A RETROSPECTIVE STUDY OF THE INFLUENCE OF COVID-19 PANDEMIC PREPAREDNESS ON HEALTHCARE WORKERS' ANXIETY LEVELS AT KENYATTA NATIONAL HOSPITAL IN NAIROBI COUNTY-KENYA.

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A Research Dissertation Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Business Administration in Healthcare Management, Strathmore University Business School.

May 2025

DECLARATION

STUDENT'S DECLARATION

I declare that this research project is my own original work and has not been presented to any other college, university or institution for any award.

Signed:__  _____Date___**21/05/2025**_____

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SUPERVISORS APPROVAL

This research project has been submitted for examination with my approval as the appointed University Supervisor.

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DEDICATION

I dedicate this research paper to my beloved husband, Dr. Benjamin Wabwire, whose unwavering support, encouragement, and sacrifices have made this journey possible. Your belief in me has been my greatest motivation. This achievement is as much yours as it is mine.

ACKNOWLEDGEMENTS

I extend my deepest gratitude to my supervisor Dr. Paul Olendo Ombanda for his invaluable guidance and patience, and encouragement throughout the research journey. Your continuous support, insightful feedback and unwavering commitment helped complete this project.

My thanks also go to the faculty members of the Institute of Healthcare Management in Strathmore Business School for their guidance and constructive suggestions since this project began. I appreciate the Strathmore Research Office for your prompt response and action when I reached out for help.

Furthermore, I appreciate the help of my colleagues and friends, particularly Dr. Lillian Obino and Dr. Carolyne Njuguna, who provided invaluable insights and motivation along the way.

Lastly, I extend my deepest appreciation to my family for their understanding, patience and support during the many hours away from them while trying to meet deadlines. Without them, this achievement would not have been possible.

To all of you, Thank you.

ABSTRACT

The COVID-19 pandemic underscored the critical role of pandemic preparedness and its impact on healthcare workers' mental well-being. Healthcare workers globally faced significant challenges, including inadequate personal protective equipment (PPE), insufficient pandemic training, limited mental health support, and ineffective response protocols. This study examined the relationship between COVID-19 pandemic preparedness and healthcare workers' anxiety levels. The objective of this study was to evaluate the influence of institutional response strategies—including the Hospital Incident Management System, Infection Prevention and Control measures, and Human Resource-related interventions and the role of communication strategies implemented during the COVID-19 pandemic in influencing healthcare workers' anxiety levels at Kenyatta National Hospital, Nairobi County, Kenya. Using a descriptive cross-sectional design, the study assessed the retrospective effects of pandemic preparedness on healthcare workers' anxiety levels. A total of 258 healthcare workers, including doctors, nurses, clinical officers, and laboratory personnel, participated, yielding a response rate of 92%. The findings revealed that during the pandemic, 31% of participants experienced severe anxiety, though this declined to 72.1% reporting minimal anxiety at the time of study. However, 34.3% still experienced mild to severe prolonged anxiety five years after the height of the COVID-19 pandemic. Several pandemic preparedness measures were significantly associated with anxiety levels. The most significant measures included the presence of an emergency operations center and dedicated COVID-19 response teams, which were associated with lower anxiety levels. In contrast, frequent pandemic updates and the use of personal protective equipment (PPE) were linked to increased anxiety among healthcare workers. Additionally, the task of separating suspected and confirmed COVID-19 cases increased anxiety, whereas adequate personal protective equipment (PPE) supply, trusted health information, and the monitoring and managing of exposed and infected healthcare staff reduced it. Surprisingly, access to psychological support and well-being programs was associated with increased anxiety. The increased use of psychological support services among healthcare workers likely reflected the severity of emotional distress during the pandemic, with barriers such as stigma, understaffing, and long working hours potentially limiting access to these essential services and leaving anxiety and stress unaddressed. These findings highlight the complex relationship between pandemic preparedness strategies and healthcare workers' anxiety levels. While some interventions effectively mitigated anxiety, others unintentionally exacerbated it, emphasizing the need for a balanced and holistic approach to pandemic preparedness.

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AIDS – Acquired Immune Deficiency Syndrome

COVID-19 – Coronavirus Disease of 2019

GAD - Generalized Anxiety Disorder

H1N1 - Swine Flu

HBM – Health Belief Theory

HCW – Healthcare Workers

HIV – Human Immunodeficiency Virus

H7N9 – Avian Influenza A

IRB –Institutional Review Board

KNBS - Kenya National Bureau of Statistics

KNH – Kenyatta National Hospital

LMIC – Low-Middle Income Countries

MERS - Middle-East Respiratory Syndrome

NACOSTI- National Commission for Science Technology and Innovation

PPE – Personal Protective Equipment

SARS-CoV 2 - Severe Acute Respiratory Syndrome Coronavirus 2

UN – United Nations

WHO – World Health Organization

OPERATIONAL DEFINITIONS

Anxiety Disorder – according to the American Psychiatric Association (2022), mental health disorder is characterized by feelings of fear and worry strong enough to interfere with ones' daily activities.

Burnout - Maslach and Leiter (2016) defines burnout as a psychological syndrome emerging as a prolonged response to chronic interpersonal stressors at work.

Epidemic - the Center for Disease Control and Prevention describes an epidemic as an unexpected increase in the number of disease cases in a specific geographical area.

Healthcare Workers - World Health Organization defines healthcare workers as all people engaged in activities whose primary intent is to enhance health, including physicians, nurses, laboratory personnel, community health workers and those involved in promotion of health.

Health Systems - the World Health Organization defines health systems as set of all activities, people, institutions, and resources whose primary purpose is to promote, restore or maintain health.

Influenza - the Center for Disease Control defines Influenza which is also known as Flu, as a contagious respiratory illness caused by an influenza virus that infect the nose, throat and lungs.

Mental Health – American Psychological Association defines mental health as a state of mind characterized by emotional well-being, good behavioral adjustment, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life.

Mental Health Conditions – National Alliance on Mental Illness use Mental Health Conditions and Mental Illness/es interchangeably**.** They are conditions that affect ones' thinking, feeling, mood and behavior and deeply impact an individual's day-to-day living and interacting with others. It includes mental disorders, psychosocial disabilities, distress, impairment in functioning and risk of self-harm

Pandemic – The National Geographic defines a pandemic as a disease epidemic that has spread to a large group of people across a sprawling region, or across multiple nations or continents.

Prevalence – the Center for Disease Control defines prevalence as the number of cases of a disease, number of infected people, or number of people with some other attribute present during a particular interval of time. It is often expressed as a rate (for example, the prevalence of diabetes per 1,000 people during a year).

Stress – in APA's Dictionary of Psychology, stress is a normal reaction to everyday pressures, potentially affecting various body systems and contributing to mental and physical health problems.

Stigma - According to the American Psychological Association (APA), stigma is defines as a negative social attitude towards a characteristics that may be seen as a mental, physical, or social deficiency.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Studies indicate that the World Health Organization (WHO) characterized the novel coronavirus (nCoV) as a pandemic in March 11th 2020 following the proliferation of the virus to other countries across the world(L. Rampal & L. Seng, 2020). By April, 2025, more than 778 million cases have been confirmed and 7.08 million deaths recorded worldwide. Africa recorded 9.58 million COVID-19 cases and 175,532 deaths(World Health Organization, 2025). Countries around the world developed strategies to contain the virus in the early phases of COVID-19 until vaccines were developed to protect populations and mitigate the impact of COVID-19 infection(WHO, 2021). Years later, COVID-19 effects are still felt profoundly by populations around the world. Countries are still rebuilding their economies, with uncertainties around when the world will fully recover from the COVID-19 effects(World Bank, 2025).

The United Nations studies indicate that the global attempts to achieve the Sustainable Development Goal (SDG) 3 - good health and well-being were derailed by the pandemic. The pandemic severely reduced life expectancy and made it difficult for women and children to access family planning, reproductive and child health services(UN, 2019). Even the well-built health systems were quickly affected by the outbreak demonstrating that many countries' health system were ill-prepared to protect their populations and healthcare workers against the scourge. Long-standing health system challenges faced by low and middle income countries (LMICs) such as limited access to health services, extreme poverty, prevalence of comorbid diseases, lack of clean and safe water, shortages of health workforce and inadequate health infrastructure were amplified by the arrival of COVID-19(A. Kaye, C. Okeagu, A. Pham et al., 2021). Constraints in health resources experienced by LMICs not only made it difficult to fight the pandemic but also to continue providing preventive and treatment services for non-communicable diseases(F. Chersich, G. Gray, L. Fairlie et al., 2020).

The UN studies further report that the Sustainable Development Goal target 3.4 that aims to reduce by one third premature mortality from non-communicable diseases through prevention and treatment was severely affected by COVID-19(UN, 2019). Measures such as lockdowns, quarantines and isolation severely affected populations' mental health, exacerbating health disparities especially for people with mental health disorders. The pandemic exposed the gaps

that existed in mental health and psychosocial supportiveness for people and especially for healthcare workers working in public health facilities(F. Jaguga & E.Kwobah, 2020). During a pandemic, healthcare professionals face numerous stressors, including high workload, increased patient demands, exposure to the virus, personal safety concerns, and the emotional toll of witnessing severe illness and death. These stressors can contribute to heightened anxiety levels among healthcare workers, which may have far-reaching consequences on their mental well-being, productivity, and optimal care provided to patients(D. Bloom, D. Cadarette, J. Sevilla, 2018). Addressing healthcare workers' anxiety levels during a pandemic is crucial for maintaining their resilience and ensuring their optimal functioning. Providing adequate mental health support, such as access to counseling services, psychological interventions, and peer support programs, can help mitigate anxiety levels and promote well-being among healthcare professionals (S. Pappa, V. Ntella, T. Giannakas et al., 2020).

Overtime pandemics have caused disastrous effects on the economies, causing human suffering and leaving severe social, economic and health consequences to the population(World Bank, 2025). Literature indicates that previously, the world has been exposed to a number of pandemics over the years including smallpox, cholera, plague, Severe Acute Respiratory Syndrome (SARS), West-Nile disease, Middle-East Respiratory Syndrome (MERS) HIV/AIDS and tuberculosis. Influenza Pandemics are the most unpredictable of them all, striking roughly every 10 -50 years. Three Pandemics have affected the world in the 20th century, the 'Spanish Flu' in 1918-1920, the 'Asian Flu' in 1957-1958, and the 'Hong-Kong Flu' in 1968-1969 (J. Piret & G. Boivin, 2021). Each of these Influenza Pandemics have caused fear and anxiety among health workers without any significant interventions (R. Maunder, W. Lancee, K. Balderson et al., 2006).Extant literature show that the outbreak of the COVID-19 pandemic brought significant attention to the importance of pandemic preparedness and the impact it had on healthcare workers mental well-being ((S. Pappa, V. Ntella, T. Giannakas et al., 2020). Pandemic preparedness therefore, contributed to the struggles experienced by healthcare workers around the world with hospital items such as personal protective equipment (PPE) for healthcare workers, oxygen, equipment, sanitizing supplies were inadequate (S.Hasan, Z Hamid, M. Jawaid et al., 2020).

In Kenya, studies suggest that during COVID-19 pandemic mental health symptoms such as stress and burnout were reported significantly in nurses, exacerbating the pre-existing severe shortage of nurses in such a low-resource setting (S. Ali, J Shah, Z. Talib, 2021). A significant

number of healthcare workers in Kenya felt they were ill-prepared to handle the pandemic (H.Abdulle, J. Masika, J. Oyugi, 2022) whereas other studies suggest that Kenya's response to the pandemic was good especially in terms of relaying information and fostering multi-sectoral collaboration(D. Ogira, I. Bharali, J. Onyango, W. Mao, G. Kokwaro et al., 2022). Further, literature suggest that a low perceived preparedness (that is lack of training, COVID-19 response protocols, PPEs and communication) to handle the pandemic was associated with moderate to high stress levels and burnout in healthcare workers in Kenya("EHW in Kenya during the COVID-19 Pandemic," 2022). Kenya is equipped with guidelines for the management of mental health conditions, however implementation is poor. Mental health surveillance system is lacking. This system is required for evidence-based intervention for mental health conditions(F. Jaguga & E. Kwobah, 2020). Such gaps in the system worsen the situation, making it a toll order in the implementation of mitigation strategies.

While much focus has been placed on the physical aspects of preparedness, such as infrastructure, resources, and protocols, it is crucial to recognize and address the anxiety faced by healthcare workers in such a crisis(A. McAlearney, A Gaughan, S. Macewan, M. Gregory, et al., 2022). Most studies have highlighted some risk factors associated with the development of anxiety amongst healthcare workers during COVID-19 pandemic without a clear focus on specific pandemic preparedness efforts. The research objective was to bridge the gap by investigating the complex relationship between pandemic preparedness and healthcare workers' anxiety levels in a public hospital. The motivation for this study arose from the perceived lack of preparedness during the COVID-19 that contributed to the struggles experienced by healthcare workers around the world. Studies suggest that the deficiencies in health systems of most countries exposed healthcare workers to momentous psychological impact that prompted healthcare organizations like WHO to rethink new ways of protecting healthcare workers and improving pandemic preparedness. This study hence enhanced this debate by examining the relationship between pandemic preparedness and healthcare workers' anxiety levels.

1.1.1 Kenya's COVID-19 Pandemic Preparedness and Response

Kenya's experience during the COVID-19 pandemic revealed both strengths and vulnerabilities in its health system. A range of studies provide a comprehensive view of the country's preparedness, response measures, and the broader implications of the crisis. From early government interventions to systemic challenges in health service delivery, these studies offer critical insights into the effectiveness of Kenya's pandemic response. They also emphasize the

need for robust public health infrastructure, strong coordination, and strategic investment to enhance resilience against future health emergencies.

Initial responses to the pandemic were swift. As documented by M. Aluga (2020), the Kenyan government launched early public health advisories, imposed curfews, enforced social distancing, and introduced a stimulus package to cushion the economic impact. The formation of the National Emergency Response Committee marked a coordinated approach to manage the crisis. However, despite these early efforts, the study warned of a likely exponential rise in infections without stricter control and improved hygiene infrastructure, particularly in informal settlements like Kibera- an informal settlement in the city of Nairobi.

Further analysis by D. Ogira, I. Bharali, J. Onyango, G. Kokwaro and colleagues (2022) offered a deeper look into the operational challenges that hindered Kenya's response. Grounded in the WHO health systems framework, this study identified critical shortages of personal protective equipment (PPE), testing kits, and inadequacies in the health workforce. The pandemic strained service delivery and highlighted structural issues such as underfunding, weak intergovernmental coordination, and systemic corruption. It also underscored the disproportionate impact on vulnerable groups and the disruption of essential services, including maternal care and HIV treatment.

In a complementary review, J. Oliwa, R. Mazhar, and G. Serem (2023) observed that while the government played a central leadership role, emergency plans often failed to align with on-the-ground realities. Investments leaned toward high-tech solutions rather than practical, scalable approaches like essential emergency and critical care (EECC), especially in rural areas. This misalignment limited the effectiveness of response efforts, pointing to the need for more inclusive and grounded health strategies.

Another key dimension of the pandemic's impact was on the availability of essential medicines. A study by J. Onyango, D. Ogira, and G. Kokwaro (2024) revealed major supply chain disruptions, procurement inefficiencies, and regulatory gaps. Kenya's heavy reliance on KEMSA, the national medical supplier, proved detrimental as the agency was plagued by corruption and inefficiencies. The study recommended diversifying procurement channels and strengthening domestic pharmaceutical production through supportive policies and infrastructure investments to safeguard future medicine availability.

Together, these studies paint a multifaceted picture of Kenya's COVID-19 response—marked by proactive leadership but undermined by systemic weaknesses. Key challenges included supply chain fragility, under-resourced healthcare systems, regulatory gaps, and socio-economic inequalities. Moving forward, the findings point to the urgent need for a resilient, inclusive, and well-coordinated health system. Enhancing local manufacturing, investing in essential care infrastructure, strengthening governance, and ensuring equitable access to health services are critical steps toward better pandemic preparedness and health system sustainability in Kenya.

1.1.2 Public Hospitals in Nairobi County, Kenya.

Nairobi County is the capital City of Kenya with a population of close to 5 million people within its 700 square kilometers. The general percentage of population is 51% male and 49% female with a population density of 4515/km2(KNBS, 2023). There are about 14 doctors per 100,000 people in the county compared to 10 for the rest of the country (that means 32% of the country's doctors are based in Nairobi) and 53 nurses per 100,000 people. The Nairobi County has Mbagathi County Referral Hospital, Mutuini Hospital and Mama Lucy Hospital and Pumwani Maternity Hospital as its three main public and functional hospitals. A number of large hospitals are under private ownership offering premium services not only to the county but also in East Africa region. They include, the Nairobi Hospital, Aga Khan Hospital, Mater Hospital and others(Nairobi City County Health Sector and Strategic and Investment Plan, 2019).

Nairobi County also hosts four public facilities owned by the National Government namely Kenyatta National Hospital-the largest referral hospital in the country, Kenyatta University Teaching and Referral Hospital, Mathare Hospital- a specialty hospital for mental care and National Spinal Injury Hospital that specializes in rehabilitative care and spinal injuries. There is also the Armed Forces Memorial Hospital managed by the Department of Defense(DOD)that provides healthcare services to members of the Kenya Defense Forces (KDF) and their family members. These are level 6 hospitals that provide specialized care and clinics, advanced diagnostics and imaging, rehabilitative care and 24 hr. healthcare services(Nairobi City County Health Sector and Strategic and Investment Plan, 2019).

During COVID-19 pandemic, national referral public and private hospitals in the County took on treatment for serious cases. Treatment was centered in two main public hospitals: Kenyatta National Hospital and Kenyatta University Teaching and Referral Hospital; and three main

private hospitals: Nairobi Hospital, Aga Khan University Hospital and Mater Hospital. Kenyatta National Hospital has the highest bed capacity, with 55 ICU and high dependency unit (HDU) beds, followed by Kenyatta University Hospital with 44 ICU and HDU beds. Less serious cases were managed at Mbagathi Hospital, a county hospital that is just a few meters away from Kenyatta National Hospital. This study was carried out in Kenyatta National Hospital(KNH). KNH was the main treatment center for COVID-19 pandemic in 2020. Its capacity to handle many cases during the pandemic made it ideal to carry out such a study.

1.1.3 Kenyatta National Hospital

This study was carried out at Kenyatta National Hospital(KNH). KNH is the largest and oldest hospital in Kenya and East Africa as well. It is a public, tertiary and level 6-referral hospital located in the area to the immediate west of Upper Hill in Nairobi, the capital city of Kenya. Its location is about 3.5 kilometers west of the city's central business district, lying on a 45.7 acres of land. KNH serves as a teaching hospital for the University of Nairobi College of Health Sciences, Kenya Medical Training College Nairobi Campus among other institutions affiliated to it. It currently offers advanced specialized medical and surgical services to the people of Kenya(Wikipedia, 2024).

KNH was established in 1901, originally named The Native Civil Hospital with a bed capacity of 40. In 1953, its bed capacity increased to 600 accommodating 300 bedded medical wing and 300 bedded surgical wing with Ismail Rahimtulla wing to accommodate the Asian Community. In 1952, it was renamed King George VI Hospital after King George of Great Britain and Northern Ireland. Later renamed Kenyatta National Hospital after Kenya got its independence in 1963. At this time KNH was declared a national teaching hospital with three main functions, including to serve as the national referral hospital and provide facilities for teaching and research. After independence KNH went through an expansion program of the main hospital, the clinical science and hospital service blocks and the medical students' hostels. After 1967, KNH had an emergency department in place and filter clinics to screen patients for admission or referral to the specialized clinics(KNH, 2024).

KNH became a State Corporation in 1987. It is now more than 120 years old, currently the largest hospital in East and Central Africa. It now has a bed capacity of 1,800 and 209 beds in the private wing, employs over 6000 staff, has 50 wards, 22 out-patient clinics, 24 theaters (16

specialized) and an Accident & Emergency Department. The hospital is managed by a 10-person board of directors, with the Chief Executive Officer, representatives from the College of Sciences of the University of Nairobi and representatives from the Ministry of Health and Finance sitting in this board(KNH, 2024).

Several factors were considered in selecting KNH as the study site for this study. One critical factor was that KNH served as the first and designated screening and treatment center for patients suspected and confirmed to have COVID-19 in Nairobi County. During the COVID-19 pandemic, KNH established a new facility with a bed capacity of 102 beds specifically to treat COVID-19 positive cases, including a 6 bed intensive care unit. This facility was named the Infectious Disease Unit. It was one of the leading facilities in the region with a high caseload of patients with COVID-19, managed by a team of highly qualified personnel adhering to local and global treatment guidelines(L. Okutoyi & KNH, 2021). Another critical factor is that the hospital has a history of collaborating with universities to conduct robust clinical and scientific research, thus made it an ideal and conducive environment for this kind of study(KNH, 2024).

1.2 Problem Statement

As previous studies suggest, pandemics caused mental health challenges among healthcare workers, who served as first responders during outbreaks. A study by Kwobah et al. (2021) revealed that during the COVID-19 pandemic, 36 percent of healthcare workers experienced generalized anxiety disorder, 15.4 percent had moderately severe depression, and 16 percent had moderate depression. A separate meta-analysis examining 19 studies from across the globe found that the prevalence of generalized anxiety disorder was 30.5 percent during the pandemic (A. Adibi, M. Golitaleb, I. Ferrahi-Ashtiani et al., 2021). Similarly, a study conducted in Finland reported that up to 30 percent of healthcare workers experienced mild anxiety, 15 percent moderate, and 5 percent severe anxiety (M. Moitra, M. Rahman, P. Collins et al., 2021).

From these findings, it was evident that anxiety disorder was one of the most common psychiatric conditions experienced by healthcare workers during the COVID-19 pandemic. Anxiety disorder, as defined by the American Psychiatric Association (2022), is a serious condition that impairs a person's ability to function in daily life. Among healthcare workers, it takes a significant toll on productivity, decision-making, professional effectiveness, and social

well-being. Many report difficulties enjoying personal and social life, and in severe cases, anxiety affects their professional performance—leading to absenteeism, medical leave, or even resignation (M. Marvaldi, J. Mallet, C. Dubertret et al., 2021).

While research had identified several risk factors contributing to anxiety among healthcare workers during the pandemic, conceptual gaps remained. These gaps highlighted the need for further investigation to develop a more comprehensive understanding of the relationship between pandemic preparedness and healthcare workers' anxiety levels. For example, most studies had focused on the immediate psychological impact of pandemics (S. Pappa, V. Ntella et al., 2020), yet few explored whether prolonged anxiety persisted five years after the pandemic, potentially affecting mental well-being, job satisfaction, and overall quality of life. Understanding long-term psychological effects could inform the design of sustained support systems and mental health interventions.

Additionally, the influence of pandemic preparedness on healthcare workers' anxiety levels varied across cultural and contextual settings, exposing contextual gaps in the existing literature. Most studies had concentrated on high-resource healthcare environments (S. Raoofi, F. Pashazadeh, S. Rafiei et al., 2023; O. Chigwedere, A. Sadath, Z. Kabir et al., 2021). However, it was important to investigate the unique challenges faced in low-resource settings, such as hospitals in Nairobi County, where limited infrastructure, insufficient resources, and socioeconomic hardships could significantly heighten anxiety levels.

Moreover, global disparities in healthcare systems also needed attention. Most existing studies were conducted in Europe (O. Chigwedere, A. Sadath, Z. Kabir et al., 2021) and North America (R. Maunder, W. Lancee, K. Balderson et al., 2006). Yet, factors such as unequal healthcare resources, workforce capacity, and differing cultural expectations influenced anxiety in diverse ways across regions. Exploring these disparities is crucial for shaping globally relevant strategies to strengthen pandemic preparedness and ensure the psychological well-being of healthcare workers worldwide.

While studies involving COVID-19 pandemic preparedness and healthcare workers' anxiety levels had been conducted using descriptive cross-sectional designs, methodological gaps remained that needed to be addressed. These gaps represented areas where further methodological refinement and innovation were necessary to enhance the quality and rigor of research. For instance, although the impact of pandemic preparedness on healthcare workers'

anxiety levels could be influenced by factors at multiple levels—individual, organizational, and societal—many previous studies had focused predominantly on individual-level factors, thereby exposing the limitations of earlier methodologies (S. Raoofi, F. Pashazadeh, S. Rafiei et al., 2023; S. Pappa, V. Ntella et al., 2020). This study focused specifically on investigating the organizational factors that contributed to healthcare workers' anxiety levels.

This study posited that addressing conceptual, contextual, and methodological gaps would contribute to a more comprehensive understanding of the relationship between pandemic preparedness and healthcare workers' anxiety levels. It aimed to inform the development of effective strategies to support the mental well-being of healthcare workers by enhancing their resilience and ensuring the provision of high-quality care during pandemics. The study explored this by asking the question: Did pandemic preparedness influence healthcare workers' anxiety levels in a public hospital in Nairobi County, Kenya?

1.3 Main Objective

To determine the influence of COVID-19 pandemic preparedness on healthcare workers' anxiety levels in Kenyatta National Hospital in Nairobi County, Kenya.

1.4 Specific Objectives

I. To assess the influence of Hospital Incident Management System during COVID-19 on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya.

II. To evaluate the influence of Infection Prevention and Control measures during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya.

III. To assess the influence of Communication strategies during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya.

IV. To determine the influence of Human Resource-related strategies during COVID-19 on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya.

1.5 Research Questions

I. What is the influence of Hospital Incident Management System during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya?

II. What is the influence of Infection Prevention and Control measures during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya?

III. What is the influence of Communication strategies during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya?

IV. What is the influence of Human Resource-related strategies during COVID-19 pandemic on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya?

1.6 Significance of the Study

Pandemic preparedness is recognized as a critical component of national health systems. In light of this recognition, there has been growing interest in exploring alternative strategies to mitigate healthcare workers' anxiety during pandemics. This retrospective study aimed to investigate the influence of COVID-19 pandemic preparedness on healthcare workers' anxiety levels. Its findings held significant implications for existing literature, national policy and practice, and theoretical development.

The analysis of prior studies identified key individual and environmental factors contributing to the development of anxiety among healthcare workers (HCWs). Environmental contributors, as suggested in the literature, included the severity and uncertainty of the pandemic, long working hours, increased workload, stigma, and the loss of colleagues(O. Chigwedere et al., 2021). Individual-level risk factors included being young, female, in the nursing profession, on the frontline, and being married(S. Raoofi et al., 2023). However, there remained a notable gap in the exploration of organizational-level factors, particularly within the regional context of sub-Saharan Africa and especially Kenya. This study comprehensively examined hospital-level pandemic preparedness and its impact on HCW anxiety, laying a foundation for future research and inquiry.

In addition, most of the existing studies had been conducted in high-income countries such as the United States, the United Kingdom, and China (S. Raoofi et al., 2023). The researcher was not aware of similar studies conducted in Kenya or other African contexts. Sub-Saharan African countries, including Kenya, faced unique health system challenges that were underrepresented in the global literature. These contextual differences highlighted the need to explore how health infrastructure and preparedness during the COVID-19 pandemic influenced anxiety levels among healthcare workers. Region-specific investigations were therefore essential to fully understand and address these unique challenges.

Conducting this study within a public hospital setting also provided crucial insights into pandemic preparedness, which could guide policymakers and hospital administrators in enhancing response efforts to reduce HCW anxiety. The findings were particularly relevant for informing disaster preparedness and human resource committees on developing and implementing effective strategies that prioritized the mental well-being of healthcare workers during health emergencies.

Ultimately, the study contributed to more effective, efficient, and informed mental healthcare practices by offering new data and perspectives to guide practical interventions. It also supported the development of recommendations aimed at improving mental health outcomes among healthcare workers and enhancing best practices within the field of mental health.

In conclusion, the theoretical significance of this study lay in its potential to refine and expand existing models, such as the Job Demand–Resources (JD-R) model. While most JD-R theory studies had been conducted in high-resource settings, this research offered a more nuanced understanding of the complex relationship between pandemic preparedness and healthcare worker anxiety in a low-resource setting.

1.7 Chapter Summary

This chapter introduced the study on the influence of COVID-19 pandemic preparedness on healthcare workers' (HCWs) anxiety levels in a public hospital. The research problem highlighted the concerns regarding the psychological impact of pandemics on HCWs, as well as the existing gaps in the literature—particularly methodological and contextual gaps.

The study aimed to achieve the following objectives:

i) To assess the influence of the Hospital Incident Management System on HCW anxiety levels during the COVID-19 pandemic,

ii) To evaluate the influence of Infection Prevention and Control measures on HCW anxiety levels during the pandemic,

iii) To assess the influence of Communication Strategies on HCW anxiety levels, and

iv) To determine the influence of Human Resource-related strategies on HCW anxiety levels during the pandemic.

The study was significant as it informed and guided policymakers in developing and implementing strategies to mitigate HCW anxiety within public hospital settings. It also offered insights to mental health professionals on best practices for improving mental health outcomes for HCWs during pandemics. The scope of the study was limited to healthcare workers at Kenyatta National Hospital who served during the COVID-19 pandemic.

Overall, this chapter established the foundation of the study by presenting the background, defining the research problem and objectives, and outlining its significance. It set the stage for the subsequent chapters, which examined the literature review, research methods, findings, and conclusions in greater detail.

CHAPTER TWO: REVIEW OF LITERATURE

2.1 Introduction

This chapter embarks on a journey through the literature relevant to this study. This literature review serves as the compass of the research, shedding light on the theory, existing literature and the research gaps in the inquiry and the conceptual framework. Traversing the terrain of previous research, the study gained a comprehensive understanding of the subject and in doing so contributed significantly to the body of knowledge.

2.2 Theoretical Framework

A theoretical framework provides a structure of theory that can support a research study and lead to the development of other theories. In this case, the Job-Demands Resources theory provides a strong foundation for the research, guiding the study design, data collection and analysis.

2.2.1 The Job Demands- Resources Theory

The Job Demands-Resources (JD-R) theory, developed by Bakker and Demerouti (2017), proposes that all work environments can be understood through two fundamental components: job demands and job resources. Job demands refer to aspects of a job that require sustained physical, emotional, or cognitive effort, often leading to stress when prolonged. In contrast, job resources are the physical, psychological, or organizational factors that help achieve work goals, reduce demands, or promote personal growth. According to the JD-R theory, a balance between job demands and resources leads to positive outcomes such as enhanced job satisfaction, reduced burnout, and improved employee well-being. Conversely, when job demands outweigh available resources for extended periods, employees may experience stress, burnout, and other health-related problems.

In the context of healthcare workers (HCWs) during the COVID-19 pandemic, job demands included increased workloads, emotional strain from treating critically ill patients, uncertainty about the disease, and concerns over personal and family safety. These demands placed HCWs at high risk of psychological strain and burnout. However, job resources—such as access to personal protective equipment (PPE), training in pandemic protocols, clear communication, and

mental health support—played a critical role in helping them manage these challenges more effectively(B. Bakker & E. Demerouti, 2014).

While widely used in occupational psychology to examine employee well-being, motivation, and burnout, the JD-R theory has its limitations. It does not specify which job demands or resources are most influential in various workplace settings. Additionally, it was largely developed and tested in high-resource, Western contexts, raising concerns about its applicability in low-resource environments where job perceptions differ. Another critique is that the theory assumes all job demands are inherently negative and all job resources are positive, which may not always hold true(B. Schaufeli & TW. Taris, 2014). Furthermore, it lacks detailed explanations of the psychological mechanisms through which demands and resources impact well-being.

A study by Lee and Jo, (2023) in Korea used the JD-R model to investigate the impact of job autonomy and psychological well-being on employee performance during the pandemic. The study found that job autonomy significantly enhanced employee engagement—supporting JD-R theory by identifying autonomy as a vital job resource that boosts motivation and performance. Moreover, psychological well-being (viewed as a personal resource) was positively linked to engagement, suggesting that emotionally healthy employees are more adaptive and committed. The study advocates for organizations to design work environments that promote autonomy and emotional support to enhance employee engagement and effectiveness.

Another study by Mohammed et al. (2022) in Qatar examined burnout among community pharmacists during COVID-19 using the JD-R framework. Findings revealed that job demands such as workload, staff shortages, role ambiguity, and fear of infection contributed significantly to burnout, especially physical and emotional exhaustion. Job resources like organizational support, co-worker assistance, and counselling services mitigated some of these effects. However, factors such as financial/job security and patient interactions were found to function ambiguously—as either demands or resources depending on context (e.g., aggressive vs. appreciative patients). Personal issues like family separation or isolation also intensified stress, particularly for those living alone. Social support, while helpful for some, also posed anxiety for others due to the risk of virus transmission. Coping strategies including spiritual practices, self-help, hobbies, and public education were key in managing burnout.

At Kenyatta National Hospital, healthcare workers likely faced heightened job demands during the COVID-19 pandemic. These included:

- **Increased workload**: Higher patient volumes and extended working hours;
- **Role ambiguity**: Rapidly changing guidelines, unclear expectations, and inconsistent protocols;
- **Emotional strain**: Fear of infection, concern for family members, and psychological distress from witnessing suffering or death;
- **Resource scarcity**: Limited access to PPE and other essential medical supplies, especially in the early phases of the pandemic.

These factors likely contributed to increased levels of anxiety among HCWs. The JD-R theory provides a valuable lens to assess how the availability or lack of job resources—such as infection prevention measures, clear communication strategies, HR support, and the Hospital Incident Management System (HIMS)—influenced healthcare workers' psychological outcomes. Understanding this balance can help inform strategies to support frontline workers during future health crises.

2.2.2 Mapping Study Objectives to JD-R Theory.

The Job Demands-Resources (JD-R) Theory posits that employee well-being is influenced by the balance between job demands (stressors) and job resources (supports). In this study, the outcome of interest is anxiety among healthcare workers during COVID-19, and each objective targets a different organizational resource or factor influencing this anxiety.

Study Objective	**Job Demands (Stressors)**	**Job Resources (Supports)**	**Expected Influence on Anxiety (Outcome)**
1. To assess the influence of the Hospital Incident Management System (HIMS) during COVID-19 on HCWs' anxiety levels	- Lack of coordinated response- Crisis confusion- Unclear roles/responsibilities during emergencies	- HIMS provides structured crisis leadership- Role clarity- Decision-making hierarchy- Coordinated emergency response	↓ Anxiety through reduced uncertainty and better operational control

2. To evaluate the influence of Infection Prevention and Control (IPC) measures on HCWs' anxiety levels	- Risk of infection- Exposure to COVID-19 patients- Inadequate protection equipment	- Provision of PPE- Hand hygiene facilities- Isolation protocols- IPC training	↓ Anxiety via improved safety perception and infection control
3. To assess the influence of communication strategies during COVID-19 on HCWs' anxiety levels	- Misinformation- Unclear protocols- Rapidly changing guidelines	- Transparent communication- Frequent updates- Leadership messaging- Feedback channels	↓ Anxiety by increasing clarity and reducing ambiguity
4. To determine the influence of Human Resource (HR) strategies during COVID-19 on HCWs' anxiety levels	- Overwork- Burnout- Job insecurity- Emotional distress	- Adequate staffing- Mental health support- Leave policies- Job security assurances- Work-life balance efforts	↓ Anxiety by buffering emotional/physical exhaustion and insecurity

JD-R Framework Summary,

- **Job Demands -** COVID-19 created extreme physical, emotional, and cognitive demands for healthcare workers, increasing their risk of anxiety and burnout.
- **Job Resources** - HIMS, IPC measures, effective communication, and HR support are organizational-level job resources that buffer the impact of demands.
- **Outcome (Strain)** - the study investigates anxiety levels**,** which in the JD-R model is a key strain outcome caused by high demands and insufficient resources.

- **Theoretical Implication** - When job resources are strengthened (e.g., HIMS and supportive policies), they mitigate the impact of high job demands**,** leading to reduced anxiety and better psychological well-being.

2.3 Literature Review

This section looks at current studies that have been done in healthcare institutions exploring the distinct relationship between various pandemic preparedness efforts and their influence on HCW anxiety levels. This empirical review will delve deeper in literature that have explored this concept, identifying the gaps and suggestions for further research.

2.3.1 Hospital Incident Management System (HIMS) and HCW anxiety levels during pandemics.

Several studies have shed light on the impact of pandemics, such as the SARS epidemic, on healthcare workers' anxiety levels. For example, a study by Maunder et al. (2003) examined the psychological impact of the SARS outbreak on healthcare workers in Canada. The findings revealed elevated levels of anxiety, stress, and burnout among the participants, highlighting the need for interventions to support their mental health. Moreover, a study by Pappa et al. (2020) explored the psychological impact of the COVID-19 pandemic on healthcare workers in China. The results indicated that healthcare professionals experienced high levels of anxiety, depression, and stress, with frontline workers reporting higher levels of psychological distress compared to non-frontline workers. Nickel et al (2004) study to determine the self-reported psychosocial effects associated with working in a hospital environment during the peak of SARS outbreak in 2003 and to establish the determinants of these effects revealed that more than half of the respondents reported psychological concerns with a higher proportion of nurses compared to other healthcare workers. Analysis from these studies identified four main factors as being significantly associated with increased levels of psychological distress - being a nurse, part-time employment status, stigma and changes in personal and family lifestyle as a result of the stigma experienced. Working in supervisory or management position was also associated with decreased levels of concern indicating that having some control whether real or perceived over a situation reduces the risk of psychological effects. As studies suggest, pandemics have significantly impacted the mental well-being of healthcare workers leading to increased stress, anxiety and burnout. However, specific research on the influence of hospital incident management system on HCW anxiety levels during pandemics is not known to the researcher.

Most of the studies focus on general stressors such as increased workload, fear of infection and inadequate personal protective equipment.

While direct studies on HIMS and its influence on HCW mental well-being are scarce, effective incident management systems are crucial in emergency situations. They provide structured responses, clear communications, human resource support services and resource allocation which can help alleviate uncertainty and stress among HCW. A comprehensive HIMS indirectly reduces anxiety among HCW by ensuring they have adequate resources and support services during a crisis. The incident management system plays a critical role in mitigating anxiety levels in HCW by providing structure and support. Therefore, further studies need to explore the relationship between HIMS and HCW anxiety levels during emergencies.

2.3.2 Infection Prevention and Control (IPC) Measures and HCW anxiety levels during pandemics.

A systematic review carried out by Chigwedere et al (2021) to examine impact of epidemics and pandemics on the mental health of healthcare workers found out that the prevalence of anxiety varied and ranged from 7% to 78% across all virus exposures. The review included 76 studies across the world focusing on SARS, COVID-19, MERS, H1N1, Ebola and H7N9 outbreaks. Findings in this study suggest that stress levels among HCWs were largely influenced by workload, exposure risk, and uncertainty in IPC measures. Frequent protocol changes caused distress, as HCWs had to constantly adapt. The presence of PPEs was a major protective factor, indicating that consistent and well communicated IPC strategies could help alleviate stress. Anxiety was heightened by direct exposure to infections, fear of spreading the virus, and uncertainty. Notable, nurses and female HCWs were disproportionately affected. Psychological preparedness and adequate training on IPC measures as the study suggests, could reduce anxiety by instilling confidence in safety protocols.

A systematic review carried out by Raoofi et al (2023) to determine the prevalence of anxiety among hospital staff of different job groups and to determine its contributing factors during the COVID-19 pandemic in various geographical locations approved that the virus indeed caused serious mental and emotional problems to healthcare workers who at a risk of contracting and transmitting the virus. The review showed that the highest prevalence of anxiety was amongst frontline healthcare workers – nurses, medical students, health technicians and doctors. Several factors were identified as contributing factors to increased anxiety among HCWs, including

occupational risks and work environment factors such as being in direct contact with infected patients, inadequate PPE supply, staff in high-infectious units such as ICU and respiratory units.

In another study carried out locally by Onchonga et al (2021) that aimed to determine the levels of anxiety and depression due to the coronavirus pandemic among healthcare workers reported a lack of confidence in managing COVID-19 cases among HCWs, suggesting insufficient IPC training, unclear safety protocols, or lack of adequate protective measures. Poor IPC measures may have contributed to uncertainty, fear of infection and increased mental health distress among HCWs.

2.3.3 Communication Strategies and HCW Anxiety levels during pandemics

One of the primary contributors to HCWs mental health challenges during the pandemic was rapid and inconsistent information. A study carried out by El-Hage et al.,(2020) that aimed to provide up-to-date information on potential mental health risks associated with exposure of health professionals to previous epidemics of 2003 (SARS-CoV-1) and 2009 (H1N1) and the COVID-19 pandemic the COVID-19 pandemic suggest that rapidly changing information created uncertainty, which is a well-known trigger for stress and anxiety. In this study, HCWs struggled with lack of clear and up-to-date information, leading to confusion and fear of being unprepared. The absence of clear communication regarding treatment protocols and best practices increased stressed. Also, a lack of clear messaging about infection risks and mitigation strategies contributed to uncertainty and social distress. The study found out that poor communication increased anxiety, uncertainty and burnout, and it emphasizes on clear, transparent and supportive communication for it builds resilience and reduces psychological distress.

A study by Martin & De Battista,(2022) that explored the role of information and communication technologies in supporting HCWs mental health during the COVID-19 pandemic highlighted the positive impact of enhanced communication on reducing stress, improving workplace interaction, and fostering emotional resilience. Key findings in this research include, clear and consistent communication channels reduced anxiety, communication strategies that utilize ICTs (such as virtual meetings, support groups and real-time updates) can significantly improve mental well-being, frequent and transparent communication reduces anxiety by keeping HCWs informed about their roles, expectations and available support systems. Overall, the study underscores the power of effective communication in safeguarding

HCWs mental health. ICT –based interventions improved communication, reduced stress, strengthened emotional support networks and fostered resilience. These findings emphasize that accessible, continuous, and structured communication strategies are crucial for maintaining the mental well-being of HCW in high-stress environments.

2.3.4 Human Resource-Related Strategies and HCW anxiety levels during pandemics

Study findings from Blake et al., (2024) highlight the significant role of human resource-related strategies, particularly the provision of well-being centers, in supporting HCW mental health. The results suggest that access to these centers was positively associated with improved mental well-being, particularly among HCW experiencing presenteeism. This implies that such facilities provided a crucial space for restoration and respite, mitigating the negative psychological impact of working when unwell.

A study by Labrague & De los Santos, (2020) that examined the relative influence of personal resilience, social support and organizational support in reducing COVID-19 anxiety in front-line nurses highlight the crucial role of organizational support as a human resource-related strategy in reducing COVID-19-related anxiety among front-line nurses. The study found that higher levels of organizational support were significantly associated with lower COVID-19 anxiety. This indicates that nurses who felt supported by their organizations experienced less psychological distress, reinforcing the importance of workplace mental health policies and institutional support systems. While personal resilience and social support also played significant roles in reducing anxiety, organizational supported emerged a s a crucial workplace that can be influenced through human resource policies. The study emphasizes that organizational strategies such as stress management programs, access to mental health resources, and fostering a supportive work environment are essential for mitigating anxiety among HCWs.

Cubitt et al., (2021) study examined the broader organizational and human resource-related strategies influencing hospital doctors' well-being during the COVID-19 pandemic in England. The findings highlight the significant impact of workload management, workplace support, facility provisions and psychological support on mitigating burnout and mental health deterioration among HCWs. Increased workload and redeployment were identified as major contributors to mental health deterioration among doctors. The study also highlights that loss of autonomy and anxiety about recovery plans also negatively affected doctors psychological well-being. Limited access to well-equipped rest areas that allowed social distancing and inadequate

changing and storage facilities were also reported as negative influences on well-being. These findings suggest that effective workload distribution, transparent communication regarding redeployment policies and availability of workplace infrastructure in supporting HCWs mental well-being are crucial HR strategies in reducing workplace stress.

2.4 Literature Review Summary and Research Gaps

The psychological well-being of healthcare workers (HCWs) has been a critical area of concern during pandemics, with studies highlighting various factors influencing their anxiety levels. The literature explores the role of structured hospital incident management systems (HIMS), infection prevention and control (IPC) measures, communication strategies, and human resource (HR)-related interventions in mitigating stress, anxiety, and burnout among HCWs. A summary of the literature review and existing research gap is presented in Table 1.

Table 1. Summary of the Literature Review and Research Gaps

Authors and Date	Aim of Study	Type of Study	Main Findings/ conclusions	Limitations	Research Gaps and Mitigation
Pappa et al 2020	To synthesis and analyze existing evidence on the prevalence of depression, anxiety and insomnia among HCWs during the COVID-19 outbreak	A systematic review and meta-analysis	Anxiety was assessed in 12 studies, and depression in 10 studies, female HCWs and nurses exhibiting higher rates of affective symptoms compared to male and medical staff respectively	Limited generalizability of findings because most studies carried out in China	The study did not establish direct links between structured hospital incident management systems and HCW mental health outcomes
Nickell et al ., 2004	To investigate the psychosocial effects of SARS on hospital staff in a large tertiary care institution in Toronto	Cross-sectional descriptive survey	Stigmatization, worry for family members and working part-time was associated with emotional distress amongst HCW.	Low response rate. Quarantined Staff did not participate in study.	did not establish direct links between structured hospital management systems and HCW mental health outcomes

Authors and Date	Aim of Study	Type of Study	Main Findings/ conclusions	Limitations	Research Gaps and Mitigation
Chigwedere et al., 2021	To examine the impact of epidemics and pandemics on the mental health of HCWs.	Systematic review Descriptive in nature	with stress being largely influenced by workload, exposure risks, and uncertainty in IPC protocols. Inadequate personal protective equipment (PPE) and frequent changes in IPC measures contributed to heightened distress,	large number of studies conducted during and after epidemics in the past 20 years. Publication bias- only included published literature no gray literature	provided a broader analysis of IPC measures without establishing explicit associations between IPC measures and psychological distress.
Raoofi et al., 2023	To systematically review the existing literature examining the prevalence of anxiety among hospital staff during the COVID-19 pandemic and identifying the contributing factors to address the complications of this disorder	Systematic review plus Meta-analysis	frontline HCWs, including nurses and ICU staff, faced the highest levels of anxiety due to direct exposure to infected patients and occupational risks.	Findings were not generalized because most were from China.Scarcity of data from other countries and continents which should be explored in future studies	provided a broader analysis of IPC measures without establishing explicit associations between IPC measures and psychological distress.

Authors and Date	Aim of Study	Type of Study	Main Findings/ conclusions	Limitations	Research Gaps and Mitigation
El-Hage et al. (2020)	to provide up-to-date information on potential mental health risks associated with exposure of health professionals to the COVID-19 pandemic	A narrative review	found that unclear communication about treatment protocols and infection risks contributed to uncertainty, anxiety, and burnout among HCWs.	Reviews only included studies done in French	provided a broader analysis of communication strategies without establishing explicit associations between particular communication strategies and psychological distress.
Martin & De Battista (2022)	to evaluate the effectiveness of an intervention with ICTs for health personnel from first-level care networks in Berazategui, Buenos Aires, Argentina	exploratory qualitative research and evaluative design	effective communication strategies, particularly those utilizing information and communication technologies (ICTs), played a crucial role in reducing anxiety. ICT-based interventions, such as virtual support groups, real-time updates, and structured messaging, were found to improve mental well-being, reduce stress, and enhance workplace interaction.	Limited generalizability of findings	provided a broader analysis of communication strategies without establishing explicit associations between particular communication strategies and psychological distress.

Authors and Date	Aim of Study	Type of Study	Main Findings/ conclusions	Limitations	Research Gaps and Mitigation
Blake et al. (2024)	to explore the relationship between wellbeing center use, HCWs wellbeing and job-related factors (job stressfulness, job satisfaction, presenteeism, turnover intentions).	Secondary analysis of data	emphasized the positive effect of well-being centers on HCW mental health, noting that such spaces provided restoration and respite for workers experiencing stress and presenteeism.	The cross-sectional study design reduces the ability to determine causality or analyze changes in variables over time	provided a broader analysis of HR strategies without establishing explicit associations between particular HR strategies and psychological distress.
Labrague & De los Santos (2020)	This study examines the relative influence of personal resilience, social support and organizational support in reducing COVID-19 anxiety in front-line nurses.	A cross-sectional study	found that organizational support was a key factor in reducing COVID-19-related anxiety among frontline nurses. Nurses who felt supported by their organizations experienced lower levels of psychological distress,	Limited generalizability of findings Study design made it impossible to establish casual links between variables	provided a broader analysis of HR strategies without establishing explicit associations between particular HR strategies and psychological distress.
Cubitt et al. (2021)	To understand the wider factors influencing and impacting upon hospital doctors' well- being during the COVID-19 pandemic in England.	Cross-sectional survey and mixed quantitative– qualitative analysis.	workload management, psychological support, and access to adequate rest areas significantly impacted mental health.	generalizability of the study findings is limited.	Provided a broader analysis of HR strategies without establishing explicit associations between specific HR strategies and distress.

2.5 Conceptual Framework.

The study variables were conceptualized in a directional way.

The Independent Variable: COVID-19 Pandemic Preparedness, assessed using the WHO Hospital Readiness Checklist. Key components include, Hospital Incident Management System, Infection Prevention and Control Measures, Communication Strategies and Human Resource Related Strategies.

The Dependent Variable: Healthcare Workers' anxiety levels, measured using the Generalized Anxiety Disorder 7 Scale (GAD-7)

Control Variable: Individual characteristics such as age, gender, years of experience, education level, profession (e.g. nurse, doctor), frontline status and department assignment during the pandemic. These factors may confound the relationship between preparedness and anxiety if not controlled.

This conceptual framework illustrates how pandemic preparedness directly or indirectly influences anxiety levels in HCWs. By controlling the individual characteristics, the study isolated the effect of preparedness on anxiety. Figure 1.0 provides a visual presentation of this framework.

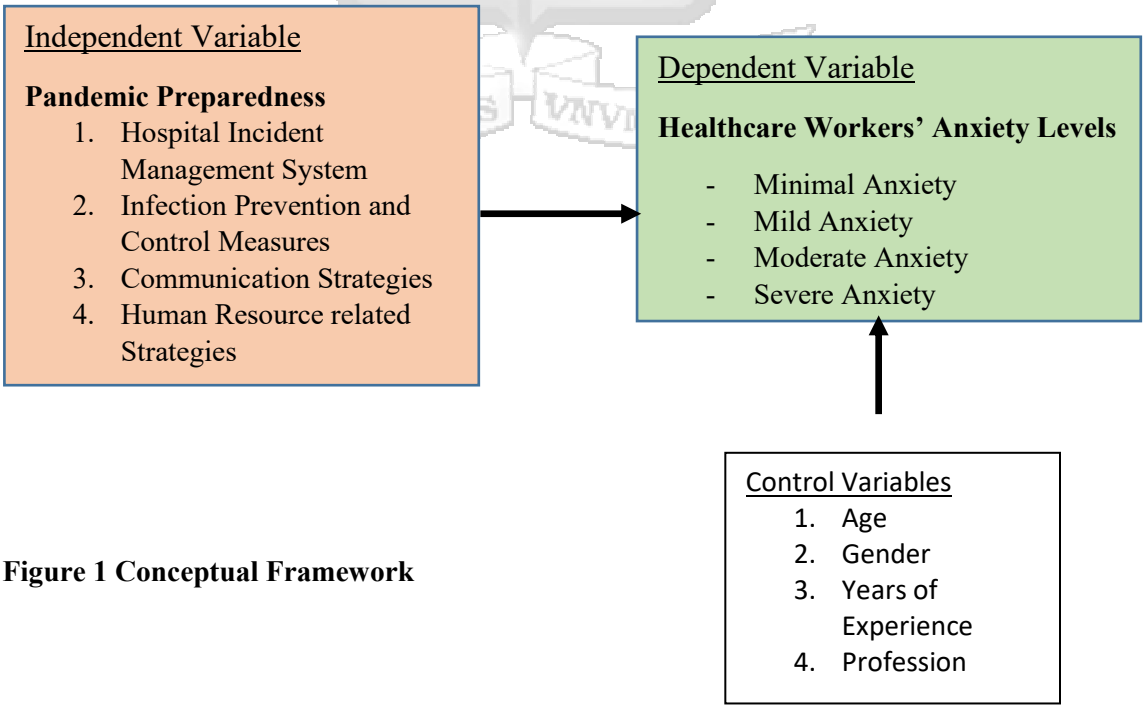

Figure 1 Conceptual Framework

2.6 Operationalization of Variables

This was the process of defining how variables were measured in the study. This process ensured clarity, consistency, and replicability. The two variables measured in this study were COVID-19 pandemic preparedness levels and anxiety levels in HCWs. The COVID-19 pandemic preparedness levels were measured using a Preparedness Index adapted from the Hospital Readiness Checklist for COVID-19 developed by WHO in February 2020. The HCWs' anxiety level, defined as the degree of psychological distress and anxious symptoms experienced in response to the COVID-19 pandemic, was measured using the Generalized Anxiety Disorder-7 scale, a validated self-reported questionnaire that assessed symptoms of anxiety. By operationalizing these variables in a structured and measurable way, the study accurately assessed the relationship between COVID-19 preparedness and anxiety levels, ensuring the findings were reliable and applicable in policy-making and healthcare management. Table 3.0 highlights this process.

Table 2. Operationalization of Variables

VARIABLE	VARIABLE ROLE	INDICATORS	MEASUREMENT	DATA COLLECTION METHOD	TEST ANALYSIS
Pandemic Preparedness	Independent variable	1. Hospital Incident Management System 2. Infection Prevention and Control Measures 3. Communication Strategies 4. Human Resource related Strategies	Likert Scales	Structured Questionnaire	Descriptive and inferential statistics
Healthcare Anxiety Levels	Dependent Variable	-Minimal Anxiety -Mild Anxiety -Moderate Anxiety -Severe Anxiety	Likert Scales	Structured Questionnaire	Descriptive and inferential statistics

2.6.1 Pandemic Preparedness

Pandemic preparedness focused on planning, exercising, revising, and translating preparedness and response plans into action. The WHO proposed that all its member states revise their preparedness and response plans based on the lessons learned during the 2009 H1N1 Influenza pandemic. Since then, only about 16 countries worldwide have updated and published their plans. WHO defined a pandemic preparedness plan as a living document that undergoes regular and necessary review following an outbreak (WHO, 2011).

This study aimed to determine whether COVID-19 pandemic preparedness influenced healthcare workers' anxiety levels. It adapted the Hospital Readiness Checklist for COVID-19 developed by WHO in February 2020. This was a current and applicable guideline for hospitals worldwide. It provided a checklist of key actions to be taken within the context of an ongoing hospital emergency preparedness process, linked to the overall national preparedness programme(WHO - Europe, 2020) during outbreaks.

The checklist included eleven key components; under each component was a list of questions assessing the implementation of recommended actions for that specific area. These components included the incident management system, human resources, surge capacity, continuity of essential health services, communication, surveillance (early warning and monitoring), patient care, case management, laboratory services, infection prevention and control, and essential support services such as logistics and management of supplies, including pharmaceuticals (WHO-Europe, 2020).

This study adapted four key components from the WHO hospital readiness checklist to assess hospital preparedness in responding to COVID-19. These were the Hospital Incident Management System, Infection Prevention and Control, Communication, and Human Resource components.

2.6.2 Healthcare Workers' Anxiety levels

Pandemics induced fear, worry, and concern among certain groups of people, particularly healthcare workers, older adults, and individuals with pre-existing mental health conditions(S. Dubey, P. Biswas et al., 2020). These groups were among the most vulnerable during the

COVID-19 pandemic. Healthcare workers typically remained on duty to manage pandemics and often developed mental health issues due to virus exposure, fear of infecting family members, or uncertainty regarding the course of the pandemic. Consequently, it was common for healthcare workers to experience mental health challenges(S. Varsha & Dr. S. Ruckmani, 2021).

Anxiety is understood as a response to stress. While mild anxiety is beneficial—helping individuals avoid danger, prepare, and remain alert—extreme anxiety can develop into a disorder. Anxiety disorder is characterized by excessive and persistent worry and fear, often about ordinary daily activities(Philip R. Muskin, M.D., 2021). These disorders involved repeated, intense feelings of worry or terror that could peak within minutes. Common symptoms of anxiety included nervousness, restlessness, and tension. Individuals often developed a sense of impending danger and, in some cases, experienced sweating. It is also common for individuals with anxiety disorders to tremble, feel weak, and have difficulty concentrating or controlling their worry(M. Craske & M. Stein, 2016).Anxiety disorders affect nearly 30% of adults at some point in their lives, making them the most common mental disorders globally (Philip R. Muskin, M.D., 2021).

Anxiety disorders appear in various forms. Generalized Anxiety Disorder (GAD) is typically identified by chronic anxiety, worry, and tension (DeMartini et al., 2019). Obsessive-compulsive disorder is marked by recurrent, unwanted thoughts (Karas et al., 2019). Panic Disorder (PD) is characterized by spontaneous, recurrent panic attacks (PA), as defined by the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5)(American Psychiatric Association, 2013).Regardless of the type, anxiety disorders can cause extreme discomfort and interfere with decision-making and routine functioning.

This study focused on Generalized Anxiety Disorder (GAD) because its core feature—worry—was found across multiple psychological disorders, making it a trans-diagnostic process(A. Harvey, E. Watkins et al., 2004).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes methods and materials that was used to collect and analyze data They include study design, study population, sampling design, sample size determination, data collection tools, data management and analysis and ethical considerations.

3.2 Research Philosophy

A research philosophy is a framework that guides how a study should be done based on existing knowledge and the state of data. The two main research philosophies are positivist and interpretivism (H. Alharahsheh1 & A. Pius, 2020).These philosophies are different and illustrate the approach human beings take in understanding their environment.

In a positivism philosophy, the state of the environment is independent of the subject that is studying it, and thus creates room to make objective observations. By contrast, in interpretivism, perceptions influence findings, and the approach is thus seen as subjective (H. Alharahsheh1 & A. Pius, 2020). This study embraces the positivism philosophy, where the observations are independent of the perceptions of the research. The purpose is to collect data and utilize it to produce precise, objective and quantitative results.

3.3 Study Design

The study adopted a descriptive cross-sectional design aimed at investigating the retrospective effects of COVID-19 pandemic preparedness on healthcare workers' anxiety levels in a public hospital in Nairobi County, with a focus on Kenyatta National Hospital (KNH). The primary advantage of employing a retrospective cross-sectional design lay in its efficiency in quantitative data collection, which significantly reduced the time required to gather information. Retrospective studies enable rapid analysis and dissemination of findings(K. Talari & M. Goyal, 2020), as they collect data long after the event has occurred—thereby avoiding the ethical and logistical challenges associated with conducting research during an active pandemic.

3.4 Target Population

The target population in research referred to the specific group of individuals or entities that the researcher intended to study and about whom inferences were drawn (J. Creswell, 2012). In this study, the target population included doctors, clinical officers, nurses, laboratory technologists, and technicians working at Kenyatta National Hospital (KNH) who worked during the pandemic. According to KNH employee records during the pandemic, the total target population was 1,017.

3.5 Eligibility Criteria

Eligibility criteria—also referred to as inclusion and exclusion criteria—were the specific attributes that individuals needed to meet in order to be considered for participation in the study (A. Quintero, Dr. S. Helm ,2022). These criteria ensured that study participants accurately represented the target population and enhanced the relevance of the research findings to the intended group.

Inclusion Criteria:

- Healthcare workers who worked at KNH during the COVID-19 pandemic (2020–2022)

Exclusion Criteria:

- Healthcare workers who were employed at hospitals other than Kenyatta National Hospital (KNH) during the COVID-19 pandemic (2020–2022).

3.6 Sampling Process

The study collected primary data using a simple random sampling technique. The sample size was determined based on the total population (those who worked during the COVID-19 pandemic) of doctors, nurses, clinical officers, and laboratory technologists and technicians working in the Medical, Surgical, Laboratory, and Accident & Emergency departments. These departments were selected because they constituted key operational areas in which the majority of healthcare workers were actively involved in pandemic response efforts.

According to human resource records at KNH during the pandemic, the total number of healthcare providers in the selected departments was 1,017. The sample size was determined

using the Krejcie and Morgan standardized sample size table (Appendix 7), as well as the Krejcie and Morgan formula. According to the table, the appropriate sample size for a population of 1,017 was 279 participants. The actual calculation using the formula was as follows:

Formula for determining sample size from Krejcie & Morgan (1970).

Formula for determining sample sizes = $\frac{X2\ NP\ (1 - P)}{d2\ (N - 1) + X2\ P\ (1 - P)}$

where,

s = required sample size

X2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

Where N (population size) is 1017

Therefore….

$$S= \frac{3.841*1017*0.5(1-0.5)}{0.05^2(1017-1) +3.841*0.5(1-0.5)}$$

= 279

Table 3. Sample size for Kenyatta National Hospital

	KNH		
Department	Total Population during pandemic	Ratio per Unit	Sample per unit
Accident and emergency	153	153/1017=0.6	0.2*279=**56**
Medical	330	330/1017=0.3	0.3*279=**83**
Surgical	399	399/1017=0.4	0.4*279=**111**
Laboratory	135	135/1017=0.1	0.1*279 =**29**
Total	1017		**279**

The study employed a simple random sampling technique to recruit respondents from each of the selected departments. Simple random sampling is a probability-based method that involves drawing a sample from a homogenous population (M. Slonim, 1957)- only those who worked in KNH during the pandemic. In this case, healthcare workers (HCWs) at Kenyatta National Hospital (KNH) during the pandemic constituted a homogenous group, as they shared the common experience of being exposed to the COVID-19 pandemic between 2020 and 2022.

Simple random sampling is commonly used in surveys and quantitative research designs. When carefully implemented, it can yield a sample that is representative of the entire population (S. Noor & O. Tajik, 2011). This method is considered unbiased and impartial, as it gives every individual in the population an equal chance of being selected. However, since selection is based purely on chance, it may not always ensure perfect generalizability, and it can be cumbersome to implement—hence, it is rarely used in complex research designs (A. Rahim, 2008).

The target population included healthcare workers who worked during the pandemic in the selected departments at KNH. An accurate and up-to-date list of HCWs in these departments was obtained from departmental heads. Each individual on the list was assigned a unique number from 1 to 1,017 (the total population size). These numbers were then entered into a table of random numbers (Appendix 12). A random sample was selected using the random numbers table. The Principal Investigator began at an arbitrary point in the table and moved in any direction—up, down, left, or right—to ensure that each number had an equal chance of being chosen. For example, if the first random number selected was 115, then the individual assigned number 115 on the population list was included in the sample. This process continued until the required sample size of 279 participants was reached. If a number appeared more than once, it was discarded to avoid duplication.

Once the sample was finalized, all selected participants were contacted—either via email, WhatsApp, or in person—to request informed consent for participation in the study.

3.7 Recruitment and Consenting Procedures

Recruitment and consenting began after obtaining approvals from the Strathmore University School of Graduate Studies, the Institutional Review Board (IRB) -(Appendix 2), NACOSTI (Appendix 3), the KNH-UoN Ethics and Research Committee (Appendix 4), and permission from the Kenyatta National Hospital (KNH) administration and relevant departments (Appendix

5). The Principal Investigator (PI) approached the departments of interest—medical, surgical, laboratory, and Accident and Emergency—and obtained comprehensive lists of healthcare workers (HCWs) from the respective departmental or unit heads.

To ensure the target sample size was reached, the PI used multiple contact methods including emails, WhatsApp messages, and face-to-face interactions. In-person contact was strategically conducted during shift changes when HCWs were less busy. During the initial approach, the PI explained the contents of the informed consent form (Appendix 11), which detailed the purpose of the study, potential benefits, and any associated risks.

Only HCWs who voluntarily consented and those who worked during the pandemic were recruited into the study. Each consenting participant was required to sign the informed consent form before enrollment. After providing consent, participants were given a structured, self-administered questionnaire. They were encouraged to contact the PI for any questions or clarifications to ensure the accuracy and quality of the data collected.

3.8 Data Collection Process

The study utilized a structured survey questionnaire categorized into three sections (see Appendix 6). Section A captured demographic characteristics; Section B gathered information on the level of COVID-19 hospital pandemic preparedness; and Section C focused on assessing anxiety levels among healthcare workers.

Each section employed Likert-scale items. Likert scales were used to measure attitudes, perceptions, and opinions in a scientifically reliable and validated manner (I.Kusmaryono, D. Wijayanti et al., 2022). Participants indicated their level of agreement with various statements, and the combination of responses provided insight into specific dimensions of their attitudes and opinions (A. Joshi, S. Kale et al., 2015).

World Health Organization Hospital Readiness Checklist

To assess pandemic preparedness, the study adapted a key framework developed by the World Health Organization—the *Hospital Readiness Checklist*, introduced in February 2020 during the COVID-19 pandemic (WHO, 2020). Four critical components from the checklist were modified to align with the study's objectives and population. These included: Infection Prevention and Control, Communication, Human Resources, and the Hospital Incident Management System.

Each of these components consisted of three questions, each containing 15 items. Every item had five response options with assigned point values: *strongly disagree* (1 point), *disagree* (2 points), *undecided/not sure* (3 points), *agree* (4 points), and *strongly agree* (5 points). These components were designed to explore respondents' attitudes toward general pandemic preparedness—for example, how well-prepared they felt—and their perspectives on hospital strategies and initiatives, such as how useful these strategies were in preparing or protecting them during the pandemic.

Generalized Anxiety Disorder 7-Item Scale (GAD-7)

The study employed the Generalized Anxiety Disorder 7-item Scale (GAD-7) (Appendix 8) to measure anxiety levels. The GAD-7 has demonstrated strong psychometric properties, making it suitable for use in health surveys, epidemiological studies, and primary care settings (A. Sapra, P. Bhandari, et al., 2020). Evidence also supported its growing use in screening for generalized anxiety disorder (GAD) and assessing its severity (C. Beard & T. Björgvinsson, 2014).

The scale's reliability and validity had been confirmed in retrospective studies conducted in multiple countries during the COVID-19 pandemic. For instance, a 2022 retrospective study on a cohort of U.S. adults used the GAD-7 to evaluate the association between visual impairment and anxiety during the pandemic (2020–2021), reporting elevated anxiety levels during the early stages of COVID-19 and towards the end of 2021 (S. Sekimitsu et al., 2024). Similarly, Bracone et al. (2022) used the GAD-7 in a study assessing psychological distress during the Italian lockdown (March–May 2020), where participants were asked to retrospectively recall their psychological states(F. Bracone et al., 2022).

These and other studies highlighted the GAD-7's wide applicability and validation across different populations and research designs, establishing it as a reliable and valid tool for assessing anxiety retrospectively.

3.9 Validity and Reliability

Validity and reliability were two essential concepts considered in this study to assess the quality and credibility of the measurement instruments and research findings. These concepts were crucial in ensuring that the results were accurate, consistent, and meaningful (R. Ewing & K. Park, 2020).

Validity referred to the extent to which a measurement instrument accurately captured what it was intended to measure. It assessed whether the study's findings and conclusions were logically and meaningfully aligned with the research questions or hypotheses (P. Roberts et al., 2006) To ensure validity, the study utilized established and validated tools: the GAD-7 item scale to assess anxiety and an adapted version of the WHO Hospital Readiness Checklist to evaluate pandemic preparedness.

Reliability pertained to the consistency, stability, and repeatability of the measurement instruments. It measured the extent to which an instrument produced consistent results when administered multiple times under similar conditions (P. Roberts et al., 2006). Cronbach's Alpha was used to test the internal consistency of the scales. A Cronbach's Alpha value of 0.70 or higher was considered indicative of strong reliability, suggesting that the items within the scale consistently measured the same underlying construct. As the measurements in this study involved multiple questionnaire items, Cronbach's Alpha served as a measure of internal consistency reliability (G. Bonett & TA. Wright, 2015).

3.10 Data Analysis

Data were analyzed using both descriptive and inferential statistics to determine the relationship between COVID-19 pandemic preparedness and healthcare workers' (HCWs) anxiety levels. The results were presented in the form of tables, charts, and graphs to enhance visual understanding of the levels of COVID-19 preparedness, HCW anxiety levels, and the underlying relationship between preparedness and anxiety during the pandemic. Demographic characteristics were analyzed using frequencies. Descriptive statistics involved the use of means and standard deviations, while inferential statistics included multiple linear regression analysis.

The extent of COVID-19 preparedness was assessed using a WHO-adapted pandemic preparedness checklist, with responses measured on a Likert scale. These data were analyzed descriptively using means and standard deviations. Preparedness levels were categorized into four groups and summarized using frequencies and percentages.

The analysis of anxiety levels was also descriptive, with the Generalized Anxiety Disorder 7-item (GAD-7) scale scores summarized using means and standard deviations. The GAD-7 scores were categorized into four groups: 0–4 (Minimal anxiety), 5–9 (Mild anxiety), 10–14 (Moderate

anxiety), and 15 or greater (Severe anxiety), and were reported using frequencies and percentages.

Multiple linear regression was used to estimate the relationship between four independent variables—representing COVID-19 preparedness strategies—and one dependent variable, the level of anxiety among HCWs. The independent variables included: Hospital Incident Management System, Infection Prevention and Control Measures, Communication Strategies, and Human Resource-Related Strategies. This model helped determine the strength of the relationship between each independent variable and the dependent variable, as well as predicted values of the dependent variable based on specific values of the independent variables (Grégoire, 2015).

The multiple linear regression model relied on several assumptions: data were collected using statistically valid sampling methods; there were no hidden relationships among variables; the data followed a normal distribution; the relationship between variables was linear; and homogeneity of variance was maintained—meaning the size of prediction error remained consistent across all values of the independent variables (Nathans et al., 2012).

The model for Multiple Linear Regression (MLR) is a statistical formula used to explain the relationship between one dependent variable and two or more independent variables. The general form of the model is:

$$Y=\beta 0+\beta 1X1+\beta 2X2+\cdots+\beta nXn+\varepsilon$$

Where:

- *Y =* ***Dependent variable*** *(e.g., anxiety level)*
- *X1, X2..., Xn=* ***Independent variables*** *(e.g., hospital preparedness components such as Incident Management System, Infection Control, etc.)*
- *β0=* ***Intercept*** *(the predicted value of Y when all X's are zero)*
- *β1, β2..., βn=* ***Regression coefficients*** *(representing the change in Y for a one-unit change in each X, holding others constant)*
- *ε=* ***Error term*** *(represents random variability not explained by the model)*

Example (in the context of this study):

Anxiety Level=β0+β1(Incident Management) +β2(Infection Control)
+β3(Communication)+β4(Human Resource) +ε

This equation would allow study to assess:

- The overall fit of the model (how well the preparedness variables explain anxiety levels),
- The individual impact of each preparedness component on anxiety,
- And whether any of the predictors are statistically significant**.**

3.11 Ethical Consideration

Permission to carry out the study was sought from Strathmore University School of Graduate Studies and the Institutional Review Board (IRB). A mandatory research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI). The researcher also sought ethical approval from the KNH-UoN Ethics and Research Committee, followed by administrative permission from the Kenyatta National Hospital (KNH) management.

An informed consent form for this research protocol was designed and approved by the IRB. To ensure privacy and confidentiality throughout the study, all enrolled participants were advised not to include their names or signatures on any study documents. All study data—both electronic and hard-copy—were securely stored in locked cabinets and in a password-protected Google Drive folder to minimize the risk of privacy breaches or unintentional data loss.

CHAPTER 4: PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter provides a detailed analysis of the data obtained during the data collection period. The objectives that guided the analysis included hospital incident management system, infection prevention and control measures, communication strategies and human resource-related strategies and their influence on anxiety levels among healthcare workers. The analysis was done per objective.

4.2 Response rate

A total 279 healthcare workers were targeted in this study.258 healthcare workers were successfully recruited into the study and included in the analysis representing 92% response rate. (Table 4).

Table 4. Response rate

	Frequency	**Response rate (%)**
Sample size targeted	279	
Total screened and recruited	258	92%

The study targeted 4 departments; the Accident and Emergency, Medical, Surgical and Laboratory departments with a unit sample of 56, 83,111 and 29 respectively. A large proportion of participants invited to be part of the research readily agreed to take part, indicating a high level of interest to participate in a study.

The response rate per department shows a generally high level of engagement across all areas, with an overall response rate of 92%. The Surgical Department had the highest response rate at 95%, suggesting that participants from this department were the most willing or readily available to engage with the study. This high response rate could be due to factors such as greater interest in the study. The Accident and Emergency Department also demonstrated strong participation with a 94% response rate, indicating that the department was relatively successful in recruiting participants as well. Both departments reflect high levels of recruitment success, which may point to strong communication and recruitment strategies in these areas.

On the other hand, the Medical Department had the lowest response rate of 86%. While still respectable, this could be influenced by the demanding nature of the medical work, which may have made it harder for participants to commit to the study. Despite these minor variations, the overall high response rate of 92% reflects a well-conducted recruitment process across all departments, with only a few areas requiring additional effort to improve participation. The response rate data is shown in Table 5.

Table 5. Response Rate Per Department

Department	**Sample Size Targeted Per Department**	**Total Screened and Recruited**	**Response rate (%) per Department**
Accident and Eemergency	56	53	**94%**
Medical	83	72	**86%**
Surgical	111	106	**95%**
Laboratory	29	27	**93%**
TOTAL	**279**	**258**	**92%**

4.3 Demographic characteristics of healthcare workers at Kenyatta National Hospital

The demographic characteristics of healthcare workers at Kenyatta National Hospital (KNH) indicated a nearly balanced gender distribution, with female workers (52.3%) slightly outnumbering male workers (47.7%). The age distribution showed that most healthcare workers fell within the 41-50 age bracket (38.4%), followed by those aged 31-40 years (30.2%), while the youngest group (21-30 years) constituted only 15.1%. This suggested that KNH had a relatively experienced workforce, with fewer younger professionals. Regarding educational qualifications, the majority of healthcare workers had at least a bachelor's degree (48.4%), while 29.1% held a diploma, and 22.5% had a master's degree. This reflected KNH's employment of a highly educated workforce, which is essential for delivering specialized and evidence-based care.

An analysis of professional cadres revealed that nurses formed the largest category (45.7%), followed closely by doctors (43.4%). Laboratory personnel accounted for 10.1%, while clinical officers represented a very small percentage (0.8%). This distribution aligned with the hospital's role as a referral facility, which required a significant number of nurses and doctors to handle complex cases. During the COVID-19 pandemic, the majority of healthcare workers (84.1%) served on the frontline, directly engaging in patient care and response efforts. Additionally, 94.6% of respondents reported working at KNH during the pandemic (2020-2022), demonstrating their active involvement in managing the crisis. This high percentage reflected the hospital's central role in Kenya's pandemic response, with most employees facing the challenges of emergency care and infectious disease management.

The distribution of healthcare workers across departments changed slightly before and after the pandemic with a few working within the Infectious Disease Unit. The medical and surgical departments consistently had the highest number of staff, with 30.6% and 39.2% currently working in these areas, respectively. Notably, the Accident and Emergency department saw an increase in staff allocation post-pandemic (from 13.2% to 20.5%), likely due to increased demand for emergency preparedness. Data on years of experience showed that the workforce was predominantly composed of highly experienced professionals, with 44.6% having over 15 years of experience and only 9.7% having less than five years. This wealth of experience contributed to the hospital's capacity to handle complex medical cases, but it also raised concerns about workforce sustainability, as a significant portion of employees might have been nearing retirement. These findings highlighted the importance of workforce planning, continuous professional development, and strategic recruitment to maintain high service delivery standards at KNH. Results of the demographic analysis are shown in Table 6.

Table 6. Demographic characteristics of healthcare workers at Kenyatta National Hospital

Characteristics	**Frequency**	**Percent**
Gender		
Male	123	47.7
Female	135	52.3
Total	**258**	**100**
Age		
21-30	39	15.1
31-40	78	30.2

41-50	99	38.4
51-60	42	16.3
Total	**258**	**100**
Level of education		
Bachelor's Degree	125	48.4
Diploma	75	29.1
Masters	58	22.5
Total	**258**	**100**
Cadre		
Nurse	118	45.7
Doctor	112	43.4
Laboratory Personnel	26	10.1
Clinical officer	2	0.8
Total	**258**	**100**
Role during the Pandemic		
Non-frontline	41	15.9
Frontline	217	84.1
Total	**258**	**100**
Work in KNH during the Covid-19 pandemic		
No	14	5.4
Yes	244	94.6
Total	**258**	**100**
Primary department during the pandemic		
Medical	87	33.7
Surgical	89	34.5
Accident and emergency	34	13.2
Infectious Disease Unit	25	9.7
Laboratory	23	8.9
Total	**258**	**100**
Current department		
Medical	72	30.6
Surgical	106	39.2

Accident and Emergency	53	20.5
Laboratory	27	9.7
Total	**258**	**100**
Years of experience		
Under five years	25	9.7
5 - 10 years	71	27.5
11 - 15 years	47	18.2
Over 15 years	115	44.6
Total	**258**	**100**

4.4 Validity and Reliability Test

The data was subjected to validity and reliability to check for its suitability in answering the identified research objectives.

Validity

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test were performed to investigate the validity of the study data as shown in Table 7. The KMO value of 0.873 indicates that the data is highly suitable for factor analysis. A value between 0.8 and 1.0 is considered excellent, suggesting that the sample size and correlation between variables are adequate for performing factor analysis. The Bartlett's Test of Sphericity showed significant results, $x^2(1431) = 11{,}973.3$, $p<0.05$, indicating that the correlation matrix is significantly different from an identity matrix. This means that there are enough correlations among the variables to perform factor analysis, which confirms the validity of the data for factor analysis.

Table 7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.873
Bartlett's Test of Sphericity	Approx. Chi-Square	11973.306
	df	1431
	p-value	0.000

Reliability

The Cronbach's Alpha statistics were conducted to investigate the reliability of the data as shown in Table 8. The values presented indicate a high level of internal consistency across most categories. For "Hospital incident management" (Alpha = 0.92), "Communication strategies" (Alpha = 0.94), "Human resource-related factors" (Alpha = 0.92) and infection prevention and control with alpha value of 0.86. This show an excellent reliability, meaning the items in these categories are highly consistent in measuring the same underlying concept. In assessing the overall reliability including all constructs, the overall Cronbach's Alpha value of 0.96 further reinforces the high internal consistency of the entire dataset. Overall, the data demonstrates strong reliability.

Table 8: Reliability test

Key measures	Number of items	Alpha value
Hospital incident management	9	0.92
Infection prevention and control	15	0.86
Communication strategies	15	0.94
Human resource- related factors	15	0.92
Overall	54	0.96

4.5 Levels of Anxiety among healthcare workers at Kenyatta National Hospital

The levels of anxiety were measured using the generalized anxiety disorder -7 item scale. The findings below are anxiety levels measured during the pandemic and at the time of the study.

4.5.1 Anxiety Levels during the pandemic

Figure 2 bar chart illustrates the distribution of anxiety levels during the COVID-19 pandemic, categorized into Minimal, Mild, Moderate, and Severe. The Severe anxiety level was the most prevalent, affecting 31.0% of individuals, highlighting the significant psychological impact of the pandemic. Mild anxiety was also relatively high at 26.7%, followed by Minimal anxiety at

22.1% and Moderate anxiety at 20.2%, which had the lowest percentage. The findings suggest that a substantial portion of the population experienced heightened anxiety, with nearly one-third suffering from severe anxiety. The uncertainty, health concerns, lockdowns, and socio-economic disruptions during the pandemic likely contributed to these elevated anxiety levels. Addressing such mental health challenges requires targeted interventions, including accessible psychological support, public awareness, and stress management strategies. Results are shown in Fig.2.

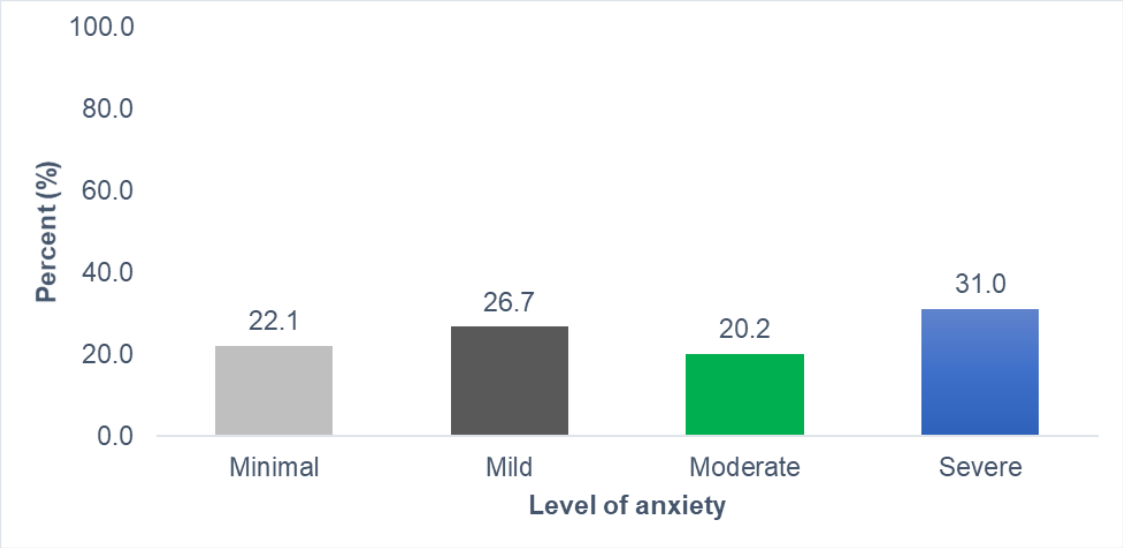

Figure 2. Anxiety Levels during the COVID- pandemic

4.5.2 Current level of anxiety

Figure 3 presents the distribution of current anxiety levels, showing that the majority of individuals (72.1%) experience minimal anxiety, indicating a significant improvement in mental well-being compared to the peak of the COVID-19 pandemic. Mild anxiety is reported in 16.7% of individuals, while moderate anxiety is considerably lower at 7.0%, and severe anxiety is the least common at 4.3%. This trend suggests that as external stressors such as health risks, lockdowns, and economic uncertainties have subsided, anxiety levels have generally decreased. The decline in severe and moderate anxiety may be attributed to increased coping mechanisms, mental health interventions, and a return to normalcy. However, the presence of mild and moderate anxiety in a notable portion of individuals highlights the continued need for mental health awareness and support systems.

Results of current anxiety levels are as shown in Figure 3.

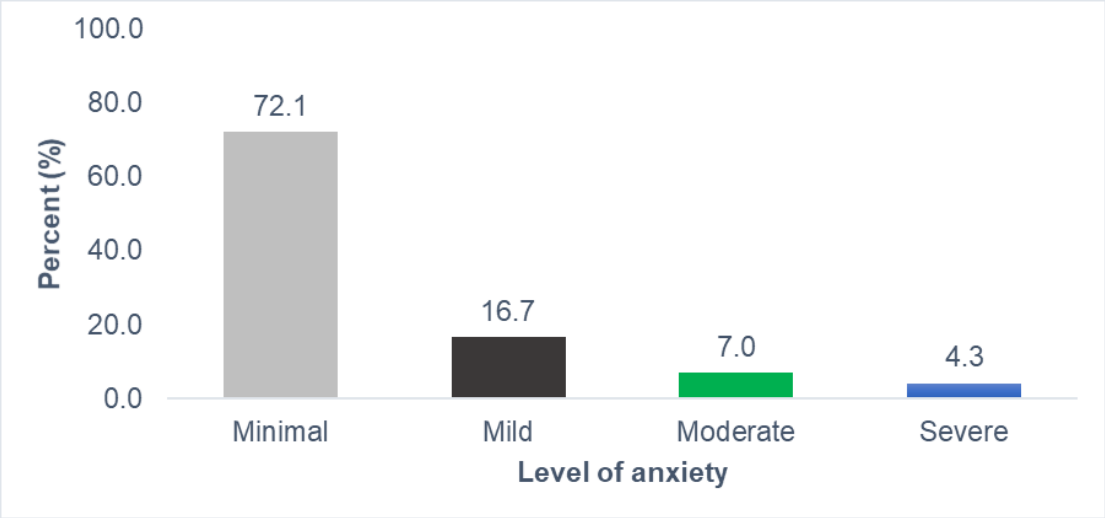

Figure 3. Current level of anxiety

4.5.3 Comparison of Anxiety During COVID-19 and Currently Among Healthcare Workers

The comparison of anxiety levels among healthcare workers during the COVID-19 pandemic and the present time shows a significant decline in anxiety. During the pandemic, 34.3% of those who experienced anxiety continued to have anxiety in the present, while 65.7% no longer reported anxiety. In contrast, among those who did not experience anxiety during the pandemic, 94.7% remained anxiety-free, and only 5.3% developed anxiety over time. The relative risk (RR) of 6.52 (95% CI: 2.13 – 19.95, $p < 0.001$) indicates that those who had anxiety during the pandemic were over six times more likely to experience ongoing anxiety compared to those who were initially anxiety-free, as shown in Table 9.

This data highlights the long-term mental health effects of the pandemic, as a significant portion of healthcare workers who had anxiety during COVID-19 continue to struggle with it. However, the fact that anxiety levels have decreased overall suggests recovery and adaptation over time. The findings emphasize the importance of continuous mental health support, particularly for those who were affected during the pandemic, to prevent prolonged psychological distress among healthcare workers.

Table 9. Comparison of anxiety during Covid-19 and currently among healthcare workers

	Current anxiety level			
	Absent n(%)	**Present n(%)**	**RR(95%CI)**	**P value**
Anxiety during Covid-19				
Absent	54(94.7)	3(5.3)		
Present	132(65.7)	69(34.3)	**6.52(2.13 – 19.95)**	<0.001

4.6 Descriptive Findings

4.6.1 On the Influence of Hospital Incident Management on healthcare workers' anxiety levels at KNH

The descriptive findings indicated that the hospital's emergency preparedness and response mechanisms were generally effective, with mean scores ranging from 3.19 to 3.76 on a five-point scale. The presence of an Emergency Response Plan, which functioned effectively before and during the pandemic, received a mean score of 3.56 (SD = 1.04), suggesting that while the plan was considered useful, there were areas for improvement. Similarly, the existence of an Emergency Operation Center, a dedicated space for coordinating hospital-wide emergency response activities, had a slightly higher mean score of 3.6 (SD = 0.99), indicating that staff generally acknowledged its role in crisis management. However, the hospital's ability to meet the increased demand for clinical care during the pandemic scored comparatively lower at 3.19 (SD = 1.06), reflecting some challenges in scaling up resources and personnel to address the surge in patient numbers. The standard deviation of 1.0 across all statements suggested variability in staff perceptions, possibly influenced by differences in roles, experiences, and departmental preparedness during the crisis. These findings highlight the need for continuous improvement in emergency preparedness, resource allocation, and healthcare system resilience. Results of the descriptive analysis are presented in Table 10.

Table 10. Descriptive Analysis of Hospital Incident Management System during COVID-19 pandemic

Statement	Mean	SD
My hospital has an Emergency Response Plan that works effectively before and during the pandemic	3.56	1.04
My hospital has an Emergency Operation Centre- a specific location prepared to convene and coordinate hospital-wide emergency response activities	3.60	0.99
During the pandemic, my hospital was able to meet the increased demand for clinical care	3.19	1.06
During the pandemic there was an efficient and accurate Triage System- well equipped triage stations that were supported by trained staff. A system that ensured early recognition of infection and isolating	3.48	0.99
During the pandemic there was an organized in-patient management strategy that ensured adequate management of patients (which included critical and 0n-critical care and suspected or confirmed cases	3.51	1.01
My hospital continued to effectively provide essential health services (emergency services, urgent surgical operations, maternal and child care) and patient care during the pandemic	3.76	0.92
There were clear and consistent communication channels and procedures in the hospital to report unusual health events (uncommon/ab0rmal clinical presentations) in my patients	3.46	0.98
I was well prepared to respond to the pandemic in my role at my department	3.07	1.17
I was confident in managing suspected and confirmed cases of COVID-19	3.11	1.16

4.6.2 On the Influence of Infection Prevention and Control measures on healthcare workers' anxiety levels at KNH

The descriptive findings on infection prevention and control measures during the pandemic show that the hospital's infection prevention and control measures were effectively implemented with high mean scores ranging from 3.38 to 4.70 on a five-point scale. Handwashing (M =4.66, SD=0.52) and alcohol rubs/hand sanitizers (M=4.7, SD=0.47) were among the highest-rated measures, with respondents generally indicating strong adherence. Similarly, gowns, gloves, and goggles scored highly (M=4.6, SD =0.64), indicating widespread use and satisfaction. Other measures, such as routine cleaning and disinfection of surfaces (M=4.43, SD = 0.72) and

vaccination (M=4.42, SD =0.82), were also rated highly, suggesting effective infection control efforts. The lowest ratings were for the statements "suspected and confirmed cases were not grouped together during the pandemic" (M=3.38, SD =1.21) and "beds for suspected or confirmed cases were one-meter distance away from each other" (M=3.72, SD=1.12), suggesting less satisfaction or more variation in responses regarding these measures. Despite this, a significant portion of healthcare workers felt that essential components, such as the infection prevention and control committee (M=4.49, SD=0.57) and dedicated teams for suspected and confirmed cases (M=4.2, SD ±0.9), were well-managed, contributing positively to the hospital's pandemic response efforts (Table 11).

Table 11. Descriptive Analysis of Infection Prevention and Control measures during COVID-19 pandemic

	Mean	**SD**
Handwashing	4.66	0.52
Alcohol rubs/hand sanitizers	4.70	0.47
Wearing Gowns, gloves, googles	4.60	0.64
Routinely cleaning and disinfection of surfaces	4.43	0.72
Vaccination	4.42	0.82
Patients were educated on respiratory and hand hygiene while in the hospital	4.05	0.76
Droplets and contact precautions (such as masks on patients, isolation rooms, limiting transportation and movement of patients) were recommended for suspected and confirmed cases	4.30	0.70
Suspected cases were put in adequately ventilated single rooms or grouped together when single rooms were not available	4.04	0.97
Suspected and confirmed cases were not grouped together during the pandemic	3.38	1.21
Beds for suspected or confirmed cases were one-meter distance away from each other	3.72	1.12
There is an infection prevention and control committee and staff in my hospital	4.49	0.57
I received infection prevention and control training before and during the pandemic	3.83	1.10

A team of healthcare workers was designated to care exclusively for suspected and confirmed cases to reduce risk of transmission	4.16	0.92
I applied standard precautions for all my patients (this include wearing masks, gowns, gloves and eye protection appropriately	4.19	1.03
There was an adequate supply of Personal Protective Equipment and easily accessible to staff	4.07	0.91

4.6.3 On the influence of Communication Strategies on healthcare workers' anxiety levels at KNH

The descriptive findings indicate that the hospital effectively implemented its communication strategies during the pandemic, with mean scores ranging from 3.29 to 4.15 on a five-point scale. A majority of healthcare workers rated highly the use of posters and notices within the hospital (M = 4.15, SD =0.83), suggesting that the hospital found this as the most affordable and reliable way of creating awareness about the pandemic. Similarly, the hospital's promptness in updating healthcare workers about the pandemic received a high rating of M = 3.87, SD=0.89 indicating that the hospital valued keeping their staff updated at all times and ensuring they were well-informed for effective patient care. On the other hand, the hospital use of videos and messages on social media regarding the pandemic (M = 3.29, SD =1.02) had the lowest rating, reflecting less satisfaction or engagement with this communication method. Additionally, updates from various departmental heads received a moderate rating of M=3.53, SD=1.00 suggesting challenges in inter-departmental communication. Results of the descriptive analysis are presented in Table 12.

Table 12. Descriptive Analysis of the Communication Strategies during COVID-19 pandemic

Statement	**Mean**	**SD**
My hospital communicated using posters and notices regarding the pandemic in the hospital	4.15	0.83
My hospital provided prompt pandemic updates	3.87	0.89
My hospital provided Video updates and messages on social media regarding the pandemic	3.29	1.02
There were Updates from various Departmental Heads regarding the pandemic	3.53	1.00

There were regular meetings discussing the pandemic in my hospital	3.67	0.91
I was briefed on my roles and responsibilities in the management of patients during the pandemic	3.87	0.92
I was informed of all the decisions on clinical triage, patients prioritization and infection prevention and control measures	3.79	1.04
I received accurate and timely information regarding the pandemic	3.69	1.02
I was briefed on the communication channels to be used in the sharing of important information about the pandemic or about my patients during the pandemic	3.69	0.98
I was educated on where to receive/get trusted health information and guidelines regarding the pandemic	3.71	0.93
Accurate and timely communication with the staff regarding the pandemic	3.77	0.94
Key messages addressing a variety of pandemic scenarios were relayed to the staff	3.64	0.90
There was actual collection, processing and reporting of information to supervisory bodies for example the Ministry of Health	3.88	0.79
There were deliberate attempts to disseminate accurate information and prevent the spread of mis and dis-information	3.76	0.93
There was effective vertical and horizontal communication between healthcare workers and hospital management, and especially among various specialties, teams, and departments	3.71	0.91

4.6.4 On the influence of Human Resource-related strategies on healthcare workers' anxiety levels at KNH

The descriptive findings in this category show generally low mean scores ranging from 2.30 to 3.84 in a five-point scale, compared to the other categories in the study. Notably, the standard deviation of over 1.0 across many statements indicate a high variability of responses amongst the healthcare workers regarding their perceptions on the implementation of human resources strategies. Perhaps, this variability in staff perception is influenced by their differences in clinical experiences, roles and departmental readiness to handle the pandemic. Healthcare workers suspected or confirmed of having COVID-19 were effectively monitored and managed.

This HR strategy received the highest mean score of 3.84 (SD=0.93) suggesting the hospital's readiness in protecting and supporting its staff during the pandemic.

Other highly-rated measures include "Training on the pandemic" (M = 3.40, SD=1.21) and "Asymptomatic screening tests for employees" (M = 3.4, SD±1.16), both of which received moderately high ratings indicating effective pandemic preparedness and infection prevention. In contrast, the lowest-rated measures were related to the pandemic Health and Well-being program for employees. Specifically, "I had access to the pandemic Health and Well-being program for employees in the hospital" (M = 2.39, SD=0.99), "I found it helpful to access the pandemic Health and Well-being program for employees in the hospital" (M = 2.38, SD=0.98), and "My family had access to the pandemic Health and Well-being program for employees in the hospital" (M = 2.30, SD=0.93) all received lower scores, reflecting a lack of satisfaction or engagement with these programs. Results of these findings are presented in Table 13.

Table 13. Descriptive Analysis of the Human Resource Related strategies during COVID-19 pandemic

Statement	Mean	SD
Temperature checks for employees	3.35	1.23
Asymptomatic screening tests for employees	3.40	1.16
Flexible working hours and days off	2.80	1.26
Training on the pandemic	3.40	1.21
Psychosocial Support	2.59	1.26
I received training and exercises relevant to areas of need including Infection prevention and control, clinical management to ensure I am competent and safe at work	3.38	1.13
There were flexible working hours and days off for recuperation during the pandemic	2.86	1.29
Psychosocial support services available and accessible for me and my family	2.55	1.17
Staff that were suspected or confirmed of having the virus (COVID-19) or exposed to suspected or confirmed COVID-19 patients were monitored and managed effectively	3.84	0.93

There was a sufficient number of healthcare workers to meet the increased demand for clinical care during the pandemic	2.54	1.18
There was a pandemic Health and Well-being program for employees in the hospital	2.52	1.02
I was aware of the pandemic Health and Well-being program for employees in the hospital	2.46	1.02
I had access to the pandemic Health and Well-being program for employees in the hospital	2.39	0.99
My family had access to the pandemic Health and Well-being program for employees in the hospital	2.30	0.93
I found it helpful to access the pandemic Health and Well-being program for employees in the hospital	2.38	0.98

4.7 Regression Analysis

4.7.1 On the Influence of Hospital Incident Management System on healthcare workers' anxiety levels

The findings from the multiple linear regression showed that the hospital's Emergency Operation Centre (EOC) had a significantly negative association with anxiety, β (95% CI, p value): -1.17 (-2.30, -0.05, p =0.009). This suggests that the presence of an EOC was linked to lower anxiety. The negative β coefficient (-1.17) suggests that having a designated coordination center for emergency response may have helped reduce uncertainty and stress, leading to lower levels of anxiety as shown in Table 14.

Table 14. A Multiple Linear Regression Analysis on the influence of Hospital Incident Management System during COVID-19 pandemic on healthcare workers' anxiety levels.

	t	**β(95%CI)**	**P value**
(Constant)	6.575		0.000
Hospital has an Emergency Response Plan that works effectively before and during the pandemic	0.349	0.02(-0.09, 0.13	0.727

Hospital has an Emergency Operation Centre- a specific location prepared to convene and coordinate hospital-wide emergency response activities	-1.655	-1.17(-2.30,-0.05)	**0.009**
During the pandemic, my hospital was able to meet the increased demand for clinical care	-1.065	-0.04(-0.12, 0.03)	0.288
During the pandemic there was an efficient and accurate Triage System- well equipped triage stations that were supported by trained staff.	1.219	0.07(-0.04, 0.18)	0.224
During the pandemic there was an organized in-patient management strategy that ensured adequate management of patients	-1.561	-0.08(-0.19, 0.02)	0.120
Hospital continued to effectively provide essential health services and patient care during the pandemic	-0.467	-0.02(-0.10, 0.06)	0.641
There were clear and consistent communication channels and procedures in the hospital to report unusual health events in my patients	-0.552	-0.03(-0.12, 0.07)	0.582
I was well prepared to respond to the pandemic in my role at my department	0.178	0.01(-0.09, 0.10)	0.859
Confident in managing suspected and confirmed cases of COVID-19	0.346	0.02(-0.07, 0.10)	0.729

4.7.2 On the Influence of Infection Prevention and Control Measures on healthcare workers' anxiety levels

The findings from the multiple linear regression indicated that wearing Personal Protective Equipment (PPEs) (β = 0.15, 95% CI: 0.02, 0.28) was associated with higher anxiety levels, likely due to discomfort, prolonged use, or concerns about its effectiveness in preventing

infection. Similarly, separating suspected and confirmed COVID-19 cases (β = 0.07, 95% CI: 0.02, 0.13) contributed to increased anxiety, possibly because of the logistical challenges and heightened awareness of transmission risks. However, strategies that enhanced preparedness and control were linked to reduced anxiety. Specifically, having a dedicated team of healthcare workers assigned to manage COVID-19 cases (β = -0.08, 95% CI: -0.15, -0.02) helped alleviate anxiety, suggesting that role specialization reduced stress among other staff members. Furthermore, an adequate and easily accessible PPE supply (β = -0.15, 95% CI: -0.23, -0.07) was strongly associated with lower anxiety levels, as it provided a sense of security and confidence in infection prevention as shown in Table 15.

Table 15. A Multiple Linear Regression Analysis on the influence of Infection Prevention and Control measures during COVID-19 pandemic on healthcare workers' anxiety levels.

	t	**β(95%CI)**	**P value**
(Constant)	1.255		0.211
Handwashing	-0.928	-0.07(-0.23, 0.08)	0.354
Alcohol rubs/hand sanitizers	1.053	0.08(-0.07, 0.24)	0.293
Wearing PPEs (Gowns, gloves, googles)	2.309	0.15(0.02, 0.28)	**0.022**
Routinely cleaning and disinfection of surfaces	-1.346	-0.08(0.18, -0.20)	0.180
Vaccination	-0.798	-0.04(-0.12, 0.05)	0.425
Patients were educated on respiratory and hand hygiene while in the hospital	-1.540	-0.08(-0.17, 0.02)	0.125
Droplets and contact precautions (such as masks on patients, isolation rooms, limiting transportation and movement of patients) were recommended for suspected and confirmed cases	0.010	0.01(-0.11, 0.11)	0.992
Suspected cases were put in adequately ventilated single rooms or grouped together when single rooms were not available	0.040	0.01(-0.07, 0.08)	0.968

Suspected and confirmed cases were not grouped together during the pandemic	2.824	0.07(0.02, 0.13)	**0.005**
Beds for suspected or confirmed cases were one-meter distance away from each other	1.546	0.05(-0.01, 0.11)	0.123
There is an infection prevention and control committee and staff in my hospital	0.508	0.03(-0.08, 0.14)	0.612
I received infection prevention and control training before and during the pandemic	0.803	0.02(-0.03, 0.08)	0.423
A team of healthcare workers was designated to care exclusively for suspected and confirmed cases to reduce risk of transmission	-2.009	-0.08(-0.15, -0.02)	**0.046**
I applied standard precautions for all my patients (this include wearing masks, gowns, gloves and eye protection appropriately	1.618	0.05(-0.01, 0.11)	0.107
There was an adequate supply of Personal Protective Equipment and easily accessible to staff	-3.825	-0.15(-0.23, -0.07)	**<0.001**

Dependent variable: Anxiety

4.7.3 On the Influence of Communication Strategies on healthcare workers' anxiety levels

The analysis reveals significant communication strategies that influenced healthcare workers' anxiety levels during the COVID-19 pandemic as shown in Table 16. Receiving accurate and timely information regarding the pandemic (β = 0.13, 95% CI: 0.01, 0.25) was associated with higher anxiety levels, indicating that while timely updates are crucial, the continuous influx of information particularly regarding risks, evolving protocols, and patient outcomes may have contributed to stress and uncertainty. The overwhelming nature of pandemic-related updates might have heightened fear rather than alleviating it. Conversely, being educated on where to access trusted health information and guidelines (β = -0.09, 95% CI: -0.19, -0.01) was linked to lower anxiety levels, suggesting that having clarity on reliable sources of information provided reassurance and reduced uncertainty.

Table 16. A Multiple Linear Regression Analysis on the influence of Communication Strategies during COVID-19 pandemic on healthcare workers' anxiety levels.

	t	β(95%CI)	P value
(Constant)	2.750	0.510	0.006
My hospital communicated using posters and notices regarding the pandemic in the hospital	-0.892	-0.04(-0.37, 0.05)	0.373
My hospital provided prompt pandemic updates	-0.131	-0.01(-0.10, 0.09)	0.896
My hospital provided Video updates and messages on social media regarding the pandemic	-1.233	-0.05(-0.12, 0.03)	0.219
There were Updates from various Departmental Heads regarding the pandemic	1.132	0.05(-0.04, 0.15)	0.259
There were regular meetings discussing the pandemic in my hospital	0.436	0.02(-0.07, 0.12)	0.663
I was briefed on my roles and responsibilities in the management of patients during the pandemic	-1.353	-0.07(-0.17, 0.03)	0.177
I was informed of all the decisions on clinical triage, patients' prioritization and infection prevention and control measures	0.265	0.01(-0.09, 0.12)	0.791
I received accurate and timely information regarding the pandemic	2.196	0.13(0.01, 0.25)	**0.029**
I was briefed on the communication channels to be used in the sharing of important information about the pandemic or about my patients during the pandemic	0.629	0.03(-0.07, 0.13)	0.530
I was educated on where to receive/get trusted health information and guidelines regarding the pandemic	-1.866	-0.09(-0.19, -0.01)	**0.006**
Accurate and timely communication with the staff regarding	0.067	0.004(-0.11, 0.12)	0.946

the pandemic			
Key messages addressing a variety of pandemic scenarios were relayed to the staff	-1.649	-0.10(-0.23, 0.02)	0.100
There was actual collection, processing and reporting of information to supervisory bodies for example the Ministry of Health	-0.707	-0.04(-0.13, 0.06)	0.480
There were deliberate attempts to disseminate accurate information and prevent the spread of mis and dis-information	-0.231	-0.01(-0.12, 0.09)	0.817
There was effective vertical and horizontal communication between healthcare workers and hospital management, and especially among various specialties, teams, and departments	1.629	0.09(-0.02, 0.21)	0.105

4.7.4 On the influence of Human Resource-related strategies on healthcare workers' anxiety levels.

The multiple linear regression analysis revealed significant findings related to human resource strategies during the COVID-19 pandemic as shown in Table 17. Temperature checks for employees (β = -0.07, 95% CI: -0.12, -0.01) were associated with lower anxiety levels, suggesting that routine screenings provided a sense of security by ensuring potential infections were monitored and addressed proactively. Similarly, effective monitoring and management of staff exposed to or infected with COVID-19 (β = -0.17, 95% CI: -0.23, -0.10) significantly reduced anxiety, likely because clear protocols for handling exposure reassured employees that their safety and well-being were prioritized.

However, some interventions appeared to increase anxiety levels rather than alleviate them. Asymptomatic screening tests for employees (β = 0.09, 95% CI: 0.04, 0.15) were linked to heightened stress, possibly due to the fear of positive test results, job disruptions, or quarantine mandates, which may have created additional uncertainty among staff. Additionally, psychosocial support services available to employees and their families (β = 0.09, 95% CI:

0.004, 0.18) were also associated with higher anxiety, indicating that those accessing these services may have already been experiencing elevated distress. This suggests that while mental health support was critical, its increased usage reflected the severity of psychological strain among healthcare workers. Similarly, access to the hospital's Health and Well-being program (β = 0.22, 95% CI: 0.07, 0.37) was linked to higher anxiety levels, possibly because those seeking such programs were already dealing with workplace stress and emotional exhaustion.

Table 17: A Multiple Linear Regression Analysis on the influence of Human Resource - related strategies during COVID-19 pandemic on healthcare workers' anxiety levels.

	t	**β(95%CI)**	**P value**
(Constant)	5.226	0.68	0.000
Temperature checks for employees	-2.483	-0.07(-0.12, -0.01)	**0.014**
Asymptomatic screening tests for employees	3.290	0.09(0.04, 0.15)	**0.001**
Flexible working hours and days off	-1.740	-0.07(-0.15, 0.01)	0.083
Training on the pandemic	-0.131	-0.01(-0.09, 0.08)	0.895
Psychosocial Support	0.456	0.02(-0.07, 0.11)	0.649
I received training and exercises relevant to areas of need including Infection prevention and control, clinical management to ensure I am competent and safe at work	-0.785	-0.03(-0.11, 0.05)	0.433
There were flexible working hours and days off for recuperation during the pandemic	1.800	0.07(-0.01, 0.15)	0.073
Psychosocial support services available and accessible for me and my family	2.062	0.09(0.004,0.18)	**0.040**
Staff that were suspected or confirmed of having the virus (COVID-19) or exposed to suspected or confirmed COVID-19 patients were monitored and managed effectively	-4.929	-0.17(-0.23, -0.10)	**<0.001**

There was a sufficient number of healthcare workers to meet the increased demand for clinical care during the pandemic	0.610	0.02(-0.04, 0.08)	0.542
There was a pandemic Health and Well-being program for employees in the hospital	0.358	0.03(-0.12,0.17)	0.720
I was aware of the pandemic Health and Well-being program for employees in the hospital	-1.750	-0.13(-0.28, 0.02)	0.081
I had access to the pandemic Health and Well-being program for employees in the hospital	2.879	0.22(0.07, 0.37)	**0.004**
My family had access to the pandemic Health and Well-being program for employees in the hospital	-1.687	-0.12(0.25, 0.02)	0.093
I found it helpful to access the pandemic Health and Well-being program for employees in the hospital	-0.387	-0.03(-0.18, 0.12)	0.699

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings of the study on the influence of COVID-19 pandemic preparedness on healthcare workers' anxiety levels at Kenyatta National Hospital in Nairobi County, Kenya. It also discusses the implications of the results in relation to healthcare policy, mental health interventions, and hospital pandemic preparedness strategies. Furthermore, this chapter offers conclusions based on the study's objectives and provides practical recommendations for improving healthcare workers' psychological well-being during future pandemics or public health crises. Areas for further research are also suggested to build on the findings and address any limitations identified.

5.2 Summary of Findings

This section provides a summary of the key findings derived from the study. The findings are presented in relation to the study objectives, which examined the adequacy of hospital preparedness, the availability of protective measures, the effectiveness of training programs, and their collective influence on healthcare workers' anxiety levels. The summary highlights patterns, trends, and significant relationships observed in the data, offering insights into how preparedness strategies influenced mental well-being during the pandemic. These findings form the basis for the discussion, conclusions, and recommendations for future healthcare crisis management as subsequently shown hereunder:

5.2.1 Findings on Demographics

The demographic analysis of the study provides critical insights into the characteristics of healthcare workers at Kenyatta National Hospital and their relationship with anxiety levels during the COVID-19 pandemic. Key demographic variables examined included age, gender, professional designation, years of experience, and department of work. These factors played a significant role in shaping the experiences and perceptions of healthcare workers regarding pandemic preparedness and its impact on their mental well-being.

The findings indicate that younger healthcare workers and those with fewer years of experience reported higher anxiety levels compared to their older and more experienced counterparts. This

aligns with existing literature suggesting that early-career professionals often feel more vulnerable due to limited exposure to crisis management. Chigwedere et al., (2021) also note that HCW with less experience were more likely to experience anxiety compared to HCW with more years of experience because they have more knowledge and skills and are more able to self-regulate. Other authors have suggested that higher anxiety levels in younger workers could also be due to greater and unlimited access to information about the pandemic through social media which may influence their distress levels(F. Bracone et al., 2022). Other studies also suggest that longer healthcare experience was a protective factor to psychological distress(R. Maunder et al., 2006). However, studies by Şahin & Kulakaç, 2022 observed that the level of anxiety increased with age. These results were thought to be related to the fact that advanced age posed a risk of COVID-19, with symptoms of the disease severity and the mortality rate higher in this group. Notwithstanding, the findings of this study suggest the need for continuous and targeted support interventions for HCW with fewer work experiences who, according to this study, have reported prolonged anxiety levels.

Gender differences also emerged, with female healthcare workers reporting slightly higher anxiety levels than their male counterparts, possibly due to greater caregiving responsibilities and emotional sensitivity to crisis situations. It is documented that women tend to suffer more from anxiety-depressive disorders than men(C. McLean et al., 2011) and is a strong risk factor in experiencing stress(J. Sareen et al., 2013).This study also notes nursing staff exhibited higher prevalence of anxiety compared to doctors and laboratory staff. Various studies conducted during the COVID-19 show similar results of nurses reporting significantly higher anxiety scores than other healthcare professionals(J. Lai et al., 2020).These results may be attributed to the fact that nurses are mostly female, are in direct contact with their patients and spend more time caring for these patients thereby facing a greater risk of exposure to the COVID-19(S. Pappa et al., 2020). Additionally, due to their closer contact to patients, they may face greater psychological distress when they have to face suffering and death of patients they care for(J. Du et al., 2020). The results of this study are similar to the descriptive characteristics observed in various relevant studies on anxiety and depressive states of healthcare workers struggling with COVID-19 that show most participants are females and nurses(C. Şahin & N. Kulakaç, 2022).

Healthcare workers in the Accident & Emergency department reported higher anxiety levels compared to those in other units. These results correspond with studies carried out by Şahin & Kulakaç, 2022 and Ageron et al., 2020 that report healthcare workers working in emergency units, a unit regarded as high risk in transmission, have high anxiety levels than workers in other

units. This is an expected result as emergency services are considered high risk health services where patients are first admitted.

These demographic patterns underscore the importance of targeted mental health support and preparedness strategies tailored to different healthcare worker groups to enhance resilience and reduce anxiety during future health crises.

5.2.2 Findings on Healthcare Workers' Anxiety levels in KNH

Overall, this study showed that 51.2% of the sample population reported to have experienced moderate to severe anxiety during the COVID-19 (as measured by the GAD-7 scale). As expected the prevalence of symptoms of anxiety is much lower currently with only 11.3% reporting moderate to severe anxiety. It is not surprising that anxiety levels in healthcare workers increased during the COVID-19 pandemic compared to the rates currently reported. This could be attributed to the fact that the uncertainty of the pandemic, its rapid spread and its mode of transmission were associated factors that increased anxiety amongst the HCW.

5.2.3 Findings on Descriptive Analysis

The study examined key aspects of hospital preparedness, including availability of personal protective equipment (PPE), adequacy of training on infection control, institutional support systems, adequate information, workload intensity, and psychological support mechanisms. The results indicate that while a majority of healthcare workers acknowledged the hospital's efforts in pandemic preparedness, significant gaps remained. The availability of PPE was inconsistent**,** with some departments reporting shortages, leading to heightened anxiety amongst frontline workers. Additionally, training on COVID-19 protocols and emergency response varied across departments, with some staff feeling inadequately prepared to handle critical situations. The study also found that high patient influx, direct contact with suspected and confirmed cases and increased workload exacerbated anxiety levels**,** particularly in high risk departments like the emergency and ICU units. Furthermore, mental health support services were either insufficient or underutilized**, c**ontributing to persistent anxiety among healthcare workers.

The findings of this study highlight the direct link between hospital preparedness measures and healthcare workers' psychological well-being**,** emphasizing the need for sustained investment in protective measures, continuous training, and structured mental health support programs to mitigate anxiety during future health crises.

5.2.4 Findings on the Influence of Hospital Incident Management System (HIMS) on HCW anxiety levels in KNH

The study identifies one key factor under the HIMS that have a significant influence on HCW anxiety levels. Hospital incident management systems are designed to handle unexpected incidences and emergencies that occur within the hospital settings, aiming to maintain operational continuity and patient safety. This system ensures clear communication, efficient resource allocation and coordinated decision making, which are crucial in high stress situations like a pandemic. This study reveals that having an emergency operation center (EOC) that is designed for emergency responses help reduce uncertainty and stress amongst the healthcare workers, leading to lower levels of anxiety. Even though there is no prior empirical evidence that can be compared with this finding, the results in this study suggest that having an effective EOC reassures HCW that protective measures are in place, preventing panic and reducing anxiety.

While the HIMS is crucial for hospital organization efficiency, their direct impact on healthcare worker mental health has not been extensively studied. Existing literature emphasize on organizational support, clear communication and adequate resources in mitigating stress and uncertainty amongst healthcare workers. For instance, studies have shown that healthcare workers with access to psychological support and adequate PPEs, report lower levels of stress and anxiety(S. Pappa et al., 2020). While HIMS plays a pivotal role in crisis response, more research is needed to understand its specific impact on healthcare workers mental well-being during stress events like the COVID-19 pandemic.

5.2.5 Findings on the Influence of Infection Prevention and Control (IPC) on HCW anxiety levels in KNH

The study identifies four key factors under this category that have a significant link with HCW anxiety levels, including wearing PPE, separating suspected and confirmed COVID-19 cases, having a dedicated team of HCW assigned to manage COVID-19 cases and an adequate and easily accessible PPEs supply.

The use of personal protective equipment during the COVID-19 pandemic was essential in safeguarding healthcare workers against the infection. However, this study reveals that wearing PPEs is associated with increased anxiety levels among HCW, likely due to their discomfort, prolonged use and concerns over their effectiveness in preventing infection. Similar to these findings, a study carried out by Ergin et al., 2021 in Turkey reports that prolonged use of PPEs,

cause discomfort and is associated with increased anxiety and stress among HCW. This study concluded that the use of N95 masks increase anxiety amongst nurses. Other studies also suggest that PPEs are likely to cause anxiety and stress amongst HCW because they limit an individual's mobility, increases body temperature, give a feeling of suffocation and possibly cause infection during sleep while still donned on them(N. Galehdar, T. Toulabi et al., 2020). This study also reveals, while wearing PPEs is associated with higher levels of anxiety, PPEs adequacy and easy access is associated with reduced levels of anxiety. Systematic reviews by Raoofi et al., (2023) and Chigwedere et al., (2021) have shown that insufficient PPE supply contributed to increased stress and anxiety amongst HCW and their availability is known to provide a sense of security and confidence in infection prevention(A. Adibi et al., 2021).

Another key factor of IPC that influenced HCW anxiety levels was the task of separating suspected and confirmed cases of COVID-19. This study reveals a strong association to increased anxiety, possibly because of the workload pressure that comes with separation of patients and the heightened awareness of transmission risks. Studies have suggested that HCW face heightened workloads and stress levels due to the surge in patients' numbers and the need to implement new protocols(S. Raoofi et al., 2023), including separation of suspected and confirmed COVID-19 cases. While direct evidence on the effects of patient separation protocols is scarce, the broader challenges associated with the management of patients suspected or confirmed with COVID-19 have indisputably affected the mental well-being of HCW during the pandemic. Therefore, this study confirms that the added pressure of ensuring suspected cases are not grouped with confirmed cases has been associated with higher stress and anxiety levels among HCW.

Finally, having a dedicated team of HCW designated to manage confirmed COVID-19 cases helped alleviate anxiety. These findings suggest that role specialization plays a crucial role in reducing anxiety during crises, which aligns with previous studies (Kiriti-Nganga, 2021) emphasizing on dividing responsibilities amongst HCW, to improve efficiency of healthcare systems and reduce uncertainty and burnout in HCW. This approach not only improve patient care but also help protect the mental well-being of HCW.

5.2.6 Findings on the Influence of Communication Strategies on HCW anxiety levels

This study notes two key factors under this category that have significant influence on HCW anxiety levels, including receiving accurate and timely information regarding the pandemic and being educated on where to access trusted health information and guidelines.

Timely and continuous updates during COVID-19 pandemic was essential in keeping the HCW well-informed about evolving protocols and safety measures. While timely information is crucial, continuous influx of the pandemic-related updates may have contributed to heightened anxiety levels as observed in this study. Results from other studies suggest that psychological distress may be reduced in the face of clear and accurate information(W. El-Hage et al., 2020).However, the nature and frequency of this information can influence the mental well-being of HCW in various ways, including information overload, lack of clarity and consistency in communication and lack of supportive communication. A study by Li & Khan, (2022) on investigating the impacts of information overload on psychological well-being of healthcare professionals; Role of COVID-19 stressor suggests that healthcare professionals who were exposed to information overload on social media during the pandemic were vulnerable to psychological distress caused by the uncertainty and confusion of easily accessible information. Timely information plays a significant role in influencing the mental well-being of HCW, consequently it should be clear and actionable devoid of confusion and uncertainty.

This study also notes that being educated on where to access trusted health information and guideline was linked to lower levels of anxiety. This suggests that access to trusted health information plays a significant role in influencing anxiety levels among HCW during the pandemic. Clear, consistent and transparent information from reliable sources provide reassurance and reduce uncertainty thereby mitigating stress and anxiety during pandemics. A study by Wong et al., (2007) agrees that psychological distress is lessened with accurate information from trusted sources such as health authorities while Amin, (2020) notes that inconsistent and false information that are easily spread online consequently cause panic and anxiety among individuals. In line with this study, WHO emphasized on minimizing frequency of information and seeking information from trusted sources (WHO, 2021) for it reassures and helps mitigate the feelings of anxiety or distress.

5.2.7 Findings on the Influence of Human Resource Strategies on HCW anxiety levels

Under this category, key factors that have significant association with HCW anxiety levels, include routine temperature checks for employees, effective monitoring and management of staff exposed to or infected with COVID-19, routine asymptomatic screening tests for employees, psychosocial support services available to employees and their families and finally access to the pandemic Health and Well-being program for employees in the hospital.

This study notes that routine temperature checks are associated with lower anxiety levels, suggesting that routine screening provided a sense of security by ensuring potential infections were monitored regularly and managed proactively. Routine temperature checks are part of the safety protocols and protective measures implemented during the COVID-19 pandemic. Such measures as studies suggest (D. Afeng-Nkansah et al., 2021) were aimed at early detection and prevention of infection, potentially contributing to a sense of security among HCW. Therefore, this study confirms that routine temperature checks as part of the comprehensive safety strategies, helps alleviate anxiety among HCW by enhancing perceived safety and early detection of infection. Additionally, effective monitoring and management of staff exposed to or infected with COVID-19 significantly reduced anxiety levels. This strategy also forms part of the comprehensive safety protocols for handling exposed employees within hospitals and thus reassures them that their safety and well-being is prioritized.

However, this study notes some interventions increased anxiety levels rather than alleviate them among the HCW. Asymptomatic screening tests for HCW was associated with heightened anxiety levels, possibly due to the fear of positive results and the subsequent events following such results like job disruptions, isolation and the suffering experienced during treatment of COVID-19. While direct evidence of the impact of asymptomatic screening tests on HCW anxiety is limited, related factors such as being a suspected case and quarantined have been associated with heightened anxiety levels among HCW during the pandemic. Wu et al., (2009) conducted a study on the psychological problems of hospital employees during the SARS epidemic, and found that those who had been exposed and quarantined had higher levels of psychological distress than those without exposure. This study therefore adds to existing literature that asymptomatic screening tests is a factor that increases anxiety among HCW.

Surprisingly, this study notes that access to psychological support services and the presence of Health and Well-being Program was associated with increased levels of anxiety among HCW.

This possibly indicates that while mental health support services are crucial, their increased usage reflected the severity of the psychological strain experienced by HCW during pandemics. Those seeking such services were already dealing with psychological distress and emotional exhaustion. While these initiatives aim to provide mental health resources, coping strategies and a supportive environment to mitigate the psychological impact of pandemics among HCW, some studies have indicated that these interventions may not always reduce anxiety. For instance, a study by Farì et al., (2021) that carried out an assessment of the mental health burden in a cohort of Italian HCWs during the COVID-19 pandemic show that there was a greater risk of developing anxiety during a pandemic despite the availability of psychosocial support services. These findings could be attributed to a number of factors such as stigma that may make HCW reluctant to access support services. This reluctance may lead to unaddressed anxiety and stress. Structural challenges like inadequate staffing is another factor that may lead to long working hours preventing HCW from accessing support services even when available. Other studies contradict these findings. For example a study by Blake et al., (2024) that aimed to explore the relationship between well-being center use, HCWs well-being and job-related factors (job stressfulness, job satisfaction, presenteeism, turnover intentions) emphasized the positive effect of well-being centers on HCW mental health, noting that such spaces provided restoration and respite for workers experiencing stress and presenteeism.

5.3 Conclusion of the Study

This study examined the influence of COVID-19 pandemic preparedness on the anxiety levels of HCW at Kenyatta National Hospital, analyzing various demographic, professional and organizational factors. The findings reveal that gender, age, work experience, professional designation, and department of work significantly influenced anxiety levels among HCW during the pandemic.

The study found out that anxiety was more prevalent among female healthcare workers, aligning with existing research that attributes this to biological, sociocultural and caregiving-related pressures. Additionally, younger and lesser experienced healthcare professionals reported higher anxiety levels, likely due to limited exposure to crisis situations and insufficient skills in managing pandemics. Nurses, in particular, experienced heightened anxiety levels compared to other healthcare professionals, a trend that can be linked to their direct and prolonged patient contact, high job demands, and the emotional toll of caregiving. The combination of being

young, female and a nurse was identified as a high-risk factor for experiencing anxiety, highlighting the need for targeted mental health interventions for this group.

Organizational-level factors, including departmental assignments and emergency response efforts, also played a crucial role in shaping anxiety levels. The study found out that HCW working in the Accident and Emergency department reported higher anxiety levels due to the high-pressure nature of their work, unpredictable patient surges, and frequent exposure to trauma. These findings emphasize the importance of addressing departmental disparities by implementing workload management strategies, mental health support programs, and team-based coping mechanisms to mitigate stress in high intensity work environments.

From these findings, this study underscores the need for structured mental health interventions tailored to specific demographic and professional groups within the healthcare sector. Future policies should focus on supporting young, female healthcare workers and nurses, improving workplace conditions in high-stress departments and strengthening organizational-level strategies to enhance mental well-being. Addressing these factors will be crucial in ensuring the long-term psychological resilience of healthcare workers, particularly in the face of future public health crises.

This study also identified key organizational strategies and initiatives that significantly influenced the anxiety levels of HCW during the COVID-19 pandemic. Findings reveal that within the incident management system, the presence of an Emergency Operational Center was associated with reduced anxiety. This suggests that an effective emergency response structure provides HCW with a sense of security by reinforcing the availability of protective measures.

Infection prevention and control measures also played a crucial role in determining anxiety levels. The study found that adequate and easily accessible PPEs contributed to lower anxiety, as they reassured HCW of their safety. However, the prolonged use of PPEs, their discomfort and uncertainties surrounding their effectiveness were linked to heightened anxiety levels. Additionally, workload pressure and the responsibilities of separating suspected and confirmed COVID-19 cases contributed to increased anxiety, likely due to the demand of handling high patient volumes while ensuring adherence to safety protocols. On the other hand, role specialization – where a designated team managed confirmed COVID-19 cases – was found to alleviate anxiety by reducing uncertainty and distributing responsibilities more effectively.

Communication strategies also played a dual role in influencing anxiety. Educating HCWs on where to access trusted and reliable sources of information was associated with lower anxiety, while excessive and unverifiable updates contributed to heightened stress levels. Similarly, human resource-related strategies had mixed effects. Routine temperature checks and effective monitoring of suspected and infected HCWs were linked to lower anxiety. However, strategies such as asymptomatic screening, access to psychological support services, and the presence of a Health and Well-being Program were paradoxically associated with increased anxiety, potentially due to concerns about health status, stigma or uncertainties surrounding mental health interventions.

Overall these findings highlight the complex relationship between COVID-19 pandemic preparedness strategies and HCWs anxiety. While certain interventions effectively reduced anxiety, others unintentionally contributed to heightened anxiety levels. Future research should explore ways to optimize these strategies to ensure a balanced approach that prioritizes both the mental well-being and operational efficiency of HCWs in crisis situations.

5.4 Contributions of the Study

Based on the study findings, various policies, health practices and research contributions can be derived.

5.4.1 On Policies

The study findings emphasize the need for implementing structured mental health programs specifically designed for high-risk groups such as young, female healthcare workers and nurses, to address anxiety and stress. It also affirms the importance of developing policies that promote better working conditions in high stress departments, such as the Accident and Emergency units, by introducing workload management and resilience-building programs. On crisis preparedness and response policies, this research points out how important it is to strengthen emergency response frameworks by institutionalizing Emergency Operational Centers (EOCs) in hospitals to enhance security and preparedness among HCW. Hospitals also need to ensure they maintain adequate PPE supplies and implement strategies to minimize discomforts, such as ergonomic PPE designs or structured PPE breaks. On communication and misinformation control policies, the study urges hospitals to establish guidelines for accurate and verified information dissemination to prevent misinformation-induced anxiety while ensuring HCW have access to reliable sources.

5.4.2 On Mental Health Practice

This study underscores the importance of targeted mental health interventions, including peer support programs, access to counselling services and stress management training for HCWs. It highlights the need to establish Departmental Workload Management units that ensure implementation of shift rotations, teamwork strategies, workload redistribution in high-intensity areas to prevent burnout and anxiety. The study also draws our attention to the optimization of mental and physical health monitoring by improving health checks for HCWs, balancing preventative screening measures with privacy considerations to minimize stigma and anxiety. it further asserts the development of resilience training programs that equip healthcare workers, especially younger and experienced staff, with the necessary skills to handle crisis situations effectively.

5.4.3 On Research Contributions

This study expands the understanding on HCWs anxiety. It contributes valuable insights into how demographic, professional, and organizational factors influence anxiety levels among HCW during a health crisis. The study evaluates emergency response strategies by highlighting the role of emergency operational centers in reducing anxiety, encouraging on further research on how structured emergency frameworks impact HCWs well-being. The study also highlights the impact of infection prevention measures on mental health. By analyzing how PPE access and prolonged use affect anxiety, the study sets the stage for future research on optimizing protective measures without compromising on HCWs mental health. The study sheds light on the role of communication in HCWs stress management. It points out the dual effects of communication strategies, paving the way for research for developing balanced information dissemination approaches. Findings suggest the need for future investigations into sustainable, long-term strategies that enhance both operational efficiency and mental well-being in healthcare settings.

5.5 Limitations of the study

This study has certain limitations. First, data were collected retrospectively, which introduces the possibility of recall bias. Participants may not recall their emotional state or the preparedness levels accurately during the pandemic. Some details may not be recalled adequately, resultantly exaggerated, altered or omitted data may be recorded. The human memory is imperfect therefore

mitigating this problem the study utilized randomization of an adequate representative sample with which data was collected for multiple comparisons.

Secondly, anxiety levels were assessed using self-reported measures rather than clinical interviews, which may affect the accuracy of mental health assessments. However, the use of a GAD-7 scale helps mitigate this concern. Additionally, the study was conducted within a specific healthcare system, which may limit the generalizability of the findings to other settings. Future research should consider longitudinal approaches and larger, more diverse samples to validate these findings.

5.6 Recommendations

Future research should explore, using longitudinal studies on HCWs anxiety, the long-term psychological effects of pandemic-related stress on healthcare workers, particularly post-pandemic recovery and the effectiveness of resilience-building strategies. Studies should also investigate the impact of targeted mental health interventions for high-risk groups, such as young, female HCW and nurses, to assess their effectiveness in reducing anxiety levels. Further studies should examine how different hospital's department working conditions contribute to mental health outcomes and develop tailored interventions to address disparities. Research should also focus on how optimizing hospital communication strategies can help minimize misinformation-induced anxiety while ensuring HCWs receive timely and reliable information. Future studies should evaluate how infection prevention measures, such as PPE use and role specialization, can be designed to maximize protection while minimizing psychological stress. Further research should analyze the unintended effects of health monitoring programs, psychological support services and well-being programs to enhance their effectiveness without contributing to additional anxiety.

On mental health practice, the study recommends implementation of structured psychological support tailored to high risk groups, particularly, young, female HCWs and nurses, to mitigate work related anxiety. The study recommends the introduction of an effective workload redistribution and shift rotation policies, particularly in high intensity departments like the Accident and Emergency Units, to prevent burnout. Establish well-structured Emergency Operational Centers in hospitals to provide a sense of security and better manage crises. Hospitals should optimize infection prevention measures by ensuring the availability of high-quality, comfortable PPEs while addressing concerns regarding prolonged use and effectiveness to reduce HCWs distress. Improve communication frameworks by developing structured

communication protocols that provide HCWs with access to verified, up-to-date information while minimizing information overload. Hospitals should refine psychological and health monitoring programs that are supportive and non-stigmatizing to encourage healthcare workers to seek help without fear of negative consequences.

Overall, emergency response plans for pandemics should incorporate structured mental health strategies to mitigate the psychological impact on HCWs. These strategies should include proactive mental health interventions, crisis counselling, and long-term psychological support programs to address anxiety, burnout and trauma experienced during and after a health crisis.

For a comprehensive and effective emergency preparedness plan, mental health professionals such as clinical psychologists and psychiatric specialists, should both be actively involved in both the planning and implementation phases. Their expertise will ensure that evidence-based mental health protocols are integrated into response efforts, including early screening for psychological distress, peer support system, and access to confidential counselling services. Additionally, mental health professionals should train frontline supervisors and team leaders to recognize early signs of emotional distress and provide basic psychological first aid to HCWs. Regular mental well-being check-ins and structured debriefing sessions post-pandemic can further support HCW in processing their experiences and reducing long-term mental health consequences.

By embedding mental health support into emergency response frameworks, healthcare institutions can enhance resilience, retention and overall well-being among HCW, ensuring they remain psychologically prepared to handle future public health crises.

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APPENDICES

Appendix 1: Introductory Letter

Ole Sangale Rd, Madaraka Estate
P. O Box 59857 - 00200, Nairobi, Kenya.
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Strathmore UNIVERSITY BUSINESS SCHOOL

Friday 19th April

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – HARRIET KIBOMA

This is to introduce Harriet Kiboma, a Master of Business Administration in Healthcare Management (MBA-HCM) student at Strathmore University Business School, student number 111518/18. As part of our MBAHCM Programme, Harriet is expected to do applied research andundertake a project. This is in partial fulfilment of the requirements of the MBA-HCM course.To this effect, she would like to request appropriate data from your organization.

Harriet is undertaking a research paper *on "The Effect of COVID-19 Pandemic Preparedness on Healthcare Workers' Anxiety Levels in Kenyatta National Hospital in Nairobi County- Kenya"* The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MBAHCM Programme seeks to establish links with industry, and one of the ways of doing so is directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.Yours sincerely,

Alois Njenga,

Manager – Graduate

Programme, Strathmore

University Business

School.

Appendix 2: Ethical Approval Letter from Strathmore University Ethics Committee

Strathmore UNIVERSITY

16th April 2024

Ms. Harriet Kiboma, harriet.kiboma@strathmore.edu

Dear Ms. Harriet,

RE: The Effect of Covid-19 Pandemic Preparedness on Healthcare Workers' Anxiety Levels in Kenyatta National Hospital in Nairobi County-Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC2057/24.** The approval period is from **16th April 2024 to 15th April 2025.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research- portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,

Chairperson;

SU-ISERC

STRATHMORE UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICAL REVIEW COMMITTEE
(SU-ISERC)
16-Apr-2024
Email:ethicsreview@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Appendix 3: NACOSTI Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **255072**

Date of Issue: **25/April/2024**

RESEARCH LICENSE

This is to Certify that Ms.. Harriet Nyangweso Kiboma of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: THE EFFECT OF COVID-19 PANDEMIC PREPAREDNESS ON HEALTHCARE WORKERS' ANXIETY LEVELS IN KENYATTA NATIONAL HOSPITAL, NAIROBI COUNTY-KENYA for the period ending : 25/April/2025.

License No: **NACOSTI/P/24/35052**

255072

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix 4: Approval Letter from KNH Ethics and Research Committee

UNIVERSITY OF NAIROBI

UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300

KNH-UoN ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERCs

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9 Ext 44355, 44102
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/RR/629

17th July, 2024

Harriet Kiboma
Reg. No. 111518
Strathmore Business School
Strathmore University

Dear Harriet,

Research Proposal: **The effect of COVID-19 pandemic preparedness on healthcare workers' anxiety levels in Kenyatta National Hospital in Nairobi County, Kenya (P427/05/2024)**

This is to acknowledge receipt of your research proposal and to inform you that upon review, the KNH- UoN Ethics and Research Committee made the following observations and suggestions:

Preliminaries & General Comments

1. Study Title: Review the title to align with revised objectives.
2. Application Form: Please complete all sections of the application form as required.
3. Abstract: Provide a more concise summary of the research proposal in a structured manner; provide key subsections.
4. For the entire document; please use the KNH- UoN ERC guidelines for research proposal development to ensure all required sections are provided.

Chapter One- Introduction

5. Section 1.3/ 1.4: Study Objectives:
   i. The study title/broad objective/specific objectives need to be reworked and harmonized.
   ii. Specific objectives should be derived from the broad objective.
   iii. The objectives must be SMART. For example, how would you determine "*effect*" in a cross sectional study?
6. Study Justification: Clearly articulate why the study is proposed. What is new/ not known?

Chapter Three- Research Methodology

7. Research Design: Comment 5 (iii) above refers. Please explain how you will determine *effect* with a cross sectional study.
8. Study Area: Provide a detailed description of the study site.
9. Sample Size Determination: It is not clear how a sample size of ***278*** was obtained. Please take note that study objectives should guide sample size determination.
10. Sampling Technique: Describe the sampling process clearly.
11. Data Collection Methods and Tools: Since Generalized Anxiety Disorder 7 (GAD-7) item scale measures anxiety in the last two weeks, it cannot be appropriate for this study on issues that happened two years ago despite including wordings that reflect past time. You can only ask perceived anxiety. If it is a new scale, then describe it.

12. Data Analysis: Describe data analysis plan fully. The study objectives should guide the analysis plan.
13. Ethical Considerations: Indicate that permission to conduct the study will also be sought from KNH administration.
14. Include a section on Study Limitations. Further indicate how you will delimit/ mitigate the identified limitations.

Appendices

15. Appendix 3, Survey Questionnaire:
    i. Number all questions appropriately for ease of reference.
    ii. Get absolute values for number of age, years of experience, etc. and categorize at analysis.
    iii. What is the rationale of using Likert scale?
    iv. Take note that many questions are assessing multiple aspects; how does one answer such questions? E.g. see section 6.

Recommendation

Revise and resubmit **three (3)** copies of the full proposal inclusive of the Application Form within a period of **four (4)** weeks with effect from the date of this letter. Include a cover letter that summarizes how you have addressed the comments and note the page number(s) where the changes have been made.

This can be presented in form of a table that summarizes how all the issues raised have been addressed and further highlight/ bold the corrections in body of the proposal for ease of reference.

You are also advised to share a soft copy of all the above documents via the ERC email (uonknh_erc@uonbi.ac.ke).

Yours sincerely,

PROF. BEATRICE K.M. AMUGUNE
SECRETARY, KNH- UoN ERC

c.c. The Dean, Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Director, Strathmore Business School, Strathmore University
Supervisor: Dr. Paul Olendo, Strathmore Business School, Strathmore University

Appendix 5: Approval letter from KNH Key Departments

KENYATTA NATIONAL HOSPITAL
P. O. Box 20723, 00202 Nairobi

Tel: 2726300/2726450/2726550
Fax: 2725272
Email: knhadmin@knh.or.ke

Ref: KNH/HOD/GEN-SURG/35/VOL.I

Date: 26th September, 2024

Harriet Kiboma
Reg. NO. 111518
Strathmore Business School
Strathmore University

Dear Harriet,

RE: APPROVAL TO COLLECT DATA FROM - GENERAL SURGERY AT KNH

We acknowledge your request on the above, together with a study registration form and a KNH/UON ERC approval letter on the study titled ***"Influence of COVID-19 Pandemic preparedness on Healthcare workers"*** anxieity levels at Kenyatta National Hospital in Nairobi County (P427/05/2024)

Approval has been granted for you to collect data from General Surgery at Kenyatta National Hospital. Kindly liaise with the SACN In-charge, General Surgery.

Note, we would like you to forward a copy of the study report to the undersigned after completion of the study.

Dr. Gibson Musila
HOD GENERAL SURGERY

Copy to: HOD Health Information
SACN General Surgery
ACN Clinic 24

Kenyatta National Hospital
P. O. Box 20723, 00202 Nairobi

Tel.:2726300/272450/2726550
Fax: 2725272
Email:knhadmin@knh.or.ke

Ref: KNH/DLM/60/VOL.IV/51 Date: 26th September, 2024

Harriet Kiboma
Reg. No. 11518
Strathmore Business School
Faculty of Health Sciencies
Strathmore University

Dear Harriet

RE: APPROVAL TO CONDUCT A STUDY AT THE KNH LABORATORY DEPARTMENT

Following approval by the KNH/UON – Ethics & Research Committee for your research proposal and subsequent filing of the study registration certificate, this is to inform you that authority has been granted to collect data in Laboratory Medicine Department, on your study titled **"influence of covid – 19 pandemic preparedness on healthcare workers' anxiety levels at Kenyatta National Hospital".**

You will also be required to submit a report of your findings to the office of the undersigned after completion of your study.

Dr. F. Ndiang'ui
Head of Department
Laboratory Medicine

Email:knhadmin@knh.or.ke
Tel:2726300-9
Fax: 2725272

KENYATTA NATIONAL HOSPITAL
P.O. BOX 20723 – 00202 – KNH
NAIROBI

REF:KNH/A&E-HOD/31 VOL.II **DATE: 26TH SEPTEMBER 2024**

Harriet Kiboma
Reg. No.11518
Strathmore Business School
Faculty of Health Sciences
Strathmore University

Dear Harriet

RE: APPROVAL TO CONDUCT A STUDY AT THE KNH MEDICINE DEPARTMENT

Following approval by the KNH/UON - Ethics & Research Committee for your research proposal and subsequent filing of the study registration certificate, this is to inform you that authority has been granted to collect data in Accident and Emergency Departemnt, on your study titled **"influence of covid - 19 pandemic preparedness on healthcare workers' anxiety levels at Kenyatta National Hospital".**

You will also be required to submit a report of your study findings to the office of the undersigned after completion of your study.

Dr. Bibiana Khainga
HOU - Medicine

Appendix 6: Survey Questionnaire

Thank you for agreeing to answer the questions in this questionnaire. It forms part of my dissertation research investigating the Influence of COVID-19 pandemic preparedness on healthcare workers' anxiety levels. The purpose of this questionnaire is to obtain findings on the level of hospital COVID-19 pandemic preparedness and your level of anxiety during and after the COVID-19 pandemic. Section A will capture your demographic characteristics; Section B will capture information on level of COVID-19 pandemic preparedness in your hospital. Section C will capture information on the level of anxiety using the GAD-7 self-reporting scale. The questionnaire will take you 15 minutes of your time to complete it.

SECTION A: Respondents demographics (Tick where appropriate)

1. **Gender:** Male ☐ Female ☐

2. **Age:** 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐

3. **Level of education:** Diploma ☐ Bachelor degree ☐ Masters ☐ PHD ☐

4. **Cadre:** Doctor ☐ Nurse ☐ Laboratory Technologist ☐ Laboratory Technician ☐ Clinical Officer ☐

5. **Primary role type during Pandemic:** Frontline ☐ Non-frontline ☐

(*frontline here means essential workers that had face-to-face interactions with persons with Covid-19 or worked in high risk areas within the hospitals such as the Infectious Disease Units, the Accident and Emergency Units, Outbreak screening spaces and laboratory units)*

6. **Worked in KNH during the pandemic (between 2020 and 2022) YES** ☐ **NO** ☐

7. **Primary department during the pandemic:** Infectious Disease Unit ☐ Medical ☐ Surgical ☐ Accident and Emergency ☐ Laboratory ☐

8. **Current Department:** Medical ☐ Surgical ☐ Laboratory ☐ Accident and Emergency ☐

9. **Years of experience:** Under 5 years ☐ 10 to 15 ☐ Over 15 years ☐

SECTION B: To measure level of COVID-19 Pandemic Preparedness (Tick one option where appropriate)

This is a Pandemic Preparedness scale that comprises of 4 scales (Infection Prevention and Control Measures, Communication Strategies, Human Resource Related Strategies and Hospital Incident Management System) each with 15 questions measuring your knowledge and awareness regarding the strategies or initiatives implemented in your hospital during COVID-19 pandemic.

A.Infection Prevention and Control Measures

1: Please indicate your level of agreement on how well your hospital enforced the following infection prevention and control measures during COVID-19

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
Handwashing					
Alcohol rubs/hand sanitizers					
Wearing PPEs (Gowns, gloves, googles)					
Routinely cleaning and disinfection of surfaces					
Vaccination					

2: Please indicate your level of agreement with the following statements about your patients during the pandemic.

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
Patients were educated on respiratory and hand hygiene while in the hospital					
Droplets and contact precautions (such as masks on patients, isolation rooms, limiting transportation and movement of patients) were recommended for suspected and confirmed cases					
Suspected cases were put in adequately ventilated single rooms or grouped together when single					

rooms were not available					
Suspected and confirmed cases were not grouped together during the pandemic					
Beds for suspected or confirmed cases were one-meter distance away from each other					

3: Please indicate your level of agreement with the following statements

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
There is an infection prevention and control committee and staff in my hospital					
I received infection prevention and control training before and during the pandemic (training on standards, contact, droplet and airborne precautions including correct use of PPEs)					
A team of healthcare workers was designated to care exclusively for suspected and confirmed cases to reduce risk of transmission					
I applied standard precautions for all my patients (this include wearing masks, gowns, gloves and eye protection appropriately- donning upon entry and properly discarding them before exiting the patients' isolation rooms)					
There was an adequate supply of Personal Protective Equipment and easily accessible to staff					

B.Communication Strategies

4: Please indicate your level of agreement on how well your hospital applied the following communication strategies or initiatives useful in preparing you to respond to the pandemic at work

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
My hospital communicated using posters and notices regarding the pandemic in the hospital					
My hospital provided prompt pandemic updates					
My hospital provided Video updates and messages on social media regarding the pandemic					
There were Updates from various Departmental Heads regarding the pandemic					
There were regular meetings discussing the pandemic in my hospital					

5: Please indicate your level of agreement on how well your hospital carried these communication activities in preparing you to respond to the pandemic at work.

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
I was briefed on my roles and responsibilities in the management of the pandemic					
I was informed of all the decisions on clinical triage, patients prioritization, infection prevention and control measures and policies related to case management and hospital epidemiology (hospital infection control)					
I received accurate and timely information regarding the pandemic					
I was briefed on the communication channels to be used in the sharing of important information about the pandemic or about my patients					

during the pandemic					
I was educated on where to receive/get trusted health information and guidelines regarding the pandemic					

6: Please indicate your level of agreement on how well your hospital carried out these communication strategies during the pandemic at work.

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
Accurate and timely communication with the public regarding the pandemic					
Key messages addressing a variety of pandemic scenarios were relayed to the staff and the public					
There was actual collection, processing and reporting of information to supervisory bodies for example the Ministry of Health					
There were deliberate attempts to disseminate accurate information and prevent the spread of mis and dis-information					
There was effective vertical and horizontal communication between healthcare workers and hospital management, and especially among various specialties, teams, and departments					

C: Human Resource Related Strategies

7: Please indicate your level of agreement on how well your hospital enforced the following Human Resource related strategies useful in supporting you or protecting you from the pandemic at work

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
Temperature checks for employees					
Asymptomatic screening tests for employees					
Flexible working hours and days off					
Training on the pandemic					
Psychosocial Support					

8: Please indicate your level of agreement with the following statements

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
I received training and exercises relevant to areas of need including Infection prevention and control, clinical management to ensure I am competent and safe at work					
There were flexible working hours and days off for recuperation during the pandemic					
Psychosocial support services available and accessible for me and my family					
Staff that were suspected or confirmed of having the virus (Covid-19) or exposed to suspected or confirmed Covid-19 patients were monitored and managed effectively					
There was a sufficient number of healthcare workers to meet the increased demand for clinical care during the pandemic					

9: Please indicate your level of agreement with the following statements

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
There was a pandemic Health and Well-being program for employees in the hospital					
I was aware of the pandemic Health and Well-being program for employees in the hospital					
I had access to the pandemic Health and Well-being program for employees in the hospital					
My family had access to the pandemic Health and Well-being program for employees in the hospital					
I found it helpful to access the pandemic Health and Well-being program for employees in the hospital					

D. Hospital Incident Management System

10: Please indicate your level of agreement with the following statements.

	Strongly Agree	Agree	Undecided/Not Sure	Disagree	Strongly Disagree
My hospital has an Emergency Response Plan that works effectively before and during the pandemic					
My hospital has an Emergency Operation Center- a specific location prepared to convene and coordinate hospital-wide emergency response activities with a well-functioning means of communication					
During the pandemic, my hospital was able to meet the increased demand for clinical care- that is adequate beds, availability of human resource, adequate physical space including space for critical care, space for isolation, adequate					

supplies and working processes					
During the pandemic there was an efficient and accurate Triage System- well equipped triage stations that were supported by trained staff. A system that ensured early recognition of infection and isolating suspected cases					
During the pandemic there was an organized in-patient management strategy that ensured adequate management of patients (which included critical and non-critical care and suspected or confirmed cases)					
My hospital continued to effectively provide essential health services (emergency services, urgent surgical operations, maternal and child care) and patient care during the pandemic					
There were clear and consistent communication channels and procedures in the hospital to report unusual health events (uncommon/abnormal clinical presentations) in my patients					
I was well prepared to respond to the pandemic in my role at my department					
I was confident in managing suspected and confirmed cases of Covid-19					

SECTION C: To measure Anxiety Levels during the pandemic (Tick one option where appropriate) – these questions will need you to remember your emotional state at the time of the pandemic.

This GAD_7 Scale will measure your level of anxiety during COVID-19

	Over the months of the pandemic period, how often were you bothered by the following problems	**Not at all=0**	**Several days during the pandemic=+1**	**More than half the days during the pandemic=+2**	**Nearly every day during the pandemic=+3**
1	Feeling nervous, anxious or on the edge				
2	Not being able to stop or control worrying				
3	Worrying too much about different things				
4	Trouble relaxing				
5	Being so restless that it is hard to sit still				
6	Becoming easily annoyed or irritable				
7	Feeling afraid as if something awful might happen				

This GAD_7 Scale will measure your level of anxiety in the past two weeks. These questions are asking about your current state of emotion in the past two weeks to now.

	Over the last two weeks, how often have you been bothered by the following problems	**Not at all=0**	**Several days during = +1**	**More than half the days =+2**	**Nearly every day =+3**
1	Feeling nervous, anxious or on the edge				
2	Not being able to stop or control worrying				
3	Worrying too much about different things				
4	Trouble relaxing				
5	Being so restless that it is hard to sit still				
6	Becoming easily annoyed or irritable				
7	Feeling afraid as if something awful might happen				

Appendix 7: **Table for Determining Sample Size for a Finite Population**

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Appendix 8: Generalized Anxiety Disorder -7 Scale (GAD-7)

	Over the last two weeks, how often were you bothered by the following problems	Not at all	Several days	More than half the days	Nearly everyday
1	Feeling nervous, anxious or on the edge				
2	Not being able to stop or control worrying				
3	Worrying too much about different things				
4	Trouble relaxing				
5	Being so restless that it is hard to sit still				
6	Becoming easily annoyed or irritable				
7	Feeling afraid as if something awful might happen				

Source: National HIV curriculum https://www.hiv.uw.edu/page/mental-health-screening/gad-7

Appendix 9: Work Plan

	ACTIVITY	PERSONNEL RESPONSIBLE	DEC 2023	JAN 2024	FEB	MARCH TO AUGUST						SEPT	OCT	NOV	DEC TO MAR	APRIL 2025	MAY 2025
1	Proposal Writing	Principal Investigator (P.I)															
2	Proposal Defense	P.I															
3	Ethical Approval	Strathmore Ethics, NACOSTI, KNH-UoN															
4	Data Collection	P.I															
5	Data Entry and Cleaning	P.I															
6	Data Analysis and Research Writing	Data Analyst and P.I and Supervisor															
7	Dissertation Defense and Corrections	P.I															

Appendix 10: Research Budget

1. **Personnel:**

- Principal Investigator (PI): 100% effort,

2. **Equipment and Supplies:**

- Data storage – Google drive and cabinets storage for hard copies
- Printing of the final thesis and stationery

3. **Travel:**

- Field Visits (transportation, meals)

4. **Research Activities**

- Data collection tool development – Survey Monkey
- Data Analyst
- Research license

Budget Summary

Category	**Cost Per Unit (KSH)**	**Estimated Total Cost(KSH)**	**Justification**
Data Analyst		**20,000**	Once data collection is complete the data analyst with the P.I will carry out the analysis. This are the average rates of paying analysts who use SPSS software within Nairobi city
Data Collection Tool Development		**5,000**	Survey monkey online data collection tool is charged at $39 (39 dollars)
Research License and Approval(NACOSTI, KNH)		**4,000**	For the research license

Printing	**2000 per copy**	**6,000**	Printing of 3 final thesis copies, one for Strathmore University, one for KNH and one for the principal investigator.
Travel		**6,000**	to and from the hospital from the onset i.e. during presentation of the proposal, following up on approval, meeting data collectors, collecting data and dissemination of findings
Contingencies		**5,800**	5 -10% of total budget. These caters for the unforeseen expenses
TOTAL		**46,800**	

Appendix 11: Consent Form

CONSENT FORM

INFLUENCE OF COVID-19 PANDEMIC PREPAREDNESS ON HEALTHCARE WORKERS' ANXIETY LEVELS IN KENYATTA NATIONAL HOSPITAL IN NAIROBI, KENYA.

SECTION 1: INFORMATION SHEET

Principal Investigator: HARRIET KIBOMA

Institutional affiliation: STRATHMORE UNIVERSITY

SECTION 2: INFORMATION SHEET–THE STUDY

1. Why is this study being carried out?

This is a retrospective study that seeks to gather information, test a hypothesis and seek to understand the relationship between hospital pandemic preparedness levels and their effect on healthcare workers' anxiety levels in a public hospital.

2. Do I have to take part?

No. Taking part in this study is entirely optional and the decision rests only with you. If you decide to take part, you will be asked to complete a questionnaire to get information on levels of pandemic preparedness within your hospital and your anxiety levels during the COVID-19 pandemic and after the pandemic. If you are not able to answer all the questions successfully the first time, you may be asked to sit through another informational session after which you may be asked to answer the questions a second time. You are free to decline to take part in the study from this study at any time without giving any reasons.

3. Who is eligible to take part in this study?

Healthcare workers in active employment in Kenyatta National Hospital during the COVID-19 pandemic period between the years 2020 and 2022

4. Who is not eligible to take part in this study?

Healthcare workers not in active employment in Kenyatta National Hospital during the COVID-19 pandemic period between the years 2020 and 2022

5. What will taking part in this study involve for me?

You will be contacted or physically approached by the principal investigator and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through a questionnaire to complete.

6. Are there any risks or dangers in taking part in this study?

Answering questions based on recall of your psychological state during the pandemic may trigger some symptoms. Incase this happens, kindly follow the steps below to help you find psychological support.

1. Talk to someone you trust about your symptoms

2. Seek professional support by calling the KNH mental health department helpline on (as provided by the mental health department)

3. Kindly note, you can withdraw from the study at any time without any explanation.

Note: All the information you provide will be treated as confidential and will not be used in any way without your express permission. You are required to answer the questionnaire anonymously.

7. Are there any benefits of taking part in this study?

The findings and recommendations of this study will be shared with your hospital and used to improve your hospital mental health system and its hospital pandemic response plans and efforts with regard to healthcare workers mental well-being.

8. What will happen to me if I refuse to take part in this study?

Participation in this study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

9. Who will have access to my information during this research?

All research records will be stored in securely locked cabinets. That information may be transcribed into our database but this will be sufficiently encrypted and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

10. Who can I contact in case I have further questions?

You can contact the principal investigator - Harriet Kiboma, at Strathmore University by e-mail harriet.kiboma@strathmore.edu, or by phone 0720402591. You can also contact my supervisor, Dr. Paul Olendo Ombanda, at the Strathmore Business School, Nairobi, or by e-mail pombanda@strathmore.edu or by phone 0722811717

If you want to ask someone independent anything about this research, please contact:

The Secretary–Strathmore University Institutional Ethics Review Board, P. O. BOX 59857, 00200, Nairobi; email- ethicsreview@strathmore.edu; Tel number: +254 703 034418

I, _____, have had the study explained to me. I have understood all that I have read and explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you;

Participation in the research study

☐ I AGREE to take part in this research

☐ I DON'T AGREE to take part in this research

Storage of Information on the completed Questionnaire

☐ I AGREE to have my completed questionnaire stored for future data analysis

☐ I DON'T AGREE to have my completed questionnaire stored for future data analysis

Participant's Signature: **Date: _____/_____/__**

_____ ***DD / MM/ YEAR***

Participant's Name:

_____ **Time: _____/_____**

Investigator's Signature: **Date: _____/_____/__**

_____ ***DD / MM/ YEAR***

Investigator's Name:

Time: _____/_____

_____

I, _____

(Name of person taking consent) certify that I have followed the standard operating procedures for this study and have explained the study information to the study participant named above, and that s/he has understood the nature and the purpose of the study and consents to the participation in the study. S/he has been given opportunity to ask questions which have been answered satisfactorily.

Appendix 12: Table of Random Numbers

525	221	915	264	547	958	544	727	967	931
380	709	402	422	540	782	408	328	234	993
846	893	555	441	99	679	329	186	984	540
353	908	1011	89	416	370	144	290	358	752
639	159	868	574	910	858	714	425	751	18
479	924	124	946	312	84	485	446	266	613
893	293	761	1009	343	176	245	783	61	925
715	343	1007	612	85	325	915	368	211	874
71	1008	278	461	270	630	137	590	1003	595
245	1011	764	423	432	998	80	95	3	279
991	862	983	71	911	460	279	318	798	260
53	57	740	597	507	941	561	536	1006	958
757	738	75	196	639	67	195	872	71	934
810	390	608	888	639	183	657	897	464	691
572	932	635	542	856	35	67	981	432	879
744	70	581	695	113	826	311	356	116	294
615	923	179	18	237	836	186	356	223	95
612	806	456	80	7	808	630	523	587	695
9	742	239	558	646	1002	886	40	748	9
258	304	13	804	576	605	387	17	505	824
380	137	495	734	152	178	718	838	138	545
649	450	462	830	557	990	588	421	157	784
224	599	111	662	1007	312	676	638	143	759
541	475	3	966	746	194	410	122	260	926
844	410	944	733	83	777	438	784	296	132
455	933	654	882	451	1012	783	650	217	937
834	875	458	353	737	728	128	859	255	766
190	991	806	716	748	778	905	300	93	137
571	780	761	765	919	872	531	380	56	306
886	525	387	257	347	752	667	557	467	180
119	253	382	965	211	615	572	117	414	300
932	708	660	137	207	619	504	328	478	134
531	160	458	901	130	20	154	575	679	59
80	373	203	92	765	378	194	477	91	229
1016	427	131	362	443	659	789	170	673	1005
564	24	852	634	876	821	609	932	528	198
823	556	58	10	903	31	789	549	958	174
782	12	589	301	311	365	864	683	220	78
473	686	692	636	860	223	218	973	21	815
162	291	725	788	160	96	503	872	144	1008
380	749	618	594	99	591	47	263	43	951
2	692	406	770	552	1014	994	752	55	702
556	212	280	243	300	526	589	50	546	119
232	632	665	952	97	186	1008	1013	841	906
360	119	276	671	96	485	27	357	631	955
343	207	159	736	687	253	262	9	252	130
658	209	376	716	505	951	794	880	710	823
297	799	741	107	618	280	954	590	393	994
262	6	482	636	878	116	128	189	926	775
179	392	273	693	721	739	146	929	554	498
71	189	266	989	957	287	162	838	438	580