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A Retrospective Study for the Influence of Covid-19 Pandemic Preparedness on Healthcare Workers' Anxiety Levels at Kenyatta National Hospital in Nairobi County-Kenya

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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 hour's 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.

Key Words: Pandemic Preparedness, Healthcare Workers, Anxiety Levels, COVID-19 Response, Mental Health Support, Institutional Strategies.

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.

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.

Kenya's COVID-19 Pandemic Preparedness and Response

A study by D. Ogira, I. Bharali, J. Onyango, W. Mao, G. Kokwaro, et al. (2022), grounded in the WHO health systems framework, highlights Kenya's strengths, gaps, and opportunities in its COVID-19 response. The findings are organized around three core themes: response effectiveness, system-wide impact, and future preparedness. During the initial phase of the pandemic, stakeholders identified several critical challenges. These included severe shortages of personal protective equipment (PPE) and testing kits, exacerbated by global supply disruptions and bureaucratic procurement delays that slowed the delivery of emergency supplies. Testing and contact tracing were hindered by low public participation, delayed results, and stigma. The health workforce was overstretched, inadequately trained, and poorly supported, negatively affecting both service delivery and mental health. Inadequate Intensive Care Units(ICU) beds and quarantine facilities contributed to avoidable fatalities. The study also revealed systemic weaknesses, including chronic underfunding of the health sector, poor coordination between national and county governments, and allegations of financial mismanagement. Early pandemic response efforts were undermined by weak intergovernmental collaboration.
Broader health system impacts as highlighted in the study included widespread disruption of essential services, such as maternal and HIV care, and setbacks in the pursuit of Universal Health Coverage (UHC). Health services became increasingly inaccessible due to rising out-of-pocket costs, deepening financial hardship for many. Vulnerable groups—particularly women, girls, persons with disabilities, and informal workers—were disproportionately affected by lockdowns, job losses, and reduced access to services. These challenges, as outlined in the study, significantly weakened Kenya's overall pandemic response. The findings underscore the urgent need for a resilient, well-funded, and digitally enabled health system, supported by strong coordination across all levels of government, to effectively manage future public health emergencies (D. Ogira, J. Onyango et al., 2022).

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.

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, 0currently 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).

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?

Main Objective

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

Research Question

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?

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.

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.

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.

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.

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.

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.

Conceptual Framework.

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.

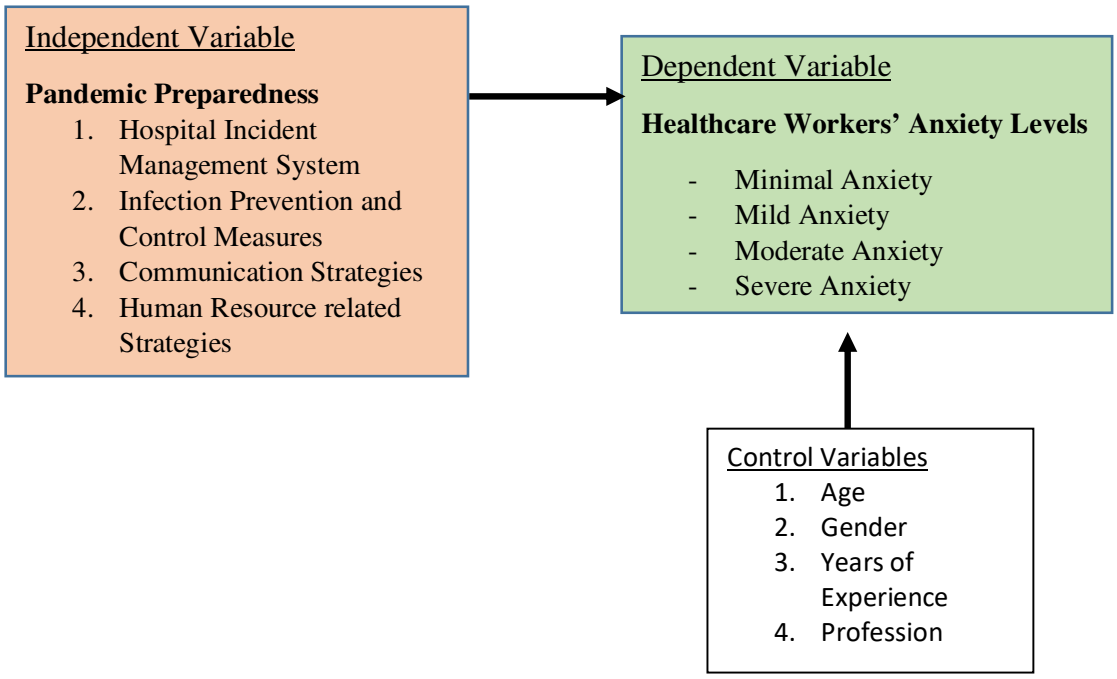

Figure 1 Conceptual Framework

Research Methodology

Research 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.

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.

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 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.

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).
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.
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.

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:

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

Findings of the study

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.

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 1. 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

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.

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.

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.

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:

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.

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.

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

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.

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.

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(Tofthagen, 2012). 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.

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.

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