

THESIS ABSTRACT

Master of Public Health

Adventist University of Africa

School of Postgraduate Studies

Title: HEALTHCARE WORKERS PERCEPTION ON PANDEMIC
PREPAREDNESS AT A TERTIARY HOSPITAL
IN SOUTHERN MALAWI

Researcher: Rose Bubily Kamanga Manda

Primary Advisor: Janet Odhiambo, DrPH

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The occurrence of pandemics has highlighted the need for early response and hospital preparedness in order to avert overwhelming consequences for countries with low and high economies.

human immunodeficiency virus (HIV), and Coronavirus disease have devastating effects on humanity. The Coronavirus pandemic took countries with low and high economies by storm, exposing serious deficiencies in the handling of outbreaks. Similarly, in countries with a low economy, the pandemic exposed their dependency on countries with high economies, lack of preparedness as well as resources to handle outbreaks. The absence of proper infrastructure, staff, resources such as equipment, and guidelines were prominent, and every government swiftly tried to come up with specific guidance for containing it. Many countries in the Sub-Saharan African region including Malawi, and across the globe have adopted checklist in an effort to manage the pandemic. The measures implemented in one way

or the other brought some relief to health institutions and the whole country. The study examined hospital preparedness and response to pandemics at one of the tertiary hospitals in Malawi. Healthcare workers (HCWs) who were or are assigned to the pandemic unit managing cases using a questionnaire adopted from the WHO preparedness checklist. Data was collected in April 2024, cleaned and by STATA version 17.0. Descriptive statistics characterize populations. Frequencies, percentages were used to determine the hospital's level of preparedness. This was essential for better solutions to potential future pandemics to save lives.

Keywords: Pandemic, Preparedness, Response, Tertiary and Referral, Southern, Malawi.

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A thesis

presented in partial fulfillment

of the requirements for the degree

Master of Public Health

by

Rose Bubily Kamanga Manda

May 2025

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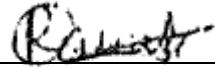
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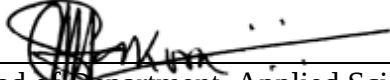
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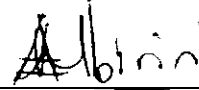
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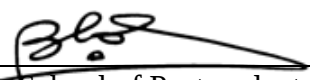

Primary Adviser
Janet Odhiambo, DrPH


Programme Coordinator, MPH
Janet Odhiambo, DrPH


Secondary Adviser
Rosebella Iseme Ondiek -, PhD


Head of Department, Applied Sciences
Musa Nyakora, PhD


External Examiner
Alaisa Mbiriri, PhD


Dean, School of Postgraduate Studies
Lossan Bonde, PhD

Date: May, 2025

I dedicate this paper to my husband, Wainings Manda my children, Samuel and Thokozile not forgetting my parents, Mr. & Mrs M.E. Kamanga, brothers and sisters. They have given the drive and discipline to approach the academic challenges with courage, enthusiasm and determination from the word go. Without their love and moral support, this research would not have been possible. I also dedicate this paper to both my primary supervisor Professor Janet Nyaboke Odhiambo, and a secondary supervisor Dr. Rosebella Iseme-Ondiek, and Professor Daniel Ganu of Adventist University of Africa (AUA) who tirelessly sacrificed their time in coaching and guiding me. To all my friends Dr. Madalitso Chitsakamile, Mr. Dean Soko, Mr. Chaplain Katumbi and Mr. Haules Zaniku, who assisted me to finish this project and, above all, the Almighty God who provides me with good health, courage and hope while doing this. In a special way I would like to thank Baker Worthy and Brempong Owusu Antwi Scholarships through AUA student Finance for the scholarship towards my academic support. May the Lord bless them abundantly.

TABLE OF CONTENTS

LIST OF TABLES	viii
LIST OF ABBREVIATIONS	ix
CHAPTER	
1. INTRODUCTION	1
Backround of the Study	2
Problem Statement	4
Research Questions	6
Hypothesis.....	7
Conceptual Framework.....	7
Significance of the Study	10
To Participants	10
To the Administrators	10
To Public Health Professionals.....	11
To Policymakers	11
To Other Researchers.....	11
To the Society	12
To Academia.....	12
Scope, Limitations and Assumptions.....	12
Assumptions of the Study	13
Operational Definitions of Terms	14
2. REVIEW OF RELATED LITERATURE	15
Hospital Pandemic Preparedness	15
Hospital Pandemic Preparedness in Malawi.....	21
Healthcare Infrastructure and Management.....	22
Physical Facilities	23
Hospital Equipment	24
Personal Protective Equipment.....	25
Human Resource Management.....	26
Infection, Prevention, Control Measures	27
Knowledge of Transmission, Prevention, and Management	28
Guidelines and Protocols	30
Guidelines.	30
Protocols.	31
Monitoring and Evaluation	31
Socio-Demographics.....	32
Age.....	32

Gender.....	33
Education level.....	33
Marital status.....	33
3. RESEARCH METHODOLOGY.....	35
Research Design.....	35
Study Area	36
Population and Sampling Techniques.....	36
Inclusion Criteria	36
Exclusion Criteria	36
Sample Size.....	37
Sampling Techniques.....	37
Instruments for Data Collection.....	38
Validity	39
Reliability.....	39
Data Collection Procedure	40
Method of Data Analysis	41
Ethical Consideration.....	42
Permission.....	42
Informed Consent.....	43
Privacy and Confidentiality	43
Data Safety.....	44
4. RESULTS AND DISCUSSION	45
Study Area	45
Response Rate	45
Application Of Behavioral Theory to Pandemic and Emergency Hospital Preparedness	46
Demographic Characteristics of Participants.....	47
Research Question One.....	49
Availability of Human Resources	49
Availability of Physical Facilities.....	50
Availability of Equipment.....	51
Research Questions Two.....	51
Research Question Three	53
Research Question Four	54
Research Question Five	56
5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	59
Summary	59
Conclusions.....	60
Recommendations.....	60
Human Resources	60
Hospital Infrastructure	60
Hospital Equipment	60
Knowledge of Transmission, Prevention and Control Measures.....	61
Guidelines and Protocol.....	61
Monitoring and Evaluation	61

Hospital Preparedness	61
Suggestions for Further Research	61
REFERENCES	62
APPENDICES	74
A. STUDY QUESTIONNAIRE	75
B. CONSENT FORMS	81
C. CORRESPONDENCE	83
D. ETHICAL APPROVAL	84
VITA.....	86

LIST OF TABLES

Table 1. Calculation and Categories of Study Participants.....	38
Table 2. Results of Cronbach's Alpha Test	40
Table 3. Analysis Plan	41
Table 4. The Concept of Intention Strengths	47
Table 5. Distribution of Participant's Socio-Demographic Characteristics.....	48
Table 6. Perceived Grading for Hospital Preparedness	50
Table 7. Regression Analysis on Predictors of Hospital Preparedness in Times of Pandemic	55
Table 8. Assessing Moderation between Demographic Factors and Healthcare Infrastructure.....	57
Table 9. Assessing Moderation between Demographic Factors, and Prevention and Control Measures	58

LIST OF ABBREVIATIONS

AUA-ISERC	Adventist University of Africa Institutional Scientific Ethics Review Committee
ECDC	European Centre for Disease Prevention and Control
EPP	Epidemic and Pandemic Preparedness
HCW	Healthcare Workers
HR	Human Resources
HRM	Human Resource Management
ICU	Intensive Care Unit
IPC	Infection Prevention and Control
M&E	Monitoring and Evaluation
NCPRS	National Coronavirus Preparedness and Response Strategy
PPE	Personal Protective Equipment
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
UNDP	United Nations Development Programme
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

A pandemic is an epidemic of an infectious disease that has a sudden increase in cases and spreads across a large region, for instance, multiple continents or worldwide, affecting a substantial number of individuals (Porta et al., 2014). Widespread endemic diseases with a stable number of infected individuals such as recurrences of seasonal influenza are generally excluded as they occur simultaneously in large regions of the globe rather than being spread worldwide.

While the term “pandemic” wasn’t in common usage during the 1918 H1N1 influenza outbreak, it’s now used to describe the global spread of diseases like the “Spanish flu,” which caused immense devastation. Spanish flu was the deadliest pandemic in history (Rosenwald, 2021). The most recent pandemics include the HIV and AIDS pandemic, the 2009 Swine Flu pandemic and the Covid-19 pandemic (Roychoudhury et al., 2020). Historically, pandemics were most commonly associated with environmental exposures such as raw sewage, ecologic factors and some unexplained etiologies (Facciola et al., 2021).

Containment and mitigation measures save lives during pandemics (WHO, 2020). According to WHO (2020), of a known disease that is spreading through containment and mitigation despite differences in the tools used. Examples of the containment tool include vaccination, contact tracing and quarantine. In reality, containment and mitigation measures may be undertaken simultaneously (Baird, 2020).

Background of the Study

Major pandemics such as HIV, respiratory that were followed by influenza viruses causing Influenza A H1N1 in 2009, have already afflicted humanity.

Pandemic outbreaks have displaced societies, wiped out entire populations, evolved from wars, but are also unexplained, and cleared the way for innovations and advances in science, the economy, and political systems (Scheidel, 2018).

These pandemics have affected multiple regions across the globe and have affected marginalized populations in Africa and the globe (Tessema et al., 2021). The current information (Gómez-Pérez et al., 2024) suggests that Sub-Saharan Africa does not reflect the ability to swiftly adapt to increased continuity of essential service demands, effective use of resources, and creation of a safe environment for HCWs and patients during pandemics

Recent information (WHO, 2023b) reported that about 6.9 million people have died due to coronavirus or by its impact that overwhelmed health systems. WHO Strategic Response, 2021 specifies four key areas for action during health facility pandemic preparedness and response broadly categorized into: governance and mechanisms (health personnel), public health capacities (health infrastructure), systems /mechanisms /tools /networks (medical equipment), and health services and systems (services infrastructure).

Effective preparedness in the case of pandemics requires good health infrastructure, human resource capacity, knowledge, and technology for the production of diagnostic devices and vaccines. In his recent study, Niohuru (2023) found that infectious diseases still account for at least 69% of deaths on the African continent. Hence, the continent faces a double burden of infectious and chronic diseases which result in pandemics (de-Graft Aikins et al., 2010).

The rate is virtually much higher than some major pandemics that have occurred in Africa include: Bubonic plague, Cholera, Measles, Ebola fever, Small pox, HIV, Measles. Vearey et al. (2019) pointed out that demographic changes in Sub-Saharan Africa affect the epidemiological changes

An integrative review explored the direct association of a strong public health infrastructure and a pandemic. The outcome of the review found that adequately lowering levels of existing infrastructure and equipment exacerbates their capacity to respond to pandemics. This was demonstrated by clinician-researchers working in developing countries in the Pacific (Cox et al., 2022). Report also established that good leadership and a skilled workforce are fundamental to managing the next pandemics, particularly for vulnerable health systems (Farah et al., 2023). Hence, hospital preparedness an emergency plan to large-scale pandemics.

Preparedness of hospitals also safeguards healthcare workers (HCWs) and patients to reduce the spread of any particular pathogen. that would usually further have negative impacts on people. Pandemic preparedness requires consultation with disease trends and projections, to determine, avoid, identify and respond in order to mitigate the effect (International Monetary Fund, 2021). This also implies that countries may not be able to contain similar pandemics in the future, resulting in extensive transmission and eventually impacting socioeconomic status country.

Malawi, a country with a low economy located in the Southeastern part of Africa, is not spared from pandemics either. Makwero et al. (2017) found that the country's health system is marked by maldistribution of resources, fragmentation of the health system and services and a shortage of staff. Recent information (WHO, 2023a) reported that the country recorded 88,707 cases, including 2,686 deaths, representing a case fatality rate of 3.0% during the coronavirus pandemic.

Public Health Institute of Malawi (PHIM) 2021 (WHO, 2021a) indicated that higher percentages of new cases of the disease were reported in the high-burden districts of Lilongwe and Blantyre, taking the case of coronavirus as an example, as of 16th March 2023 PHIM statistical report of 2021 (WHO, 2021a), showed that the biggest tertiary and referral health facility where the study was conducted was located in Blantyre highest proportion of the new cases (653/2,092, 31.2%) followed by Lilongwe Health District (597/2,092, 28.5%) and Zomba (115/2092), 5.5%.

During this time, the tertiary hospital where the provision of advanced level emergency care is expected to be up to date had scanty or no information about the site level of preparedness for the pandemic. Another study (Ayele et al., 2021) pointed out that in order to stop the pandemic, health facilities' readiness response is crucial. WHO developed a tool aimed at assessing the readiness of countries in tackling the pandemic. The WHO (2007) implemented a risk-reduction and emergency preparedness plan for the health sector and community capacity development to assess emergency preparedness for mass casualty incidents (MCIs) or disasters in each country. These assessments often involve questionnaires, checklists, and simulations to evaluate the hospital's preparedness for various scenarios.

Problem Statement

Hospital facilities lacked pandemic preparedness highlighted by ineffective responses to communicable disease pandemics. Although the hospital had the most advanced level of emergency care but had scanty or no information about the level of pandemic preparedness.

The increased deaths in Malawi was males aged 60, living in urban areas, and age was considered the most important risk factor for death by Covid-19 with 12 times compared to those men aged 59 years and below reported by (Hivos, 2021).

The hospital was also faced with existing challenges related to inadequate human capacity, limited resources, inadequate infrastructure (wards, emergency rooms) but also limited diagnostic equipment/apparatus.

According to the Malawi Covid-19 Situation Report, during the reporting period:30 July to 5 August 2020, over 330 health workers were infected, with nurses topping the list as most affected accounted for about 25% of the cases of HCWs, followed by support staff that account for (24%). The same report established that the hospital-acquired infections were due to infection prevention and control inefficiencies in the health facilities. Over and above, locally transmitted Covid-19 infections were at 3,344, which was almost three times the number of imported cases at 1,017, which indicated that the infection was high within communities; that was further compounded by a continued inflow of Malawians returning from South Africa.

The report further revealed that there was an increase in the number of disease pandemic fatalities in the country due to late reporting and limited management capacity at emergency treatment centers. The MoH team of experts also revealed a lack of skills by HCWs as the major cause of death, followed by lack of equipment. No effective usage of PPEs as per WHO guidelines and also shortage of test kits and lack of adherence to testing protocols were reported.

A health facility where the provision of advanced level emergency care is expected to be up-to-date, has scanty or no information about the site grade preparedness level as stipulated by WHO standards. The absence of research data for the hospital on the level of preparedness for managing disasters at a hospital reflects a lack of ability to swiftly adapt to increased demands. To meet surge demand, many hospitals have needed to con-vert space and reassign personnel and equipment resources to the ICU and isolation rooms (CDC, 2020).

Hospital and stakeholder managers need to think of pandemics as recurring events with four phases: Mitigation, Preparedness, Response, and Recovery. In the event of a disease pandemic, e.g. coronavirus has revealed weaknesses in knowledge, institutional and strategic gaps.

There is an urgent need for people to have knowledge on the epidemiology of disease outbreaks at national, regional and international levels, disease transmission and prevention strategies.

Research findings suggests that most health facilities got overwhelmed on the availability of resources that potentially caused inability to provide high-quality care during coronavirus pandemic (Maves et al., 2020). The outcome of many studies urge hospital administrators to have good knowledge about the governance of health system, and usage of effective policies, usage of appropriate treatments using new technology and vaccines to prevent and control diseases.

Research Questions

1. To what extent is the healthcare infrastructure of the health facility prepared to handle a pandemic in terms of:
 - a. Availability of equipment
 - b. Availability of physical resources
 - c. Availability of human resources
2. What is the extent of the healthcare perceptions of the health facility in terms of
 - a. Knowledge on transmission, prevention measures, and management
 - b. Guidelines and protocols
 - c. Monitoring and Evaluation measures?
3. To what extent is the hospital prepared in case of a pandemic?
4. Is there a correlation between respondent's healthcare infrastructure; infection, prevention, and control measures, and hospital pandemic preparedness?

5. Which of the independent variables best predicts hospital preparedness in the case of a pandemic?
6. Do the demographic profile variables moderate the relationship between healthcare Infrastructure, IPC measures and preparedness?

Hypothesis

Null hypothesis: There is no correlation between respondent's healthcare infrastructure; IPC measures, pandemic preparedness.

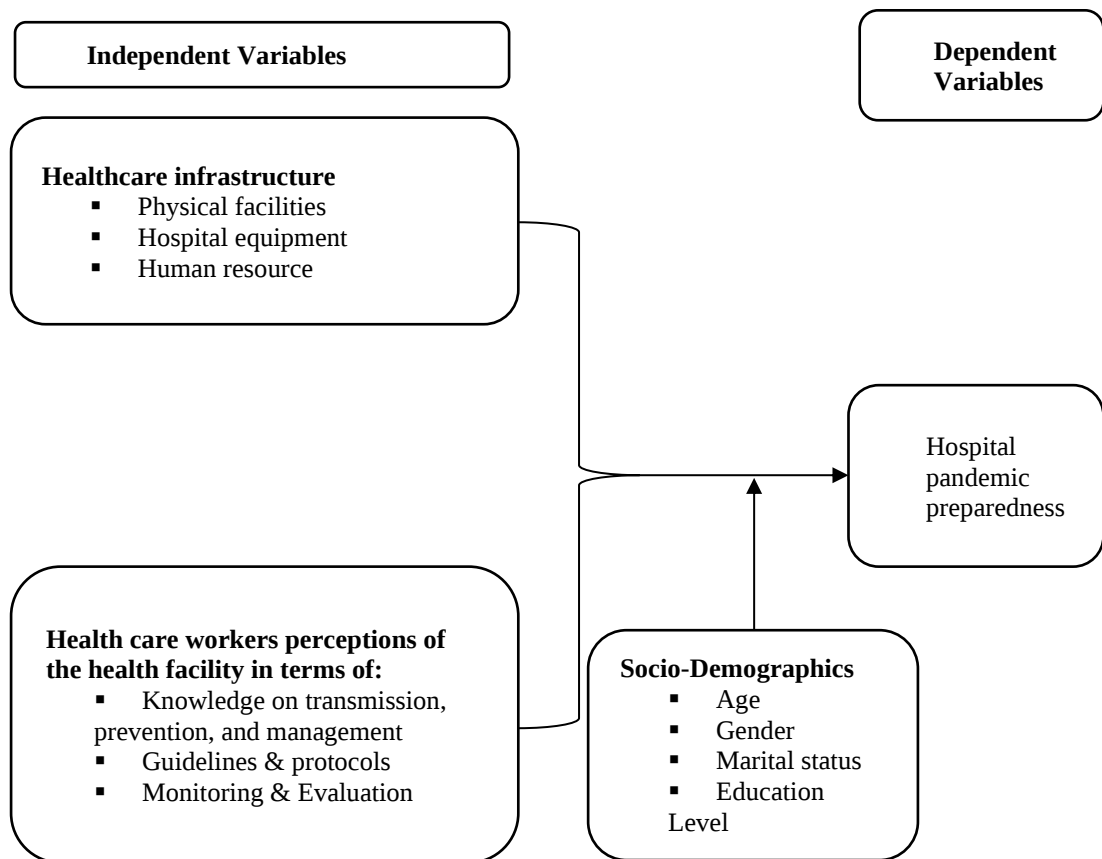
Alternative hypothesis: There is correlation between respondent's healthcare infrastructure; IPC measures, pandemic preparedness.

Conceptual Framework

The conceptual framework for this study was based on the application of behavioral theory to pandemic and emergency hospital preparedness. Sheeran et al. (2017) stated that behavioral scientists propose that interventions based on theories from the behavioral sciences, particularly psychology, are optimally effective in evoking behavior change.

Figure 1.

Conceptual Framework



Studies by Teixeira et al. (2012), Ferguson (2013), Kelder et al. (2015), and Condello et al. (2017) stated that behavioral theories come from multiple disciplines such as psychology, sociology, behavioral economics), and identify multiple determinants or mechanisms of behavior including beliefs, motivation and intentions, individual differences, social influence, and environment and demographics. In contrast with positive behavioral theories, many studies investigated by Kelly and Barker (2016) observed that changing health-related behavior is very difficult. Management of pandemic diseases includes a behavior change component.

Behavioral models are important in hospital preparedness since they assist understand and influence human behavior during epidemics, leading to more effective

hospital preparedness and response. Through the application of these models, hospitals can align their interventions to specific needs, improve communication modes, and ensure that staff and patients are well prepared to respond to pathogens.

The behavioral model has the capacity to assist in the social aspects of disease prevention and control. Behavioral models can provide accurate, clear, relevant and timely information to the public on how to contain pandemics and protect HCWs, patients and the general community. Effective hospital preparedness reduces vulnerability, increases mitigation levels, enables timely and effective response to pandemics and so shortens the recovery period from a disaster, and increases community resilience.

In this model, the dependent variable was the level of preparedness of the tertiary hospital. While, the independent variables were healthcare infrastructure, i.e., human resources, physical facilities and equipment. Human Resource Management (HRM) tends to assist hospital institutions to function better through good leadership and managerial skills, subsequently enhancing patient quality of care.

Competent HCWs have knowledge of processes, challenge accepted ideas and consider dynamics in managing pandemics by implying the right mediating variables, such as the available health facility guidelines, protocols and safety procedures to better manage cases in disease transmission, infection prevention, and control measures.

The availability of quality physical healthcare facilities promotes health, provides essential medical services and subsequently saves shelter for patients' lives. Effective delivery of hospital necessitates a well-functioning health system with trained staff, adequate funding, and reliable infrastructure.

Quality in healthcare facilities is perceived as a technical quality category. In addition, some studies (Scholz et al., 2015) also highlighted that the infrastructure of primary healthcare facilities is a relevant instrument for healthcare systems management. Current information (WHO, 2020) suggests that numerous indicators have been developed to assess the level of infrastructure and performance of healthcare facilities, as it is more difficult to access primary healthcare services in the rural areas of poor countries.

Equipment assists in the diagnostic measures and the generation of data that is accurate and acceptable as a scientific method. According to the information by Cox et al. (2022), found that 47% of the global population has little or no access to diagnostics. In contrast with negative outcomes, many studies investigated by Pai et al. (2019) seem to show that diagnostic testing in countries in low-economy (under-resourced) settings is growing alongside concerns about anti-microbial resistance, and the threat of emerging pathogens.

Significance of the Study

To Participants

Preparing a health facility before a pandemic plays a crucial role to participants (HCWs) in ensuring that they are safe and save countless lives and promotes healthier communities, through the usage of the necessary equipment, knowledge of infectious disease detection, prevention and control measures during pandemics.

To the Administrators

Pandemic allowed administrators to acquire effective strategies that would them prepare insufficiencies that would be detrimental to hospital sustainability.

Administrators will also be able to apply evidence-based practices and real-world evidence to pandemic issues reducing the morbidity and mortality rates of not only frontline health workers but the general population as well. Together with other health professionals would enhance the knowledge of hospital preparedness for pandemics by developing contingency care in the public health management system by highlighting the steps to be taken in improving the unit's preparedness.

To Public Health Professionals

Hospital preparedness is extremely important for public health professionals as it will ensure a coordinated and effective response to disease pandemics, protect HCWs, and safeguard the general public health and safety. Public health professionals will also advance in the problem-solving skills and to challenge themselves in new ways of countering disease outbreaks that would lead to pandemics.

To Policymakers

Policy makers at the Ministry of Health (MoH) level are responsible for approval of the plan on epidemics, mobilization of resources, coordination and monitoring activities for postpandemic evaluation. The study findings will enhance the policy makers to enable them to develop and improve pandemic preparedness policies as well as cost-effective interventions in the future. Study findings will also assist to policy makers to identify better or improved approaches and good practices.

To Other Researchers

Hospital preparedness ensures implementing an effective response to disease outbreaks or pandemics. The findings of a research study will help other research investigators improve knowledge and build resilience at all levels. The same

knowledge would assist them to detect and develop therapeutics and optimize access interventions (technologies, and innovations) that could contribute to an impact on a research field. Researchers can provide information about what works best for different conditions. Scientists help policymakers, and other professional fraternities make informed decisions to management.

To the Society

Hospital preparedness information shared at all levels is crucial to ensure all stakeholders and the communities have the information to support cooperation and collaboration in effective outbreak responses. Current information (Niohuru, 2023) suggests that the information is essential and good for the progress of society and the development of future generations.

To Academia

Hospital preparedness is important to academia by fostering research, training healthcare professionals, and developing effective strategies for disaster response to emerging infectious diseases. It also enables other academic disciplines with advancements and techniques, ensuring that recipients receive the best possible treatment. Several studies (Domecq et al., 2014; Patient-Centered Outcomes Research Institute, 2021; Purvis et al., 2017) the Declaration of Helsinki 1964.

Scope, Limitations and Assumptions

The study will ensure that sampling strategies used collect data representative of the population at large, while ensuring that data quality control measures are managed well to ensure that they are reliable and valid. The study is limited to recruiting 294 HCWs (participants) who were or are currently assigned to the

pandemic unit at the hospital where the study was conducted. Hospital administrators were also included.

A structured questionnaire was administered to HCWs (participants) at the tertiary hospital pandemic unit who consented. Recruitment lasted for a period of 2 months. Participants were required to answer the questions from the questionnaires administered by the researcher herself in order to assess the impact of healthcare infrastructure, and knowledge of transmission, prevention, and management on hospital preparedness.

The researcher only sampled HCWs at the tertiary hospital pandemic unit. The boundaries of the research were based on the purposely selected variables, as well as the target population and sample. To address the challenge of selection bias, random sampling was done when administering the questionnaire.

The study focused one tertiary hospital in the country. In addition, asking the participants about knowledge is prone to recall bias. This gap should, however, be addressed through verification by workers with good memory of the events during the past pandemic.

Assumptions of the Study

Participants were cooperative responding to the structured questions, since they were or are among the most vulnerable and stigmatized citizens to the recent coronavirus pandemic. Only selected healthcare professionals who are designated or worked at the pandemic unit will participate and be identified by code numbers. The researcher will be responsible for the administration of the structured questionnaires to study participants without engaging a third party in order to maximize the individual's confidentiality and truthfulness.

Operational Definitions of Terms

Age: A period of human life, measured by years from birth

Demographics: Are statistics that describe populations and their characteristics.

Education Level: The academic qualification you have obtained

Equipment: materials used at the hospital to aid in the care of patients

Guidelines and protocols: Any guide or indication of a future course of action

Hospital Equipment: A functioning machine for some health purposes

Hospital pandemic preparedness: A collaboration between key healthcare organizations healthcare capability.

Human resources: People working at the hospital

Infrastructure: Basic facilities and systems serving an institution

Knowledge on transmission, prevention, and management: Acquaintance with facts, truths, or principles from a study investigation Knowledge on transmission, prevention, and management:

M&E: Measures to check progress activities at the hospital

Marital status: State of being married or not married.

Residence: Place where one actually lives as distinguished from one's domicile

Trainings: Additional educational matters

CHAPTER 2

REVIEW OF RELATED LITERATURE

The chapter introduces relevant issues related to hospital pandemic preparedness, and response to the interventions in disease transmission. Preparedness of hospitals for pandemic response is recognized as critical to shifting the pandemic. Data was retrieved largely from recent scholarly publications, WHO dashboards, professional journals or articles, technical reports, the internet, academic journals, manuscripts and statistical data from government websites.

Pandemic occurrence conditions are associated with overcrowding, especially in highly developed cities as well as Asian countries, is on its own a catalyst for pandemics (Grennan, 2019). The expansion of cities, trade territories, increased travel and effects on ecosystems and coronavirus pandemic as contributing factors. Hamidi et al. (2020) takes the idea a bit further, suggesting that a raised human population heightens pandemic cases.

Hospital Pandemic Preparedness

Countries in the west missed the window of coronavirus pandemic compared to what East Asian countries used to stop the pandemic (Pasquariello & Stranges, 2020). In contrast, another study by Shokoohi et al. (2020) found that the majority of western countries were not as timely, and lacked pandemic preparedness, which led them to fail to successfully strengthen early responses in spite of implementing public health measures (Pasquariello & Stranges, 2020).

Six aspects of the country's hospital preparedness, i.e., health infrastructure, infection prevention and control, health systems, compliance, communication and coordination are critical in pandemic preparedness (Felix Ritcher, 2021).

The Grant (2021) reported that the “best prepared” countries did perfume well during coronavirus preparedness. Coronavirus requires timely and rapid responses to efficiently contain the pandemic and reduce its associated burden. Studies by Haldane et al. (2021), Hivos (2021), & Bell et al. (2020) revealed that coronavirus pandemic is such an example that challenged global, regional, national and local capacities compared to previous pandemics to prepare and respond. Rapid sharing of information is considered key to the containment of pandemics.

Several studies (Pasquariello & Stranges, 2020) found that the less successful management of the coronavirus pandemic in the western world was largely due to a delayed response and case management. In contrast with negative outcomes, many studies praised Germany for being the only western country to have effectively managed the coronavirus pandemic and recorded the lowest numbers of (8, 007 deaths, (fatality rate of 4.5%) (WHO, 2020).

Studies by Stafford (2020) revealed that infection and death rates remained relatively low, and hospitals were never overwhelmed compared to other countries due to timely response during coronavirus pandemic. Of interest are studies from Asia that found that countries were so timely, used multiple strategies to respond to pandemics compared to those of western countries (S. Park et al., 2020). Besides the rapid response, implementation of multiple strategies, advanced diagnostic capacities, and screening programs remain key to controlling pandemics.

Several studies have identified four key elements for an effective healthcare system as: staff, space, and systems. Leaders need to find the best methods to gather

and interpret make changes. While, space assists in countering global pandemics and identifying possible solutions. The use of digital technology provides support, delivers, and tracks the spread of viruses during pandemics. Knowledge helps in health promotion and disease prevention (Al-Shaikh et al., 2017).

Lessons from China, a country with a high economy, have heightened the need for countries to expand infrastructure and deploy human resources with knowledge and skills as essentials for controlling the spread of pandemics. Samei et al. (2023) reported that the applicability aggressive measures during coronavirus pandemic remained a tough point in resource-limited countries where preparedness was influenced by various factors that differed among societies according to their socioeconomic context. Implementation of a reinforcement learning-control strategy assists in decision support during a pandemic. Gandhi et al. (2020) found that relaxed mitigation strategies and reinforcement yield positive results during health care emergencies.

The examples of countries like Sweden and Hong Kong deployed relaxed mitigation strategies and reinforcement approach of pre-diagnosis way before respectively and yielded positive results for pandemic preparedness. Research studies (Pasquariello & Stranges, 2020) found that poor health infrastructures, untimely response, inadequate hospital systems, overburdened hospitals and poor approaches lead to cumulative deaths of patients during health pandemics.

Global Preparedness Monitoring Board, Geneva: WHO (2021) highlighted that western countries to invest in prevention and control of infectious diseases, surveillance of communicable diseases, allocate adequate resources, increase staffing capacities, facilities, promote inter-national partnership, enhance collaborative research, and transparent sharing of data to fight upcoming pandemics.

Pandemic Preparedness in Sub-Saharan Africa

According to the World Health Organization report (WHO, 2002), it was estimated that in 2001, approximately 60% of the 56.5 million total reported deaths in the world and approximately 46% of the global burden of disease was attributable to chronic diseases and cardiovascular disease in particular. The same report highlighted that most deaths in Africa were caused by HIV/AIDS, malaria, tuberculosis and other predominant communicable diseases.

According to Google scholar in the Institute of Medicine, 2003 many emerging diseases are reported from or originated from Africa. (Calvignac-Spencer et al., 2012 cited by Fenollar & Mediannikov, 2018) listed HIV infection and malaria being among the most important ones, which emerged from wild monkeys. A study (Fenollar & Mediannikov, 2018) found that 88% of pandemics came from conflict-affected countries of the central highlands of Madagascar, and some African countries.

The Sub-Saharan African countries' economic growth rates are still not high enough to make a real dent to catch up with the Western World (International Monetary Fund, 2021). Current information (International Monetary Fund, 2021) describes them as relatively weak economies with low living standards with undeveloped industrial base. Africa compared to the rest of the world, the Covid-19 pandemic had less anticipated health effects, despite the fear that the continent was inadequately prepared to contain the spread of the virus (African Development Bank, 2021).

In his study, Demombynes et al. (2022) observed that low-economic countries in Africa had lower mortality rates for coronavirus pandemics compared to those in

the western world, highlighting that the experiences of the coronavirus pandemic in the western world may not be generalizable to the countries with low economy.

Of interest are studies (Elbany & Elhenawy, 2021; Okoth & Oyola, 2020) that found that, on a small scale, some African countries, Senegal and South Africa, were among the first to undertake laboratory disease during coronavirus pandemic tests increased from 2 to 33 in January 2020

Most countries fall under low economic power in Africa with nearly similar health system capacity for hospital pandemic preparedness. Recent research (Sengupta et al., 2018) shows that South Asia and Africa have so many things in common with respect to disease outbreaks. These include poor hospital infrastructure, lack of equipment, lack of funding, lack of enough and qualified professionals to deal with disease pandemics.

Research appears to have found that South Asia lacks information on public health and makes it difficult to easily monitor the high burden of morbidity and mortality caused by communicable diseases in these countries (Sengupta et al., 2018). Health data management is crucial to tracking the spread of novel viruses to prevent them from becoming pandemics. Tessema et al. (2021) pointed out that Africa has limited evidence of research data on facilities to manage pandemics.

Current information (World Bank, 2020) encourages countries to invest in human capital (HC) in the wake of the current coronavirus pandemic and prioritize safeguarding HCWs and patients in an effort to reduce morbidity and mortality. Unavailability of basic infection prevention materials and PPEs in health facilities in low and low middle income countries is therefore evident. PPEs are essential in reducing the spread of the disease within the facility's settings to patients as well as staff.

The Coronavirus pandemic caused a substantial disruption of healthcare services, such as reduced services due to lockdown restrictions (Moynihan et al., 2021). Recent information (WHO, 2020) appeals to countries to deliver essential services to their populations. Several studies have reported the impact on services caused by the coronavirus pandemic in many countries such as Kenya and Rwanda. The most affected were services include tuberculosis and antenatal care which dropped to 50% (Abdela et al., 2020).

Routine reproductive healthcare and oncology were severely neglected in Kenya due to priorities (Gichuna et al., 2020). While, in South Africa, there was a drop in child healthcare visits by about 36%–50%, with a 50% decline in pediatric hospitalizations (Jensen & McKerrow, 2020). A study carried out in Ethiopia that found approximately 13 African countries reported increased daily health issues and depression because of the stigmatization of HCWs during the coronavirus pandemic (Debes et al., 2021).

Similar studies carried out in Thailand found that the pandemic leads to uncertainty, anxiety, fear and stigmatization in HCWs (Nochaiwong et al., 2020). And in Mozambique, 38%–50% and 65% of HCWs were somewhat worried and extremely worried about being at risk of getting the infection (Tessema et al., 2021).

An integrative review explored the impact of lockdowns and travel bans in countries with low economies during the coronavirus pandemic. In their investigations, Ranney et al. (2020) established that lockdowns and travel bans lead to a sharp inadequacy of supplies of PPEs and essential medicines in several African countries. In contrast, C. Park et al. (2020) suggest that a decrease in these PPEs and essential resources was as a result of mass testing.

The outcome of studies by Otitolaju et al. (2020) established that there existed a resource gap in test kits in countries like Mauritius, Ghana, South Africa, Botswana, Tunisia and Cape Verde during the pandemic. Bajaria and Abdul (2020) in Tanzania observed that variations in the disruption were primarily due to the geographic locations of vulnerable populations. Koka et al. (2018) in his findings established that hospital preparedness was still in its early stages in many other African countries. The researcher further observed shortage of staff, mismanagement, medical economic constraints are among hospitals' challenges.

The WHO, 2020 report emphasizes that initial capacity assessments of hospitals were key to pandemic preparedness. Interesting findings from South Wollo zone, Ethiopia found that out of forty-six health centers conducted to assess the health facility pandemic preparedness, 40-79% of the group criteria fell within the “work to do” (Ayele et al., 2021). These results signify that sites were not ready to contend with the pandemic due to lack of resources, among other things. Similar findings in the assessment of hospital pandemic preparedness in the Intensive Care Unit (ICU) department fell in the class of the ‘work to do’ in resource gaps; essential equipment (Sonenthal et al., 2020).

Hospital Pandemic Preparedness in Malawi

According to UN Malawi (2020) the country responded to Covid-19 pandemic with various measures. The Government declared a State of Disaster on 20th March 2020. A number of measures meant to contain the spread of the virus were put in place. As the number of cases increased, more stringent measures were equally stepped up.

Malawi government declared a 21-day national lockdown to take effect on April 18 UN Malawi (2020), although was not implemented as it was challenged in

court. In the same report of UN Malawi (2020) several key initiatives were taken by the government, including a declaration of disaster, restrictions on gatherings of no more than 100 people, travel restrictions, and the promotion of sanitation and hygiene practices.

The UN Malawi report of 2020, response plan provided information to policymakers on the depth and breadth of the impact of the pandemic and the impact related to the economy.

The outcome of the UN Malawi (2020) Socio-economic impact assessment plan revealed gaps that needed to be addressed such as infrastructure measures, improvement of quarantine facilities, provision of necessary diagnostic devices, hospital equipment for patient management, protective equipment for HCWs.

The UN Malawi (2020) pandemic final report however, postulated that there was low uptake in knowledge about the pandemic among Malawi citizens. Approximately, 95% of Malawians did not hear about the coronavirus pandemic through the radio in its early days. The same report highlighted that lack of communication, underestimations, insufficient preparation had an impact on the preparations. Internal communication intensively remained a key factor in handling situations.

Healthcare Infrastructure and Management

Healthcare infrastructure encompasses a broad range of elements. These include: physical facilities, medical equipment, IT systems, human resources, and processes. These components work together to ensure the delivery of effective and efficient healthcare services and can be further broken down into environment and supporting elements. Hospital infrastructure is critical to ensuring the security of

HCWs, wellbeing of patients, but also to promote, prevent and control diseases in the community.

Several studies by Tessema et al. (2021) have revealed that most African countries have limited health infrastructure, shortage of well trained health professionals, and insufficient health financing. On the other hand (El-Sadr & Justman, 2020; Hopman et al., 2020), observed that not many specialized hospitals in Africa are equipped with intensive care units. In studies, Lal et al. (2022) establish that availability of quality infrastructure is extremely important to fill the gap between hospital pandemic preparedness and response. Quality healthcare infrastructure promotes health, provides essential medical services and subsequently saves as shelter for patients' lives.

Infrastructure is a key pillar supporting the fundamental aim of promoting improved standards of care and wellbeing for all patients, together with a good experience of the health care system (NHS England, 2014). In addition, a secondary aim must be to improve the wellbeing of staff, as this is integrally related to ensuring improved care for patients (NHS England, 2014).

Physical Facilities

Hospital infrastructure is an all-encompassing term for the services and physical facilities that contribute to a population's health. These include: workforce, energy, water, food, equipment, buildings etc., are considered critical infrastructures in many countries and vary from country to country. Hospitals need to have sufficient staff, space, equipment, and supplies.

A critical infrastructure is a complicated system whose failure (in whole or in part) has a significant impact on national interests, including security, the economy and basic human needs (Rehak et al., 2016). Sandholz and Wannewitz (2018)

established that hospitals and other healthcare facilities depend critically on power supply, among others. Many patients' lives depend on hospital equipment such as ventilators, dialysis machines and incubators.

Power outage, threatens patients on support machines at risk and if it doesn't come back, the risk intensifies. In disease pandemics and other disaster events, water supply failures prove to be a bottleneck. Mushi and Shao (2020) state that handwashing is a key practice in reducing the spread and transmission of infectious diseases such as pneumonia, influenza, and environmental enteropathies.

Hospitals need to have a design encompass the physical construction (layout, room doors and windows), ambient features (noise, air quality), interior design (furniture, equipment), (Institute of Medicine (US) Forum on Emerging Infections, 2000; Ulrich et al., 2008). Hospital design is now informed, comparable in certain respects.

Hospital Equipment

Hospital equipment comprises a wide range of medical devices that are used for specific, intended medical purposes within healthcare settings. These devices can broadly be categorized into two major groups: machines and personal protective equipment (PPE). Hospital machines include diagnostic tools, surgical equipment, durable medical devices, stretchers, and defibrillators. These machines are essential for clinical diagnosis, treatment, and patient support, and their availability and functionality significantly influence the quality of care delivered, particularly during public health emergencies such as pandemics.

Personal protective equipment (PPE), on the other hand, refers to specialized clothing or gear worn by healthcare workers to reduce their exposure to infectious agents and other health hazards. Common examples of PPE include gloves, gowns,

face masks, coats, and surgical suits. The appropriate use of PPE is a critical component of infection prevention and control strategies in both routine and emergency health care.

Effective clinical management during pandemics and other high-demand periods is highly dependent on the availability, quality, and reliability of hospital equipment. Therefore, the maintenance and management of hospital machines are essential to ensure they function according to the manufacturer's specifications and comply with safety standards. Proper equipment maintenance not only supports patient safety but also protects healthcare workers and contributes to the overall resilience of health systems. Dong and Bouey (2020) found that the recent pandemic of coronavirus has challenged the world in all aspects of economics, medicine, and equipment.

Machines used in hospitals should be of good quality and ensure a strong and consistent workflow during a disease outbreak or pandemic. Studies by Badnjevic et al. (2023) also highlighted that hospital machines are important. Delays in the usage of essential procedures by critical machines in hospitals can have serious consequences, especially during a disease pandemic. A machine that breaks down or works inaccurately could lead to loss of life (Kutor et al., 2017). Recent studies (Kutor et al., 2017) indicate that hospitals need to have sufficient ventilator equipment, ancillary supplies during pandemics.

Personal Protective Equipment

Personal Protective Equipment (PPE), are specialized equipment worn by HCWs/individuals to minimize exposure to hazardous materials at work places. Common PPEs include gowns, gloves, face masks, and a face shield or goggles which

prepares personnel from health risks and gives extra protection in the event of pandemics, accidents or against the elements of becoming ill.

Recent research (Hersi et al., 2015) indicated that global PPE shortages were one of the contributing factors to the death of HCWs in West Africa during the Ebola virus pandemic. In contrast, Leite et al. (2020) observed that there was an interruption by the manufactures in delivery of PPEs during a coronavirus pandemic.

Proper coordination of PPE supplies across regions is very important during pandemics. Stocks need to go various hospitals required in times of disease outbreaks or pandemics. Partnerships of facilities and suppliers are critical during pandemics.

Global shortages of PPE worsen during pandemics making the preparedness effort not quite effective. In contrast with negative outcomes, studies (Berklan, 2020) found that a surge in demand during pandemics exacerbates panic in buying and excessive stockpiling, leading to disruption in supply chains.

Human Resource Management

People of various cadres: Healthcare workers (HCWs), form the human capital workforce of hospital human resources (HR). HCWs form workforce, and to support the hospital's goals and objectives. Smith and Bititci (2017) postulated that planning by HCWs is essential to ensure hospital preparedness for response, enhance training, protection, rights, recognition, and tools necessary to undertake their roles. HCWs form the hospital human capital during pandemic preparedness. Najjuka et al. (2022) found that adequately trained HCWs (clinicians, nurses and support staff) with good knowledge, skills and awareness regarding disease transmission, prevention, and management would perform their duties effectively, with speed and adaptability to critically respond to a pandemic.

A study by Smith and Bititci (2017) found that organizations require qualified leaders to foster administrative improvements. It is an undeniable fact that well-trained HCWs deliver the best outcome. Another study (Najjuka et al., 2022), found that HCWs who had some form of training in managing patients had a higher level of efficacy.

Administrative staff respectively help with the proper diagnosis (Pan-American Health Organization, 2020) suggests that countries and health institutions must have the capacity to respond with HCWs that are sufficient in quantity and possess regarding transmission of diseases to address pandemics. Al-ahdal et al. (2020) found that governments face the challenges of inadequacy of HCWs to handle pandemics.

Research appears to have shown that the recruitment of human resources with sound knowledge and awareness is one of the great challenges of hospitals to preparedness and management. HCWs perform effectively if they have adequate knowledge and skills. Several studies have shown that pandemics tend to create the demand for human resource management.

The concept of competence in healthcare workers is important by its very nature. An integrative review explored the sense of competence available in HCWs in the types of services and communication and are very vital. However, two studies (Chou et al., 2020; Hosseini et al., 2019) found that HCWs pandemics are an ongoing threat to HCWs globally; pandemic.

Infection, Prevention, Control Measures

Current information (CDC, 2020) suggests that HCWs need to be protected from infections. Infection Prevention, Control (IPC) remain crucial in planning and

responding to hospital pandemic preparedness for patients during coronavirus pandemics. The WHO (2020), advocates that HCWs should be moved affected areas to non-affected areas as one of the pillars of the IPC. The practice promotes knowledge and capacity building of HCWs through innovative and impactful training.

Knowledge of Transmission, Prevention, and Management

In the context of disease transmission, carriers are individuals who might not show signs of the diseases to the community and beyond remains a threat to HCWs globally. Knowledge sharing is very important regarding the transmission and management of diseases to stakeholders for better planning and management of hospital preparedness during the pandemic. Understanding convalescent carriers is critical to knowing the time when disease is more infectious, such as Cholera.

Recent research indicates that sound knowledge, and the use of the right tools or equipment and adoption, enhance better emergency disease management for any future epidemics in the health system at large. In all this, communication remains key to achieving the goal of hospital pandemic preparedness. Lack of it would lead to insufficient preparation, and is deemed an indicator of poor preparedness.

Environmental factors such as economic could promote vulnerability and also lead to better knowledge perspective about infectious diseases. A recent study (Luo et al., 2020) highlighted that knowledge and awareness enhance better emergency disease management during pandemic preparedness in hospitals with the right tools.

Disease Prevention Measures. Collective work for the prevention and control of infectious should be maintained to prevent pandemics. Hospital leadership needs to communicate strategies to HCWs, patients as disease prevention measures require full cooperation between authorities and stakeholders. Both national and international

stakeholders need to work together to reduce disease pandemics. The researchers postulated that both patients and individuals need to wear protective masks or isolate patients with an airborne pathogen to prevent them from spreading.

Recent research (Williams et al., 2021) has indicated that HCWs need to be protected from respiratory diseases. Hospital administrators need to apply disease preventive skills wisely, as socio-economics IPC measures must focus on proper cleanliness, vaccination, for preventable diseases during hospital pandemics preparedness.

Current information (Williams et al., 2021) suggests that a surveillance network of infectious diseases should be recorded of all infections related to health unit prevention policy and strategies for tropical diseases. The records should include vector surveillance, and implementation of strategic plans.

An epidemiological surveillance modeling of climate risks would help to prevent tropical disease pandemics (Semenza & Paz, 2021). Pandemics preparedness of a health facility requires management issues tackled by good workforce ensuring that a health facilities are prepared during pandemics or crises (Semenza & Paz, 2021).

Numerous studies have found that hospital management poses many challenges for organizations: remote working culture, performance management, low employee motivation (Singh et al., 2022). In contrast with negative outcomes, a study (Ammirato et al., 2024) showed that there are certain health issues isolation that negatively influence workers' psychological wellness.

Hospital leadership need an effective management during pandemics. Of interest is a study (Gigauri, 2020) suggesting that professionals to ensure their career growth during pandemics. Effective communication and creativity are paramount

during pandemics where HCWs could be in isolation and no longer interactive with other members of staff to enhance innovation for career growth. Gigauri (2020) indicated that without effective management, transparency and effective monitoring, it is difficult for health practitioners to respond to pandemic challenges.

Guidelines and Protocols

Clinical guidelines are hospital documents that present evidence-based information to support clinicians in the management of specific clinical problems (Grol & Grimshaw, 2003). While protocols are documents that provide a description of specific steps to be followed once clinical management decisions have been made. However, two studies have found that.

Guidelines. Guidelines are documents that contain recommendations for hospital interventions. Enacting laws mandating preparedness, developing and updating preparation of protocols. These documents provide information about what policymakers, HCWs need to reinforce. Malawi (National Coronavirus established key policy guidelines to contain the coronavirus pandemic by; Implementing a mandatory negative coronavirus test certificate into the country for travelers from disease pandemic threats regions, infrastructure development for diagnosis and washing facilities, especially with local transmission of coronavirus.

Regularly monitoring and evaluation of the effectiveness of measures. Pandemic guidelines by HCWs during pandemic. Pereira-Sanchez et al. (2020) emphasized that hospital leadership needs proper guidelines for all HCWs.

Epidemic Preparedness Guidelines (WHO, 2021b) suggest that multiple IPC guidelines have been produced in order to protect HCWs during hospital pandemic preparedness. In contrast, many studies investigated stated that the use of these guidelines may, however, be affected by the availability of medications. Guidelines

and complementary training documents must be accessible to all hospital staff.

Guidelines are an essential tool for disaster or disease pandemic preparedness.

Protocols. Official procedures or system of rules governing affairs of the occasion in the IPC during a disease pandemic. Without the availability of protocols, it would be difficult to come up with sound clinical decisions that would lead to better outcomes in hospital preparedness for critical patient care situations. Disease pandemics require well-established protocols for infection prevention and control measures (Hersi et al., 2015).

Research found that 23% adhered to the protocol and suggested forgetfulness and negligence as major contributing factors worsened by lack of knowledge about non-compliance (Kalata et al., 2013). Although protocols play a significant role, they may not be standardized worldwide as they vary across countries and also within the CDC and WHO due to ever-changing and growing data (CDC, 2020; WHO, 2020).

A study (Pérez-Belmonte et al., 2020) that found HCWs also need to be skilled in the implementation of protocols during hospital pandemic preparedness.

Importance: Protocols facilitate shared care, bolstering speed and resources mobilization efficient processes.

Monitoring and Evaluation

Researchers postulated that Monitoring and Evaluation (M&E) would help define a program's scope during hospital pandemic preparedness. Documents and templates allow organization programs to follow proper framework. M & E can be achieved through close monitoring during pandemic preparedness (WHO, 2021b).

M&E requires good quality data, responses to pandemic and the emergencies that have risen worldwide (Impouma et al., 2020). Another study (Impouma et al., 2020) found that inputs provide guidance for existing epidemics in the country, region

and world. Analyzing and evaluating current interventions is important in drawing best practices.

Pierce (2016), found that a reliable report with quality data that is reproducible provides an accurate M&E report. Numerous studies have found an association between sound decision-making and quality data reports during hospital pandemic preparedness (Pierce, 2016). process guarantees transparency to better accountability. Not only that, but it also makes it much harder to deceive stakeholders. Through, M&E results hospitals and organizations can replicate the best. In good M&E plans, all voices are important and matter. Nearly each and every organization benefits from M&E perspective.

Through the process of M&E, assists organizations such as such as hospital preparedness for the shocks of a disease pandemic has fulfilled its goals. Furthermore, it assists in preventing wastage of resources during hospital pandemic preparedness.

Socio-Demographics

Socioplay an important role in pandemic and relief work. Demographics as as moderators influence, strength or direction of these effects. Situation, a moderating variable can moderate the relationship between two variables in many different ways, such as strengthening, weakening, but also negating. (Madhav et al., 2017) pointed out that hospital pandemic preparedness experiences and certain socio impacts by age , education, marital status, etc.

Age. Attributes to such as perceived risk and consequences. In addition, some studies (Kim & Crimmins, 2020) also highlighted that context coronavirus risks and adherence. Tuohy et al. (2014) attached barriers to pandemic preparedness in emergency supplies stock of older people to younger generation. Recent research (Chan et al., 2016), on the other hand, found that age is associated with

responsibilities. Several studies (Dostal, 2015) found that people with disabilities in the health and functioning of their bodies, would prepare quicker during pandemic preparedness.

Gender. Gender and pandemic preparedness are closely interconnected. It also shapes people's disease levels of risks. It is very important to implement policies using an intersectional and gender-transformative approaches. Research studies (Jha et al., 2022), indicate that it is important to take into account vulnerabilities and inequalities. Studies (Croda & Grossbard, 2021; Dlamini, 2021; Flor et al., 2022; VanBenschoten et al., 2022) show women had heightened risks during coronavirus pandemic.

Hospital pandemic preparedness, is critical to ensuring that nobody is left behind. In contrast with positive outcomes, many studies investigated gender as key to equality. Social norms has holds power to decide (decision) (Morgan et al., 2016).

Education level. The level of education is crucial to hospital leadership. Hospital preparedness implementation requires a good level of education to develop hospital pandemic preparedness plans. Wachira and Mwai (2021) stated that a pandemic causes hospital disruptions. Hence hospitals need to have people with good knowledge and quality education.

Marital status. Married people are both responsible to one another and, with that dynamic, lead to living more responsible and fruitful and satisfying lives irrespective of the situation. Marriage, too, is a transformative act of future roles in society. Recent research has shown that singles were more psychologically affected during a disease pandemic (Woon et al., 2020). In contrast, researchers focusing on HCWs found that married people had reduced psychological well-being (Ghaleb et al., 2021).

Findings from other studies show that marital status are determinants of the coronavirus pandemic in well-being single people people were more prone to feel lonely than those who do not live alone, a feeling that leads to the development of a depressive state (Lal et al., 2022). A report from China demonstrated that insomnia after the coronavirus pandemic was related to marital status (Li et al., 2020). A study from Japan revealed a similar pattern, suggesting that marital status psychological symptoms may be widespread.

CHAPTER 3

RESEARCH METHODOLOGY

The chapter presents the study design, and sampling procedure, size, study area, validity, reliability of the study, administration of instruments methods of data analysis and ethical considerations.

Research Design

An analytical cross-sectional research design was used to measure the correlation between healthcare infrastructure and pandemic preparedness in the hospital. This study design was deemed appropriate as compared to a descriptive cross-sectional design as it allowed me to measure the correlation of the dependent variable and the independent variables. Creswell (2014) points out that this design focuses relationship which are grounded a positivist paradigm. The researcher collects data, and observes variables from many individuals at a single point in time without influencing them.

The design allows study of a smaller group (Schmidt & Brown, 2019). Part of the population is studied, and outcomes from the study findings is generalized to the entire population by examining the variables. (Banerjee et al., 2015). The design allowed creation of numeric statistics by using a questionnaire to gather data which was an appropriate design because it collected all the information from a large pool of 294 participants and analysed the findings from the outcomes.

Study Area

The research was conducted at a tertiary hospital in Southern Malawi. This is the largest referral hospital among the other four in the country with 1,300 patients capacity. It is also the main teaching facility for the Kamuzu University of Health Sciences (KUHeS). It is considered the most advanced in terms of health service delivery and a center of excellence with an up to date emergency care unit but with very little information on the hospital pandemic preparedness as stipulated by WHO standards, hence its selection as the study site.

Population and Sampling Techniques

The target population was healthcare workers (HCWs) who were still or once got involved for the past five years in the management of pandemics directly or indirectly at the emergency pandemic unit. The group was composed of decision makers such as the hospital management team, staff, workers, and other cadres.

Inclusion Criteria

1. HCWs, particularly those that work in the pandemic emergency unit, manage pandemic cases (Cholera, HIV & AIDS, H1N1 and coronavirus).
2. HCWs who once worked in the past five years at the pandemic emergency unit provide care and management
3. Hospital administrators and directors involved in the management of the health facility
4. Hospital matrons, nurses, laboratory technicians, and all the technical support staff who worked or were once assigned to the emergency unit in the past five years.

Exclusion Criteria

1. HCWs who worked in sections or departments not directly involved with pandemic response.
2. HCWs who were ill and who could not respond to the questionnaire

Sample Size

Charan and Biswas (2013); Ermatology et al., 2014, used a statistical formula. With 6% level of precision and proportion 50% nonresponse. Assuming that percentage of those unprepared for the pandemic management was not known (i.e., in these situations, a percentage of 50% was typically estimated to ensure the maximum sample size, assuming all other factors remained constant. Below, the final sample size (267 + 10% non-responsive) participants.

$$n = \frac{Z_{1-\alpha/2}^2 p(1-p)}{d^2}$$
$$n = \frac{1.96^2 \times 0.5(1-0.5)}{0.06^2} = 267 \text{ participants}$$

Plus 10% (27) = 294 participants.

Sampling Techniques

Stratified probability sampling method was used to select the respondents. This method chose representatives of study participants in proportion to their professional categories (i.e., Administrators, Nurses, Doctors or Clinicians, Support staff). The participants were first stratified by professional category and then sampled under a simple random sampling method, see Table 1.

Table 1.*Calculation and Categories of Study Participants*

Clinicians	Nurses	Surveillance Assistants	Laboratory Technicians	Hospital Director	Hospital Admin.	Hospital Matrons	Others Ward attendants	
Total number of Healthcare workers (HCWs) at the facility								480
Total number of study participants or respondents								294
40	80	60	30	2	2	20	80	#/480*294
25	50	37	18	1	1	12	50	Participants

Note. Source: Field data 2025

Instruments for Data Collection

Instruments were adopted and customized from the WHO Checklist, 10 February 2020, due to the unique characteristics of the study population and the efficiency of data collection. However, some questions were asked by the researcher. The items included in the data collection tools were based on the objectives and research questions adopted from the WHO coronavirus preparedness checklist tool.

The checklist consisted of three domains, namely; 1.) assessment of the availability of trained personnel, facilities, and equipment (PPE), 2.) assessment of the level. The checklist consisted of three domains, namely; 1.) assessment of the availability of trained personnel, facilities, and equipment (PPE), 2.) assessment of the level management pandemics at a tertiary hospital; 3.) HCW's knowledge. Each domain had a set of Likert scale questions which were answered based on the respondents' best opinion on a three-point scale; four-point scales; and five-point scales.

Descriptive statistics was used to calculate percentages and proportions. IPC was categorized as low, moderate and high and ANOVA test was applied to test for

difference between sex and level of degree of IPC. An average relative percentage was finally be calculated. Ready Score (What is the Ready Score?); The facility was classi-fied as “better pre-pared”, if they scored over 80%, “work to do” if they scored 40% to 80%, and “not ready” if they scored less than 40%.

Validity

From a practical perspective, research instrumentation improves the quality of research practice. Hence, some things were changed to ensure that the data acquired was accurate and reliable to assist and guide decision-makers in the management of health systems during pandemics in Malawi. A valid design ensures that research findings represent real relationships between the variables of interest. Specifically, I-CVI of 0.78 (Polit et al., 2007) or higher for three or more experts will be considered as evidence of good content validity. Four experts were consulted to review the research instrument, and provided directions on the relevance of each item. These experts were specialists with a medical background who are based at KUHEs.

Regarding face validity, four experts were consulted from the same team review the instrument to establish they were meeting the criteria for measuring the traits purportedly measured. The construct validity was measured by calculating coefficient above 0.35 was considered beneficial (Streiner & Norman, 2003).

Reliability

A pilot was carried out in the nursing department at one of the semi-urban hospitals, which is approximately 3 kilometers away from the study facility. The sample size was 10% of the total sample number, which was 29. Participants and time taken to determine, how long participants take to respond to the questions.

The reliability analysis was conducted on a 8-item questionnaire designed to measure healthcare workers perception on pandemic preparedness at a tertiary

hospital in Southern Malawi on the constructs of hospital preparedness (HP), Monitoring and Evaluation (ME), guidelines and protocols (GP), infection prevention and control measures (IPC), health care infrastructure (HCI), hospital equipment (HE), human resource (HR) and demography (DG). Findings of the Cronbach's alpha was = 0.82, suggesting consistent measure.

Table 2.

Results of Cronbach's Alpha Test

Construct	No of items	Value of Cronbach's Alpha
HP	3	0.827
ME	3	0.81
GP	5	0.82
IPC	5	0.822
HCI	5	0.823
DG	5	0.818
HE	5	0.821
HR	5	0.826
Total	36	

Note. Hospital preparedness (HP), monitoring and evaluation (ME), guidelines and protocols (GP), infection prevention and control measures (IPC), health care infrastructure (HCI), hospital equipment (HE), human resource (HR) and demography (DG)

Data Collection Procedure

Eligible participants (HCWs) or respondents were selected from stratified categories hospital administrators, doctors, matrons, nurses, technical staff and others. An informed consent form was used to obtain consent from each participant willing to participate in the study. Only those participants or respondents that consented were allowed to complete the given questionnaire.

Participants or respondents were allowed to freely leave participation before came to an end if they desired to do so. Participants or respondents were asked or

requested to complete a questionnaire as a data collection tool with customized structured questions from the WHO pandemic preparedness questions that helped the researcher document specific behaviors or events during collection spanned an average period of two months. This occurred in a private and comfortable environment that was convenient for the participants or respondents. The setting was chosen to ensure participants' comfort and to encourage open and honest responses. The process was stopped when the number of participants got to 320 in order to accommodate absconders and rejected data.

Method of Data Analysis

The investigator checked its accuracy, clarity, and consistency. The data was checked and cleaned before data processing and analysis. Ambiguous or uncompleted data was not analyzed. Data was cleaned in Excel and exported to STATA version 17.0 for analysis.

Table 3.

Analysis Plan

Research questions	Result presentation	Test used]
1. To what extent is the healthcare infrastructure of the respondents prepared to handle a pandemic in terms of: a. Availability of human resource b. Availability of physical resource c. Availability of equipment	Percentages and proportions.	Descriptive statistics
2. Healthcare perceptions of the health facility in terms of: a. Knowledge on transmission, prevention, and management b. Guidelines and protocols c. Monitoring and Evaluation	Level of extent of IPC measures shall be categorized as a. Low b. Moderate c. High	Descriptive statistics ANOVA test will be applied to test for difference between sex and level of degree of IPC
3. To what extent is the hospital prepared in case of a pandemic?	Percentages (%) and proportions.	Descriptive statistics

	An average relative percentage will finally be calculated. Based on the Ready Score (What is the Ready Score?); The facility will be as prepared will score, they score, they will score.	
4. Is there a correlation between participants' healthcare infrastructure; infection, prevention, and control measures and hospital pandemic preparedness?	Coefficients and p-values	Point-biserial correlation test
5. Which of the independent variables best predict hospital preparedness in case of pandemic?	Coefficients and p-values	Multiple linear regression
6. Does the demographic profile variables moderate the relationship between healthcare infrastructure, in infection, prevention, and control measures and hospital preparedness?	Coefficients and p-values	Run multiple regression model. Check interaction effect. Check for multicollinearity test for all the independent variables.

An average relative percentage for all domains was finally calculated. Based on the Ready Score criteria of preparedness (What is the Ready Score?). For the research question 4, ANOVA test was applied to test for difference between sex and level of degree of IPC. All statistical analysis were performed in Stata version 17.0. A p value < 0.05 was considered statistically significant.

Ethical Consideration

Ensures one respect the rights, dignity, and safety of the research participants and that of report the data, results, methods, and procedures honestly and accurately.

Permission

A letter from AUA IERC was presented to the hospital management (administrator) where for permission conduct final approval came from the National Health Sciences Research Committee (NHSRC) in Malawi before collecting any data.

This was done which governs principles when conducting a research study that involves human subjects

Informed Consent

Before engaging or respondents participants or respondents (HCWs) in the study were explained in detail about what the study intends to achieve. Risk is the potential for harm. The nature of risks and harm varies in daily life. According to the beneficence principle of the Belmont Report. This was study was due to loss of time on the estimated study completion period of two months.

There was no harm or discomfort (physical, mental, social, or emotional) to participants while participating in the study required written forms of their participation in study. The researcher provided participants with as much information as possible during informed consent and debriefing. The aim of signing informed consent forms was to assure participants that their participation in the research was free from it. No financial incentives were given to the participants apart from thanking them for their commitment.

Privacy and Confidentiality

Names of participants or respondents were not recorded; instead, each participant was allocated a unique identification number or code instead of names. The information provided by the participants or respondents was not revealed to other persons not involved in the research. Information recorded on computers was encrypted while the signed informed consent forms will be locked in a file cabinet for archiving.

Data Safety

Data safety encompasses measures and practices to protect research data from accidental loss, corruption, or unauthorized access, ensuring its integrity and availability for ongoing research purposes. Data will be kept in a secure, lockable cabinets and digital data will have a password preferably, encrypted storage.

CHAPTER 4

RESULTS AND DISCUSSION

Reports of study results of the respondents, will be based on the research questions and provide the basis on which the hypothesis was either accepted or rejected and analyzes the research findings.

Study Area

Blantyre city, with population approximately 800,200 residences as of the 2018 census, and the commercial city of Malawi. It has a diverse population and varied socio-cultural background with people from neighboring countries such as Mozambique, Zambia and as far as Zimbabwe and South Africa. The research was conducted at a tertiary hospital in Blantyre city, Southern Malawi.

This hospital is the largest referral hospital among the other four in the country with 1,300 beds. The main teaching facility for the Kamuzu University of Health Sciences (KUHeS). It is considered the most advanced in terms of health service delivery and a center of excellence with an up-to-date emergency care unit but with very little information on the hospital preparedness as stipulated by WHO standards, hence its selection based on convenience.

Response Rate

The target sample for the study was 294 participants, who were all HCWs from the selected tertiary hospital in Blantyre city, Malawi. However, the actual sample size considering only those who participated in the study was 253. Hence, the

response rate for this study was 86.1%. Therefore, the results presented, and the conclusions made from this study were based on the 86.1% % response rate. Low staffing levels in some categories contributed to failure to reach a higher response rate. For instance, 30 ward attendants were targeted but only 13 were available during the data collection period of this study.

Application Of Behavioral Theory to Pandemic and Emergency Hospital Preparedness

The application of behavioral theories plays a critical role in strengthening pandemic and emergency preparedness within healthcare settings. Strong behavioral intentions among healthcare workers (HCWs) are essential for the effective management of pandemic threats and contribute to the reduction of vulnerabilities. Pandemic preparedness encompasses not only logistical and technical components but also requires deliberate behavioral changes by HCWs, particularly in response to health and technological hazards. Behavioral theories provide important insights into the underlying abilities and motivations that influence healthcare workers' actions. These theories help identify critical behavioral gaps that, if addressed, can enhance a health facility's capacity to manage future outbreaks more effectively.

Additionally, behavioral frameworks support the social dimensions of disease prevention and control, offering guidance on how HCWs, patients, and communities interact with public health information and interventions. By informing both the design and implementation of interventions, behavioral theories can foster stronger intentions, which in turn bolster community resilience and enable health facilities to implement timely and effective responses. Ultimately, integrating behavioral theory into preparedness planning helps avert preventable deaths and ensures a more robust, coordinated response during public health emergencies, see Table 4.

Table 4.*The Concept of Intention Strengths*

A.	Strong intentions	Reduction.
		• Management of pandemic diseases includes a behavioral change by HCWs component of
		3. Health hazards
		- Technological hazards
		• Behavior theories are key to gaining a better understanding of certain abilities.
		• Behavior theories assist HCWs to understand critical gaps that need to be improved in order for a health facility to better prepare for any future pandemic.
		• Theories assist in the social aspects of disease
		4. prevention and control.
		• Theories information pandemics HCWs, patients, the general community.
		• Effective hospital preparedness reduces vulnerability, pandemics by HCWs.
B.	Strong intentions have the additional features	Interventions
		• Increases community resilience
		• Health facility to better prepare for any future
		5. pandemic to avert deaths

Note. Source: Field data, 2025

Demographic Characteristics of Participants

This section presents information based on their age, sex, education, occupation, and marital status.

Table 5.*Distribution of Participant's Socio-Demographic Characteristics*

Characteristic	Variable	Frequency n (253)	Percent %
Age	Minimum	22	NA
	Maximum	73	NA
	Median (IQR)	33 (24-61)	NA
Sex	Female	139	54.9
	Male	114	45.1
Education	Certificate	18	7.1
	Degree	192	75.9
	Masters	43	17.0
Occupation	Nurse	99	39.1
	Clinician	89	35.2
	Laboratory	47	18.6
	Administration	5	2.0
	Support	13	5.1
Marital Status	Married	173	68.4
	Single	67	26.5
	Divorced	13	5.1

Note. Source: Field data, 2025

Above participants were 99 (39.1%), followed by clinicians (n=89; 35.2%).

Close to two-thirds of the participants were married. Generally, nurses tend to top the list in many hospital set-ups in providing to patients.

Nurses are vital in hospitals during disease pandemics, serving as the primary caregivers who provide constant, compassionate care, monitor patient conditions, administer medications, and advocate for patients, all while contributing to the overall quality of hospital services. The median was 33 with with interquartile range 24 to 61. The distribution of male and female participants was close to one-half (45.1% v 54.9 %). A majority were married, 173 (68.4%), and based on this finding one would assume that most of these participants had a higher sense of maturity when it came to decision-making. About 192 had their first degree (75.9%). See Table 5.

Research Question One

To what extent is the healthcare infrastructure of the health facility prepared to handle a pandemic in terms of: human resources, infrastructure, equipment, and prevention and control measures.

Availability of Human Resources

Legend: Customer satisfaction is often expressed as $\geq$ and above is categorized as $\geq$ and above is $\geq$ excellent, 41% $\geq$ 79 % good, and 40% and below as unsatisfied. Findings of the participants (HCWs) showed the following outcomes. Based on the analysis, 151 out of 253 (60%) were satisfied. Hence, it fell into the category of ‘good’, when they were asked about the availability of personnel to handle pandemics at the hospital. While 60 of 253 (23.7%) participants were not satisfied, falling into a category of ‘unsatisfied’ while 42 out of 253 participants (16.6%) were slightly satisfied, falling into a category of ‘unsatisfied’. An average relative calculated % determined the Ready Score criteria of preparedness on infrastructure.

The facility was classified as “better prepared” with a score of over 80%, “work to do” with a score between 40% to 80%, and “not ready” with a score $\leq$ 40%. Studies by Hersi et al. (2015) and Najjuka et al. (2022) found that hospitals need to have trained healthcare workers to have the best outcomes. They further went on to point out that healthcare workers who had some form of training in managing patients had a higher level of efficacy.

The hospital was graded in percentages and categorized as ‘not ready’, ‘work to do’ or ‘better pre-pared’ using a perceived customized WHO standard checklist after the analysis of data of independent variables of healthcare infrastructure (physical facilities, hospital equipment, human resource), healthcare workers

perceptions of the health facility in terms of (knowledge on transmission, prevention, and management, guidelines and protocols, monitoring and evaluation) and socio-demographics (age, gender, marital status, education level).

Table 6.

Perceived Grading for Hospital Preparedness

Description of the outcome	Scores in percentage (%)	Interpretation of results
Hospital pandemic preparedness	$\leq 40\%$	“Not ready”
Hospital pandemic preparedness	$\geq 40\%, \leq 80\%$	“Work to do”
Hospital pandemic preparedness	$\geq 80\%$	“Better prepared”
Outcome of the hospital preparedness	$\geq 40\%, \leq 80\%$	“Work to do” (In terms of knowledge)

Note. Source: Field data, 2025

Availability of Physical Facilities

A total of 167 out of 253 (66.0%) participants were very satisfied, falling into a category of $60 \geq 80\%$ good on opinion for the availability of the current healthcare infrastructure ‘unsatisfied to handle the next pandemic. About 49 out of 253 (19.3%) were dissatisfied, representing $\leq 40\%$, and 37 out of 253 (14.6%) dissatisfied ($\leq 40.0\%$).

Physical facilities healthcare systems are vulnerable to collapse during disease pandemics. Shokoohi et al. (2020) established that infrastructure ought to integrate with hospitals and must be efficient. Pasquariello and Stranges (2020) found that poor health infrastructure, untimely response, inadequate hospital systems, overburdened hospitals and poor approaches lead to cumulative deaths of patients during health pandemics.

Availability of Equipment

A total of 118 out of 253 (56.7%) participants were in agreement that the hospital had enough equipment to use during the next pandemic. According to the WHO (2021b) on Ready Score measure, this was an ‘unsatisfactory’ score which was below 60.0 % to 80.0%. It was also shown that 79 out of 253 (31.2%) remained neutral on whether the hospital had enough equipment or not.

Finally, 56 out of 253 (22.1%) stated that the hospital did not have equipment to handle the next pandemic. To underscore the importance of hospital equipment, Sandholz and Wannewitz (2018) indicated that hospitals and other healthcare facilities depend critically on managing and safeguarding patients’ lives on hospital equipment. Badnjevic et al. (2023) also highlighted that hospital machines are substantially important. Kutor et al. (2017) observed that effective equipment is paramount.

Research Questions Two

Extent perceptions of the health facility in terms of:

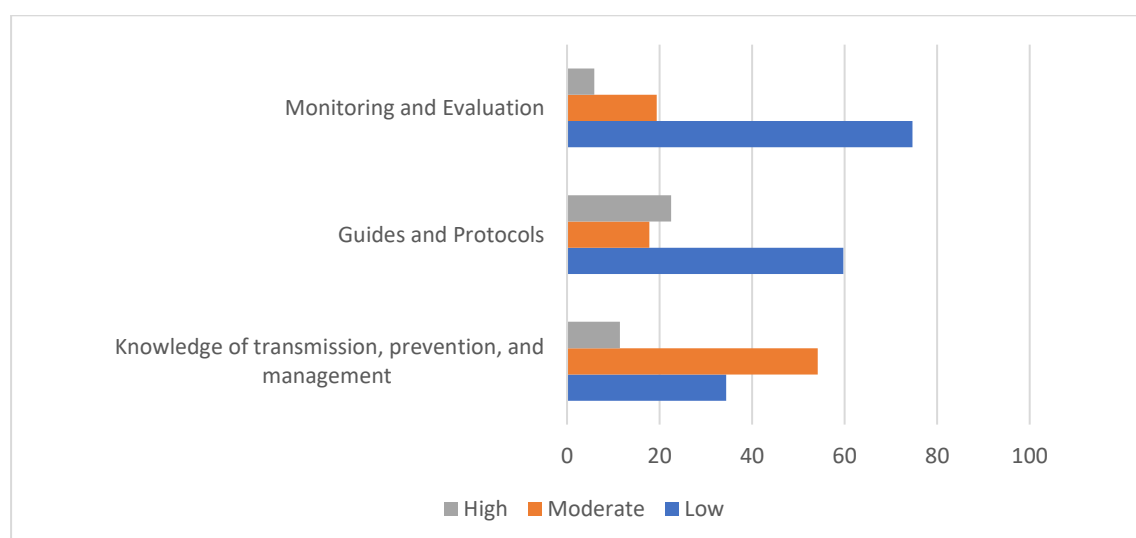
1. Knowledge of transmission, prevention, and management
2. Guidelines and protocols
3. Monitoring and Evaluation

This is the scale for participants’ knowledge measures. Below presents descriptive statistics on the bar graph about measures among study. Because of disease pandemics, participants demonstrated moderate levels of awareness across the different categories in knowledge of transmission, prevention and management of infections/pandemics. Most participants fell between 50% and 75% based on the scale of low, moderate and high measurements.

The mean scores ranged from 30.0%. However, a small group represented by 15% of participants showed a high. In contrast, 60% were rated as having guidelines, protocols role in disease pandemics, while 25.0% of participants had the knowledge. Similarly, 75.0% of participants registered very low on knowledge of monitoring and evaluation relative to. Findings are evident that the disease pandemics remains a gap among professionals. This should be a concern to policymakers on the HCW's knowledge gap.

Figure 2.

Extent of IPC Measures (Low $\leq 50\%$, Moderate $\leq 50\%$, $\geq 75\%$, and High 75%)



The above, South Wollo Zone in Ethiopia in 2021 found that most facilities out of 46 where the assessment on health facility pandemic preparedness was conducted fell in the 40-79% group criteria fell in the “work to do” (Ayele et al., 2021). Similarly, Sonenthal et al. (2020) found that pandemic preparedness at department fell in class ‘work to do’ group.

Studies by Gasmelseid (2014), Charan and Biswas (2013) all agree on the fact that sound knowledge, and the use of the right tools or equipment and adoption, ease

the management of epidemics. Wachira and Mwai (2021) stated that regularly monitoring hospital for improvement. Al-Shaikh et al. (2017) stated that knowledge helps in health promotion and disease prevention and the use of digital technology provides support, delivers, and tracks the spread of viruses during pandemics. The WHO, (2021b) advocates to contact HCWs of affected areas to non-affected areas.

Research Question Three

To what extent is the hospital prepared in case of a pandemic? Based on these results, on the question about the hospital's preparedness for disease pandemics, 61.3% of the participants felt the hospital was well-prepared. Refer to figure 3. There is a need for a deliberate effort aimed at sensitizing HCWs, represented by 22.1% who have no idea and 16.6% with no answer at all whether the hospital is ready or not.

A stronger collaboration between hospital management and staff is needed for the facility to be prepared. Following a WHO (2021b) definition for the ready score to pandemics classified as "work to do", for a score ranging between 40% and 80%, the results imply that the hospital has "work to do" since the score fell below the stated grade.

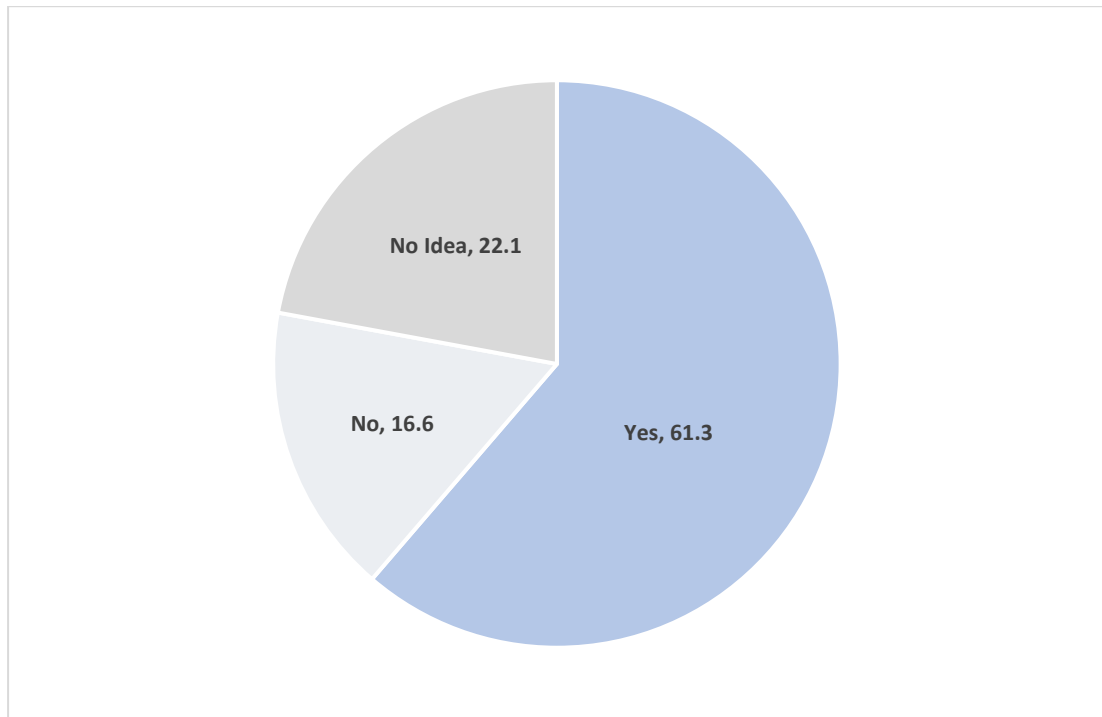
These findings are in line with what was stated in Niohuru (2023) that significant gaps exist in all countries in the world, and this makes preparedness fundamentally weak worldwide. Also, Koka et al. (2018) found that hospital disaster preparedness is still in its early stages in many other African countries.

Pasquariello and Stranges (2020) found that a majority of western countries were not as timely in their responses, and lacked pandemic preparedness, which led them to fail in successfully strengthening of early responses in spite of implementing public health measures. S. Park et al. (2020) stated that besides the rapid response,

implementation of multiple strategies, advanced diagnostic capacities, and screening programs remain key to controlling pandemics.

Figure 3.

Extent of Preparedness for Pandemics and Emergencies



Research Question Four

Which of the independent variables best predict hospital preparedness in case of the pandemic?

Table 7.*Regression Analysis on Predictors of Hospital Preparedness in Times of Pandemic*

No of obs	MSE	R-squared	Adj R-squared		
253	.748996	0.2687	0.0352		
Source	Partial SS	dF	MS	F	P-value
Model	39.379616	61	.64556747	1.15	0.2366
Age	12.051665	36	.33476848	0.6	0.9663
Sex	6808809	1	.6808809	1.21	0.2720
Occupation	.7930824	4	.1982706	0.35	0.8414
Education	1.0766339	2	.53831696	0.96	0.3849
Marital status	1.2706092	2	.63530461	1.13	0.3244
Human resource	.36906199	3	.12302066	0.22	0.8829
Infrastructure	3.1245268	3	1.0415089	1.86	0.1384
Equipment	6.4708095	4	1.6177024	2.88	0.0238
Infection prevention	2.619564	2	1.309782	2.33	0.0996
Guides and protocols	.31085131	2	.15542565	0.28	0.7583
Monitoring and evaluation	5.254915	2	2.6274575	4.68	0.0103
Residual	107.15003	191.56	.56099491		
Total	146.52964	252.58	.58146684		

The findings from this regression analysis highlight the critical role of hospitals. Equipment in disease pandemic preparedness. Availability of hospital equipment ($p=0.0238$) and monitoring and evaluation ($p=0.0103$) best predict hospital preparedness as evidenced by their p-values being less than the 0.05 threshold.

Similarly, the availability of essential hospital equipment such as diagnostic equipment, treatment equipment, monitoring equipment, assistive equipment, surgical instruments, rehabilitation equipment, and personal protective equipment (PPE) can enable hospitals to minimize their risk of disease transmission and deaths during pandemics.

Furthermore, understanding the crucial role of hospital equipment during pandemics in modern healthcare, which enables accurate diagnosis, effective treatment, and vital patient monitoring, is key to effectively supporting life and

consequently contributing to improved overall community health and well-being. See Table 5.

These findings align with those of a study by Tessema et al. (2021) which found that there was an association between sound decision-making and quality data reports during hospital pandemic preparedness. Notably, the quality of reports is informed by a robust monitoring and evaluation system.

Research Question Five

Do the demographic profile variables moderate the relationship between healthcare infrastructure, infection, prevention, and control measures and hospital preparedness?

Table 8.*Assessing Moderation between Demographic Factors and Healthcare Infrastructure*

No of					
253	.742193	0.1993	0.0527		
Source	Partial Sum of squares	df	MS	F	P-value
Model	29.19867	39	.74868325	1.36	0.0896
CI	.6711463	3	.22371543	0.41	0.7487
Sex	.71810129	1	.71810129	1.30	0.2548
Occupation	4.0323227	4	1.0080807	1.83	0.1242
Education	.69749527	2	.34874763	0.63	0.5319
Marital status	1.182027	2	.59101349	1.07	0.3439
Age	.21158881	1	.21158881	0.38	0.5361
ipc_categ~s#age	1.1259803	3	.37532677	0.68	0.5643
ipc_categ~s#sex	1.4486019	3	.4828673	0.88	0.4540
ipc_categ~s#occupy2	5.492774	10	.54927774	1.00	0.4470
ipc_categ~s#education	4.0867903	6	.68113171	1.24	0.2888
ipc_categ~s m_status	2.0936101	4	.52340251	0.95	0.4359
Residual	117.331	213	.55084975		
Total	146.5296	252	.58146684		

It was revealed that there was no moderation between the demographic factors and infrastructure as hospital preparedness. This was evidenced by the p-values being greater than the threshold of 0.05. See Table 8. Well-prepared healthcare facilities

Table 9.*Assessing Moderation between Demographic Factors, and Prevention and Control**Measures*

No of obs		Root MSE			
253		0.762263			
Source	Partial Sum of squares	dF	MS	F	P-value
Model	17.537585	30	.58458618	1.01	0.4633
Ipс_сateg~s	.85714409	2	.42857204	0.74	0.47994
Age	.25682629	1	.25682629	0.44	0.5068
Sex	1.0065924	1	1.0065924	1.72	0.1895
Occupation	2.7576942	4	.68942354	0.07	0.3176
Education	.07781405	2	.03890703	0.07	0.9353
Marital status	2.7556359	2	1.377818	2.37	0.0957
Age	.25682629	1	.25682629	0.44	0.5068
ipc_сateg~age	.50838946	2	.25419473	0.44	0.6462
ipc_сateg~s#sex	.84727354	2	.42363677	0.72	0.4835
ipc_сateg~s#occupy2	6.1854323	7	.88363319	1.52	0.1613
ipc_сateg~s#education	3.0535051	4	.76337626	1.31	0.2657
ipc_сateg~s m_status	1.1954058	3	.39846858	0.69	0.5616
Residual	128.99206				
222	.58104531				
Total	146.52964	252	.58146684		

The findings displayed in Table 9 show no terms of moderation. Thamer (2022) found that interaction infection. Calvignac-Spencer et al. (2012) reported that there is a significant correlation that exists socio-demographics behaviour of HCWs focusing on IPC.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Study was conducted, Queen Elizabeth Central Hospital, which is a referral hospital, as well as the teaching hospital for Kamuzu University of Health Sciences (KUHeS). During the Covid-19 pandemic, the hospital experienced inefficiencies which led to the infection of 330 healthcare workers, of which 25% and 24% were nurses and support staff respectively, during the pandemic (Hivos, 2021; UN Malawi, 2020).

The infections heightened potential inefficiencies in pandemic preparedness as stipulated in the WHO standards for the hospital's next and/or subsequent pandemics. Stratified probability was used to draw its sample. Recruitment of participants was based on the definition. Data collection instruments then validity and of tools were ascertained. Informed consents were collected before conducting the study. Stata counts , proportions and statistical tests for association, while descriptive analysis were conducted as well.

The 60% was satisfied with availability of human resource, 66% satisfied with availability infrastructure, and 57% satisfied with the available equipment. Overall, the hospital was at a moderate level in terms of infection prevention knowledge, availability of guidelines and protocols, and availability of a monitoring and evaluation system. In terms of preparedness, the hospital was at “work to do” level. The best predictors of preparedness were hospital equipment, and the availability of a

monitoring and evaluation system. There was no interaction and multicollinearity among the best predictors of preparedness.

Conclusions

The hospital is classified as “work to do” and the areas with the lowest score point to the areas where the hospital needs to pull up. Hospital infrastructure and the availability of a monitoring and evaluation system are associated with hospital preparedness as per the present assessment findings.

Recommendations

The following recommendations were made based on the findings:

Human Resources

1. To lobby the other deployment of more staff at the hospital so that the availability of human resources increases from around 60% to 80%.
2. Hospital management needs to find means and ways of motivating available staff to avoid attrition.

Hospital Infrastructure

1. Hospital management needs to have a strategic plan that would guide the development of infrastructure at the hospital.
2. Staff and hospital management need to maintain the infrastructure in working order so that in times of pandemic the infrastructure serves the purpose.

Hospital Equipment

1. Hospital management needs to have a resource mobilization to enable the purchase of required hospital equipment.
2. There is a need to have a service plan so that available equipment is repaired on time.

Knowledge of Transmission, Prevention and Control Measures

1. There is a need to have established ways of ensuring continuous professional development, and guidelines, protocols.
2. There is a need to introduce rewards for individual staff or departments who are doing well in transmission, prevention and control measures.

Guidelines and Protocol

1. To guide sourcing of the current versions of guidelines and protocols as well as train staff on the same
2. Each department at the hospital must have a schedule for conducting refresher courses so that staff are always up-to-date.
3. Where possible, the guidelines and protocols must be pasted on the walls for ease of reference/access.

Monitoring and Evaluation

There is a need to establish a robust monitoring and evaluation system to go with the knowledge on infection utilization and protocols.

Hospital Preparedness

1. There is a need for a continued flow of ideas through scheduled focus group discussions, brainstorming sessions and suggestion boxes. The ideas will help in soliciting ideas about what staff think would help the hospital to not just prepare but also improve hospital preparedness for pandemics once the solicited ideas become operationalized.
2. There is a need to institute a team to brainstorm and come up with a strategy that would enable the hospital to move the ‘work to do’ level to the “best prepared” level over a defined period.

Suggestions for Further Research

1. Extend this study to include the qualitative aspects focus with staff, patients order, get a deeper understanding of the issues that informed the findings in this study and draw recommendations on what exactly needs to be done.
2. Comparison of impact of healthcare infrastructure and knowledge on pandemic preparedness for HIV, and Flu with that of Coronavirus.

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APPENDICES

APPENDIX A

STUDY QUESTIONNAIRE

A: Observation checklist: English Version

Demographics

Age : _____years

Race

Status at hospital Administration Technical Tick the correct

Gender/Sex: Male Female Administrator

Occupation : Nurse Clinician Laboratory

Education level: Certificate Degree Masters

Marital status: Married Single Divorced

Residence : Rural Urban Race

Demography

Grade: Agree strongly = 3, Agree = 2, Can't say = 1, Disagree = 0

Do the demographic profile variables moderate the relationship between healthcare infrastructure, infection, prevention, and control measures and hospital preparedness?

Agree Strongly

Agree

Can't say

Disagree

How much do you agree with the following statements?

Is demographic profile necessary in hospital pandemic preparedness?

Agree Strongly

Agree

Can't say

Disagree

Grade: Very Important =4, Important =3, Slightly Important =2, Not Important =1

Importance of helpline/authority/hospital to contact patients in their homes during pandemic diseases important?

Very Important

Important

Slightly Important

Not Important

Grade: >65 = 4, 35 to 64 = 3, 18 to 35 = 2, <18 = 1, don't know = 0

Which of the following age group best describes better preparedness during pandemic preparedness?

>65

35 to 64

18 to 35

<18

Don't know

Grade: Rich = 4, Average income =3, Rich & poor = 2, Poor = 1

Which of the following level of income were significantly affected by pandemic preparedness on health related issues?

Rich

Average income

Rich & Poor were the same

Poor

Healthcare Infrastructure

Physical facilities

Key: Very satisfied-4, Reasonably satisfied-3, Slightly dissatisfied-2, Very dissatisfied-1

Are you satisfied with the current healthcare infrastructure to handle the next pandemic?

Very satisfied

Reasonably satisfied

Slightly dissatisfied

Very dissatisfied

How satisfied are you with the availability of incineration for Biohazards?

Very satisfied

Reasonably satisfied

Slightly dissatisfied

Very dissatisfied

Are you satisfied with the type of emergency infrastructure at the hospital, such as (Ambulance services, Emergency shelters, Wards)?

Very satisfied

Reasonably satisfied

Slightly dissatisfied

Very dissatisfied

Grade: Great extent-3, Somewhat-2, Very little-1, Not at all-0

Is there a correlation between respondents' healthcare infrastructure; and hospital pandemic preparedness?

Great Extent

Somewhat

Very Little

Not at All

Did the hospital ever assess the function of infrastructure including equipment before pandemic?

Great Extent

Somewhat

Very Little

Not at All

Very Poor

Hospital Equipment

Grade: Strongly agree = 3, Strongly disagree = 2, Disagree = 1, Can't say = 0

Level of agreement to the availability of hospital equipment during pandemics?

Strongly agree

Strongly disagree

Can't say

Agree Strongly

Grade: Excellent = 4, Average = 3, Below average = 2, Very poor = 1

Quality of the supplies in stock: Face masks/goggle, Gowns, Soap, Hand rub, Disinfectant

Excellent

Average

Below Average

Very Poor

Grade: Yes = 2, Don't know = 1, No = 0

Do you anticipate that the hospital will continue to need PPEs after the coronavirus pandemic has concluded?

Yes

Don't know

No

Grade: Agree = 4, Rather agree = 3, Disagree = 2, Can't tell = 1

How much do you agree with the following statements? Select one answer in each row

Hospital facility uses state-of-the-art medical equipment.

Agree

Rather agree

Disagree

Can't tell

What is your overall satisfaction with medical equipment such as Oxygen cylinders, Intubation, Resuscitators during pandemic? (1 star = minimum satisfaction / 5 stars = maximum satisfaction)

(2) (3) (4) (5)

Human resource

Grade: Extremely satisfied = 3, Very satisfied = 2, Slightly dissatisfied = 1, Not satisfied at all = 0

Are you satisfied with hospital management to handle a pandemics in terms of the level

of the quality and quantity of personnel at the hospital?

Extremely satisfied

Very satisfied

Slightly dissatisfied

Not satisfied at all

2. Level of satisfaction for the performance satisfaction at the hospital

Extremely satisfied

Very satisfied

Slightly dissatisfied

Not satisfied at all

3. Does the disaster response plan outline who, what, where, when and how satisfactory?

Extremely satisfied

Very satisfied

Slightly dissatisfied

Not satisfied at all

Grade: Great extent = 4, Somewhat = 3, Very little = 2, Not at all = 0

4. To what degree are the HCWs (staff) trained for the pandemic?

Great extent

Somewhat

Very little

Not at all

Grade: Great extent = 4, Somewhat = 3, Very little = 2, Not at all = 0

5. Level of numbers of essential HCWs during pandemic at the hospital?

Great extent

Somewhat

Very little

Not at all

Infection prevention and Control Measures

Knowledge on transmission, prevention, and management

Transmission

Grade: Absolutely essential =3, Little importance =2, Average important =1, Not Important =0

Importance of the knowledge on disease transmission, prevention and control measures.

Absolutely essential

Little importance

Average importance

Not Important

Prevention

Grade: Absolutely essential=3, Little importance=2, Average important=1, Not Important =0

Is regularly washing of hands enough to protect me?

Not Important

Little importance

Average importance

Absolutely essential

Grade: Excellent=4, Average=3, Below average=2, Very poor=1

Quality of disease prevention and control measures at hospital during pandemics.

Excellent

Average

Below Average

Very Poor

Management

Grade: Always = 3, Intermittently = 2, Rarely = 1, Never = 0

Are masks and disposable towels available at all sinks?

Always

Intermittently

Rarely

Never

Are infection and prevention measures e.g. protocols available at the emergency?

Always

Intermittently

Rarely

Never

Guidelines and Protocols

Grade: Excellent =3, Somewhat =2, Poor =1

Relevance during pandemic of guidelines and protocols at the hospital

Excellent

Somewhat

Poor

Grade: Always = 3, Rarely = 2, Not applicable = 1, Never = 0

Does every HCW has easy access to guidelines and protocols during pandemic?

Always

Rarely

Not applicable

Never

Are handrub dispensers replaced when empty per guidelines and protocols?

Always

Rarely

Not applicable

Never

Are examination gloves available in all designated areas per guidelines and protocols?

Always

Rarely

Not applicable

Never

Are standard operating procedures for safe handling of suspected patients during pandemic observed all the time?

Always

Rarely

Not applicable

Never

Monitoring and Evaluation

Grade: High =4, Moderate =3, Low =2, None =0

Is Monitoring and Evaluation of great value at the hospital?

High

Moderate

Low

None

Grade: Once per week = 3, Less frequently = 2, Not sure = 1, Not done =0

How often are audits on hand hygiene compliance performed at the hospital?

Once per week

Less frequently

Not sure

Not done

How often are protocols being constantly monitored to track essential service provision during pandemics?

Once per week

Less frequently

Not sure

Not done

Hospital Preparedness

Grade: Great extent-4, Somewhat-3, Very little-2, Not at all-0

What is the likelihood of the hospital preparedness in case of a new pandemic?

Great extent

Somewhat

Very little

Not at all

Grade: Well prepared =3, Somewhat =2, Neutral = 1, Not prepared = 0

How well do you believe your hospital health management is prepared for pandemics?

Well prepared

Somewhat

Neutral

Not prepared

On a scale of 1 to 5, how safe do you feel working at the hospital during pandemics?

(2) (3) (4) (5)

APPENDIX B

CONSENT FORMS

Informed Consent Form English Version
IMPACT OF HEALTHCARE INFRASTRUCTURE AND KNOWLEDGE ON
PANDEMIC PREPAREDNESS AT A TERTIARY HOSPITAL IN SOUTHERN
MALAWI

Principal Investigator: Mrs Rose Bubily Kamanga Manda.

What you should know about this research?

You will be asked to participate in the research undertaken, assess the hospital preparedness to pandemic. You are also informed that your participation in the study is voluntary and encouraged to accept to participate or not. Investigator is Mrs Rose Bubily Kamanga Manda, a research nurse/midwife working at Johns Hopkins Research Project. Before making a decision to take part,

I would like you to have information on the purpose of this study, potential risks and benefits of you participating in this study and expectation from you as a participant.

You are encouraged to ask questions on the information provided. Upon understanding the information provided you will then be asked whether to take part or not. In the case that you have decided to participate, you will be given two copies of consent forms to sign. One copy will be given to you and another will be kept by the researcher.

Purpose of the study

The main objective of the study is to examine preparedness and response to the pandemic at one of the tertiary hospitals in Malawi.

Study procedures

In the first place the researcher is going to ask you to give your permission to participate in the study by signing the consent form. If you agree to take part in this study, you will give information through answering questions from a questionnaire that will be provided. All this will take approximately 20 minutes.

Risks and discomforts

Participating in this study has no risks and you are free to withdraw at any time with no consequences.

Potential benefits

There may be no direct benefit to you from this study, but the information that will be collected from this study will help the management team at Q.E.C.H and the entire Malawi health system to understand preparedness and response to pandemics at the tertiary hospitals in Malawi that will then guide in developing strategies on how to strengthen the health system.

Reasons why you may be withdrawn from the study without your consent

There are two things which can halt your participation in this study. These are; the study has been stopped by the Institutional Review Board of Adventist University of Africa (AUA) and in the situation that the study is harmful to you.

Costs and compensation

There will be no cost for your participation in the study.

Confidentiality

Information you will provide will be kept in a password protected computer with password known to the Principal Investigator only. We would like to assure you that the information you will give will remain confidential and your name will not be mentioned when disseminating the results.

Problems or questions

If you have any questions regarding this study, please contact:

The Principal Investigator, Rose Bubily Kamanga Manda. on 0888331248

In case of concerns or questions about your rights as a study participant, contact:

The Chairperson, the Institutional Review Board of Adventist University of Africa on 0888118993

Signature page

If you have read the informed consent, or have had it read and explained to you, and understand the information, and you voluntarily agree to join the study, please sign your name or put your mark below.

Participant Name (print)

Participant Signature/thumb print Date

Researcher Name (print) Researcher Signature Date

APPENDIX C

CORRESPONDENCE



Adventist University of Africa
Developing Leaders for Service
A Private Christian University Accredited by the Commission for Higher Education, Kenya



8th August, 2024

Rose Bubily Kamanga Manda
School of Postgraduate Studies
Adventist University of Africa, Kenya

Reference: **AUA/ISERC/16/05/2024.**

Dear Rose,

RE: Impact of Healthcare Infrastructure and Knowledge on Pandemic Preparedness At A Tertiary Hospital In Southern Malawi

This is to inform you that the Adventist University of Africa Institutional Scientific Ethics Review Committee (AUA-ISERC) has reviewed and approved your above research proposal. Your application approval number is AUA/ISERC/2024/030. The approval period is 8th August 2024 – 7th August 2025.

This approval is subject to compliance with the following requirements;

- i. Only approved documents (including informed consent and study instruments) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by AUA-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 AUA-ISERC within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others, or affect the integrity of the research must be reported to AUA-ISERC within 72 hours.
- v. 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.
- vi. Submission of an executive summary report within 90 days upon completion of the study to AUA-ISERC.

Prior to commencing your study, you are expected to obtain permissions or any other clearances needed.

Yours Sincerely

Josephine Ganu, Ph.D.
Chair, Institutional Scientific Ethics Review C'ttee
ethics@aua.ac.ke



Physical Address: Advent Hill, Magadi Road, Ongata Rongai, Kajiado, Kenya | Tel: +254 730 733400
Postal Address: Private Bag, Mbagathi, 00503 Nairobi, Kenya | Email: info@aua.ac.ke | Web: www.aua.ac.ke

APPENDIX D

ETHICAL APPROVAL

Certificate of Ethics Approval

	
CERTIFICATE OF ETHICS APPROVAL	
This is to certify that the National Health Science Research Committee has reviewed and approved the study titled:	
Study Title: Protocol #24/114551: Assessing the State of Hospital Pandemic Preparedness at Queen Elizabeth Central Hospital (QECH)	
Investigator: Rose B.K. Manda	
Start Date 17/03/2025	End Date: 18/03/2026
Date of issue: 17/03/2025	
Dr. Marias Joshua Chairperson-NHSRC	Mrs. Chikondi Chimbatale NHSRC -Administrator
	
	

Appendix 5. Ref/QF/Research/11/09/2024-0291

Telephone: (265)874 333/877 333 Facsimile: (265)874 603 Email: queenshospital@malawi.net All Communications should be addressed to: The Hospital Director		In reply please quote No. QUEEN ELIZABETH CENTRAL HOSPITAL MINISTRY OF HEALTH P. O. BOX 95 BLANTYRE MALAWI
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Ref/QF/Research/11/09/2024 – 0291	11 September, 2024
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The Chairperson
College of Medicine Research and Ethics Committee
College of Medicine
Private Bag 360
Chichiri
Blantyre 3

Dear Sir/ Madam

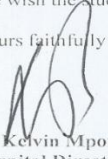
**IMPACT OF HEALTHCARE INFRASTRUCTURE AND KNOWLEDGE ON PANDEMIC
PREPAREDNESS AT A TERTIARY HOSPITAL IN SOUTHERN MALAWI**

I write to support the conduct of the above research activity in this hospital by Ms Rose Bubily Kamanga and her study team. The study will assess the impact of healthcare infrastructure and knowledge on pandemic preparedness at Queen Elizabeth Central Hospital.

We request that the findings of the study be made available to our Hospital Research Committee and the relevant department in this hospital.

We wish the study team success.

Yours faithfully


Dr Kelvin Mponda
Hospital Director

The Hospital Director
Queen Elizabeth Central Hospital

11 SEP 2024

P.O. BOX 95
Blantyre

VITA

Rose Bubily Manda +265 888 331 248 /999 147 417 rosebubily@gmail.com	
Current Position: Research Nurse Former - Johns Hopkins Research Project/KUHEs Clinical research management in nursing operations. Excellent leadership skills and knowledge in clinical research activities and strategic planning. Good personal relationship. 30 years of work experience. Analytical mind.	
	
Experience	
2016 - Present	Research Nurse - Officer Johns Hopkins University/KUHEs Project, Blantyre International Maternal Pediatric Adolescent AIDS Clinical Trials Network (IMPAACT-2008) Study ▪ Clients' recruitment into study and follow up ▪ VRCO1 Administration ▪ Conducting QC, Data entry and tracing ▪ Report writing ▪ Good Clinical Practices at the clinic to achieve excellence ▪ Trainer of Trainer on study protocol
Sept 2015 -	Co-Principal Investigator/Research Nurse Queen Elizabeth Hospital: KUHEs Blantyre ▪ Provide quality general nursing care to babies born with Sickle Cell. ▪ Create traceable maps to family ▪ Patient follow up in wards/communities and counselling
Feb - Mar 2015	Public Health Management - Intern Queen Elizabeth Hospital, Blantyre ▪ Worked with stakeholders towards improvement in the sexual and reproductive health ▪ Public health of Information Education and Communication (IEC) on reproductive health
Jan - 1995	Lead Nurse/Clinic Manager Positions Johns Hopkins University/KUHEs Project, Blantyre ▪ Maintenance of clinical records for HIV patients as defined by the study protocol
Nov 2012	▪ Training and mentorship of junior staff on ART protocols and Ethics ▪ Drug administration as per protocol to mothers and infants e.g. Nevirapine and Zidovudine ▪ Report writing, presentation in management meetings as well as at clinic level
Education	
2020 > Present	Pursuing a MPH Adventist University of Africa
2013 > 2015	Bachelor's Degree in Public Health University of Livingstonia
1992 > 1994:	Nursing and Midwifery Certificate Malamulo College of Health Sciences
1987 > 1991:	Malawi School Certificate of Education Phwezi Girls Secondary School
Additional Skills ▪ Trained in Customer care and ART protocols ▪ Trained in Antiretroviral therapy management and Screening of Cervical Cancer ▪ Trained in HIV and AIDS voluntary counseling and testing orientation (Adult & Infants) ▪ Trained in Good Clinical Practice on youth friendly services and community health ▪ Trained in Integrated Management of Childhood illness (PMTCT of HIV) ▪ Leadership Management of Health Management Systems ▪ GCP-HSP Recertification - English - 2024	
Hobbies • Travelling • Reading Books	