (17.4)
Refused to believe that the corona virus or the COVID-19 disease actually exists	129 (77.2)	22 (13.2)	9 (5.4)	7 (4.2)
Used alcohol and drugs to help me get through it.	114 (68.3)	15 (9.0)	27 (16.2)	11 (6.6)
Took deliberate steps/action to ensure that I am not infected	12 (7.2)	63 (37.7)	33 (19.8)	59 (35.3)
Concentrated by making the situation better	15 (9.0)	59 (35.3)	64 (38.3)	29 (17.4)
Got support and comfort from my family and friends	13 (7.8)	60 (35.9)	67 (40.1)	27 (16.2)
Tried to see the good side (positive side) of the situation.	8 (4.8)	85 (50.9)	54 (32.3)	20 (12.0)
Accepted the situation and learning to live with it	15 (9.0)	82 (49.1)	49 (29.3)	21 (12.6)
Made fun of the situation	37 (22.2)	30 (18.0)	91 (54.5)	9 (5.4)
Tried to find comfort in my religion	17 (10.2)	55 (32.9)	53 (31.7)	42 (25.1)

n = 167, Cronbach's alpha = 0.703

About one-third of the respondents 53 (31.7%) admitted to using drugs and alcohol to help them get through the effect of COVID-19. Majority 125 (74.9%) cope by working on other activities to get their mind off things. While about one-third 53 (31.8%) refused to believe that COVID-19 actually does exist, majority 155 (92.8%) agreed to taking deliberate actions to prevent COVID-19 infection. Majority of respondents cope by getting support from family and friends, only less than one –tenth 13 (7.8%) usually do not get such support.

TABLE 25: COPING STRATEGIES OF RESPONDENT WITH COVID-19 (NFHWs)

Variable	I usually don't do this Freq (%)	I do this alot Freq (%)	I usually do this moderately Freq (%)	I have been doing this alot Freq (%)
Worked on other activities	67 (20.1)	137 (41.1)	81 (24.3)	46 (13.8)
Refused to believe that the corona virus or the COVID-19 disease actually exists	255 (76.6)	45 (13.5)	24 (7.2)	8 (2.4)
Used alcohol and drugs to help me get through it.	264 (79.3)	30 (9.0)	25 (7.5)	14 (4.2)
Took deliberate steps/action to ensure that I am not infected	37 (11.1)	116 (34.8)	126 (37.8)	54 (16.2)
Concentrated by making the situation better	29 (8.7)	125 (37.5)	131 (39.3)	48 (14.4)
Got support and comfort from my family and friends	35 (10.5)	119 (35.7)	132 (39.6)	47 (14.1)
Tried to see the good side (positive side) of the situation.	24 (7.2)	151 (45.3)	75 (22.5)	83 (24.9)
Accepted the situation and learning to live with it	28 (8.4)	181 (54.4)	75 (22.5)	48 (14.4)
Made fun of the situation	97 (29.1)	100 (30.0)	113 (33.9)	23 (6.9)
Tried to find comfort in my religion	30 (9.0)	105 (31.5)	71 (21.3)	127 (38.1)

n = 333, Cronbach's alpha = 0.703

Slightly above one-third 127 (38.1%) of respondents have been trying to find comfort in their religious or spiritual belief while 100 (30.0%) of respondents makes fun of the situation. Majority 304 (91.3%) cope by accepting the situation and learning to live with it whereas nearly one-quarter 69 (20.7%) cope by using alcohol and drugs to help them get through. A higher proportion 126 (37.8%), 131 (39.3%) and 132 (39.6%) usually takes deliberate actions to prevent infections, concentrate to make situation better and getting support from family and friends respectively as a way of coping with COVID-19 pandemic.

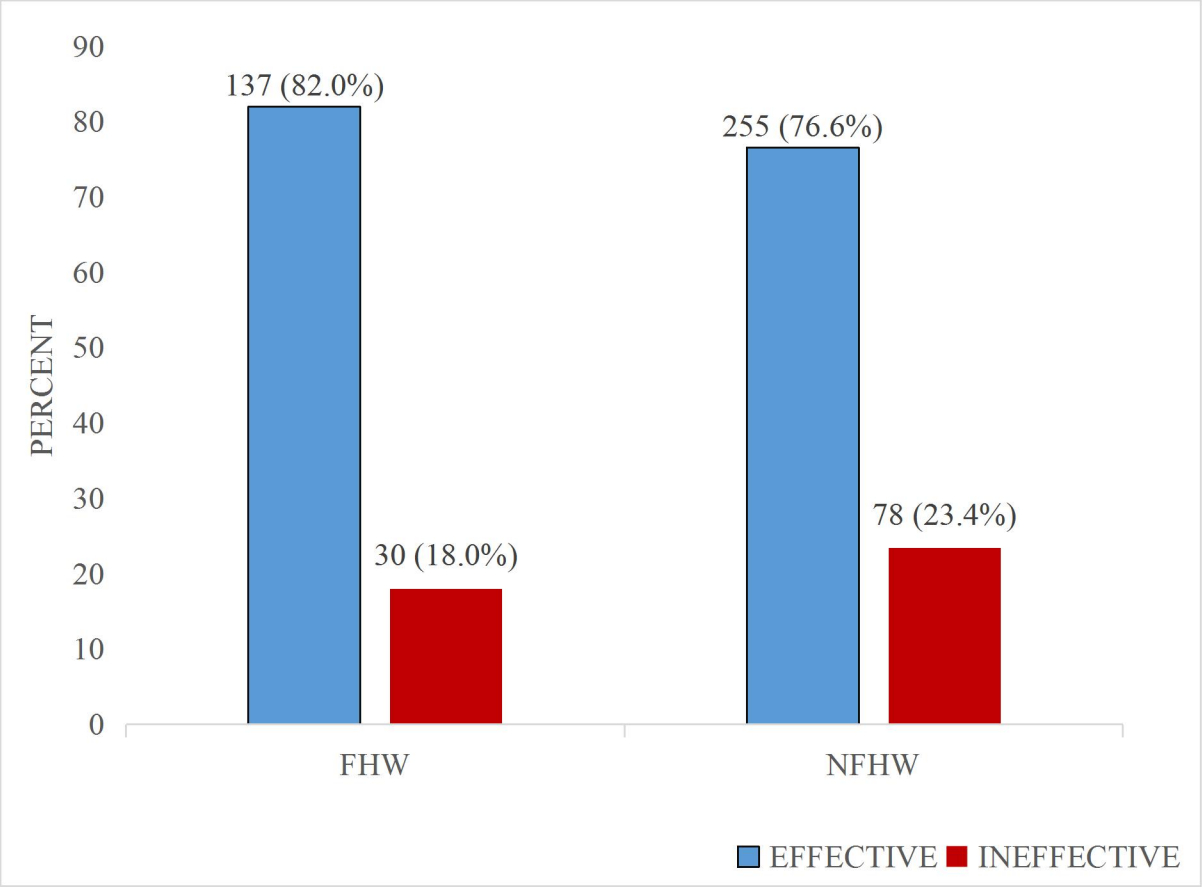

FIGURE 3: COPING STRATEGIES OF RESPONDENTS WITH COVID-19

Coping strategies with COVID-19 was effective in majority 137 (82.0%) and 255 (76.6%) of frontline and non-frontline health workers respectively, and the difference was not statistically significant ($p = 0.162$).

TABLE 26: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND COPING STRATEGIES WITH COVID-19

Variable	Coping strategies			
	FHW		NFHW	
	Effective (n=137) Freq (%)	Ineffective (n=30) freq (%)	Effective (n=255) freq (%)	Ineffective (n=78) freq (%)
Age group (years)				
20 – 29	11 (8.0)	2 (6.7)	26 (10.2)	4 (5.1)
30 – 39	90 (65.7)	26 (86.7)	107 (42.0)	40 (51.3)
40 – 49	33 (24.1)	1 (3.3)	114 (44.7)	30 (38.5)
50 – 59	3 (2.2)	1 (3.3)	8 (3.1)	4 (5.1)
	Fisher's exact = 8.198, p = 0.029			**χ^2 = 4.074, p = 0.254**
Sex				
Female	102 (74.5)	10 (33.3)	117 (45.9)	37 (47.4)
Male	35 (25.5)	20 (66.7)	138 (54.1)	41 (52.6)
	χ^2 = 18.839, p <0.001			**χ^2 = 0.058, p = 0.810**
Marital status				
Married	115 (83.9)	23 (76.7)	201 (78.8)	66 (84.6)
Single	20 (14.6)	7 (23.3)	37 (14.5)	4 (5.1)
Separated/ Divorced	2 (1.5)	0 (0.0)	12 (4.7)	6 (7.7)
Widowed	0 (0.0)	0 (0.0)	5 (2.0)	2 (2.6)
	Fisher's exact = 1.622, p = 0.515			**χ^2 = 5.609 , p = 0.132**
Religion				
Christianity	128 (93.4)	28 (93.4)	231 (90.6)	73 (93.6)
Islam	7 (5.1)	1 (3.3)	21 (8.2)	4 (5.1)
ATR	2 (1.5)	1 (3.3)	3 (1.2)	1 (1.3)
	Fisher's exact = 1.051, p = 0.644		**Fisher's Exact = 0.833, p = 0.646**	
Ethnicity				
Benin	51 (37.2)	13 (43.3)	111 (43.5)	33 (42.3)
Esan/Etsako	45 (32.8)	9 (30.0)	94 (36.9)	23 (29.5)
Yoruba	20 (14.6)	2 (6.7)	22 (8.6)	6 (7.7)
Igbo	13 (9.5)	3 (10.0)	13 (5.1)	10 (12.8)
Others	8 (5.8)	3 (10.0)	15 (5.9)	6 (7.7)
	Fisher's Exact = 2.130, p = 0.695			**χ^2 = 6.475, p = 0.166**

A higher proportion 90 (65.7%) of frontline health workers with effective coping strategy were within age group 31 – 39 years compared to 114 (44.7%) of non-frontline health workers who also had effective coping strategy but were within age group 41 – 49 years. The association between coping strategy and age was statistically significant among frontline health workers (p = 0.029) compared to non-frontline health workers (p = 0.354).

Majority 102 (74.5%) of frontline health workers who had effective coping strategy were females compared to 117 (45.9%) NFHWs females who had effective coping strategies. Male NFHWs accounted for the highest proportions 138 (54.1%) and 41 (52.6%) of respondents with effective and ineffective coping strategies respectively compared male FHWs counterpart constituted a greater proportion of 35 (25.5%) and 20 (66.7%) of those with effective and ineffective coping strategies. The association between coping strategies and sex of frontline health workers was statistically significant (p= 0.001) compared to NFHWs (p= 0.810).

There was no significant statistical association between coping strategy and marital status, religion and ethnicity though higher proportions of respondents with effective and ineffective coping strategies were married, Christians and bini by tribe.

TABLE 27: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS AND COPING STRATEGIES WITH COVID-19

Variable	Coping strategies			
	FHW		NFHW	
	Effective (n=137) Freq (%)	Ineffective (n=30) freq (%)	Effective (n=255) freq (%)	Ineffective (n=78) freq (%)
Level of education				
Primary	19 (13.9)	6 (20.0)	22 (8.6)	3 (3.8)
Secondary	23 (16.8)	13 (43.3)	67 (26.3)	22 (28.2)
Tertiary	95 (69.3)	11 (36.7)	166 (65.1)	53 (68.0)
		χ^2 = 2.803, p = 0.002		**χ^2 = 1.976, p = 0.372**
Monthly income (₦)				
< 50,000	5 (3.6)	0 (0.0)	1 (0.4)	0 (0.0)
50,000 – 99,999	52 (38.0)	8 (26.7)	232 (91.0)	73 (93.6)
100,000 – 149,999	39 (28.5)	3 (10.0)	22 (8.6)	5 (6.4)
≥ 150,000	41 (29.9)	19 (63.3)	0 (0.0)	0 (0.0)
		χ^2 = 12.950, p = 0.005		**Fisher's exact = 0.712, p = 0.725**
Work experience (years)				
< 5	13 (9.5)	4 (13.4)	37 (14.5)	4 (5.1)
5 – 9	57 (41.6)	13 (43.3)	38 (14.9)	18 (23.1)
≥ 10	67 (48.9)	13 (43.3)	180 (70.6)	56 (71.8)
		χ^2 = 0.534, p = 0.766		**χ^2 = 6.656, p = 0.036**

The proportion of respondents with effective coping strategy was observed to increase with increasing level of education with those who had tertiary level of education accounting for larger proportions 95 (69.3%) and 166 (65.1%) of those with effective coping strategy among frontline and non-frontline health workers respectively. The association between coping strategies and level of education was statistically significant for frontline health workers (p = 0.002) compared to (p= 0. 372) of NFHWs.

There was also a significant statistical association between coping strategies and monthly income among frontline health workers (p = 0.005) compared to NFHWs who earned between ₦50,000 – ₦ 99,000 and constituted the highest proportion 52 (38.0%) of those with effective coping

strategy while FHWs who earned ₦150,000 and above accounted for a higher proportion 19 (63.3%) of respondents with ineffective coping strategy. There was no significant statistical association between coping strategy of non-frontline health workers (p = 0.725) though majority 232 (91.0%) and 73 (93.6) of respondents with effective and ineffective coping strategies respectively earned between ₦50,000 – ₦99,999.

The proportion of respondents with effective coping strategy increased with increasing years of work experience among frontline and non-frontline health workers. FHWs with 10 or more years of experience accounted for higher proportions 67 (48.9%) of those with effective coping strategy compared to 180 (70.6%) of non-frontline health workers respectively. The association between coping strategy and work experience was not statistically significant for frontline health workers (p = 0.766) but was significant for non-frontline health workers (p = 0.036).

TABLE 28: KNOWLEDGE, ATTITUDE AND MENTAL HEALTH STATUS OF RESPONDENTS AND COPING STRATEGIES WITH COVID-19

Variable	Coping strategies			
	FHW		NFHW	
	Effective (n=137) Freq (%)	Ineffective (n=30) freq (%)	Effective (n=255) freq (%)	Ineffective (n=78) freq (%)
Knowledge				
Good	118 (86.1)	27 (90.0)	149 (58.4)	42 (53.8)
Poor	19 (13.9)	3 (10.0)	106 (41.6)	36 (46.2)
		$\chi^2 = 0.322$, p = 0.570		**$\chi^2 = 0.513$, p = 0.474**
Attitude				
Positive attitude	107 (78.1)	27 (90.0)	228 (89.4)	56 (71.8)
Negative attitude	30 (21.9)	3 (10.0)	27 (10.6)	22 (28.2)
		$\chi^2 = 2.197$, p = 0.138		**$\chi^2 = 14.771$, p < 0.001**
Mental health status				
Affected	148 (89.1)	3 (10.0)	66 (25.9)	9 (11.5)
Not affected	19 (10.9)	27 (90.0)	189 (74.1)	69 (88.5)
		$\chi^2 = 0.023$, p = 0.879		**$\chi^2 = 7.043$, p = 0.008**

Larger proportions 118 (86.1%) of frontline health workers with effective coping strategies had good knowledge compared to 149 (58.4%) non-frontline health workers. About 27 (90.0%) of FHWs who had ineffective coping strategies had good knowledge compared to 42 (53.8%) of NFHWs. However, the association between coping strategy and knowledge was not statistically significant (p = 0.570 and 0.474 for frontline and non-frontline health workers respectively).

There was a significant statistical association between coping strategies and attitude among non-frontline health workers as majority 228 (89.4%) of respondents with effective coping strategy had positive attitude compared to 107 (78.1%) FHWs. Less than half 56 (71.8%) of the NFHWs who had ineffective attitude (p < 0.001) had good knowledge and positive attitude compared to 27 (90%) FHWs. The association was however not statistically significant for FHWs (p = 0. 138)

Majority 189 (74.1%) of non-frontline health workers with effective coping strategy were not affected by COVID-19 compared to 19 (10.9%) of FHWs. This association was statistically

significant (p = 0.008) though the mental health status of majority 148 (89.1%) of frontline health workers with effective coping strategy was affected as compared to 66 (25. 9%) of NFHWs with effective coping strategy, the association was however statistically significant (p = 0.008).

TABLE 29: PREDICTORS OF COPING STRATEGIES OF RESPONDENTS

Predictors	B (regression co-efficient)	P-value	Odds ratio	95% CI for OR	
				Lower	Upper
FHWs					
Level of education	1.062	0.155	1.127	0.561	2.265
Work experience (years)					
10	-0.310	0.428	0.734	0.341	1.577
< 10*	1				
Knowledge	0.034	0.903	1.035	0.594	0.520
Attitude	-1.375	0.039	0.253	0.128	0.500
NFHWs					3.056
Level of education	-0.242	0.727	0.785	0.202	
Work experience (years)					
≥ 10	0.017	0.987	1.017	0.134	7.733
<10*		-0.279	0.756	0.274	2.088
Knowledge	0.569	0.448	1.766	0.406	7.690
Attitude	0.813	0.268	2.255	0.534	9.514

***Reference category, R^2 = 13.5 % - 22.1%, CI= Confidence Interval.**

FHWs with effective coping with COVID-19 increased by 1.602 compared to -0.242 with odds ratios 1.127 and 0.785 for frontline and non-frontline health workers respectively. This was however not statistically significant (p = 0.737 and 0.804 respectively).

Frontline health workers with 10 or more years of experience were -0.310 times less likely to cope effectively compared to those with lesser years of experience while non-frontline health workers with 10 or more years of work experience were 0.017 times more likely to cope effectively compared to those with less experiences. This was however not statistically significant (p = 0.428 and 0.017 for frontline and non-frontline health workers respectively). Similarly, frontline health workers with good knowledge were 0.034 times less likely to cope effectively while non-frontline health workers with good knowledge were 0.569 times more

likely to cope effectively compared to those with poor knowledge. This was also not statistically significant (p = 0.903 and 0.448 respectively).

Non-frontline health workers with positive attitude were 3 times more likely to have effective coping strategy compared to those with negative attitude. This was not statistically significant (p = 0.268) compared to frontline health workers with positive attitude who were 1.375 times less likely to cope effectively and this was not statistically significant (p = 0.039).

Being affected mentally by COVID-19 increased the likelihood of coping effectively by 1.875 and 0.813 with odds ratios 0.253 and 2.255 for frontline and non-frontline health workers respectively. This was however statistically significant for non-frontline health workers (p = 0.039).

CHAPTER 5

DISCUSSION

Healthcare workers are at the front line of any given pandemic and risk their lives in the line of duty. HCWs were under huge stress not only during the pandemic, but they can also suffer from long-term psychological consequences. This was evident with the SARS outbreak and most recently with the Ebola virus outbreak.[15]

Since the outbreak of the novel coronavirus, there has been widespread and unfolding mental crisis globally.[17] Consequent to this, most HCWs were affected mentally by COVID-19 due to several factors.[13,14] This study documented the effect of COVID-19 on the mental health status HCWs in University of Benin Teaching Hospital (UBTH).

This study was dominated by age group 31 – 39 years and this was statistically significant. A possible reason may be due to the risk stratification of staffs using age groups and health status during the COVID-19 pandemic guidelines to protect HCWs. This was in consonance with a study done at UBTH on risk-stratification of HCWs into different categories.[32]

This is also in keeping with findings from a similar study conducted in 2020 to assess risk exposure to COVID-19 pandemic among HCWs in Ethiopia where HCWs within 35– 44 years of age were less likely to be infected with COVID-19 infection than those aged 18–24 years.[34,57] This was done to circumvent danger in the healthcare system. Standards of practice should be designed by health organizations for implementation of better health practices.

A statistically significant difference was observed as majority of the frontline health workers were females compared to non-frontline health workers who were males. An overwhelming majority of the respondents in both categories practiced Christianity. This may be a reflection of

the location of the study area with Christianity being the main religion in the southern part of Nigeria.

The major ethnic group of respondents was Benin as was reflected in the social demographic distributions of the respondents. This may be a representation of the locality of the respondents. There was however a mix of other ethnic groups like Esan, Etsako, Igbo, Yoruba, Urhobo, Yoruba, Itsekiri, Hausa, Igbira, Ika and Ijaw. The reason for this distribution can be linked to ethnic distribution across the different geographical locations in Edo state and Nigeria in general.

Majority of the FHWs had tertiary level of education compared to NFHWs, who had secondary and tertiary level of education. This is in consonance with the minimum educational requirement of secondary school leaving certificate for gainful employment in federal government organizations in Nigeria. This is in keeping with findings obtained from a similar study conducted in 2020 in a tertiary health facility in South-Eastern Nigeria.[13,34]

The average monthly income of majority of NFHWs was low compared to frontline health workers who earned significantly higher. This might be due to the length of years spent in training for a professional course and the statutory pay scale design.

Almost half of frontline health workers had more than 10 years of work experience compared to majority of non-frontline health workers with similar years of work experience. Although work experience was not significant in this study, it has a significant association with a study done to assess the vaccine uptake of COVID-19 among HCWs in Nigeria where participants who had work experience of 3–5 years, and 6–10 years of age, were less likely to develop symptoms of depression, compared to a participant who had two and fewer years of work experience.[15]

Awareness and knowledge of COVID-19 pandemic was found to be above average among both categories. This is similar to findings from a study conducted in 2020 in West Africa, Ghana which showed a strong correlation between knowledge and utilization of the knowledge in preventing COVID-19 infection.[65]

Television, radio and the internet were the most frequently reported sources. This is in contrast with a similar study done in Wuhan, China where affiliated health care professionals were more likely than the general public, but less likely than frontline health care professionals, to receive information regarding COVID-19 from formal education and medical professionals.[65] This finding supports the ever-increasing importance of the role of the media in informing the general populace about health, health related issues and events.

Information passed across through the media will thus enable the populace to make informed decisions on health and health related matters however, getting information from the internet, television and radio especially about health and disease is not advisable as various falsehoods and unverified information lacking scientifical backing could be disseminated through such channels of mass communication and this could have a negative impact.

Hence, there is an urgent need for health facilities to strengthen their information dissemination strategies to the public since it is obvious that people watch televisions and listen to the radios, health facilities should consider disseminating information through these means.

Overall knowledge of COVID-19, its causative organism, route of transmission and preventive measures were higher among FHWs than NFHWs. This is similar to a web-based study carried out in Nigeria in 2020 where the overall knowledge of COVID-19 was found to be high.[62] This is appreciable as respondents with good knowledge are more likely to take precautions and adhere

to known preventive measures available for a disease entity. Several factors, including the fact that COVID-19 was a new, ambiguous virus, no one knew its potential effects on the human body, and whether it would cause death or have long-term effects.

Moreover, the huge media campaign about the disease and its effects had a greater effect on elevating the level of psychological distress. Hence, the onus is on the health management to update her knowledge and that of her workers on this novel virus or disease entities from health organization manuscripts.

A good proportion of the respondents know the symptoms of COVID-19. This is similar to a study carried out in Kenya and United States of America (USA) where awareness of fever and dry cough, headache were the top three symptoms of COVID-19, with 86% and 82% of respondents correctly identifying these symptoms respectively.[40]

The findings from this study are of public health significance because people who know about the symptoms of COVID-19 would be able to recognize the symptoms in themselves and in others. Such individuals would self-isolate when they come down with the symptoms of the disease and seek medical attention promptly. This would prevent complications and reduce morbidity and mortality from the disease. These reasons emphasize the need for improvement in information dissemination to the respondents and general public.

Majority of frontline health workers had positive attitude towards COVID-19 compared to a higher proportion of non-frontline health workers with positive attitude. Negative attitude was higher among frontline health workers than in non-frontline health workers. There was statistically significant difference in the attitude of frontline and non-frontline health workers. This might be due to work experiences and protective behaviour of FHWs.

This is similar to a study done in United States of America (USA) to assess the risk perception of HCWs.[80] This is attributable to the fact that they were trained and practiced Infectious Control protocol. Health facilities should enhance the training of staffs for better preparedness for pandemics.

With increasing age, respondents with positive attitudes increased. The association between attitude, age and knowledge was significant among frontline health workers contrary to that of the non-frontline health workers. This may be explained by the work experiences and knowledge garnered over the years. This is consistent with a study done in Wuhan, China where majority of the respondents with positive attitude had good knowledge.[65]

Female respondents constituted the largest proportion of frontline health workers with positive attitude compared to non-frontline health workers where higher proportion of those with positive attitude were males. The association between attitude and sex among frontline and non-frontline health workers was not significant.

This is in keeping with a study conducted in Singapore and Hong Kong where females were more likely to adhere to precautionary behaviours during SARS than male[2] similarly, women in the United Kingdom were found to practice precautionary behaviours such as hand washing, sanitizing, wearing of facemasks and disinfecting surfaces more often than males.[2,16] Preventive measures which is one of the tripods of public health should be taught to health care workers to help reduce the prevalence of diseases.

This study found that the knowledge of COVID-19 was significantly affected by the respondents' level of education. FHWs with tertiary level of education had good knowledge of COVID-19 compared to NFHWs with secondary and tertiary level of education who had good

knowledge of COVID-19 as well. This is probably because they were more exposed to information regarding the disease by virtue of working in a health facility.

Similar findings were noticed in a study carried out in Saudi Arabia where most of the respondents with good knowledge of COVID-19 were found to have tertiary level of education.[51]Also, a study done in India reported that educational attainment and awareness was associated with less psychological distress, possibly due to better coping strategies and better access to social support systems.[84]

With increasing age, respondents with positive attitudes increased. The association between attitude, age and knowledge was significant among frontline health workers contrary to that of the non-frontline health workers. This may be explained by the work experiences and knowledge garnered over the years. This is consistent with a study done in Wuhan, China where majority of the respondents with positive attitude had good knowledge.[65]

There was a significant association between attitude and marital status of non-frontline health workers as majority of respondents with positive attitude were married compared to respondents who were widowed accounted for the least proportion of those with positive attitude. The association was not statistically significant.

This might be attributed to support and companionship that comes from been married. This is in keeping with a study done in India where marriage and having a supportive partner were found to protect against Post-Traumatic Stress Symptoms (PTSD) when working in unfavorable environments during the pandemic.[84]

Religion and ethnicity did not show any strong correlation with attitude among frontline and non-frontline health workers though majority of respondents with positive and negative attitudes in both categories of respondents were Christians and Benin and Esan/Etsako.

This cannot be explained because some of the coping strategies of respondents include faith, trusting God and praying compared to non-frontline health workers who resorted to making jokes, using alcohol and drugs. This is in contrast with studies done in Nepal where religion and ethnicity played a major role in attitude.[53]

Frontline health workers with 10 or more years of work experience were more likely to have positive attitude compared to those with less than 10 years of work experience. On the contrary, non-frontline health workers with 10 or more years of work experience were less likely to have positive attitude compared to those with less than 10 years of experience.

Positive attitude, and practice is likely, because at the time of this study, the pandemic has already gained immense importance and various measures have been taken to increase awareness among people. Also, this might not be the first pandemic or epidemic they are witnessing.

Findings unveiled that frontline health workers who tested for positive to COVID-19 were compared to non-frontline health workers who had tested for COVID-19 were positive. The difference between frontline and non-frontline health workers who tested for COVID-19 and test outcome was significant.

This is attributed to their high risk of infection because of their close, frequent contact with and working longer hours than usual in patient's care and management. The finding was similar study in UBTH on the risk perception and precautionary measures of COVID-19.[34] Under-staffed health facilities can employ more workers rather than over-working HCWs as this will

improve shift routines. Also, provision of PPEs by health facility and the enforcement of its use will help improve the outcome of contracting COVID-19 and reduce prevalence.

From this study, it was found that typical mental disorders (depression and anxiety), psychological distress and PTSD were the major mental health manifestations of the COVID 19 pandemic. Majority of the respondents stated they were feeling unhappy and depressed as well as losing confidence in themselves much less than usual.

This is because HCWs have a greater sense of responsibility that comes with having a family and the fear that they may spread the infection to their loved ones, especially the more susceptible members of the family. This study also yielded high levels of stress among FHWs, compared to the NFHWs. This is consistent with studies done in India, Pakistan, China and United States of America (USA) reporting more than 70% of HCWs to have experienced psychological distress, burn out, anxiety and insomnia.[41,65,80,84]

Distress may be due to feelings of vulnerability and concerns about health of self, spread of the virus, health of family and others, lack of definitive treatment for the virus, increased workload, overwhelming media news, and stigmatization. This is in line with a study on MERS where safety was found to be the main concern for HCWs. Stress levels were highest among doctors while most nurses had moderate stress.[7]

The absence of an effective treatment for the COVID-19 illness increases the emotional burden of caring for infected patients. Physicians treating COVID-19 patients have had to cope with the difficulty of caring for often severely ill individuals with few options to propose. In addition, they have had to keep up with emerging knowledge and information and follow the rapidly changing recommendations and institutional policies.

FHWs have also been faced with marginalization in the community compared to NFHWs. HCWs have previously reported societal stigmatization and avoidance due to working directly with infected individuals during the SARS epidemic.[80] One study found that FHWs feeling higher levels of negative stigma in the community were more likely to report PTSD and alcohol use disorder symptoms.

Similarly, a few proportion of respondents have been feeling reasonably happy all things considered as same as usual. However, very lower proportions have been enjoying their day-to-day activities and able to face up to their problems respectively much less than usual. This is attributed to the increase in risk of contracting a novel virus which was undergoing research for cure. This is in keeping with a study done in India were depression and anxiety was high.[22] Future psychological intervention providers should pay more attention to HCWs on a priority basis.

The mental health status of frontline health workers was affected by COVID-19 compared to non-frontline health workers that were affected, and the difference was significant. Firstly, this is attributable to FHWs having the most exposure risk and having seen first-hand the effects of SARS-CoV-2 on patients, fear of being infected themselves and transmitting to their colleagues, other patients, friends, and family.

Much like SARS-CoV-2, during the SARS-CoV pandemic, a greater disease exposure was associated with higher stress levels.[18,26] Secondly, Personal Protective Equipment (PPE) is often double layered and uncomfortable. They must be worn for several hours on end without eating, drinking, or using the toilet. Many become dehydrated from excessive sweating and develop skin conditions from excessive hand cleaning. In the case of PPE shortages, their risk of infection increases dramatically.

Thirdly, due to the high morbidity and mortality associated with the disease, in addition to the reported unpredictable nature of deterioration, medical workers experience feelings of helplessness. The presence of respiratory symptoms such as sore throat, breathlessness, or cough, as well as other systemic symptoms of myalgia and lethargy may raise HCWs' fear of SARS-CoV-2 infection. HCWs may feel conflicted between self-isolating for further testing or continuing to work along- side their colleagues, especially if they are under-staffed.

This dilemma could result in anxiety, distress, insomnia and burnout. These findings are in consonance with a study conducted in Birmingham, United Kingdom.[33]A public health significance is better preparedness and training for health events and disasters by the health management to ensure safety of HCWs. These could be through the provision of adequate PPEs, standard protocols posted on all walls for wider views and flexible shift routines.

Mental health status was significantly affected by COVID-19 with increasing age in FHWs compared to non-frontline health workers. The association between mental health status and age was not significant however, from this study, this might be attributed to longer years of work experience hence, they have adjusted over time. Age 31 – 39 years FHWs were more likely to suffer psychological consequences during outbreaks. The additional responsibilities associated with this age bracket was deemed responsible for mental health setbacks.

A high fraction of affected frontline health workers were females compared to a much lower proportion of female non-frontline health workers whose mental health status were affected. Male respondents accounted for a slightly higher proportion of affected NFHWs. There was no significant correlation between mental health status and sex of respondents. Marital status and religion were not significantly associated with mental health status of respondents.

This may indicate that women may be more vulnerable to environmental stressors, especially in the context of epidemics. On the other hand, part of the cause of the higher prevalence of the symptoms in females can be due to changes in the levels of hormones in them during exposure to these stressful environmental conditions.

Females were more predisposed owing to their psychological constitution, others reported that men suffered greater owing to the nature of their work, bringing them in closer contact with suspected cases. Another part may be related to the probable further negative cognitive changes among females in this situation as mental health disease is no respecter of sex, religion and marital status.

It affects everyone however support from an individual's faith and spouse can make a difference and improve the outcome. This is consistent with a study done in Iran.[63] Limited working hours and a reduced patient load should be implemented whenever possible. Increasing support from management tiers of the healthcare establishment and providing easy and direct access to updated information to employees may reduce anxiety and depression levels.

The proportion of affected respondents was noticed to increase with level of education as those with tertiary level of education accounted for the highest proportions of affected frontline and non-frontline health workers respectively. The association between mental health status and level of education was significant among frontline health workers compared to non-frontline health workers which did not show any significance.

The reason for this could be the level of good knowledge the FHWs have; NFHWs might have been influenced by their workplace i.e. the health facility. Frontline health workers who earned more had the highest proportions of affected and unaffected subjects respectively whereas non-

frontline health workers who earned low constituted the highest proportions of affected and unaffected subjects respectively.

There was however no strong correlation between mental health status of respondents and monthly income. This could be because the income is not commensurate to the workload, stress and burnout that comes from the job. Incentives by health management can be a motivating factor hence there could be an upscaling in the salary pay scale.

There was a significant statistical association between the mental health status and attitude of non-frontline health workers as those with positive attitude accounted for the majority of affected and unaffected subjects respectively. Among frontline health workers, respondents who had positive attitude also accounted for majority of affected and unaffected subjects respectively but this was however not significant.

Female non-frontline health workers were less likely to be affected compared to frontline females. This was not significant. It is as in contrast with a study done in Wuhan, China where sex was not a determinant of mental health affectation.[22] Frontline health workers with good knowledge are more likely to be affected compared to non-frontline workers with good knowledge. This was also not significant.

The mental health status of respondents with positive attitude was more likely to be affected, and this was significant for non-frontline health workers. Few respondents admitted to using drugs and alcohol to help them get through the effect of COVID-19. Majority cope by working on other activities to get their mind off things.

While others refused to believe that COVID-19 actually does exist, majority agreed to taking deliberate actions to prevent COVID-19 infection.

Majority of respondents cope by getting support from family and friends, only lesser proportions usually do not get such support. This might be attributed to greater psychological stress among FHWs due to their direct contact with patients and colleagues that have become ill with COVID-19. FHWs may also experience elevated anxiety in relation to a constant pressure to perform their duties in the face of adversity.

This is in contrast to a study done in Scotland where there was significantly increased risk of hospitalization for COVID-19 in household members of FHWs. Slightly few proportions of respondents have been trying to find comfort in their religious or spiritual belief while some of the respondents makes fun of the situation. This resonates with a study done in Palestine among HCWs. Their passion to serve humanity and commitment to their profession was a primary motivation to continue to work due to their religion.[35]

Majority cope by accepting the situation and learning to live with it whereas others cope by using alcohol and drugs to help them get through. A higher proportion of respondents usually take deliberate actions to prevent infections, concentrate to make situation better and getting support from family and friends respectively as a way of coping with COVID-19 pandemic.

Due to this risk, FHWs chose to remain separated from their families and friends to reduce the risk of infection. Isolation from the social circle, which generally represents a source of comfort and support, significantly increases psychological pressure on these individuals. The risk of burnout in FHWs was significantly more elevated in individuals that chose to move out of their family homes while doing frontline work.[82]

A higher proportion of FHWs with effective coping strategy were within age group 31 –39 years compared to NFHWs who also had effective coping strategy but were within age group 41 – 49

years. The association between coping strategy and age was significant among frontline health compared to non-frontline health workers.

This might be attributed to the several years of experience of the FHWs; as they have identified and developed coping strategies through their years of experience. This is similar to a study done in Kenya.[40] A public health importance is the acknowledgement of HCWs by their families and the communities through appreciation rather than marginalization.

Majority of frontline health workers who had effective coping strategy were females compared to their male counterpart constituted a greater proportion of those with ineffective coping strategy. The association between coping strategies and sex of frontline health workers was significant. Among the non-frontline health workers, males accounted for the highest proportions of respondents with effective and ineffective coping strategies respectively.

This association was however not significant but might be attributed to the fact that females are more emotional, are at high risk for mental health problems and seeks for help by opening up while males wallow in their psychological distress due to ego. This could also be linked to the fact that most females were married and had supportive spouses and males were cumbered with family responsibilities to provide this emotional support to their families coupled with their work duties hence, they are under pressure.

Hence, female FHWs were 4 times more likely to have effective coping strategy. Similarly, female non-frontline health workers were more likely to have effective coping strategy. A public health program is the provision of support groups to these vulnerable individuals.

There was no significant statistical association between coping strategy and marital status, religion and ethnicity though higher proportions of respondents with effective and ineffective

coping strategies were married, Christians and Bini by tribe. This might be attributed to the warmth, security, assurance and companionship, marriage, ethnicity and religion affords.

The proportion of respondents with effective coping strategy was observed to increase with increasing level of education with those who had tertiary level of education accounting for larger proportions of those with effective coping strategy among frontline and non-frontline health workers respectively. The association between coping strategies and level of education was significant for frontline health workers only.

The proportion of respondents with effective coping strategy increased with increasing years of work experience among frontline and non-frontline health workers as respondents with 10 or more years of experience accounted for higher proportions of those with effective coping strategy among frontline and non-frontline health workers respectively. The association between coping strategy and work experience was not significant for frontline health workers but was significant for non-frontline health frontline health workers.

Larger proportions of frontline health workers with effective and ineffective coping strategies respectively had good knowledge. Similar trend was noted among non-frontline health workers, however, the association between coping strategy and knowledge was not statistically significant. there is no explanation to this.

There was a significant correlation between coping strategies and attitude among non-frontline health workers as majority of respondents with effective coping strategy had positive attitude as against with ineffective coping. Though similar findings were observed among frontline health workers, the association was however not statistically significant. this could be attributed to individual characteristics or personalities.

Majority of non-frontline health workers with effective coping strategy were not affected by COVID-19 as opposed to those with ineffective coping strategy that were affected. This association was statistically significant. this might be due to

With increasing level of education, the likelihood of effectively coping with COVID-19 increased and decreased for frontline and non-frontline health workers respectively. This was however not statistically significant. With increasing monthly income, the probability of having effective coping strategy decreased among frontline and non-frontline health workers respectively. This was also not statistically significant.

Frontline health workers with 10 or more years of experience were less likely to cope effectively compared to those with lesser years of experience while non-frontline health workers with 10 or more years of work experience were more likely to cope effectively compared to those with less experiences. This was however not statistically significant.

Similarly, frontline health workers with good knowledge were less likely to cope effectively while non-frontline health workers with good knowledge were more likely to cope effectively compared to those with poor knowledge. This was also not statistically significant.

Non-frontline health workers with positive attitude were 3 times more likely to have effective coping strategy compared to those with negative attitude. This was statistically significant. On the contrary, frontline health workers with positive attitude were 0.5 times less likely to cope effectively and this was not statistically significant.

Being affected mentally by COVID-19 increased the likelihood of coping effectively for frontline and non-frontline health workers respectively. This was however statistically significant for non-frontline health workers.

CONCLUSION

This study revealed that respondents had overall good knowledge of COVID-19. Good knowledge was higher among FHWs than NFHWs.

Majority of respondents had positive attitude towards COVID-19, and it was observed to be higher among FHWs than NFHWs.

About half of the respondents tested positive to COVID-19. Positive test was higher in FHWs than NFHWs.

Higher proportion of the population were affected mentally. Negative mental health effect was noticed to be higher among FHWs compared to NFHWs. Domains such as depression, anxiety, PTSD and psychological distress were identified as areas responsible for the psychological symptoms.

Good knowledge of COVID-19, positive attitude towards COVID-19 and religion were predictors of coping styles among NFHWs while knowledge of COVID-19, attitude towards COVID-19, level of education and marriage were identified as predictors of coping styles of FHWs.

Maintaining the mental and physical health of FHWs is crucial for an effective response to a global pandemic. Increasing awareness of the intrinsic and environmental risk factors predisposing healthcare workers to adverse mental health outcomes is crucial to target interventions that are aimed at managing these conditions in future situations of extraordinary strain on healthcare systems.

RECOMMENDATIONS

It is noteworthy that mental health has not received adequate attention from the government despite its high burden. Based on the study findings, the following recommendations are put forward for improving the mental well-being of health workers in UBTH.

TO THE FEDERAL GOVERNMENT AND NON-GOVERNMENTAL ORGANIZATIONS

1. Intensify efforts in public health campaign to raise awareness on psychological effects of pandemics which are mostly negative to be mitigated, psychologists' involvement, and better education. Long-term follow-up is also required.
2. Changes at the policy makers' level to offer an enhanced variety of supports to HCWs who play a critical role during large-scale disease outbreaks e.g prevention of stigmatization.
3. Organizational measures for frontline institutions such as periodical monitoring or inclusion of psychologists specialized in crisis-management to prevent negative symptoms and provide timely support.

TO THE HEALTH MANAGEMENT AND HEALTH CARE WORKERS

1. Provision of an enabling work environment with a good support system, adequate availability of PPE, proper training of health workers on management of COVID-19, mental aid and crisis management and focus on incentives which boost their work morale.
2. Need for more significant psychosocial support and more explicit dissemination of disease-related information.

3. Employ adequate staffs to prevent burn-out among HCWs and reduce the number of working hours via shift routine.
4. Psychiatrists and clinical psychologists should assume leadership roles in order to safeguard the mental health of treating teams. Their expertise can be invaluable in the early identification and treatment of psychological issues that arise in their clinical colleagues. Medications, as well as psychological interventions like cognitive behavior therapy (CBT), can be offered to help those who come forward to seek support.
5. Workshops may be conducted for medical staff to prepare them for the psychological challenges associated with being on the frontlines of the epidemic.
6. Psychiatrists can screen personnel for psychological vulnerabilities before being deployed to especially stressful work environments.
7. Frontline staff must be identified and suitably upskilled with psychological first aid training and knowledge on coping strategies in order to be able to support co-workers showing early signs of distress.
8. A forum must be made available for medical personnel to voice their concerns surrounding the challenges of patient care. Peer support programs must be made available and accessible.
9. Guidelines must be put in place to ensure greater physical distancing and better personal hygiene at the workplace. Conducting meetings on online platforms should be encouraged as a step in the right direction.

TO THE INDIVIDUALS AND COMMUNITY

1. Individuals should continue to show cooperation and compliance with health workers and Ministry of health in containing pandemics.
2. Advocacy in the community is needed to encourage positive attitude towards prevention of pandemics.
3. Marginalization and stigmatization should be replaced with acknowledgements and appreciation.

REFERENCES

1. Dhama K., Khan S., Tiwari R., Sircar S., Bhat S., Malik Y.S., Singh K. P., Chaicumpa W., Bonilla-Aldana D. K., Rodriguez-Morales A. J. 2020. Coronavirus disease 2019–COVID-19. Clinical Microbiology Review. Available at: https://doi.org/10 .1128/CMR.00028-20. Accessed on 19th July, 2021.
2. Munawar K. and Choudhry F. R. Exploring stress coping strategies of frontline emergency health workers dealing COVID-19 in Pakistan. 2021. American Journal of Infection Control. Available at: https://doi.org/10.1016/j.ajic.2020.06.214 Accessed on 19th July, 2021.
3. Yingfai Z. and Ma Z. F. Impact of the COVID-19 Pandemic on Mental Health and Quality of Life among Local Residents in Liaoning Province, China. 2020; International Journal on Environmental Research. Public Health 2020. Available at : doi:10.3390/ijerph17072381 Accessed on 20th July, 2021.
4. Elimian K. O, Ochu C. L, Ilori E., Oladejo J., Igumbor E., Steinhardt L., Wagai J, Arinze C, Ukponu W., Obiekea C., Aderinola O., Crawford E., Olayinka A., Dan-Nwafor C., Okwor T., Disu Y., Yinka-Ogunleye A., Kanu N. E., Olawepo O. A., Aruna O., Michael C. A., Dunkwu L., Ipadeola O., Naidoo D., Umeokonkwo C. D., Matthias A., Okunromade O., Badaru S., Jinadu A., Ogunbode O., Egwuenu A., Jafiya A., Dalhat M., Saleh F., Ebhodaghe G. B., Ahumibe A., Yashe R. U., Atteh R., Nwachukwu W. E., Ezeokafor C., Olaleye D., Habib Z., Abdus-Salam I., Pembi E., John D., Okhuarobo U. J., Assad H., Gandi Y., Muhammad B., Nwagwogu C., Nwadiuto I., Sulaiman K., Iwuji I., Okeji A., Thliza S., Fagbemi S., Usman R., Mohammed A. A., Adeola-Musa O., Ishaka M., Aketemo U., Kamaldeen K., Obagha C. E., Akinyode A.O., Nguku P., Mba N., and

Ihekweazu C. Descriptive epidemiology of coronavirus disease 2019 in Nigeria, 2020. Epidemiology and Infection. 2020. Available at: https://doi.org/10.1017/ S095026882000206X . Accesed on 20th July, 2021.

5. Kwaghe A. V., Olayinka S., Okediran J., Utulu R., Balohun M. S., Amede P. Stigmatization, psychological and emotional trauma among frontline health care workers treated for COVID-19 in Lagos State, Nigeria: qualitative study. 2019 Available at: https://doi.org/10.21203/rs.3.rs-53453/v1. Accessed on: 19th July,2021.
6. Conti C., Fontanesi L., Lanzara R., Rosa I., and Porcelli P. Fragile heroes. The psychological impact of the COVID-19 pandemic on health-care workers in Italy (2020). PLoS ONE. Available from : https://doi.org/10.1371/journal.pone.0242538. Accessed on: 20th July, 2021.
7. Mallah S. I., Ghorab O. K., Al- Salmi S., Tharmaratnam O. S. A, Iskandar M. A., Sefen J. A. N., Sidhu P., Atallah B., El- Lababidi R., and Al- Qahtani M. COVID-19 : breaking down a global health crisis. Annals of Clinical Microbiology Antimicrobial. 2021. Available from: https://doi.org/10.1186/s12941-021-00438-7. Accesed on: 21st May, 2023.
8. Enenche F., Saleh A., Owoicho S., Abraham N., Jauro S., Madukaji L. Knowledge, attitude, and practice among healthcare workers towards COVID-19 outbreak in Nigeria. Heliyon 2020. Available from: https://doi.org/10.1016/j.heliyon.2020.e05557. Accessed on: 20th July, 2021.
9. Ali H., Cole A., Ahmed A., Hamasha S., and Panos G. Major Stressors and Coping Strategies of Frontline Nursing Staff During the Outbreak of Coronavirus Disease 2020 (COVID-19) in Alabama. Journal of Multidisciplinary Healthcare. 2020 Healthcare

2020. Available from https://www.dovepress.com/102.89.2.160. Accessed on: 17th March, 2023.

10. World Health Organization (WHO) 31st January, 2021. COVID 19 weekly Epidemiological update. Available from: https://www.who.docs/. Accessed on: 31st August, 2021.
11. Ogboghodo E.O., Osaigbovo I.I., Obarisiagbon O.O., Okwara B.U., Obaseki D.E., Omo-Ikirodah O.T., Ehinze E.S, Adio F., Nwaogwugwu J.C., and Eseigbe E.F. Facility-Based Surveillance Activities for COVID-19 Infection and Outcomes among Healthcare Workers in a Nigerian Tertiary Hospital. 2021; The American Society of Tropical Medicine and Hygiene. Available from : doi:10.4269/ajtmh.20-1402. Accessed on: 20th May, 2023.
12. Shi C., Guo Z., Luo C., Lei C., and Li P. The Psychological Impact and Associated Factors of COVID-19 on the General Public in Hunan, China. Risk Management and Healthcare Policy. 2020:13 3187–3199 Available from : https://www.dovepress.com/82.145.223.152. Accessed on: 20th July, 2021.
13. Anozie O.B., Nwafor J.I, Nwokporo E.I., Esike, C.U., Ewah R.L., Eze J.N., Azuogu B.N., and Ukaegbe C.I.. Mental Health Impact of COVID-19 Pandemic on Health Care Workers in Ebonyi State, Southeast, Nigeria. International Journal of Innovative Research in Medical Science. 2020. Available from : DOI: 10.23958/ijirms/vol05-i09/955. Accessed on: 20th July, 2021.
14. World Health Organization (WHO). COVID Prevalence 27 June, 2020. Available from: https://covid19.who.int/ . Accessed on: 29th July, 2021.
15. World Health Organization (WHO). 19 March 2021. Nigerian health workers take

country's first COVID-19 vaccine. Available from: https://www.afro.who.int/news/nigerian-health-workers-take-countrys-first-covid-19-vaccine. Accessed on: 29th July, 2021.

16. Muhammad S., Zafar A., Tahir M.J., Malik M., Malik M.I., Akhtar F.K. and Ghazala R. Awareness, anxiety, and depression in healthcare professionals, medical students, and general population of Pakistan during COVID-19 Pandemic. Medical Journal of the Islamic Republic of Iran (MJIRI) 2020. Available at : https://doi.org/10.34171/mjiri.34.131. Accessed on: 30th August, 2021.
17. Olashore A.A., Akanni O.O., and Oderinde K.O. Neuroticism , resilience , and social support : correlates of severe anxiety among hospital workers during the COVID-19 pandemic in Nigeria and Botswana. British Medical Council Health Services Research 2021. Available from : https://doi.org/10.1186/s12913-021-06358-8. Accessed on: 20th July, 2021.
18. Luan R., Pu W., Dai L., Yang R., and Wang P. Comparison of Psychological Stress Levels and Associated Factors Among Healthcare Workers, Frontline Workers, and the General Public During the Novel Coronavirus Pandemic. Frontiers in Psychiatry. 2020. 11: 1–16. Available from: doi:10.3389/fpsyt.2020.58397116. Accessed on: 20th July, 2021.
19. Ramandeep S., Kang A., Xhiangqian L., Jeoyanathan M., Gillgrass A., Afikhami S., and Xing Z. Current knowledge in clinical features, immunological responses, and vaccine development:1-23. The Federation of American Societies for Experimental Biology Journal. 2021;35. Available at: https://doi.org/10.1096/fj.202002662R. Accessed on : 27th July, 2021.

20. Oche M.O., Oladigbolu R.A., Ango J.T., and Okafoagu N.C. Work Absenteeism amongst Health Care Workers in a Tertiary Health Institution in Sokoto, Nigeria. Journal of Advances in Medicine and Medical Research 2018. Available at: DOI: 10.9734/JAMMR/2018/40467. Accessed on: 30th July, 2021.
21. World Health Organization (WHO) 31st January, 2021. COVID-19 weekly Epidemiological update. available from: https://www.who.docs/. Accessed on: 27th July, 2021.
22. Niraj N.M., Apeksha M., Gauri A.P, Shubhada B., Pradip D.L., and Vishal R. Prevalence and Clinical Presentation of COVID-19 among Healthcare Workers at a Dedicated Hospital in India. Journal of the association of physician in India. 2020. 68. Available at: https://japi.org/x264d494/prevalence-clinical-presentations-and-treatment-outcomes-of-covid-19-among-healthcare-workers-at-a-dedicated-hospital-in-india Accessed on: 30th July, 2021.
23. World Health Organization, Coronavirus disease (COVID-19) pandemic. Available at: https://covid19.who.int/?gclid=Cj0KCQjwoJX8BRCZARIsAEWBFMIIPyrg_B-xL9S8jCsny3hG0SRYo4Om2DMLr4INMpbjv7o1D9A4PQ4aAjSUEALw_wcB Accessed on: 1st September, 2021.
24. Lai X., Wang M., Qin C., Tan L., Ran L., Chen D., Zhang H., Shang K., Xia C., Wang S., Xu S., and Wang W. Coronavirus Disease 2019 Infection Among Health Care Workers and Implications for Prevention Measures in a Tertiary Hospital in Wuhan, China. International Journal of Environmental Research and Public Health. 2020. Available from: doi:10.3390/ijerph17197149. Accessed on: 28th December, 2022.

25. Dzinamarira T., Mhango M., Dzobo M., Ngara B., Chitungo I., Makanda P., Atwine J., Nkambule S.J., and Musuka G. Risk factors for COVID-19 among healthcare workers. 2021. A protocol for a systematic review and meta-analysis. PLoS ONE. Available from: https://doi.org/10.1371/journal.pone.0250958. Accessed on: 30th July, 2021.
26. UNICEF. West and Central Africa Coronavirus (COVID-19) Situation Report No. 4 2020 [Available from: https://www.unicef.org/appeals/files/UNICEF_WCARO_COVID19_Sitrep_No_4_4_15_June_2020.pdf. Accessed on: 30th, July, 2021.
27. Erdem H. and Lucey D.R. Health Care Worker Infections and Deaths due to COVID-9: A Survey from 37 Nations and a Call for WHO to Post-National Data on their Website. International Journal of Infectious Diseases. 2020. The Federation of American Societies for Experimental Biology Journal. 2021;35. Available at: https://doi.org/10.1096/fj.202002662R. Accessed on: 31st July, 2021.
28. Maunder R.G. , Lancee W.J., Balderson K.E, Bennett J.P., Borgundvaag B., Evans S., Fernandes C.M.B., Goldbloom D.S, Gupta M, Hunter J.J., Hall L.M., Nagle L.M., Pain C., Peczeniuk S.S., Raymond G., Read N., Rourke S.B., Steinberg R.J., Stewart T.E., VanDeVelde-Coke R., Veldhorst G.G., and Wasylenki D.A. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. Emergency Infection Disaster 2020. Available from: doi:10.3201/eid1212.060584. Accessed on: 2nd August, 2022.
29. Lai J., Ma S., Wang Y., Cai Z., Hu J. and Wei H. Factors associated with mental health outcomes among HCWs exposed to coronavirus disease 2019. JAMA Network Open.

Available from: doi: 10.1001/jamanetworkopen.2020.3976. Accessed on: 1st August, 2021.

30. Singh R., Kang A., Luo X., Gillgrass A., Afkhami S., and Xing Z. Current knowledge in clinical features, immunological responses, and vaccine development. Journal of The Federation of American Societies for Experimental Biology. 2021. Available from: https://doi.org/10.1096/fj.202002662R2021. Accessed on: 21st July, 2022.
31. Okoro J., Odionye T., Nweze B., Onuoha M., Ezeonwuka C., Owoh J and Nkire J. COVID-19 pandemic, psychological response to quarantine, and knowledge of the disease among inmates in a Nigerian custodial center. 2020. Emerald Open Research. Available from: https://doi.org/10.35241/emeraldopenres. Accessed on: 20th July, 2022.
32. Obaseki D.E., Akoria O.A., Mokogwu N., Omuemu C.E., Mokogwu U. B., and Ogboghodo E.O. Staff risks stratification in preparation for COVID-19 in a tertiary healthcare facility in Nigeria. Pan Africa Medical Journal. 2020. Available from: DOI: 10.11604/pamj.supp.2020.35.2.25095. Accessed on: 21st June, 2023.
33. Mullera A.E., Hafstada E.V., Himmelsa J.P.W, Smedslunda G, Flottorpa S., Stenslandb S. Ø., Stroobantsc S., Veldea S.V., and Vista G.E. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them : A rapid systematic review Psychiatry Research 2020. Available from: https://doi.org/10.1016/j.psychres.2020.113441. Accessed on: 21st July, 2021.
34. Enabulele O. and Aihevba E.. The risk perception of COVID-19 and practice of precautionary measures amongst healthcare workers in the National Health Insurance Scheme Clinic of a tertiary hospital in Nigeria. Pan African Medical Journal. 2021. Available from: https://doi.10.11604/pamj.2021.38.73.2742721. Accessed on: 14th May,

2023.

35. Maraqa B., Nazzal Z. and Zink T. Palestinian Health Care Workers' Stress and Stressors During COVID-19 Pandemic : A Cross-Sectional Study. Journal of Primary Care & Community Health. 2020. Available from: DOI:10.1177/2150132720955026. Accessed on: 21st July, 2021.
36. Tsamakis K., Rizos E., Manolis A. J., Chaidou S., Kympouropoulos S. and Spartalis E. COVID-19 pandemic and its impact on mental health of healthcare professionals. Experimental and therapeutic medicine. 2020. Available from: DOI:10.3892/etm.2020.8646. Accessed on: 21st July, 2021.
37. Ide K, Asami T, Suda A, Yoshimi A, Fujita J and Watanabe K. The psychological effects of COVID-19 on hospital workers at the beginning of the outbreak with a large disease cluster on the Diamond Princess cruise ship. PLoS ONE 2021; 16(1)2697:1–15: e0245294. Available from: https://doi.org/10.1371/ journal.pone.0245294. Accessed on: 21st July, 2021.
38. Ming-Yu S., Xiao-You S., Yu J., Wen-Jun W., Gu X., Ma L., Li J., Shao-Kai Z., Ze-Fang R., Ran R., Yuan-Li L. and You-Lin Q. Psychological impact of COVID-19 on medical care workers in China. Journal of Infectious Diseases of Poverty. 2020 Available from: https://doi.org/10.1186/s40249-020-00724-02020. Accessed on: 21st July, 2021.
39. Shi C., Guo Z., Luo C., Lei C. and Li P. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak. Journal of Brain Behavior and Immunity-Health. Available from: doi: 10.1016/j.bbi.2020. 03.028. Accessed on: 3rd March, 2023.

40. David O., Enoch N., Wilbroda M., Pius W., Diana W. and Premusz V. Anxiety and depression due to 2019 SARS-CoV-2 among frontier healthcare workers in Kenya. Journal of cell press 2020. Available from: http://doi.org/10.1016/journal.heliyon.2021.e06351 Accessed 30th July, 2021.
41. Luan R., Pu W., Dai L., Yang R. and Wang P. Comparison of Psychological Stress Levels and Associated Factors Among HCWs, Frontline Workers, and the General Public During the Novel Coronavirus Pandemic. Frontier Psychiatry. Available from: https://doi: 10.3389/fpsyt.2020.583971. Accessed on: 19th May, 2023.
42. Kanga L., Maa S., Chenb M., Yangb J., Wanga Y., Lia R., Yaoa L., Baia H., Caic Z., Yangd B. X., Hue S., Zhangf K., Wanga G., Ci Mag and Liu Z. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak. Journal of Brain Behavior and Immunity-Health. Available from: doi: 10.1016/j.bbi.2020. 03.028. Accessed on: 3rd August, 2021.
43. Tiete J., Guatteri M., Lachaux A., Matossian A., Hougardy J. M., Loas G. and Rotsaert M. Mental Health Outcomes in Healthcare Workers in COVID-19 and Non-COVID-19 Care Units: A Cross-Sectional Survey in Belgium. Frontiers in Psychology.11:612241. Available from: doi: 10.3389/fpsyg.2020.612241. Accessed on: 4th August, 2021.
44. Søvold L. E., Naslund J. A., Kousoulis A. A., Saxena S., Qoronfleh M. W., Grobler C. and Münter L. Prioritizing the Mental Health and Well-Being of Healthcare Workers: An Urgent Global Public Health Priority. 2021 Frontiers in Public Health. Available at : doi: 10.3389/fpubh.2021.679397. Accessed on : 29th August, 2021.
45. Tsamakis K., Rizos E., Manolis A. J., Chaidou S., Kympouropoulos S., Spartalis E., Spandidos D. A., Tsiptsios D. and Triantafyllis A. S. COVID-19 pandemic and its impact

on mental health of healthcare professionals. Exp Ther Med. 2020. doi: 10.3892/etm.2020.8646. 2020 April 7. Accessed on: 30th August, 2021.

46. Ide K., Asami T., Suda A., Yoshimi A., Fujita J., Nomoto M., Roppongi T., Hino K., Takahashi Y., Watanabe K., Shimada T., Hamasa T., Endo M., Kaneko T., Suzuki M., Kubota K., Saigusa Y., Kato H., Odawara T., Nakajima H., Takeuchi I., Goto T., Aihara M., Hishimoto A. The psychological effects of COVID-19 on hospital workers at the beginning of the outbreak with a large disease cluster on the Diamond Princess cruise ship. PLOS ONE 2021. Available from: doi:10.1371/journal.pone.0245294. Accessed on: 7th August, 2021.
47. Deng D. and Nashlund J. A. Psychological Impact of COVID-19 Pandemic on Frontline Health Workers in Low-and Middle-Income Countries. Harvard Public Health Review (Cambridge) 2020. Accessed 7th July, 2023.
48. Maleki S. and Fakhri M. Knowledge, Attitude and Behavior of Health Care Workers in the Prevention of COVID-19. Research Square Journal. Available from: DOI: https://doi.org/10.21203/rs.3.rs-23113/v. Accessed on: 10th August, 2021.
49. Bhagavathula S. A., Aldhaleei W. A., Rahmani J., Mahabadi A., Bandari D. K. Novel Coronavirus (COVID-19) Knowledge and Perceptions : A Survey of Healthcare Workers. Medical Revolution Journal. Available from: doi: https://doi.org/10.1101/2020.03.09.20033381. Accessed on: 11th August, 2021.
50. Han G., Niuh T. and Nang H. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. 2020;13 :260-265. Asian Pacific Journal of Tropical Medicine. Available at : doi:10.4103/1995-7645.280396. Accessed on: 2nd September, 2022.

51. Temsah M. H., Alhuzaimi A. N. and Alamro N. Knowledge, attitudes and practices of healthcare workers during the early COVID-19 pandemic in a main , academic tertiary care centre in Saudi Arabia. Epidemiology and Infection 148, e203, 1–9. Available at : https://doi.org/ 10.1017/S0950268820001958. Accessed on: 2nd September, 2021.
52. Kassie B. A., Adane A., Tilahun Y. T., Kassahun E. A., Ayele A. S. and Belew A. K. Knowledge and attitude towards COVID-19 and associated factors among health care providers in Northwest Ethiopia. PLoS ONE e0238415. Available from: https://doi.org/10.1371/journal.pone. Accessed on: 5th March, 2023.
53. Nepal R., Sapkota K., Adhikari K., Paudel P., Adhikari B. and Paudyal N. Knowledge, attitude and practice regarding COVID-19 among HCWs in Chitwan, Nepal. Research Square Journal. Available from: https://orcid.org/0000-0001-7576-2593. Accessed on: 11th May, 2023.
54. Jawed F., Manazir S., Zehra A. and Riaz R. The novel Coronavirus disease (COVID-19) pandemic : Knowledge, attitude, practice, and perceived stress among HCWs in Karachi, Pakistan. Medical Journal of the Islamic Republic of Iran (MJIRI). 2020 ;34.132. Available from: https://doi.org/10.34171/mjiri.34.132. Accessed on: 8th May, 2023.
55. Baloran E. T. Knowledge, Attitudes, Anxiety, and Coping Strategies of Students during COVID-19 Pandemic. Journal of Loss and Trauma, 25:8, 635-642. Available from: https://doi.org/10.1080/15325024.2020.1769300. Accessed on: 1st February, 2023.
56. Mbachu C., Azubuike C., Mbachu I., Ndukwu C., Ezeuko A., Udigwe I., and Nnamani C. COVID-19 infection: Knowledge, attitude, practices, and impact among healthcare workers in a South-Eastern Nigerian state. The Journal of Indection In Developing Countries. Available from: https:// doi:10.3855/jidc.13248. Accessed on: 19th March,

2023.

57. WHO. Health workers exposure risk assessment and management in the context of COVID-19 virus: Interim guidance, 2020. World Health Organization; 2020. Available from: https://www.who.docs/. Accessed on: 19th May, 2023.
58. Novo Psychiatry Brief-COPE-questionnaire, 2020. https://www.Novo Psychiatry. Accessed on: 19th May, 2023.
59. Atnafie S. A., Anteneh D. A.,Yimenu D. K. and Kifle Z. D. Assessment of exposure risks to COVID-19 among frontline health care workers in Amhara Region, Ethiopia. 2021. PLoS ONE. Available from: https://doi.org/ 10.1371/journal.pone.025100. Accessed on: 2nd September, 2022.
60. Nguyen L. H., Drew D. A., Joshi A. D., Guo C., Wenjie M., Mehta S. R., Sikavi D. R., Lo C. H., Kwon S., Song M., Mucci L. A. ,Stampfer J. M., Willett C. W., Eliassen A. H., Hart J. E., Chavarro J. E., Rich-Edwards J. W., Davies R., Capdevila J., Lee K. A., Lochlainn M. N., Varsavsky T., Graham M. S., Sudre C. H., Card M. J., Wolf J., Ourselin, S.Steves J. C., Spector T. D. and Chan T. A. Risk of COVID-19 among frontline HCWs and the general community. Medical Revolution Journal. 2020. Available from: https://doi.org/10.1101/2020.04.29.20084111. Accessed on: 4th September, 2021.
61. Newman K. L., Jeve Y., Majumder P. Experiences and emotional strain of NHS frontline workers during the peak of the COVID-19 pandemic. International Journal of Social Psychiatry. 2021. Available at: doi:10.1177/00207640211006153. Accessed on: 4th September, 2021.
62. Yunusi L., Agbebi R. and Ojewale E.. Psychological state, family functioning and coping

strategies among students of the University of Ibadan, Nigeria, during the COVID-19 lockdown. Medical Revolution Journal. Available at: doi: https://doi.org/10.1101/2020.07.09.20149997. Accessed on: 5th September, 2021.

63. Guo W. P., Min Q., Gu W. W., Yu L., Xiao X., Yi W. B., Li H. L., Huang B., Li J. L., Dai Y. J., Xia J., Liu J., Li B., Zhou B. H., Li M., Xu H. X., Wang X. B. and Shi W. Y. Prevalence of mental health problems in frontline healthcare workers after the first outbreak of COVID-19 in China: a cross-sectional study. Health Quality Life Outcomes. 2021. doi: 10.1186/s12955-021-01743-7. PMID: 33752686. Accessed on: 6th September, 2021.
64. Onchonga D., Ngetich E., Makunda W., Wainaina .P, Wangeshi D. Anxiety and depression due to 2019 SARS-CoV-2 among frontier HCWs in Kenya. Heliyon Journal 2021. Available from: doi:10.1016/j.heliyon.2021.e06351. Accessed on: 7th September, 2021.
65. Zandifar A., Badrfam R., Khonsari N. M., Mohammadi M. R., Asayesh H. and Qorbani M. Prevalence and Associated Factors of Posttraumatic Stress Symptoms and Stigma among Health Care Workers in Contact with COVID-19 Patients. Iran Journal of Psychiatry. Available at: https://doi:ijps.tums.ac. Accessed on: 8th September, 2021.
66. Mamun M. A., Akter T., Zohra F., Sakib N., Bhuiyan I., Banik P. C. and Muhit M.. Prevalence and risk factors of COVID-19 suicidal behavior in Bangladesh population. Heliyon Journal 2020. Available from: https://doi:10.1016/j.heliyon.2020.e05259. Accessed on: 17th September, 2021.
67. Ofori A. A., Osarfo J., Agbeno E. K., Manu D. O. and Amoah E. Psychological impact of COVID-19 on health workers in Ghana. 2020 Sage Journal. Available from:

https://doi.org/10.1177/2050312121100091. Accessed from: 19th september, 2021.

68. Tahara M., Mashizume Y. and Takahashi K. Coping Mechanisms: Exploring Strategies Utilized by Japanese Healthcare Workers to Reduce Stress and Improve Mental Health during the COVID-19 Pandemic. International Journal Environmental Research on Public Health 2021, 18, 131. Available at: **https://doi.org/10.3390/ijerph18010131**. Accessed on: 8th September, 2021.
69. Htay M. N., Marzo R. R., Bahari R., AlRifa A., Kamberi F. and El-Abasiri R. A. How healthcare workers are coping with mental health challenges during COVID-19 pandemic. Clinical Epidemiology and Global Health Journal. Available from: https://doi.org/10.1016/j.cegh.2021.100759. Accessed on: 19th Sepetember, 2022.
70. Abid F. S., Hossain H., Chinna K., Sundarasen S., Khoshaim B. H., Kamaludin K., Baloch G. M., Sukayt A. and Shan X. Coping strategies of students for anxiety during the COVID-19 pandemic in China: a cross-sectional study 2020. F1000Research 2020, 9:1115 Available at: https://doi.org/10.12688/f1000research.25557.1. Accessed on: 9th September, 2021.
71. University of Benin Teaching Hospital, 2020. About us. Available at: https://ubth.org/about-us/. Accessed on: 6th August, 2021.
72. GPS Coordinate of UBTH, 2021. Available at: https://www.google.com/search?information/. Accessed on: 7th August, 2021.
73. University of Benin Teaching Hospital, 2020. General Information. Available at https://ubth.org/general-information/. Accessed 6th August, 2021.
74. Ogboghodo E. O., Osaigbovo I. I., Obarisiagbon O. O., Okwara U. B., Obaseki E. D., Omo-Ikirodah T. O., Ewere S. E., Adio F., Nwaogwugwu J. C., and Eseigbe F. E. An

analysis of COVID-19 patients receiving care in a tertiary facility in Southern Nigeria. West Africa Journal of Medicine 2021. Available at: https://doi/org:10.4269/ajtmh. Accessed on: 24th April, 2023.

75. Guo W., Qing M., Gu W., Yu L., Xiao X., Yi W., Li H., Huang B., Li J., Dai Y., Xia J., Liu J., Li B., Zhou B., Li M., Xu M., Wang X., and Shi W. Prevalence of mental health problems in frontline healthcare workers after the first outbreak of COVID-19 in China. *Health and Quality Life Outcomes*. 2021. Available from: doi:10.1186/s12955-021-01743-7. Accessed on: 7th April, 2023.
76. Qiu X., Lan Y., Miao J., Wang H., Wang H., Wu J., Li G., Zhao X., Cao Z., Mei J., Sun W., Zhu Z., Zhu S. and Wang W. A Comparative Study on the Psychological Health of Frontline Health Workers in Wuhan Under and After the Lockdown. Frontier Psychiatry Available at: 12:701032. doi: 10.3389/fpsyt.2021.701032. Accessed on: 15th August, 2022.
77. Ali M., Sayed Z., Hossini M., Zakeri M. and Dehghan M. The relationship between frontline nurses' psychosocial status, satisfaction with life and resilience during the prevalence of COVID-19 disease. Wiley Nursing Open Journal 2021. Available at: DOI: 10.1002/nop2.832. Accessed on: 20th August, 2021.
78. Gao F., Luo N., Thumboo J., Fones C., Shu-Chen L., and Cheung Y. Does the 12-item General Health Questionnaire contain multiple factors and do we need them? BioMed Central Journal 2012. Available at: DOI: 10.1186/1477-75225-2-63. Accessed on 10th October, 2021.
79. Awoke M., Mamo G., Abdu S. and Terefe B. Perceived stress and Coping strategies Among Undergraduate Health Science Students of Jimma University Amid the COVID-

19 Outbreak. Frontiers Psychology 2021. Available at: https://doi.org/10.3389/fpsyg.2021.639955. Accessed on: 3rd March, 2023.

80. Froessl L. J. and Abdeen Y. "The Silent Pandemic: The Psychological Burden on Frontline Healthcare Workers during COVID-19", *Psychiatry Journal*, vol. 2021, Article ID 2906785, 2021. https://doi.org/10.1155/2021/2906785. Accessed 16th June, 2023.
81. Afeng-Nkansah D., Asumanu E., Nyinaku P., Acheampong P., and Lamptey R. "Response of Healthcare Workers to COVID-19 Protocols after the Index Case at 37 Military Hospital, Ghana". *BioMed Research International*, 2021, Article ID 2873859, 2021. https://doi.org/10.1155/2021/2873859. Accessed 16th June, 2023.
82. Alfaraj H. A., Alsharif F. H., and Elhady M. M., "Psychological Distress among Healthcare Workers with Chronic Diseases during the COVID-19 Crisis", *Mental Illness*, Article ID 6653259, 2022. https://doi.org/10.1155/2022/6653259. Accessed 16th June, 2023.
83. Sultan H., Shaikh S., Shaheen S., Pervez H., Ali S. A., Baseer S. "Psychological Impact on the Orthodontic Postgraduate Residents and Their Anxiety Level during the COVID-19 Pandemic". *International Journal of Dentistry*, Article ID 3143475, 2022. https://doi.org/10.1155/2022/3143475. Accessed 16th June, 2023.
84. De Kock J. H., Latham A. H., Leslie S. J., Grindle M., Munoz S., Ellis L., Polson R. and O'Malley C. M. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. Available at: https://doi.org/10.1186/s12889-020-10070-3. Accessed 16th June, 2023.

APPENDIX

APPENDIX I: QUESTIONNAIRE

ASSESSMENT OF THE MENTAL HEALTH STATUS OF HEALTH WORKERS DURING COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH), BENIN-CITY, EDO STATE: A COMPARATIVE STUDY

I am a 600L Medical Student of the University of Benin, Benin City. This questionnaire is designed to assess and compare the effect of COVID-19 pandemic on the Mental Health of Front-liners and other Healthcare Workers in UBTH. All information given will be confidential. Please mark and fill any areas as appropriate**.**

Section A: Socio-demographic characteristics

1. Age as at last birthday(years): _____
2. Sex: [ ] Male [ ] Female
3. Marital status: [ ]Single [ ] Married [ ]Widowed [ ] Separated [ ] Divorced [ ] Co-habiting
4. Tribe: [ ]Benin [ ] Esan [ ] Yoruba [ ] Ibo [ ]Hausa Others……
5. Religion: [ ]Christianity [ ]Islam [ ] ATR
6. No of Children: [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] > 4
7. Level of education: [ ] Primary [ ] Secondary [ ] Tertiary
8. Work Experience: [ ] < 5 years [ ] 5-9years [ ] > 10years
9. Type of health work: [ ] Medical Doctor [ ] Registered Nurse [ ] Laboratory Personnel [ ] Porter [ ] Cleaner [ ] Paramedic [ ] Administrative staff
10. Did you work in COVID-19 isolation Centre? [ ] Yes [ ] No
11. Average monthly income #_____

Section B: Knowledge of COVID-19 among Frontline HCWs and other-HCWs

12. Have you heard of COVID-19? Yes ( ) No ( ) If No skip to question 19
13. If yes, what is your source of information? Television ( ) Radio ( ) Internet ( ) Friends ( ) Health facilities ( ) Religious centers ( ) Newspaper ( ) Others specify _____ **multiple responses allowed**
14. What causes COVID-19? Bacteria ( ) Fungi ( ) Virus ( ) 5G installation ( ) A curse/ punishment from God ( ) it does not exist ( ) Others_____
15. How is COVID-19 transmitted? Blood transfusion ( ) Faeco-oral ( ) Inhalation of respiratory droplets ( ) Contact with bare skin ( ) Sexually transmitted ( ) Touching your eyes, nose and mouth after touching contaminated surfaces ( ) Insect bites ( ) others specify_____ **multiple responses allowed**
16. Which is a symptom for COVID-19? Fever ( ) Cough ( ) Generalized body weakness( ) Headache ( ) Difficulty with breathing ( ) Others specify _____ **multiple responses allowed**

17. COVID-19 can be prevented by: ( ) eating ginger and garlic ( ) taking Ivermectin ( ) frequent handwashing with soap and water ( ) use of hand sanitizer ( ) vaccination ( ) use of natural herbs ( ) social distancing ( ) taking vitamins ( ) **multiple responses allowed**
18. COVID-19 can be treated by _____ Exposure to sunlight ( ) use of steroids ( ) use of antiviral agents ( ) use of antibiotics ( ) use of herbs and native preparations like agbo ( ) use of blended ginger and garlic ( ) no treatment yet ( ) **multiple responses allowed**

Section C: Attitude of Frontline HCWs and other-HCWs towards for COVID-19 pandemic

	Strongly agree 1	Agree 2	Undecided 3	Disagree 4	Strongly disagree 5
19. COVID-19 is real					
20. COVID-19 is a hoax and a means for the government to amass wealth					
21. COVID-19 is as a result of the 5G installation					
22. COVID-19 vaccines are dangerous and can cause death					
23. I would take the COVID-19 vaccine if available					
24. Face masks should be worn at all times in public					
25. Disposable face masks should be washed and reused after use.					
26. It is important to wash hands with soap and water					
27. It is important to test people for COVID-19					
28. It is important to sanitize surfaces of objects					
29. Public places should restrict the number of persons gathered at a particular time					
30. Social distancing should be practiced only when it is convenient					
31. I would isolate from friends and family if I notice symptoms suggestive of COVID-19					

32. Taking precautions against COVID-19 is my responsibility					

Section D: Prevalence of COVID-19 among the Exposed and Unexposed.

33. Have you ever tested for COVID-19? Yes [ ] No [ ]

34. What was the diagnosis? Positive [ ] Negative [ ]

35. If yes, how many times did you test positive? _____

Section E: Effect of COVID-19 pandemic on the Mental Health status of HCWs and non-HCWs

Since the COVID-19 pandemic, have you recently…

S/N	Item	0	1	2	3
		Better than usual	Same as usual	Less than usual	Much less than usual
36.	Been able to concentrate on what you're doing?				
37.	Lost much sleep over worry?				
38.	Felt you were playing a useful part in things?				
39.	Felt capable of making decisions about things?				
40.	Felt constantly under strain?				
41.	Felt you couldn't overcome your difficulties?				
42.	Been able to enjoy your normal day-to-day activities?				
43.	Been able to face up to your problems?				
44.	Been feeling unhappy and depressed?				
45.	Been losing confidence in yourself?				

46.	Been thinking of yourself as a worthless person?				
47.	Been feeling reasonably happy, all things considered				

Section F: Coping Strategies among HCWs
I have been…

S/N	Item	1	2	3	4
		I usually don't do this	I do this a lot	I usually do this a medium amount	I've been doing this a lot
48.	Turning to work on other activities to take my mind off things (such as watching movies, reading, sleeping, shopping).				
49.	I have refused to believe that the corona virus or the COVID-19 disease actually exists.				
50.	Using alcohol and drugs to help me get through it.				
51.	Taking deliberate steps/action (compliance with preventive measures) to ensure that I am not infected with the corona virus.				
52.	Concentrating and making the situation better.				
53.	Getting support, comfort and advice from my family and friends				
54.	Trying to see the good side (positive side) of the situation.				

55.	Accepting the situation and learning to live with it.				
56.	Making fun (jokes) out of the situation.				
57.	Trying to find comfort in my religion or spiritual beliefs and praying about this situation.				

Thank You.

APPENDIX II: INFORMED CONSENT

TITLE OF RESEARCH: ASSESSMENT OF THE MENTAL HEALTH STATUS OF HEALTHCARE WORKERS DURING COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN-CITY: A COMPARATIVE STUDY

NAME AND AFFILIATION OF INVESTIGATOR

Olaadura Theodora Odubote

Department of Community Health,

University of Benin Teaching Hospital,

PMB 1111,

Benin City,

Edo State.

E-mail: theodoraolaadura@gmail.com

Cell: +234 8179586116

PURPOSE OF RESEARCH

This study aims to assess and compare the knowledge, attitude and the effect of COVID-19 pandemic on FHWs and NFHWs of UBTH in view to provide a scientific based study to help the hospital management formulate policies to help alleviate the morbidity of mental health disorders among FHWs and NFHWs.

PROCEDURE INVOLVED IN THE STUDY: In this study, questions will be asked regarding knowledge, attitude and effect of COVID-19 on the mental health status.

CONFIDENTIALITY: All data collected will be treated with utmost confidentiality. Participants who volunteer to take part in the study will be given a unique study number and data

will be collected without including the names of the participant taking part in the study. Participants information will be stored safely, secured by codes in computers using only the identification number. All those handling the data will not at any time reveal respondents' identity.

FINANCIAL COMPENSATION: There will be no payment for participation in this study.

VOLUNTARY PARTICIPATION: Your participation in this study is entirely voluntary and if you desire to withdraw out of this study at any time, no punitive measure will be meted out against you on account of your withdrawal. Your refusal to participate or withdrawal from the study, will not involve any negative consequences or loss of benefits to which you are otherwise entitle to.

RISK: It is not expected that any harm will come to you because of your participation in this study. This study does not entail any activity that will result in harm to you.

BENEFIT: The study will help assess and compare the effect of COVID-19 on the mental health status of FHWs and NFHWs of University of Benin Teaching Hospital (UBTH) as this will help in providing a scientific based study to help the hospital management in the prevention of mental health disorders as this will help in providing a scientific based study to help the hospital management to advocate for mental health stability.

FINANCIAL SPONSORSHIP: This research is self-sponsored. The under-listed may be contacted in case you have any clarifications to make

Olaadura Theodora Odubote

Department of Community Health,

University of Benin Teaching Hospital,

PMB 1111,

Benin City,

Edo State.

E-mail: theodoraolaadura@gmail.com

Cell: +234 8179586116

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA

Telephone: 052-600418
Telex: 41120 NG
Website: ubth.org

CHAIRMAN, BOARD OF MANAGEMENT: CHIEF ADEDOJA ADEWOLU, MFR

CHIEF MEDICAL DIRECTOR: PROF. DARLINGTON E. OBASEKI
MBBS (Benin), FMCPath
E-mail: darlobaseki@gmail.com

DIRECTOR OF ADMINISTRATION: M.O. JIMOH-KADIR
B. Sc, (Hons)FJPMD, Dip. Theo. AHAN

HEALTH RESEARCH ETHICS COMMITTEE APPROVAL

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14831249

PROPOSAL TITLE: **"A COMPARATIVE STUDY ON THE MENTAL HEALTH STATUS OF FRONTLINE HEALTH WORKERS AND OTHER HEALTHCARE WORKERS DURING THE COVID-19 PANDEMIC IN UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH), BENIN-CITY, EDO STATE"**

PRINCIPAL INVESTIGATOR(S): **ODUBOTE THEODORA OLAADURA**

DEPARTMENT/INSTITUTION: **DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY**

DATE CONSIDERED NOVEMBER 23TH, 2021

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 23/11/2021 TO 11/11/2022. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE** 23/11/2021

SUPERVISOR (S): DR (MRS) E. O. OGBOGHODO

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates and **you are to furnish the committee with the research activities at the completion of the study**. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date 26/11/2021