PREDICTORS OF COVID-19 PREVENTION PRACTICES AMONG HEALTHCARE PROVIDERS AT BUSIA COUNTY REFERRAL HOSPITAL-KENYA

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A Thesis submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Advanced Nursing Practice (Community Health and Primary Health Care) of Masinde Muliro University of Science and Technology

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DECLARATION

This thesis was written entirely by myself, without the assistance of any other sources, and it hasn't been submitted anywhere else for consideration for a degree or other honor.

Signature…… Date……..

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HNR/G/11/2016

CERTIFICATION

The undersigned certify that they have read and hereby recommended for acceptance of Masinde Muliro University of Science and Technology a thesis entitled **"Knowledge, Awareness and Prevention Practices among Health Care Providers towards COVID-19 pandemic at Busia County Referral Hospital, Kenya".**

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DEDICATION

I dedicate the work to Division of patient and Health worker safety at the Ministry of Health, Department of Health and Sanitation, Busia County, My family members (Millicent Nakhumwa, Virginia Abirwa, Valerius Egesa, and Verian Lusike), colleagues and infection prevention and control fraternity for their moral support throughout the adventure.

ABSTRACT

SARS-COV-2 is a subgenus of the Sarbecovirus, a member of the Coronaviridae family, and an enveloped RNA virus. November 2019 saw the discovery of the first COVID-19 human case in China's Wuhan live market. The earliest transmission occurred between people and animals, and then it occurred inside the human race. As of June 11, 2021, Busia County had a total of 3,982 infected people, of whom 157 were healthcare professionals from all cadres. Of them, 2 healthcare professionals died from COVID-19, representing a positive rate of 3.9%. Thirty percent of all healthcare professional infections in the county, which consists of seven sub-counties, were related to Busia County Referral Hospital. The primary goal was to evaluate the knowledge, awareness, and practices of medical professionals on the COVID-19 pandemic at Kenya's Busia County Referral Hospital. Descriptive cross-sectional research design was used in the investigation. The County Referral Hospital provided both quantitative and qualitative data for the collection. It was determined that a sample size of 153 would provide data from the various stratified cadres. The World Health Organization's Risk Assessment and Management Questionnaire Regarding Exposure of Healthcare Workers to COVID-19 and the Center for Disease Control and Prevention's Facility Readiness Assessment for Coronavirus Disease 2019 Questionnaire were the sources from which the data collection tools were adapted to create a structured questionnaire and a key informant guide for managers of each relevant key cadre. The statistical software for social sciences (SPSS) version 21 was used to clean, code, sort, and analyze the acquired quantitative and qualitative data. Frequencies, pie charts, graphs, proportions, and tables were used to display the data. The bivariate and multivariate analyses were used to evaluate the relationships between the variables. When the p-value is less than 0.05 ($p<0.05$) and the confidence interval is 95% (CI 95%), the correlation is deemed significant. The research found that shorter training sessions (one to two days) and shorter employment durations (one to three years) were associated with statistically significant increases in the likelihood of reporting proper COVID-19 management practices ($p = 0.03$) and 2.1, respectively. Additionally, there was a statistically significant correlation between the awareness of the five moments of hand hygiene ($p=0.007$) and audit ($p=0.004$) in reporting appropriate pandemic management practices. Furthermore, in order to support appropriate COVID-19 management practices, the presence of gloves, face masks, thermoguns, screening checklists, and designated focal persons at triage was associated with greater chances >2.5 with $p>0.05$. Respondents who said that an infection prevention and control committee existed had 5.2 chances ($p=0.03$) of following the right procedures while managing pandemics. The study suggested consistent evidence-based education and training, sufficient supplies in accordance with the produced list of necessities, modification and distribution of policy documents, and, lastly, research on the effects of COVID-19 mitigation techniques.

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LIST OF ABBREVIATIONS AND ACRONYMS

CHV	-	Community Health Worker
COVID-19	-	Coronona virus 2019
EOC	-	Emergency Operation Centre
FBOs	-	Faith Based Organizations
HCPs	-	Healthcare providers
GoK	-	Government of Kenya
HAIs	-	Healthcare Associated Infections
HPTs	-	Health Products and Technologies
IPC	-	Infection Prevention and Control
ISO	-	International Organization for Standardization
KHIS	-	Kenya Health Information System
MoH	-	Ministry of Health
PHIs	-	Primary Health Institutions
PPE	-	Personal Protective equipment
SARS-Cov-2	-	Severe Acute Respiratory Syndrome Coronavirus 2
WHO	-	World Health Organization

OPERATIONALIZATION OF KEY TERMS

Competencies:	Having relevant knowledge and skills to offer service required in management of COVID-19.
Management:	Incorporate surveillance, prevention, control, referral, containment Measures and care for COVID-19 suspected probable or confirmed patients.
Healthcare Provider:	A worker who is directly involved in prevention, treatment with COVID-19 suspected or confirmed cases through screening, testing, nursing, specimen collection and pathologic examination.
Health Products and Technologies:	Supplies like PPEs, waste management, screening tools, Oxygen, pharmaceuticals and medical Supplies.
Mitigation strategies:	Structures put in place to facilitate containing the COVID-19 virus Like IPC and emergency Committees, availability of supplies, Communication channels, hand hygiene program, screening tools
Prevention practices:	Incorporate healthcare providers using PPEs, early detection through screening for COVID-19, and hand hygiene as well as action taken by HCPs in reducing the severity or seriousness of Covid-19 infection in the referral hospital as reported by respondents

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter involve the introduction to the study giving background information of SAR-CoV-2 infections, the magnitude of the infection in problem of statement, justification for the study in Busia County Referral Hospital, objectives and research questions to guide the study, hypothesis to be tested, assumptions of the study and the conceptual framework.

1.2 Background of the study

Leading the charge in combating the coronavirus disease (COVID-19) epidemic are health care professionals. As a result, it is believed that their knowledge, attitude, and practice (KAP) on the 2019 COVID-19 virus, which is caused by the SARS-COV-2 virus, are essential to the effectiveness of the ongoing COVID-19 response activities (Kanu, 2021; Yuen, 2020).

SARS-COV-2 is a member of the subgenus of Sarbecovirus of the Coronaviridae family, which is a vast family of enveloped RNA viruses. Severe Acute Respiratory Coronavirus 2 (SARSCov2) is a zoonotic viral illness that was first identified on December 29, 2019, at the Huanan seafood and livestock market in Wuhan, Hubei province, China (Habibzadeh, 2020). It is the source of COVID-19 infection, which was first spread to humans either directly by contaminated droplets or through an intermediate host, most likely bats or pangolins. The World Health Organization estimates that the incubation time is between one and fourteen days, with an average of five days. According to M.O.H. (2020), the illness was spread during the incubation phase.

November 2019 saw the discovery of the first COVID-19 case in a person at a major live animal market in Wuhan, China (WHO, 2020). All occurrences that followed the first animal-to-human transfer were human-to-human (Hope, 2020). On December 31, 2019, a report on the case was made after the identification of patient zero in Wuhan in November of 2019. The illness quickly spread across China and other nations worldwide. It was deemed a Public Health Emergency of International Concern by the World Health Organization by January 30, 2020 (Tripathi, 2020). There was little information available regarding COVID-19, thus it was essential that healthcare professionals (HCPs) have a sufficient understanding of the virus's preventive strategies and method of transmission in order to adopt suitable practices and have a constructive attitude toward lowering the risk of infection (Polychronis, 2020). Within a short period of time, the virus was recognized as a public health risk by WHO. It spreads by droplet infection in those who are exposed and do not follow conventional and transmission-based measures (WHO, 2020a). The spread of COVID-19 was made worse by a lack of understanding and awareness about its treatment, mechanism of transmission, and prevention. The 2019 new coronavirus was identified as the etiological culprit in the preliminary studies. Afterwards, the WHO dubbed the illness Coronavirus disease 2019 (COVID-19) when it was reclassified as SARS-CoV-2 (Hasöksüz et al., 2020b).

As of March 11, 2020, there were 118,319 illnesses and 4,292 fatalities worldwide; 80,955 infections and 3,162 deaths were reported in China alone, while 113 countries and territories outside of China reported a total of 37,364 infections and 1,130 deaths. According to WHO, the infection rate in China, the region, and the world is all quite high. Because of this, on March 11, 2020, SARS-CoV-2 was designated a pandemic (WHO, 2020). Kenya was not a case at that time.

Within nine (9) days after the announcement, the illness had spread to several nations where there had not yet been any cases documented. Having verified 234,073 illnesses and 9,840 (4.2%) fatalities worldwide, using figures sourced from every WHO region: There were 104,591 infections and 4,899 (4.6%) deaths in the European region, 93,349 infections and 3,405 (3.6%) deaths in the Western Pacific, 20,759 infections and 13,212 (63.6%) deaths in the Eastern Mediterranean region, 13,271 infections and 178 (1.3%) deaths in the Americas region, 918 and 31 (3.4%) deaths in South East Asia, and 473 infections and 8 (1.7%) deaths in the African region. Kenya provided seven illnesses; however, no deaths were recorded (WHO, 2020). On March 20, 2020, the President of the Republic of Kenya proclaimed it to be a pandemic (Hope, 2020). In order to protect people against SARS-CoV-2, the WHO advised important preventative measures such wearing face masks, adhering to proper hand hygiene, keeping a social distance of 1.5 meters, and being vaccinated (with Astra Zeneca) (W.H.O., 2020).

The Chinese authorities named the illness, which impacted the lower respiratory tract, new coronavirus pneumonia (NCP). Afterwards, the World Health Organization suggested COVID-19, or coronavirus disease 2019. It was dubbed as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2) by the international committee on taxonomy of viruses (Yuen, 2020). The Coronavirus Disease 2019 (COVID-19), also known as Severe Acute Respiratory Syndrome Corona Virus 2 (SARS COV 2), was first discovered in Wuhan, China, on December 29, 2019 (China, 2020). On March 11, 2020, the World Health Organization (WHO) proclaimed Coronavirus Disease 2019 (COVID-19) to be a pandemic (WHO, 2020). In order to limit COVID-19, the World Health Organization and the China Joint Mission put in place a number of preventative and control measures that were beneficial. Ultimately, this decreased the

infection and the severity of the local epidemic in China (WHO, 2020). However, COVID-19 community outbreaks have surfaced rapidly in some nations, placing pressure on health systems and containment initiatives (WHO, 2020). It quickly expanded, turning into a worldwide epidemic. As of January 16, 2021, there were 94,315,331 individuals infected worldwide; of them, 67,346,640 (71.4%) had recovered and 2,017,913 (2.1%) had passed away (WHO, 2021).

The pandemic spread quickly because to a lack of information, limited resources from Health Products and Technologies, and reliance on infodemics for COVID-19 control in Africa (Zeenny et al., 2020). With 96,678 infections, 31 community deaths, and 1,685 (1.7%) deaths as of January 3, 2021, Kenya remained the leader in East Africa. Uganda came in second with 35,712 cases, 6 community deaths, and 274 (0.77%) deaths; Rwanda came in third with 8,567 cases, 8 community deaths, and 98 (1.1%) deaths; South Sudan came in third with 3,558, 6 community deaths, and 63 (1.8%) deaths; Burundi came in second with 833 and 2 (0.4%) deaths; Tanzania had 509 cases and 21 (4.1%) deaths recorded, respectively (W.H.O, 2021). Adherence to public health measures such as the right use of personal protective equipment both inside and outside of hospitals may prevent the illness, which was spread by droplet infection.

In spite of the measures put in place, Busia County has 4,980 COVID-19 cases overall as of June 18, 2021, with a 2.6% positive rate. A total of 194 healthcare personnel were affected; Busia County Referral Hospital made up 30% of this number. (EOC, 2021). For COVID-19, taxonomists and epidemiologists elucidated the causal organism and route of transmission. In order to stop the spread, healthcare professionals have to be aware of and follow standard and transmission-based measures (WHO 2020). Due to a shortage of supplies, HCPs in a Slovenian research handled COVID-19 patients without the proper PPEs, affecting their competence (Leskovic, 2020). Limited

resources: Insufficient supply of health products and technologies hampered the provision of COVID-19 management services (Moradi, 2021; Zeenny et al., 2020). This prompted a research to evaluate health care providers' knowledge, understanding, and practices about the COVID-19 pandemic at Kenya's Busia County Referral Hospital. It provided information on places to reinforce and maintain or holes that needed to be filled.

1.3 Statement of the problem

Wuhan City in China, Hubei Province in mainland China was the epicenter for SARS COV 2 initially, but since then, the infection had spread worldwide and in the community with escalating human infection. Different Countries had instituted varied measures to curb the spread. However, they were marred with several implementation challenges and devastating consequences for health systems, economies, health care providers and patients (Elhadi, 2020).

Globally as at 16th January 2021, the infected population was 94,315,331 out of whom 67,346,640 (71.4%) had recovered and 2,017,913 (2.1%) died. The socio-economic attitude, in era of social distancing and lock down study in four European Countries (France, Germany, Spain and United Kingdom) revealed an increase in trust in domestic institutions. Despite the positive side of the pandemic, there was increase in economic insecurity, loneliness and acceptance of authoritarianism with decreased support from the globalization (Arina, 2021).

The resources allocated for health care services were depleted by the upsurge of COVID-19 and countries had to pool resources from other sectors to furnish the sector, countries invested less on infrastructure and more on consumables. Most of the schools were closed and students lost opportunities to learn. The same was reflected in Siera

Leone's Ebola Outbreak, where 10.7% adolescent girls were exposed to pregnancy occurring out of wedlock and were less likely to return to school, their children had fewer health and education investment. Furthermore, front line health care provider lost their lives in line of duty especially in circumstance with short or inadequate supplies (O. Bandiera, 2019). By 22nd September, 2020 in Africa, Kenya was the 6th Country with infected population of 37,218 cases, out of which 970 (2.6%) were health care providers and 659 (1.8%) deaths reported, after Ghana (46,062 cases), Algeria (50,214), Nigeria (57,613), Ethiopia (70, 422) and South Africa most infected with 663,282 cases (W.H.O, 2020).

During the same period in East Africa, Kenya was leading with infected population of 37,218 cases and 659 (1.8%) deaths was the hardest hit by the pandemic compared to other Countries in East Africa Community, followed by Uganda with 6,712 cases out of which 274 were health care providers and 64 deaths, Rwanda with 4,738 cases and 27 deaths no health care provider died, South Sudan with 2,664 cases out of which 128 were health care providers and 49 deaths and Burundi with 476 out of which 35 were health care providers and 1 death reported. Tanzania had no data recorded (W.H.O, 2020). All of the East Africa countries were ill prepared to handle the pandemic. The resources available were all depleted and called for reallocation of resources from other sectors and donation from other implementing partners within their respective jurisdictions.

As at July 2020 in Kenya, Busia County was among the first five counties with high numbers of COVID-19 following Nairobi (10,249), Mombasa (1952), Kiambu (1,131) Kajiado (1,018), Busia (693) and the leading in Western region of Kenya, with high attack rate of 77% for both local and imported COVID-19 cases (MOH, 2020). Being the gate way to East and Central Africa, it was prone to suffer the pandemic burden,

because of the long truck drivers moving commodities from Mombasa to other parts of East Africa using both Malaba and Busia Borders epidemiological report as at June 2020 revealed.

Most Counties had challenges accessing adequate supplies of health product and technologies including personal protective equipment. The inadequacy prompted a Country wide industrial strike by medical personnel: Nurses, Medical Officers, Clinical Officers and laboratory staffs as per the 5th issue on the national wide strike notice NBI/KNUN/MOH/VOL.IV.16/673/20 and press release by the Cabinet Secretary Ministry of Labour and Social Protection on 3rd December 2020.

Health care providers in Kenya were being infected and some dying out of COVID-19 infections. Busia County was not spared the wrath of infection and death. By 16th January 2021, it had a cumulative confirmed 130 infections with seven (7) reported deaths, patients out of whom, two (2) were senior medical personnel in Busia County - Senior Orthopedic Surgeon at Busia County Referral Hospital and Senior Registered Nurse in Teso South Sub County working as reproductive health coordinator (Department of Health and Sanitation, 2021).

Courtesy of the Emergency Operation Centre analysis, the County had a cumulative of 3,982 infected individuals, out of whom 157 were health care providers across all cadres. As at 11th June 2021, with a positivity rate of 3.9%. Busia County Referral Hospital accounted of 30% of all health care providers infections in the whole county comprising of Seven Sub Counties (E.O.C., 2021), due to scanty knowledge and awareness on COVID-19 management, transmission mode, and prevention.

Due to the aforementioned scenario, the study become a corner stone to unearth and shade light on the best practices and challenges in management of COVID-19 and have a structured implementable way forward based on the findings.

The National IPC Guidelines for Healthcare Services in Kenya, 2nd edition provides the gold standard to be observed in prevention and management of COVID-19 infection.

The key areas of focus include: coordination structure for management of Covid-19, adherence to standards precaution and transmission based precautions, observe public health measure in isolation/holding areas, maintain clean environment both within and out of service delivery points, controlled traffic flow through the triage desk and in patient activities, adherence to the instrument and equipment processing protocols, observe clinical and laboratory safety precautions, the personnel working at the laundry should be able to sort and process linens separately based on their source of origin, the management should adhere to employee Occupation Health and Safety Act 2007, all the service delivery points should have standard operating procedures in place to remind the service providers on key issues to be observed, the facility should strive to minimize or eliminate common healthcare associated infections and infection prevention and control should be adhered in specialized areas like Intensive care unit, high dependency unit and dialysis unit (M.O.H, 2010).

Busia County Referral Hospital accords health care service to population within its borders and neighboring Country Uganda and Counties such as Siaya, Bungoma and Kakamega. It a referral site for the 177 health facilities from the seven Sub Counties in Busia: Bunyala, Samia, Matayos, Nambale, Teso South and Teso North. It stands as the face of health services for Busia County. Furthermore, by correct service delivery on management of COVID-19, reduction in morbidities and mortalities was

realized. Ultimately, the population embarked on economic activities to revamp the dwindling productivity level caused by the pandemic. Whatever interventions implemented at Busia County Referral Hospital had ripple effect across all other health facilities within Busia County at large.

By 30th July 2021, Matayos Sub County which encompasses Busia County Referral Hospital reported the highest COVID-19 attack rate/100,000 of 1,821.7 followed by Teso North at 964.5, Teso South 252, Nambale 64.1, Butula 45.6, Budalangi 32.9 and Funyula 27.2 (EOC, 2021). Therefore, this study aims to assess COVID-19 management by healthcare providers in Busia Referral Hospital, Busia County, Kenya.

1.4 Justification

The only treatment for the COVID-19 illness, which was impacting millions of people worldwide and spreading quickly, was to take preventive measures, such as universal standard-based precautions and transmission-based precautions. According to a survey conducted in Israel, just 61% of doctors followed the recommendations made by their Ministry of Health (Shahrabani, et al., 2022). Precautionary steps against COVID-19 and HCPs' overall management of the virus were shown to be significantly correlated in a Turkish research (Kabasakal, et al., 2021). The ability of healthcare professionals to handle COVID-19 was critical to containing the epidemic. According to research done in Korea, nurses' management of COVID-19 is significantly impacted by their knowledge and awareness of the illness as well as their fear of COVID-19 (Jung & Kim, 2022). Only 82% of HCPs adhered to the usage of face masks, according to Saudi Arabian research (Albeladi et al., 2021). This was crucial to the investigation and for comparing the results with those obtained at Kenya's Busia County Referral Hospital.

Preventive actions were the only way to stop the spread of COVID-19 at that time, both globally and in Kenya.

Due to the lack of thorough research on the pandemic both nationally and in Busia County, there was room for interpretation when it came to gathering data to help with the management and readiness of medical institutions for COVID-19 infections.

being aware of Busia County Referral Hospital's ability to handle COVID-19 infections. This gives the Busia County Assembly the chance, via its standing committees on budgeting, finance, and health, to support the gaps that have been identified and tailor policies to the needs of the County in order to carry out services aimed at managing COVID-19 infections.

being a border county and one among the top five counties in Kenya affected the most severely by the epidemic. It is a component of the reference point used by other Counties to learn from and enhance their COVID-19 infection control. It was anticipated that the nation will implement several of the study's suggestions in order to assist other Kenyan counties in managing COVID-19 infections.

For the delivery of services to be efficient and successful, health as a system needs all of its pillars to work together. In the same way that medical professionals were essential to the wise use of the resources assigned to them. In order to control the infections, they needed health products and technologies, which they had to get from the Kenya Medical Supplies Authority (KEMSA) (G.O.K., 2019) or other reliable sources like grants and contributions, among other things. Well-informed judgments are made based on data that speaks volumes about the services provided. This was recorded using the proper reporting instruments to serve as a source of reference for further research and well-informed decision-making. Busia County Referral Hospital discovered their degree of COVID-19 management readiness via the survey. The information acquired was sent to all other Sub County hospitals in Busia County, as the reference health facility for all other healthcare institutions in the county.

With the study's results in hand, medical professionals were more equipped to handle COVID-19 and fight the infection by understanding their own advantages and disadvantages as well as how to best use them to provide higher-quality healthcare.

The research demonstrated the health professionals' capacities and proficiencies in managing SAS-CoV-2 infection in the County health system. It also provided a chance to close the gaps in decision-making across a range of levels, including beneficiaries' requests, operation-level choices, and policy-level decisions.

The foundation for managing COVID-19 as a County Referral Health institution with supposed qualified medical personnel was established by this.

The availability of pertinent medical supplies and technological tools to facilitate the delivery of COVID-19 health care services and stop the virus from spreading later on was the focus of the research.

The research identified gaps and best practices in the COVID-19 infection management and informed all relevant parties of its results. The decision-makers recognized the shortcomings in COVID-19 management and the implications thereof, and they urged all parties involved in a coordinated effort to uphold best practices and address highlighted obstacles in order to combat the pandemic from all fronts. To stop the threat, practice adhering to transmission-based measures and making proper use of infection prevention and control tools. In the end, it was anticipated that the healthy population would restructure their financial relationships. The results of the research might have an impact on how infectious disease prevention and control curricula are developed.

This means that creating active learning systems has to be prioritized. But this takes deliberate planning and investment—it doesn't simply happen. Consequently, in order

to comprehend regional issues, come up with creative solutions, learn from our failures, expand on what works, and exchange experiences, we must delve deeply into the reality of health care. Prioritizing local education is necessary, but local knowledge must be disseminated both locally and internationally.

1.5 Broad objective

To evaluate how medical staff at Busia Referral Hospital in Busia County, Kenya, are handling COVID-19.

1.5.1 Specific objectives

1. To determine the knowledge of health care providers on management of COVID-19 infection at Busia County Referral Hospital.
2. To assess the healthcare providers awareness level of the essential Health Products and Technologies and to manage COVID-19 infection at Busia County Referral Hospital.
3. To determine the mitigation strategies put in place to manage COVID-19 infection a Busia County Referral Hospital.
4. To evaluate the skills of the health care providers in prevention of COVID-19 infection at Busia County Referral Hospital.

1.6 Research questions

1. Are health care providers knowledgeable on management of COVID-19 infection in Busia County Referral Hospital?
2. What is the awareness level of healthcare providers on the essential Health Products and Technologies to manage COVID-19 infection at Busia County Referral Hospital
3. What mitigation strategic measures have been put in place to manage COVID-19 infection in Busia County Referral Hospital?

4. What skills are required by health care providers in the prevention of COVID-19 infection in Busia County Referral Hospital?

1.7 Assumption of the study

Health care providers were not trained and therefore do not have skills on management COVID-19 infection

The health care facility lacks essential Health Products and Technologies to manage COVID-19 infection

COVID-19 stewardship does not exist to deal with the infection.

1.8 Study Limitation

Being a cross sectional study, it did not assess the changes over time or cause and effect relationship but this had minimal impact on the study findings.

The practice was on reported information by the respondents. Therefore, the findings cannot be generalized to other County Referral Hospitals because they are all unique in terms of access to Health Products and Technologies, Human resource workforce. And governance structures.

1.9 Conceptual Framework

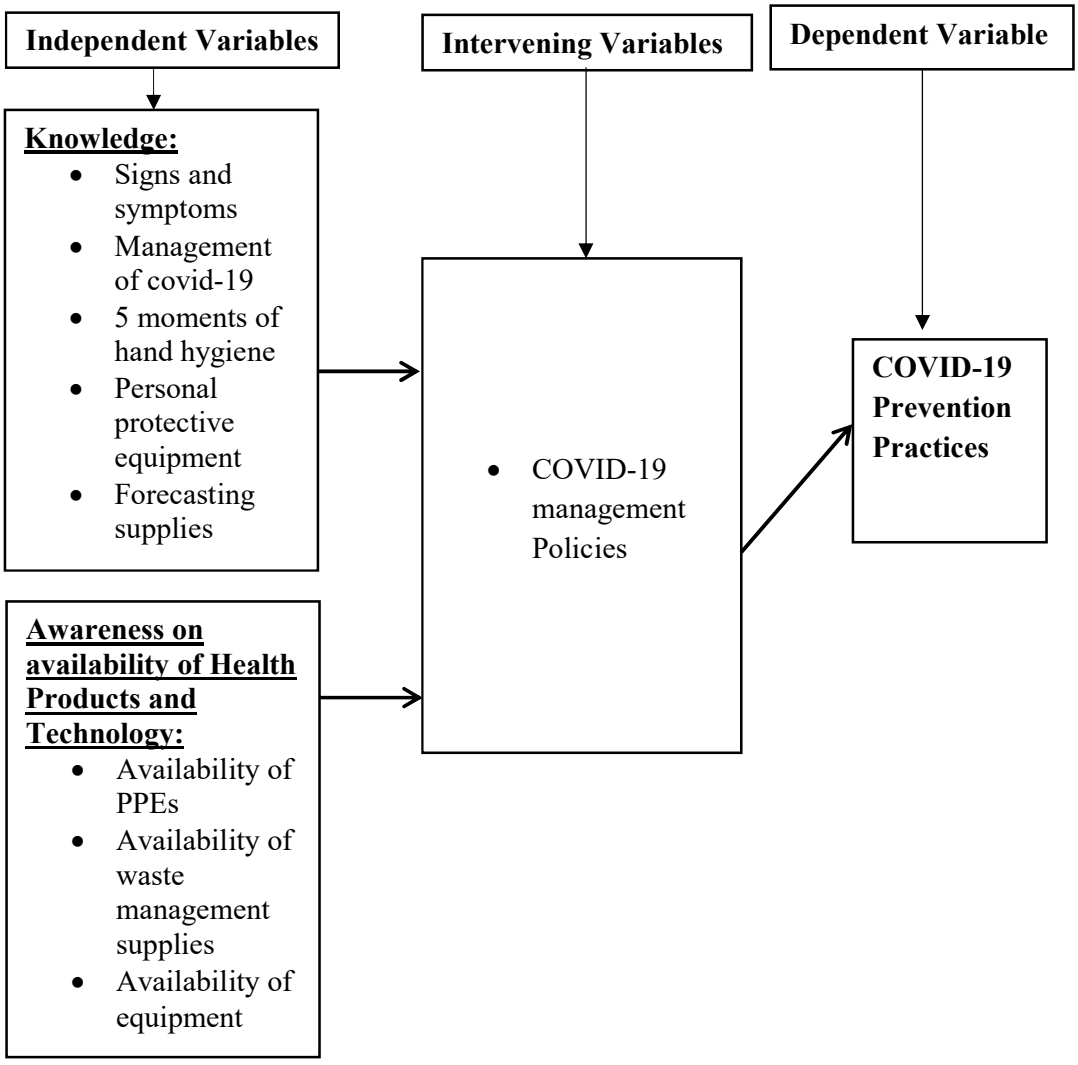

Figure 1.1: Conceptual framework
Source: Researcher, 2021

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

The section covers COVID-19 magnitude, knowledge, skills of front-line health care providers in the fight against the pandemic. The Health Products and Technologies required to manage COVID-19 infections. and mitigation measures put in place to manage the infection. With emphasize on the strengths and weaknesses revealed in different studies across the world.

2.2 Knowledge of health care providers to manage COVID-19

The understanding, mindset, and practices of healthcare providers about COVID-19 are critical to reducing the transmission of SARS=COV-2 and enhancing the effectiveness of their response. 175 medical professionals in Siera Leone contracted the virus; this morbidity made medical professionals afraid to treat patients, which ultimately made the battle against COVID-19 more difficult (Kanu, 2021). Healthcare professionals that work directly with communities in Zimbabwe and Oman confirmed that the transmission of misleading information and rumors contributed to the COVID-19 infection (Mackworth, 2020; Ghafri, 2020). Numerous studies have suggested long-term funding for front-line healthcare professionals in order to identify and treat infections before they worsen in order to save lives, enhance health outcomes, lower medical costs, and improve preparedness for epidemics—all of which contribute to the development of a robust and resilient healthcare system.

Zhang, a Chinese scholar, recognized that attitudes were directly influenced by knowledge. Expert Health Care Professionals (HCPs) with knowledge of COVID-19 were hopeful about defeating the virus (OR: 1.41; 95% confidence interval (CI): 1.12e1.77) and recommended screening of all visitors with notable risk factors (OR:

1.22; 95% CI: 1.04e1.42). However, compared to the level of knowledge and positive attitude, only 68.9% of HCPs in Southern Ethiopia practiced enough (Yesse, 2021). In contrast, 79.4% of HCPs in that region had a good attitude and 84.2% were knowledgeable.

Front-line healthcare professionals are using preventative and control measures training as part of their intervention to address COVID-19. Before January 20, 2020, 22.0% of CDC employees and 9.0% of employees of Primary Healthcare Institutes (PHI) were doing COVID-19 control and preventive duties in the wake of the pandemic in China. By January 27, 2020, the percentage of competence had increased to 87.0 and 78.0%, respectively, after the 16 hours of COVID-19 training received by 52.3% of PHI staff and 47.6% of CDC staff (Zhang, 2020).

Staff at the Centers for Disease Control and Prevention (CDC) gave up their lives during the outbreak because they knew how to stop the spread of the COVID-19 virus and how to prevent family members from getting infected. In order to prevent spreading the virus to others, 14.8% of participants sent their children to live with their parents, and 13.9% of participants chose not to live at home (Zhang, 2020). This was not the situation in Siera Leone, where 58.3% of people had positive attitudes and excellent practices, and 72.7% of people were well-informed about COVID-19. But 77.5% of them admitted that their medical facilities lacked the necessary resources to contain the epidemic. Therefore, it was suggested that in order for HCPs to perform services effectively and efficiently while working in a safe environment, policy makers and health authorities should give the required essential resources (Kanu et al, 2021). Furthermore, it was evident from a Libyan research that medical professionals were purchasing personal protection equipment for use at work since hospitals were not supplying enough of it. Due of this structural issue, the hospital serves as a COVID-

19 hub and puts medical professionals, their families, and the general public at risk for infection. 13.4% of interviewees said hospitals were ready to handle the COVID-19 infection epidemic, nevertheless. On the other hand, 73.5% of people did not know enough about COVID-19 (Elhadi et al., 2020).

The psychological state of Health Care Professionals employed in COVID-19 isolation and treatment centers jeopardized their competencies. This was well shown in Europe (France, Germany, Spain, and the UK), where the imposition of social separation and lockdowns as public health measures led to a rise in economic instability and loneliness as a result of a reduction in assistance from donor nations and organizations. However, there was also a rise in confidence in domestic institutions (K. P. Arina, 2021). The aforementioned results are in line with a research conducted in five Chinese provinces where public health professionals gave their all and sacrificed much to combat COVID-19. Twenty percent of patriotic public health professionals worked nonstop for over three days, while forty-five percent worked over the Chinese New Year vacation. They were exposed to two mental health protective factors and three dangers as a result of this strain. In addition to feeling underappreciated by the people they serve and having little assistance, public health professionals were afraid they would contract COVID-19 at work. Due to the compounding effect of the encounter, 9.8% had poor self-rated health outcomes, 19% experienced anxiety, and 21.3% had depression (Li et al., 2021). Knowledge and abilities are not enough to get better results from an employee; they also need internal motivation in a secure atmosphere.

High sero-prevalence of SARS-CoV-2 antibodies among HCPs in Kenya was shown by a sero-surveillance research conducted in hospitals in Kilifi, Nairobi, and Busia (Etyang et al., 2021). This information helped prioritize and classify the populations for the delivery of the AstraZeneca vaccine in Kenya. At the Alupe Isolation Center in

Busia County, the majority (90%) of SARS-CoV-2 cases were imported cases from truck drivers traveling from other East African counties and countries. More recently, community transmission has been documented; as of January 28, 2021, 1076 cases were from local or community transmission (food handlers, HCPs, passenger service vehicle drivers, and the community) and 1798 cases were imported by truck drivers (EOC, 2021).

In 10 more nations, the Variant of concern (VOC) 202012/01 has been identified. Seventy nations in all six WHO regions reported either imported cases or local/community transmission of this variation as of January 25, 2021 (W.H.O., 2021). This ultimately hampered the effective and efficient service delivery by predisposing HCPs to the COVID-19 infection at Busia County Referral Hospital. Four of them finally got the illness and were had to receive home-based isolation treatment for ten days.

Hospitals are essential for supplying the general public with basic medical treatment during pandemics and catastrophes. SARS-CoV2 has sporadically accelerated the COVID-19 pandemic, causing abrupt spikes in patient demand that have an impact on hospital operations and the health system as a whole. In order to stop the epidemic from spreading, there has to be smooth interaction between human resources and other resources. Even though Libyan medical professionals had educated 47.3% of physicians and 54.7% of nurses on COVID-19 management, only 43.2% of them knew how to properly wash their hands. When it came to treating probable COVID-19 patients who presented with fever, dry cough, exhaustion, shortness of breath, sore throat, headache, and diarrhea, the majority of them—83.8%—lacked confidence (Elhadi et al., 2020). But even a hospital that had prepared properly couldn't handle the demand from the epidemic. A well-managed hospital aids in maintaining critical

services, efficiently coordinating prioritized implementation actions, providing accurate and transparent communication both internally and externally, quickly adapting to growing demands, making efficient use of limited resources, and creating a secure environment for medical professionals (Gul & Yucesan, 2021). This was confirmed in South-West Saudi Arabia, where over 97.7% of people knew about the COVID-19's mode of transmission, symptoms, and common causes; over 89.6% knew where to find accurate and trustworthy information; and over 92.3% followed transmission-based precautions (hand hygiene and social distancing). In order to achieve the eradication aim, the research suggested raising awareness among community people, particularly the less educated ones, and using creative local tactics (R. Tripathi, 2020). Conversely, South-West Ethiopian jails and detention centers showed less preparation and ability to control the COVID-19 outbreak. They had a high number of COVID-19 cases, but they did not make an effort to observe and follow standard and transmission-based precautions that addressed risk assessment and management, referral system and clinical management, contingency planning, prevention measure, staff training, and risk communication, as recommended for highly vulnerable places. Mekonnen and associates, 201.

Similar to the 2014 Ebola virus disease (EVD) epidemic in West Africa, Malawi was dependent on the World Bank for funding for critical interventions such as infrastructure, and health care personnel needed to be educated in managing the infectious illness. Additionally, there were limited financial resources available. From that time on, there was a decline in knowledge and abilities. Refresher training was thus essential to enhancing their abilities and knowledge in areas like specimen collection and infection prevention and control (MoH, 2020). When the coronavirus illness first appeared, the adage "what goes around, comes around" applied, and the

threat could still be controlled using the same approach to infectious disease management.

2.3 Health Product and Technology required to manage COVID-19 (resources)

Health Products and Technologies are needed for COVID-19 screening, surveillance, testing, and management to be done effectively and efficiently. Malawi has determined that the following resources are among those needed to administer COVID-19: Personal protective equipment includes a surgical mask, gloves, N95, eye protection, gowns, and hand washing facilities. Diagnostics include arterial blood gas, pulse oximeters, and radiographic investigations, particularly ultrasonography and chest x-rays. Oxygen is the treatment (MoH, 2020).

According to Azlan et al. (2021), 83.4% of Malay people avoided crowds, 87.8% cleaned their hands properly, and 51.2% used face masks. This indicates that the government must modify health education initiatives to raise awareness and enhance behavior. In order for healthcare practitioners to use resources wisely, knowledge and practice—two distinct things—must go hand in hand with the appropriate mindset.

A Malawian investigation found deficiencies in essential resources needed to control SARS-CoV-2 illness. Building up and improving health systems should be a top priority. The epidemic's avoidable deaths were caused by the wards' limited oxygen supply, the lack of personal protective equipment put medical professionals at serious risk, and the majority of healthcare professionals worldwide contracted SARS-CoV-2. The situation was similar in Lebanon, where pharmacists admitted to experiencing shortages, price increases, and delays in the delivery of face masks and hand sanitizers due to insufficient supplies of basic goods (Zeenny et al., 2020). A better pandemic prognosis might result from having enough HPT supplies in conjunction with

containment strategies such contact tracing, physical separation and isolation, broad testing for COVID-19 illness in both inpatient and outpatient settings, food and water availability, and isolation (MoH, 2020).

There were several ways to stop the coronavirus from spreading from person to person. In order to offer effective and efficient treatment, healthcare personnel need have the proper equipment and operate in a safe atmosphere. In Sierra Leone, 96.7% of workers use face masks adequately while at work, and 98.8% of people regularly wash their hands (Kanu et al., 2021). Hand washing has been linked to both the promotion and prevention of illness as a universal health precaution. By using face masks as directed, washing your hands, and keeping a physical distance from the affected person, you may interrupt the chain of transmission. A crucial pathway for the spread of the infection was physical contact between humans and objects. To stop the germs from spreading to other medical equipment, alcohol was used as a disinfectant. Alcohol is the primary component of most sanitizers and has been shown to be bactericidal. Worldwide, ethanol and isopropyl alcohol are the two most widely utilized forms of alcohol. Most sanitizers include isopropyl alcohol, whose metabolites are thought to be less hazardous than those of methanol and ethylene glycol, which are toxic. Use 70% to 75% concentration of 99% isopropyl alcohol dissolved in water to make an efficient isopropyl hand sanitizer. Water causes bacterial membrane pores to open, providing isopropyl alcohol with a path to remove the microbes on the hand (Shoge et al., 2021). Hand sanitizer or running water with soap and water were used for hand hygiene.

The Community Health Volunteers in Kenya urged locals to follow transmission-based precaution. To help the less fortunate members of the community, they had to rely on partners and Non-Governmental Organizations (NGOs) for funding for

personal protective equipment and related supplies like face masks, soaps, and hand sanitizers, as these were difficult to obtain from the government (Sudhipongpracha, 2021). Testing was necessary to determine who was contaminated and to segregate them. As the gold standard approach for the detection of coronavirus illness (COVID-19) globally, reverse transcription-quantitative polymerase chain reaction (RT-qPCR) test kits are equally necessary. The tests took about 45 minutes to complete in a centralized laboratory with advanced technology and trained workers; sometimes, the findings were ambiguous or falsely negative. Using CRISPR-Cas systems, a novel quick and affordable diagnostic technique for pathogen diagnostics and nucleic acid detection has been established. It eliminated the need for complicated gear and offered a high sensitivity and specificity on-site detection. With limited resources and 30-minute turnaround times for findings, this technology (CRISPR-based SARS-Cov-2 detection) was employed to deliver many tests per day with lower rates of false negative or unclear results (Palaza et al., 2021).

The patients, front-line healthcare workers, and their families experienced some psychological stress after the outcomes. This became evident while caring for patients who had burnouts, depression, psychological anguish, and sleeplessness. In times of worldwide emergency, telehealth services were advised as they were practical and pertinent for supporting patients, their families, and front-line medical professionals (Wadoo et al., 2021).

2.4 Mitigation measures/strategies put in place to manage COVID-19 infection

A vital resource in the battle against COVID-19 was healthcare professionals. Nonetheless, hundreds of people had perished while doing their duties and thousands had contracted SARS-CoV-2 worldwide. The health staff became more anxious and

stressed as a result, which made them less confident in following the COVID-19 best practices.

W.H.O. in 2019 that focused on eight different themes, one of which was coordination. Preparing for the COVID-19 spike, monitoring healthcare professionals and inpatients for the infection, communication and reporting, supplies, training, triage and assessment of suspected/confirmed cases, and, lastly, creating a work plan to remedy the gaps identified. In an effort to mitigate the risks to health workers, Basu (2020) created a tool that consists of 10 theme categories for quick self-assessment of health facilities. Guidelines for the prevention and management of COVID-19 should be established by the healthcare facility, and there should be a specific area for donning and donning in both the wards and laboratories. Patients and/or clients should observe social distancing at the outpatient clinics. All personnel in the healthcare facility must comply with infection prevention and control measures. Healthcare providers must also receive adequate training on the appropriate use of personal protective equipment, and they must be provided with adequate relevant personal protective equipment for COVID-19. Healthcare providers must also be screened and tested for COVID-19 infection, with appropriate action taken in response to the results. Risk assessment and mitigation strategies are crucial for monitoring prognosis and researching the disease.

Both instruments have the same theme areas and were used in Nigeria's Edo State as a mitigating measure to evaluate the preparedness of 252 healthcare facilities—which include clinics, hospitals, and labs—for COVID-19 management. According to Omaeki et al. (2020), the tool's overall poor performance for hospitals, pharmacies, and labs was 34.2%, 3.2%, and 4.9%, respectively. These results fell short of the 70% regarded ready for COVID-19 interventions and management.

Due to its limited resources, the Africa Region established strategic plans for the pandemic, which was expected to run from February 1, 2021, to January 31, 2022. In an attempt to stop the threat, it was able to identify key tactics and allocate funding for them. These tactics were divided into 11 pillars, which are as follows: pillar 1: Coordination, planning, financing, and monitoring; pillar 2: Risk communication, community engagement, and infodemic management; pillar 3: Surveillance, outbreak investigation, and calibration of public health and social measures; pillar 4: Point of entry, international travel, transport, and mass gatherings; pillar 5: Laboratory and diagnostics; pillar 6: Infection prevention and control and protection of the health workforce; pillar 7: Case management, clinical operations, and therapeutics; pillar 8: Operation support, logistics, and supply chains; pillar 9: Strengthening essential services and systems; pillar 10: Vaccination; and pillar 11: Innov This was intended to lessen the virus's spread and stop related illnesses and fatalities.

The epidemic in Wuhan, China, gave many nations a chance to learn. In contrast to most developing nations with decentralized systems of governance, such as Kenya and Indonesia, which had exceptional difficulties coordinating with the local government, particularly when there was an imbalance in local government capacity, countries with centralized systems of governance, like China, found it easy to manage a crisis like COVID-19 (A. Kamradt, 2011).

Conversely, compared to their Thai counterparts who worked in a centralized public health system with regular government wages, Community Health Workers (CHWs) in Kenya, who operated in a decentralized public health system without regular wages, were more driven to identify and implement preventive measures (Sudhipongpracha, 2021).

The information needed to make a well-informed choice must be accurate, high quality, consistent, full, and compliant with the data set. Since it was a health system, the clinical, human resources, logistical, and financial domains provided the data components. According to the International Organization for Standardization (ISO), the data/information comes from the Community, Dispensaries, Health Centers, Sub County hospitals, County Referral hospitals, and National Teaching and Referral hospitals (MOH, 2014).

Both Kenya and Thailand implemented measures to stop the pandemic's spread between March and April 2020. They declared a state of emergency, implemented a curfew at night, required foreign visitors to stay in a quarantine for 14 days, restricted domestic and international travel, enforced social distancing in public places, closed schools, universities, shopping malls, and nightclubs, and swiftly mobilized and trained Community Health Workers (CHWs) on preventive techniques to teach locals about transmission-based precautions. These actions, along with the national governments of Kenya and Thailand, significantly decreased the number of infected individuals (Sudhipongpracha, 2021).

Front-line healthcare workers were forced to follow COVID-19 transmission precautions, which increased their risk of physical symptoms, anxiety, fear, sadness, psychological distress, burnout, and emotional tiredness. A Warwick-Edinburgh Mental Well Being Scale (WEMWBS) research conducted in Qatar found that, in contrast to other health professionals, nurses were more likely to have mental illness. Additionally, 17.4% of individuals had well-being ratings below 45, which is considered suboptimal and associated with a higher risk of psychological distress and depression (Wadoo et al., 2021). A systematic review and meta-analysis on the prevalence of depression, anxiety, and insomnia during the COVID-19 pandemic

corroborated the findings; it found that front-line healthcare providers reported a prevalence of 22.8% for depression, 23.2% for anxiety, and 38.9% for insomnia (Pappa et al., 2020). It was crucial that those in charge of policy and decision-making in the health system keep an eye on the psychological effects on their workforce and implement suitable mitigating measures, including installing a device that encourages virtual consultation in isolation centers to reduce anxiety (Wadoo et al., 2021).

Despite these difficulties, a comparison between the public health systems of Kenya and Thailand revealed that Kenya's decentralized system performed better than Thailand's centralized system in terms of empowering Community Health Workers (CHWs) to address the needs of vulnerable populations and enabling them to respond to a large-scale crisis such as the COVID-19 pandemic. A more favorable atmosphere for front-line employees to operate independently and cooperatively with the commercial and charitable sectors is fostered by the decentralized structure. During the epidemic, this aided in bridging the divide between the public and the government. According to the results, public managers and decision-makers have viable and long-lasting options for including communities and people in their pandemic response strategies (Sudhipongpracha, 2021). However, in order to carry out the services in an efficient and successful manner, financial resources were needed, which lawmakers negotiated in parliament. As a result, politics plays a crucial role in determining the effects that happened both during and after the epidemic. Controlling the spread of COVID-19 without negatively affecting national finances was a difficult task for governments throughout the globe. In order to implement logical policies, the pandemic handling system must be set up with strength and power (Supriyadi et al., 2021). To handle any crisis or epidemic, there needed to be cooperation and consultation between the national/central government and the regional/local

governments, as well as consideration for local knowledge. This was the guiding principle of Kenya's Constitution, which describes the interactions between the national and 47 county levels of government in terms of consultation, support, assistance, information sharing, administration, policy coordination, and capacity building (GOK, 2010).

Any government must stop the epidemic from killing large numbers of people and reduce personal conflicts of interest in order to revive economic development and speed recovery (Supriyadi et al., 2021). This may be improved by enticing the public to assist and get engaged via government-run public outreach programs, risk communication, and uniform enforcement of laws. This was seen in Great Britain, where the critical bed occupancy curve shifted to the lowest peak of critical bed occupancy when the government took into consideration social distancing, home quarantine, and case isolation as well as delaying taking appropriate action or doing nothing during the pandemic (Supriyadi et al., 2021).

Implementation of interventions to manage COVID-19 had bearing on the Ministry of Health policies strategic objectives such as: reduce the burden of communicable disease like COVID-19, halt and reverse the burden of non-communicable disease i.e. psychological trauma and stigma associated with COVID-19 infected persons, provide essential healthcare services including primary health care i.e. management of COVID-19 in holding and isolation wards, minimize exposure to health risk factors by adherence to public health measures (social distance 1.5meters, appropriate use of face mask and hand hygiene, strengthening collaboration with health related sectors i.e. formation of County Antimicrobial Stewardship Committee that brought together line ministries and department such as Ministry of health, Ministry of National and interior coordination, department of natural resources and environment, department of

agriculture, livestock and fisheries, agro- business community and Emergency Operation Centre (Kibui et al., 2015). With a focus on preventative tactics over cure, individuals with COVID-19 were treated symptomatically rather than receiving a particular therapy. Nonetheless, in scoping review studies, healthcare professionals voiced worries about the poor quality of healthcare services and the moral conundrums they were facing due to a shortage of personal protective equipment (PPEs), an increase in workload, and a lack of specialized training and expertise. (Chemali S, 2022) putting mitigation strategy implementation at risk.

2.5 Summary of the Literature Review

COVID-19 infection started in November 2019 in Wuhan in the Republic of China. The Country had to make serious budgetary adjustments to accommodate amendments to manage the infection that was rapidly spreading.

Same was replicated across all other Countries globally, Kenya included and Busia County was equally not left behind such restructuring. Of essence was to identify the mode of transmission, and then how to curb it. W.H.O issued guidelines on adherence to standard and transmission-based precautions: observe social distance, appropriate use of personal protective equipment such as face mask and adherence to 5 moments of hand hygiene by all.

Studies done were in agreement that critical mass of knowledgeable health care providers, when provided with appropriate health product and technologies they were optimistic to manage COVID-19 amicably utilizing and adhering to appropriate skills while practicing and offering service to the patient(s). This was backed with policies to guide implementation on researched approaches to fight the menace. Failure to which, psychological challenges manifest, morbidities and mortalities escalate. The information acquired from various studies and documents were used to improve or

strengthen management of COVID-19 infection at Busia County Referral Hospital that reduced the incidences of morbidities and mortalities being border County.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This section provides information on where the study was conducted, the adopted design, sampling and sample size, data collection instruments and procedure, proposed data analytical tools, inclusion and exclusion criteria and ethical considerations for the study.

3.2 Study Area

The study was conducted at the Busia County Referral Hospital, within Matayos Sub County, that forms part of the seven Sub Counties in Busia County: Bunyala, Samia, Butula, Nambale, Teso North and Teso South. It was the referral hospital for all the 177 health facilities within Busia County (98 – G.O.K, 13 - FBOs and 66 private owned) and had a workforce of about 450 staff both technical and non-technical staff. It was the highly staffed health facility within the County. The facility had bed capacity of 250. Busia County was one of the four Counties in Western Region of Kenya forming the lake Region Economic Block (LREB). Its five Sub Counties (Teso North, Teso South, Matayos, Samia and Bunyala) borders Republic of Uganda to the West and North, Bungoma County to the North East, Kakamega County to the East and Siaya County to the South.

3.3 Study Design

The study adopted descriptive cross sectional study designs which ensure that all relevant cadres and their health care providers had equal opportunity to participate in

the study to improve the confidence interval. The study collected both qualitative and quantitative data.

3.4 Study Population

The target population include: 10 medical officers, 28 clinical officers, 26 laboratory staffs, 122 nursing staffs and 4 morticians, a total of 190 study subjects who were directly in contact with COVID-19 patients/bodies (Hospital, 2021/22).

3.5 Sample Size Determination

For population more than 10,000 persons

$$n = \frac{Z^2 pq}{d^2}$$

Where;

n - The desired sample size if the target population is more than 10,000

z - The standard normal deviate of the acquired confidence level. Usually set as 1.96

which corresponds to 95% confidence level

p - The proportion in the target population estimated to have the characteristics being

Measured (0.5)

q - 1-p (proportion of the population without the characteristic being measured)

d - Degree of accuracy usually set at 0.05

Therefore;

$$n = \frac{1.96^2 (0.5 \times 0.5)}{0.05^2}$$

$$n = 384$$

Where the sample size was less than 10,000 the researcher will use;

$$nf = \frac{n}{\quad}$$

$$1 + \left(\frac{n}{N} \right)$$

Where;

nf - The desired sample size (population less than 10,000)

n - Desired sample size greater than 10,000

N - The estimate of the target population (190) i.e. an estimate of the health care workers who are likely to come in directly contact with COVID-19 patients.

$$nf = \frac{384}{1 + \left(\frac{384}{190}\right)}$$

nf = 127 + 26 (20%) contingencies (to carter for refusal and improve confidence interval)

nf = 153

(W.G.Cochran, 1963)

3.5.1 Sampling procedure

The facility was purposively identified, being the highest level for referrals from all the 177 health facilities with largest bed capacity within Busia County. It had huge resource allocation compared to the rest of the facilities. Cadres that are directly involved with patient care were stratified, and then from each stratum (Nurses, Medical Officers, Clinical Officers, Laboratory Officers and Morticians), were subjected to simple random sampling method based on duty roster to find individual participant to be the respondents. This allowed for equal opportunity for each individual cadre stratum to be included in the study.

Purposive sampling was deployed for the key informant interview who included: Infection Prevention and Control Focal Person, Laboratory Manager in charge, Logistics Manager in charge, Medical Superintendent, Nurse Manager in charge, Clinical Officer in charge, and were identified for key informant interview.

Table 3.1: Categories of the respondents

Cadre	Total	% Contribution	Proportion	Population
Nursing	122	64.2	98.2	98
Medical officers	10	5.2	7.9	8
Clinical officers	28	14.7	22.5	23
Laboratory staff	26	13.7	20.96	21
Mortician	4	2.1	3.2	3
Total	190			153

3.6 Data Collection Tools

The data collection tools were adapted from Facility Readiness Assessment for Coronavirus Disease 2019 and Risk Assessment and Management of Exposure of health care workers in the context of COVID-19 by picking the relevant questions for the study from the two tools to form the questionnaires. All these tools were adapted from the (CDC, 2020) and (WHO, 2020) in the English versions, respectively. To capture the key areas like: socio-demographic, knowledge, skills, availability of Health Products and Technologies, and mitigation strategies. Structured questionnaire and key informant interview guide were used to collected data from the Health Care Providers across the stratified cadres in the hospital. The qualitative data collected was transcribed and used to support the quantitative data.

To assess relationship between knowledge and practice, knowledge on sign/symptoms, Five Moments of Hand Hygiene, management of COVID-19 patients and PPEs and waste and correct practices, correct responses on knowledge were scored as 1 and wrong response scored as zero. The scores for each of the four knowledge sub-domains were added for each respondent and expressed as a percentage. Overall scores of 60% and above was considered as knowledgeable and less than 60% as not knowledgeable (Nyangena & Getanga, 2013).

Regarding good practice, eleven practice areas were examined on the frequency in which the following were practiced single-use gloves, medical mask, face shield or

goggles/protective glasses, among others. Correct practice was considered as "always as recommended" and scored as 1 while wrong practice was scored as zero. The scores were added for each respondent and expressed as a percentage. Overall scores of 60% and above was considered as good practice and less than 60% as wrong practice.

3.7 Data Collection Procedure

Following the informed consent given by the study participants, data was collected by three research assistants, having undergone two-day training on the data collection tools at East Africa Public Health Laboratory Boardroom at Busia County Referral Hospital. The tools were successfully piloted at Holy Family Mission Hospital in Nangina, a level 1V facility just like Busia County Referral Hospital. These was conducted to allow the research assistants improve on their questioning process that would elicit common understanding by the respondents for appropriate responses. By close of business on daily basis, all the data collection tools from the field were verified for completeness of responses and number for questionnaires given out. The documents were filled and locked in cabinet with keys handled by the researcher only. The soft copies had password only known to the researcher, upholding data protection Act section 3 sub sections b, c and e (GoK, 2019).

For the Key Informant Interview; the data was collected from the key informants (Medical Superintendent, Nurse Manager in Charge, Clinical Officer in Charge, Laboratory Manager in Charge, Logistician in charge, and Infection Prevention and Control focal person). Consent was signed up on agreement to participate in the study by the key informant to allow the research assistants to write note and audio record the respondents during the interview. The information provided reached saturation because same things were mentioned using different wordings.

3.8 Data Analysis

Version 21 of the statistical program for social sciences (SPSS) was used to clean, code, sort, and input both qualitative and quantitative data into a computer system for analysis.

Finding the means, medians, standard deviations (SD), and range is one method of doing descriptive statistics. The results are then shown in tables, graphs, pie charts, frequencies, and proportions. Bivariate logistic regression was used to test variable associations. To determine how strongly independent factors were associated with the primary outcome, which was preventative behaviors, the Odds Ratio (OR) was used. Following a qualitative examination of the responses to the open-ended questions and the key informant interview guide, the emergent themes were numerically coded and imported into the Statistical Package for Social Sciences (SPSS) version 21 for further analysis. The results were applied to quantitative data in order to complement, clarify, and analyze it.

3.9 Inclusion criteria and Exclusion Criteria

3.9.1 Inclusion Criteria

- All health care providers who were directly and actively involved at management of COVID-19 patients in Busia County Referral Hospital.

3.9.2 Exclusion criteria

- Health care providers who did not consent to participate in the study.
- Healthcare providers who had active comorbidity like diabetes, TB
- Health care providers infected with COVID-19.
- Expectant Healthcare providers.

3.10 Ethical Consideration

Authority was sought from Masinde Muliro University of Science and Technology Research and Ethics Committee, National Commission of Science, Technology and Innovation (NACOSTI), the Department of Health and Sanitation Busia County, Busia County Referral Hospital, Holy Family Mission Hospital Nangina and informed consent from the respondents.

Human subjects

This study involves human subjects and therefore the following guidelines were observed.:

"**First, do no harm."**

Study participants were be provided with all the information regarding the study. Their participation was completely voluntary with no negative impact for those who choose not to participate. The following risks may occur as a result of your participation in this study:

Interviews may have yielded information that was potentially sensitive and there was a chance that recollections may arose emotions. To prevent harms, the researcher ensure that all data was treated with confidentiality and anonymised and allowed participants to skip questions they were uncomfortable to talk about. The researcher also endeavoured to ensure that the research causes minimal disruption to service delivery e.g., conducting the survey and interviews during work breaks or after working hours. Prior to the start of the study, discussions were held with potential participants to explain the role of the researchers, clarifying the aim of the study and allaying any fears they might have. When reporting any study results, the participant

identity was concealed. Copies of the signed consent forms containing information on the study were given to all study respondents.

Direct benefit to study subjects or the community

There were no direct benefits to study participants. However, the results of this study contributed to a better understanding of COVID-19 management and improved service delivery that lead to transformation of the health system. The findings of this study helped policy makers and relevant stakeholders learn how to improve in management of COVID-19 and other Severe Acute Respiratory Disease that may emerge or re-emerge in future.

Informed consent

Prior to the interview, a research information sheet was given to every study participant. The interviewer offered the participants a rundown of the information sheet's contents and a chance to ask questions. The information sheet included the following details: 1) the study's title and the purpose for which it was being conducted. 2) who people would be participating and why; 3) the time commitment of the participants; 4) the study being voluntary; 5) the guarantee of anonymity after they consent to participate; and 6) the intended use of the submitted data. The permission form was signed by each individual who consented to take part in the research.

Confidentiality.

Information obtained from participants was treated with confidentiality and anonymously reported. The study did not collect or use any data that identified participants. The research transcripts were only identifiable through a numerical code in place of participant’s names. All the audio recordings were transcribed omitting any names that may have been mentioned. The transcribed recordings during the interview were kept secure under lock and key. All audio recordings and transcripts were stored

in a secure folder in a password protected computer which will only be accessible to the researcher.

All collected data was managed in line with the Data Protection Act 2019 - Kenya.

Data sharing

Data was generated to information for sharing with the beneficiaries and stakeholders through feedback mechanism presentation and in thesis defence submission.

CHAPTER FOUR

RESULTS

4.1 Overview

This section gives the description of the data collected and presentation in terms of graphs, pie chart and tables detailing results of the findings from the study area.

4.2 Participant's characteristics

A total of 153 respondents took part in the study. Most of the participants were females (59.5%). More than half (57.5%) were aged 25 – 35 years and majority were Christians (98.7%). The most common cadre were nurses (60.8%), worked in in-patient medical wards (28.1%) and had worked for 1 – 3 years (56.2%) were trained/sensitized on recognition of COVID-19 symptoms (90.8%). More than two-thirds (69.8%) had trained for between 1 – 2 days. These details on the respondents' characteristics are captured in table 2.

Table 4.1: Respondents' characteristics

Variables	Categories	n	%
Gender	Male	62	40.5
	Female	91	59.5
Age in completed years	25 – 35	88	57.5
	36 – 45	53	34.6
	46 – 55	6	3.9
	≥ 55	6	3.9
Religion	Christian	151	98.7
	Muslim	2	1.3
Cadre	Nurse	93	60.8
	Medical Officer	8	5.2
	Clinical Officer	24	15.7
	Laboratory staff	25	16.3
	Mortician	3	2.0
Service delivery point	Outpatient	36	23.5
	Maternal child health	8	5.2
	Inpatient medical	43	28.1
	Inpatient surgical	5	3.3
	Maternity	28	18.3
	Laboratory	24	15.7
	Others (Mortuary, Admin, Billing)	9	5.9
Duration in service delivery in years	< 1	42	27.4
	1 – 3	86	56.2
	4 – 6	12	7.8
	≥ 7	13	8.5
Trained/Sensitized on recognition of COVID-19 Symptoms	Yes	139	90.8
	No	14	9.1
Length of training / sensitization in days	1 – 2	97	69.8
	3 – 4	32	23.0
	≥ 5 – 6	10	7.2

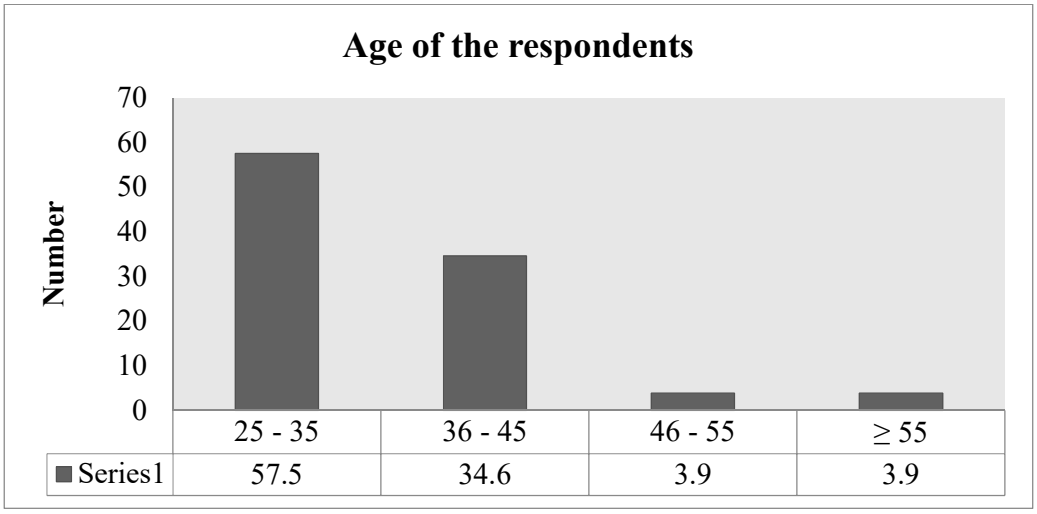

Figure 4.1: Age of the respondents

4.3 Knowledge on COVID-19

Health care provider trained/sensitized on COVID 19 were 91%

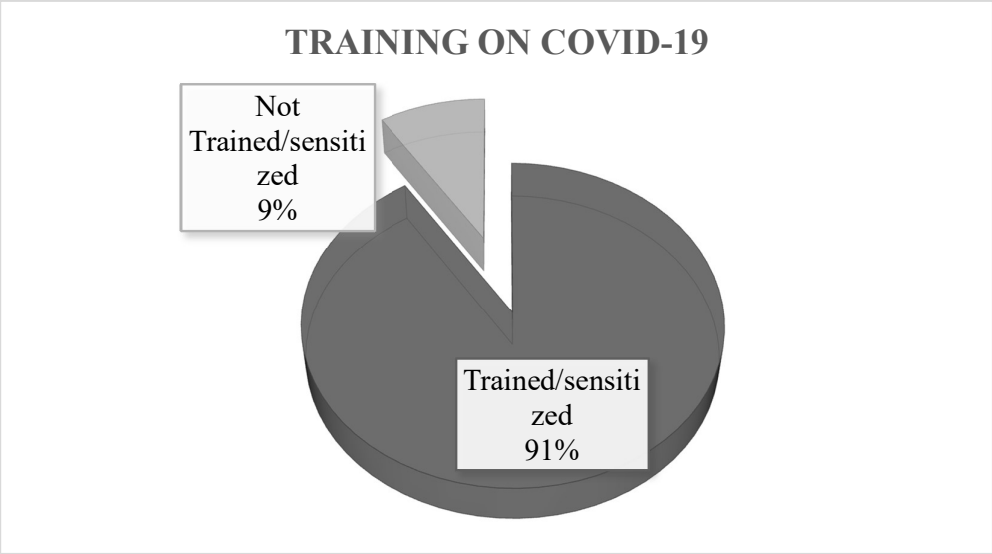

Figure 4.2: Training on COVID-19

4.3.1 Knowledge on COVID-19 Signs/Symptoms and Five Moments of Hand Hygiene

Table 4.2 Presents detailed results on respondents' knowledge signs/symptoms and Five Moments for Hand Hygiene. Respondents who correctly mentioned the signs/symptoms and Five Moments for Hand Hygiene were considered as knowledgeable while those who did not lacked the expected knowledge on the same. Study findings reveal good knowledge in almost all the areas assessed with more than 60% correctly mentioning the signs/symptoms and the Five Moments for Hand Hygiene. Highest proportion of respondents cited cardinal sign of cough (95.4%) and difficulty in breathing (92.8%). The least proportion was on diarrhea as a sign/symptom of COVID-19 (34.0%). On Five Moments for Hand Hygiene, majority know that Five Moments for Hand Hygiene should be practiced after touching patient's surroundings (89.5%). The Five Moments for Hand Hygiene approach

was designed by the World Health Organization to minimize the risk of transmission of microorganisms between healthcare providers, the patient, and the environment.

Table 4.2: Knowledge on COVID-19 Signs/Symptoms and Five Moments of Hand Hygiene

Variables	Categories	N	%
Cardinal Sign cough	Yes	146	95.4
	No	7	4.6
Difficulty in breathing	Yes	142	92.8
	No	11	7.2
Fever	Yes	135	88.2
	No	18	11.8
Diarrhoea	Yes	52	34.0
	No	101	66.0
General body malaise	Yes	120	78.4
	No	33	21.6
Loss of smell	Yes	20	13.1
	No	133	86.9
Loss of taste	Yes	21	13.7
	No	132	86.3
Immediately you enter the hospital	Yes	116	75.8
	No	37	24.2
Before touching the patient	Yes	127	83.0
	No	26	17.0
Before aseptic procedure	Yes	129	84.3
	No	24	15.7
After handling patient's fluid	Yes	110	71.9
	No	43	28.1
After touching patient's surroundings	Yes	137	89.5
	No	16	10.5

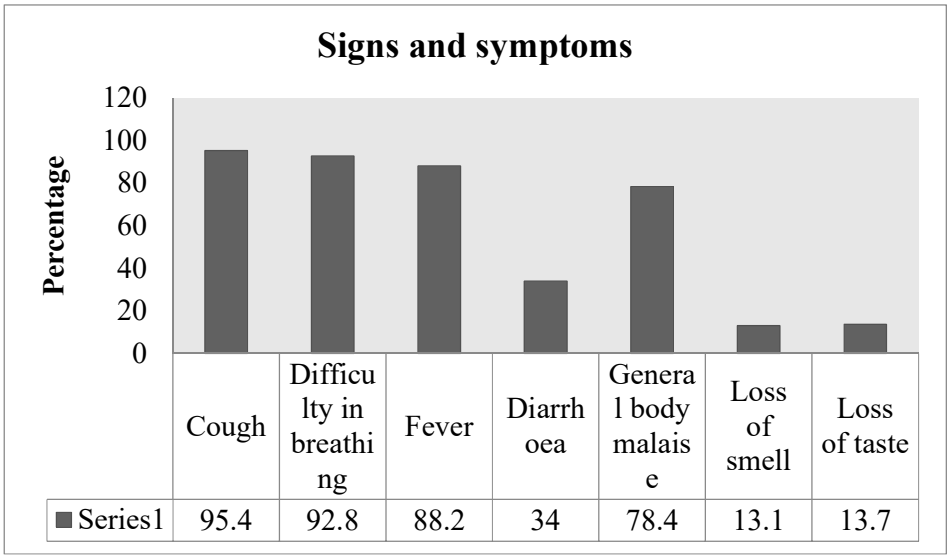

Figure 4.3: Knowledge on signs and symptoms (clinical manifestations)

4.3.2 Knowledge on management of COVID-19

Majority are aware need to isolate patients from general public (90.2%), antifungal administration not being a recommended method of management (96.7%), observing infection prevention and control measures (86.3%). Poor knowledge was demonstrated on use of antiviral (29.4%), zinc (44.4%), sanitizers (6.5%), liquid soap (3.9%), oxygen (7.8%), psychosocial support (2.0%), administration of balanced diet (0.6%) and contact tracing (1.3%). One in five of respondents (20.3%) also mentioned administration of herbal concoction for management of COVID-19.

Table 4.3: Knowledge on management of COVID-19

Variables	Categories	N	%
Administration of Antibiotics	Yes	92	60.1
	No	61	39.9
Administration of Antiviral	Yes	45	29.4
	No	108	70.6
Administration of Antifungal	Yes	5	3.3
	No	148	96.7
Administration of herbal concoction	Yes	31	20.3
	No	122	79.7
Observe Infection prevention and control measures	Yes	132	86.3
	No	21	13.7
Isolate from the general public	Yes	138	90.2
	No	15	9.8
Send for home-based care	Yes	113	73.9
	No	40	26.1
Administration of vitamin C	Yes	95	62.1
	No	58	37.9
Administration of zinc	Yes	68	44.4
	No	85	55.6
Administration of sanitizer (Alcohol based hand rub)	Yes	10	6.5
	No	143	93.5
Administration of liquid soap	Yes	6	3.9
	No	147	96.1
Administration of oxygen	Yes	12	7.8
	No	141	92.2
	Yes	3	2.0
Psychosocial support	No	150	98.0
	Yes	1	0.6
Administration balanced diet	No	152	99.4
Contact tracing	Yes	2	1.3
	No	151	98.7

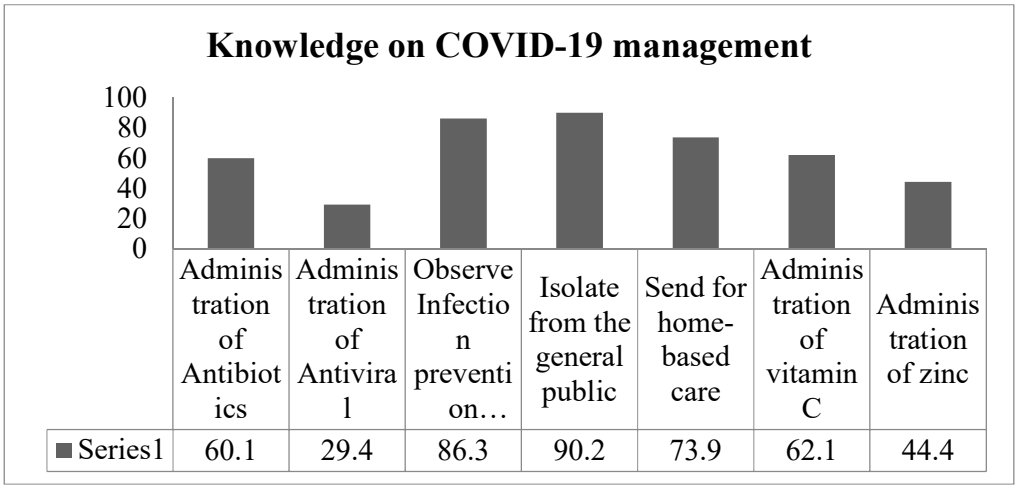

Figure 4.4: knowledge on COVID-19 management

4.3.3 Knowledge on PPE and Waste Management Supplies for prevention of COVID-19 Transmission

Respondents were knowledgeable on use of masks (98.7%), gowns (92.2%), gloves (94.8%) distantly followed by use of gumboot (68.0%), goggles (62.7%) and apron (60.8%). Use of buckets, (8.5%), waste bin buckets (5.2%) and bin liners (4.6%) attracted the lowest proportion of respondents (4.6%).

Table 4.4: Knowledge on PPE and Waste Management Supplies for prevention of COVID-19 Transmission

Variables	Categories	n	%
Mask	Yes	151	98.7
	No	2	1.3
Gown	Yes	141	92.2
	No	12	7.8
Apron	Yes	93	60.8
	No	60	39.2
Goggles	Yes	96	62.7
	No	57	37.3
Shield	Yes	85	55.6
	No	68	44.4
Gumboot	Yes	104	68.0
	No	49	32.0
Gloves	Yes	145	94.8
	No	8	5.2
Bucket for Infection Prevention and Control	Yes	13	8.5
	No	140	91.5
Waste bin buckets	Yes	8	5.2
	No	145	94.8
Bin liners	Yes	7	4.6
	No	146	95.4

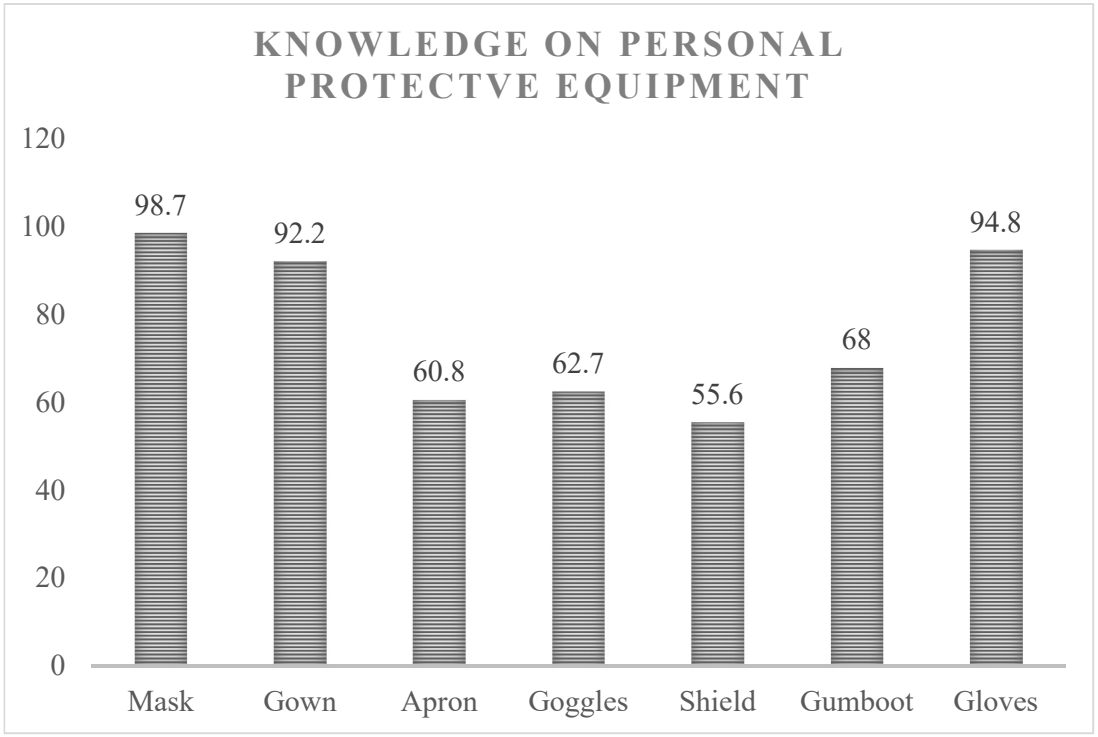

Figure 4.5: Knowledge on personal protective equipment

4.3.4 Knowledge on five moments of hand hygiene

The respondents who had knowledge on hand hygiene were 82%.

Figure 4.6: Knowledge on five moments of hand hygiene

4.3.5 Knowledge on estimation of health products and technology consumption rate

The respondents who were knowledgeable on health product and technology were 81%

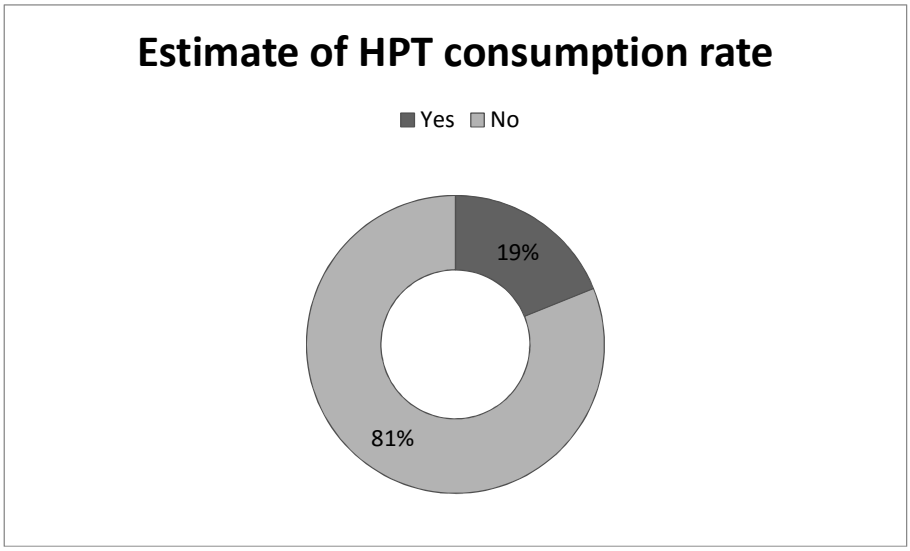

Figure 4.7: Knowledge of HPT estimation on consumption rate

4.4 Awareness on availability of COVID-19-related health products and technology and communication and reporting system in the hospital

Respondents were also assessed being conscious of the availability of COVID-19-related health products and technology and communication and reporting system in the hospital to determine their awareness level (Table 4.5). Respondents were more aware of the facility having designated focal person(s) who is available at all times to file reports of suspected or confirmed COVID-19 cases (90.9%), facility having COVID-19 focal person(s), leadership, and emergency committee or health authorities at the National or County level to report suspected or confirmed COVID-19 cases (88.2%) and facility having hand hygiene program for monitoring hand hygiene compliance by all cadres of health care providers (87.6%). There was relative lack of awareness on facility having a process to request additional supplies (45.1%), facility having phone number(s) of the facility focal person(s) being available at all hours to

report (35.3%) or ability to estimate the consumption rate per week for critical supplies including Personal Protective Equipment, hand hygiene supplies, and disinfectant materials (18.9%).

Table 4.5: Awareness on availability of COVID-19-related health products and technology and communication and reporting system in the hospital

Variables	Categories	N	%
Facility has a process to request additional supplies	Yes	69	45.1
	No	84	54.9
Ability to estimate the consumption rate per week for critical supplies including Personal Protective Equipment, hand hygiene supplies, and disinfectant materials	Yes	29	18.9
	No	124	81.1
Facility has hand hygiene program for monitoring hand hygiene compliance by all cadres of health care providers	Yes	134	87.6
	No	19	12.4
Aware facility has designated focal person(s) who is available at all times to file reports of suspected or confirmed COVID-19 cases	Yes	139	90.9
	No	14	9.1
Facility has phone number(s) of the facility focal person(s) who is available at all hours to report suspected or confirmed COVID-19 patient(s)	Yes	54	35.3
	No	99	64.7
Aware facility has focal person(s), facility leadership, and emergency committee or health authorities at the National or County level to report suspected or confirmed COVID-19 cases	Yes	135	88.2
	No	18	11.8

4.4.1 Awareness on availability of COVID-19-related health products and technology and screening facilities in the hospital

Majority agreed that the following were available in the hospital: face masks (91.5%), alcohol-based hand rub (87.6%), liquid soap (83.7%), hospital-grade disinfectants (86.9%), colour coded waste bin buckets (94.8%), thermo-gun (90.9%), screening or triage area for COVID-19 (95.4%), a designated person to work at the screening or triage area in (95.4%), a screening or triage area for COVID-19 (91.5%), safety boxes (98.7%) and a screening checklist at the triage (85.0%). Less than half agreed

availability of utility gloves (28.1%), eye protection gadgets (face shields or goggles) (35.3%), N95, FFP2, or equivalent respirators (7.8%) and paper towels (3.9%).

Table 4.6: Awareness on availability of COVID-19-related health products and technology and screening facilities in the hospital

Variables	Categories	n	%
Utility gloves	Yes	43	28.1
	No	110	71.9
Gown	Yes	98	64.1
	No	55	35.9
Apron	Yes	78	51.0
	No	75	49.0
Eye protection (face shields or goggles	Yes	54	35.3
	No	99	64.7
Face masks	Yes	140	91.5
	No	13	8.5
N95, FFP2, or equivalent respirators	Yes	12	7.8
	No	141	92.2
Alcohol-based hand rub	Yes	134	87.6
	No	19	12.4
Liquid Soap	Yes	128	83.7
	No	25	16.3
Hospital-grade disinfectants (e.g. sodium hypochlorite)	Yes	133	86.9
	No	20	13.1
Paper towels	Yes	6	3.9
	No	147	96.1
Bin liners (black, Yellow, and Red)	Yes	99	64.7
	No	54	35.3
Colour coded waste bin buckets	Yes	145	94.8
	No	8	5.2
Thermo-gun	Yes	139	90.9
	No	14	9.1
Safety boxes	Yes	151	98.7
	No	2	1.3
Facility has a screening or triage area for COVID-19	Yes	146	95.4
	No	7	4.6
Facility has a designated person to work at the screening or triage area in your facility	Yes	140	91.5
	No	13	8.5
Facility has a screening checklist at the triage	Yes	130	85.0
	No	23	15.0

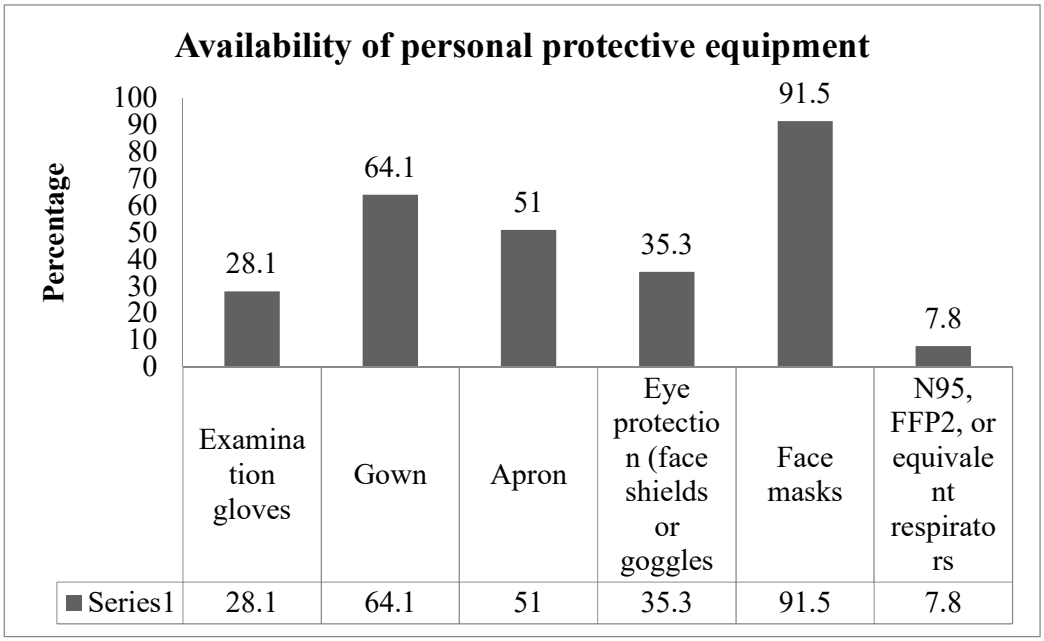

Figure 4.8: Availability of personal protective equipment

4.4.2 Hand hygiene supplies

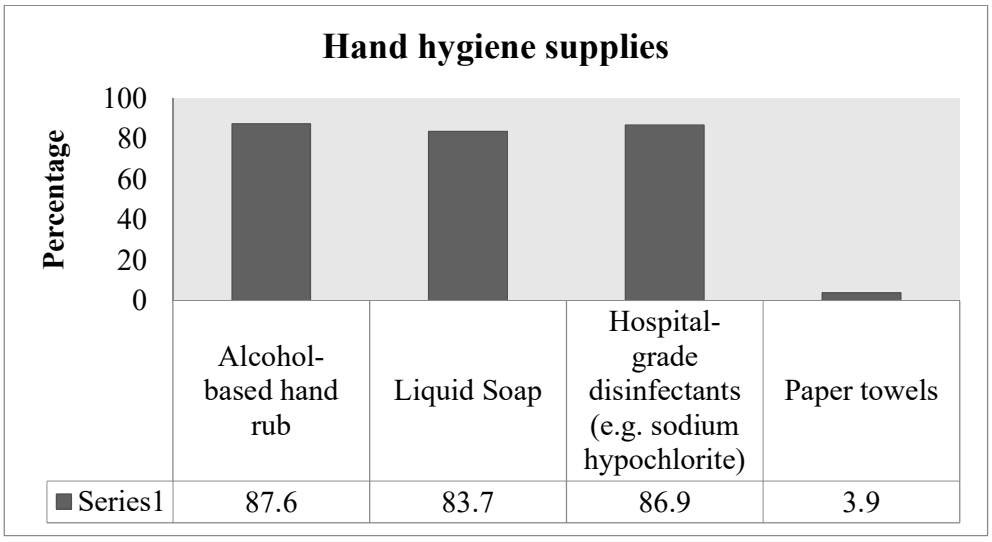

Figure 4.9: Awareness on availability of hand hygiene supplies

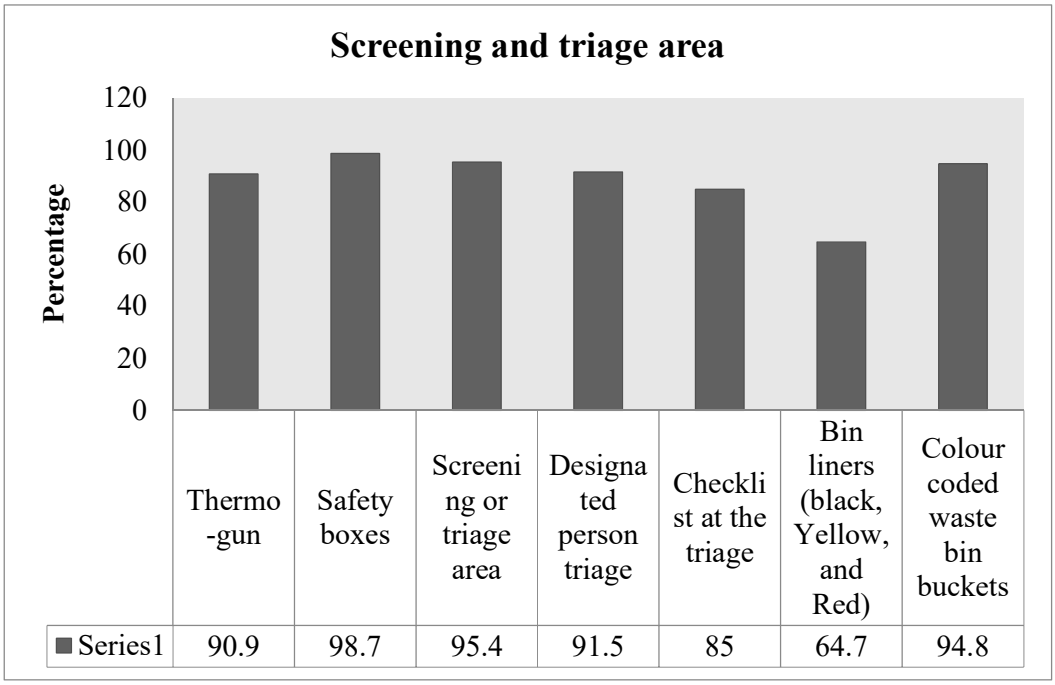

Figure 4.10: Availability of screening and triage area supplies

4.5 Healthcare provider's interaction with COVID-19 patients in hospital (n = 153)

Figure 4.8 shows study findings on healthcare providers' interaction with COVID-19 patients in hospital. Out of the 153 respondents 82.4% (126) had interacted with such patients. Of the 126, 43.8% had seen on average one (1) patient.

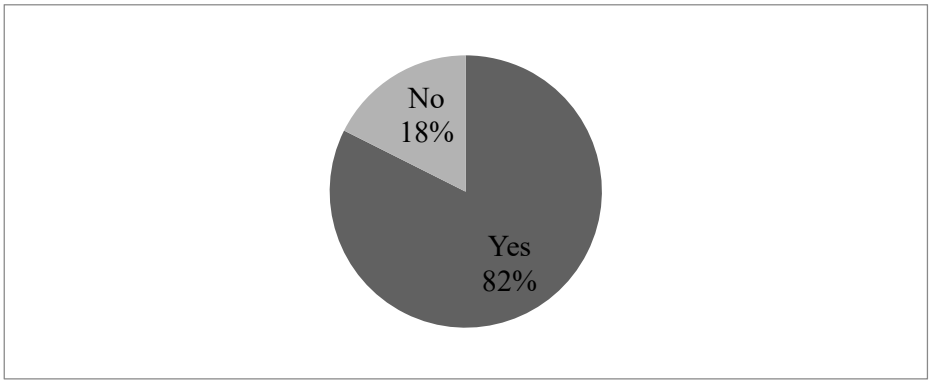

Figure 4.11: Interacted with a COVID-19 patient

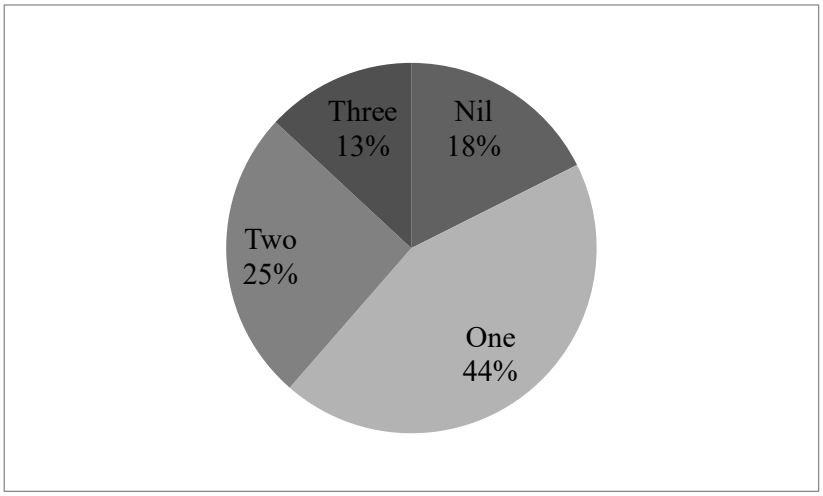

Figure 4.12: Average number of patients seen

4.6 Mitigation strategies adopted by the hospital to prevent COVID-19 pandemic in the hospital

The outbreak of COVID-19 has become the most significant global public health emergency to human society in the 21st century. Until now, there had been a lack of effective antiviral medication and vaccines against COVID-19. Various mitigation strategies had been taken to slow down the rapid spread of COVID-19 in hospitals and in public places. The study attempted to determine from respondents the mitigation strategies adopted by the hospital to prevent COVID-19 pandemic in the hospital (Table 4.7). Majority of the respondents agreed that the facility had an IPC cmmittee in place (92.8%), emergency response plan for COVID-19 or other respiratory pathogens in place (85.6%), a COVID-19 emergency committee (84.3%), patients in the department/unit being screened for COVID-19 (88.9%) and facility having hard copies of policy guidelines on COVID-19 (80.4%). In contrast, only 30.7% had filled self-attestation form in their department/unit which is proof that one is negative or has recovered from COVID-19 infection. Majority agreed that the facility has an Infection

Prevention and Control focal person in place (92.8%) emanating from then nursing cadre (75.8%). This was affirmed by the key informant respondents.

> *"I am the Infection Prevention and Control Focal Person for the facility. I coordinate Infection Prevention and Control activities in this hospital" (IPC focal person - Nurse)."*

Table 4.7: Mitigation strategies adopted by the hospital to prevent COVID-19 pandemic in the hospital

Variables	Categories	n	%
Facility has an IPC committee in place	Yes	142	92.8
	No	11	7.2
Facility has an emergency response plan for COVID-19 or other respiratory pathogens in place	Yes	131	85.6
	No	22	14.4
Facility has a COVID-19 emergency committee	Yes	129	84.3
	No	24	15.7
Respondent has filled an attestation form in your department/unit	Yes	47	30.7
	No	106	69.3
Patients in your department/unit screened for COVID-19	Yes	136	88.9
	No	17	11.1
Facility has hard copies of policy guidelines on COVID-19	Yes	123	80.4
	No	30	19.6
Does the facility have an Infection Prevention and Control focal person in place	Yes	142	92.8
	No	11	7.2
Cadre of Infection Prevention and Control focal person	Nurse	116	75.8
	Laboratory Staff	13	8.5
	Medical Officer	6	3.9
	Public Health Officer	2	1.3
	Don't know	16	10.5

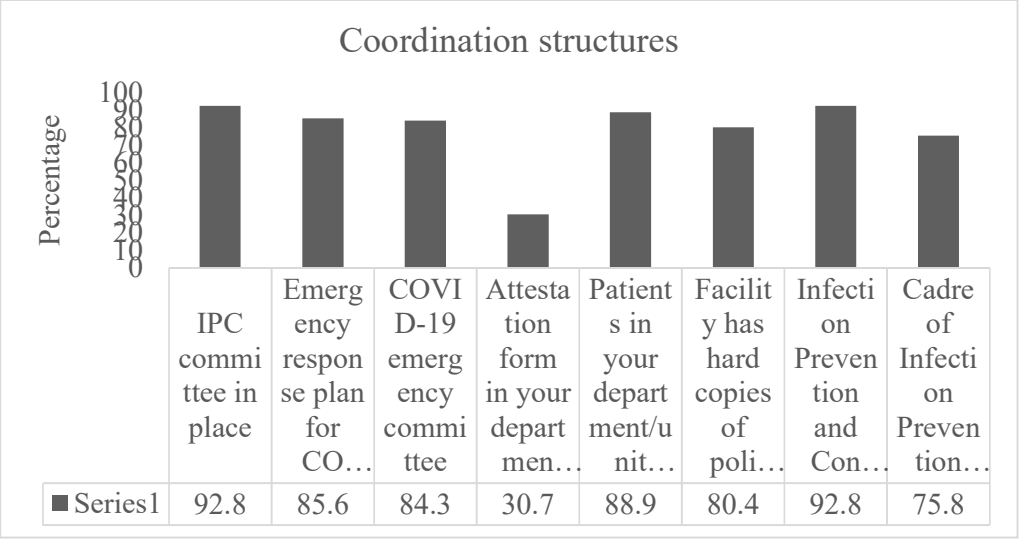

Figure 4.13: Coordination structures

4.6.1 Healthcare providers practice in mitigation of COVID-19 exposure in hospital

Table 4.8 presents findings on healthcare providers' practices in mitigation of COVID-19 exposure in hospital. Analysis was done on 126 respondents who had interacted with COVID-19 patients. Majority (98.4%) wear any personal protective equipment. A higher proportion frequently wearing single use glove (examination/surgical) (84.1%), medical mask (96.8%), remove and replace PPE according to the protocol (62.7%), only a very small proportion always wore face shield or goggles/protective glasses (4.8%) and disposable gown (8.7%) as recommended most of them were in maternity labour and delivery room.

Perform hand hygiene before touching the COVID-19 patient(s) (77.0%), perform hand hygiene before and after any clean or aseptic procedure (inserting cannula, catheterization, intubation etc) (79.4%), perform hand hygiene after exposure to body fluid(s) (94.4%), perform hand hygiene after touching the COVID-19 patient's (89.7%), performing hand hygiene after touching patient's surroundings (bed, drip stand, door handles etc) (72.2%) always as recommended.

Table 4.8: Healthcare providers practice in prevention of COVID-19 exposure in hospital (n = 126)

Frequency in practicing preventive measures during interaction with COVID-19 patient	Categories	n	%
Wear any personal protective equipment	Yes	124	98.4
	No	2	1.6
Frequency of wearing single use glove (examination/surgical)	Always as recommended	106	84.1
	Not as always as recommended	20	15.9
Frequency of wearing medical mask	Always as recommended	122	96.8
	Not as always as recommended	4	3.2
Frequency of wearing face shield or goggles/protective glasses	Always as recommended	6	4.8
	Not as always as recommended	120	95.2
Frequency of wearing disposable gown	Always as recommended	11	8.7
	Not as always as recommended	115	91.3
Frequency of removing and replacing your PPE according to the protocol	Always as recommended	79	62.7
	Not as always as recommended	47	37.3
Frequency of performing hand hygiene before touching the COVID-19 patient(s)	Always as recommended	97	77.0
	Not as always as recommended	29	23.0
Frequency of performing hand hygiene before clean or aseptic procedure (inserting cannula, catheterization, intubation etc)	Always as recommended	100	79.4
	Not as always as recommended	26	20.6
Frequency of performing hand hygiene after exposure to body fluid(s)	Always as recommended	119	94.4
	Not as always as recommended	7	5.6
Frequency of performing hand hygiene after touching the COVID-19 patient	Always as recommended	113	89.7
	Not as always as recommended	13	10.3
Frequency of performing hand hygiene after touching the COVID-19 patient's surroundings (bed, door handles etc)	Always as recommended	91	72.2
	Not as always as recommended	35	27.8

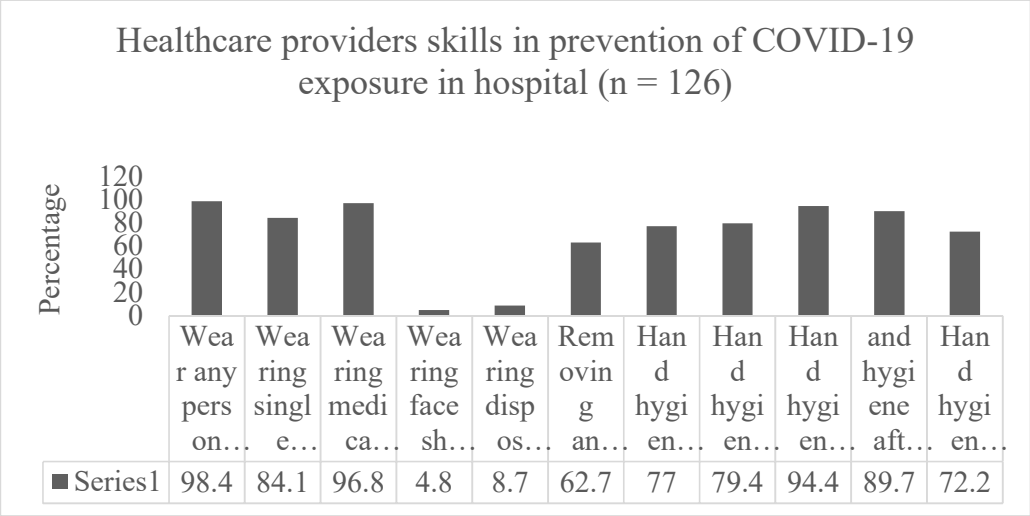

Figure 4.14: Healthcare provider's skills on prevention of COVID-19

4.6.2 Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of prevention practices

Bivariate analysis was done on independent variables with outcome being correct Prevention practices on COVID-19 pandemic using data of the 126 respondents who had interacted with COVID-19 patients (Table 4.9). Eleven practice areas were examined on the frequency in which the following were practiced single-use gloves, medical mask, face shield or goggles/protective glasses, among others. Correct practice was considered as "always as recommended" and scored as 1 while wrong practice was scored as zero. The scores were added for each respondent and expressed as a percentage. Overall scores of 60% and above was considered as good practice and less than 60% as wrong practice.

When binary logic regression was used, the respondents who had worked in service delivery for between 1 -3 years had 2.3 higher odds of reporting the correct practice than those who had worked for four or more years (OR: 2.3; 95% CI: 1.1 – 4.9; p =

0.03). Similarly, those whose length of training/sensitization was between 1 – 2 days were twice as likely as have reported good practice than their colleagues with more than 2 days of training/sensitization (OR: 2.1; 95% CI: 1.0 – 4.5; p = 0.04), results being statistically significant.

Although the relationship was not statistically significant, the younger age group (25–35) compared to the older counterparts, were up to 3-fold more likely to have reported correct practice (OR: 1.5; 95% CI: 0.7 – 3.1; p = 0.28). In the same way, respondents who were trained/sensitized on recognition of COVID-19 symptoms higher odd (1.8) to have reported correct practice unlike those who had not benefitted from the same, the results being non-statistically significant (OR: 1.8; 95% CI: 0.6 – 5.6; p = 0.36).

Table 4.9: Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of prevention practices

Independent variable	Categories	n	Prevention practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Gender	Male	50	68.0	32.0	1.2	0.5 – 2.5	0.68
	Female	76	64.5	35.5			
Age group in years	25 – 35	67	70.1	29.9	1.5	0.7 – 3.1	0.28
	≥ 36	59	61.0	39.0			
Cadre	Nurses	75	64.0	36.0	0.8	0.4 – 1.7	0.59
	Other healthcare providers	51	68.6	31.4			
Service delivery point	In patient Ward	40	70.0	30.0	1.3	0.6 – 2.9	0.51
	Other departments	86	63.9	36.1			
Duration in service delivery in years	1 – 3	70	74.3	25.7	2.3	1.1 – 4.9	0.03
	≥ 4	56	55.4	44.6			
Trained/Sensitized on recognition of COVID-19 Symptoms	Yes	113	67.3	32.7	1.8	0.6 – 5.6	0.36
	No	13	53.9	46.1			
Length of training / sensitization in days	1 – 2	74	73.0	27.0	2.1	1.0 – 4.5	0.04
	≥ 3	52	55.8	44.2			

4.6.3 Association between knowledge of COVID-19 pandemic and prevention practices

To determine association between knowledge on sign/symptoms and prevention practices, Five Moments of Hand Hygiene, management of COVID-19 patients and PPEs and waste and correct practices, correct responses on knowledge were scored as 1 (one) and wrong response scored as 0 (zero). The scores for each of the four knowledge sub-domains were added for each respondent and expressed as a percentage. Overall scores of 60% and above were considered as knowledgeable and less than 60% as not knowledgeable (E. Nyangena, 2013), University of Nairobi

examination guide II accords credit to 60% and above and upper class honors the same is acknowledged by the Nursing Council of Kenya.

From the results presented in Table 4.10, only knowledge sub-domain on Five Moments of Hand Hygiene was statistically significantly associated with good practice (OR: 2.9; 95% CI: 1.3 – 6.3; p = 0.007) Respondents with knowledge on signs/symptoms had 1.3 higher odds than their counterparts although results were not statistically significant (OR: 1.3; 95% CI 0.6 – 3.0; p = 0.50).

Table 4.10: Association between knowledge of COVID-19 pandemic and prevention practices

Independent variable	Categories	n	Prevention practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Knowledge on signs and symptoms of COVID-19	Yes	37	70.3	29.7	1.3	0.6 – 3.0	0.50
	No	89	64.0	36.0			
Knowledge on management of COVID-19	Yes	19	57.9	42.1	0.7	0.2 – 1.8	0.43
	No	107	67.3	32.7			
Knowledge on Five Moments	Yes	59	78.0	22.0	2.9	1.3 – 6.3	0.007
	No	67	55.2	44.8			
Knowledge on PPEs and waste management	Yes	55	61.8	38.2	0.7	0.3 – 1.5	0.40
	No	71	69.0	31.0			

4.6.4 Association between awareness of COVID-19-related health products and prevention practices

Table 4.11; shows results on bivariate analysis of association between awareness of COVID-19-related health products and prevention practices. Respondents who were aware that the facility has hand hygiene program for monitoring hand hygiene compliance by all cadres of health care providers were 4.4 times more likely to have reported good practice than those who were unaware, results being statistically significant (OR: 4.4; 95% CI: 1.5 – 12.9; p = 0.004). While the findings were not

statistically significant, respondents who were aware that the facility has designated focal person(s) who is available at all times file reports of suspected or confirmed COVID-19 cases were up to six times to have reported good practice (p = 0.51). The same applied to respondents who were aware of emergency phone number(s) of the facility focal person(s) for reporting suspected or confirmed COVID-19 patient(s) (p = 0.29) and those who are aware of there being COVID-19 focal person(s), facility leadership, and emergency committee or health authorities in the facility (p = 0.27) were up to three and five times, respective more likely to have reported good practice. This was affirmed by the infection prevention and control focal person and the Nurse Manager as reported:

> *We conduct hand hygiene audits using a tool in all the service delivery points and per cadre (Infection Prevention and Control Focal Person).*
>
> *For outpatients or inpatients or HWCs who turn positive for COVID-19, we inform the designated focal person at Emergency Operation Centre 0800721009 (Nurse Manager).*

Table 4.11: Association between awareness of COVID-19-related health products and prevention practices

Independent variable	Categories	n	Prevention practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Facility has a process to request for additional supplies	Yes No	59 67	62.7 68.7	37.3 31.3	0.8	0.4 – 1.6	0.48
Able to estimate the consumption rate per week for critical supplies	Yes No	27 99	63.0 66.7	37.0 33.3	0.9	0.3 – 2.1	0.72
Facility has hand hygiene program for monitoring hand hygiene compliance by all cadres of health care providers	Yes No	109 17	70.6 35.3	29.4 64.7	4.4	1.5 – 12.9	0.004
Facility has designated focal person(s) who is available at all times file reports of suspected or confirmed COVID-19 cases	Yes No	115 11	67.0 54.6	33.0 45.4	1.7	0.5 – 5.9	0.51
Have the emergency phone number(s) of the facility focal person(s) for reporting suspected or confirmed COVID-19 patient(s)	Yes No	52 74	71.1 62.2	28.8 37.8	1.5	0.7 – 3.2	0.29
Knows COVID-19 focal person(s), facility leadership, and emergency committee or health authorities	Yes No	111 15	67.6 53.3	32.4 46.7	1.8	0.6 – 5.4	0.27

4.6.5 Association between availability of COVID-19-related health products in last two months and implementation of prevention practices

Table 4.12 shows study findings on association between availability of COVID-19-related health products in the last two months and prevention practices. Five factors were statistically significantly associated with respondents who reported good practice. Respondents who agreed that gloves (OR: 2.5; 95% CI: 1.0 – 6.3; p = 0.05), surgical face masks (OR: 3.8; 95% CI: 1.1 – 13.9; p = 0.04), thermo-gun (OR: 3.8; 95% CI: 1.1 – 13.9; p = 0.04), there was designated person at triage (OR: 6.1; 95% CI: 1.5 – 24.3; p = 0.008) or that there is screening checklist at the triage (OR: 3.2; 95% CI: 1.2 – 8.3; p = 0.01) had higher odds of reporting good practice as opposed to their counterparts. Despite the sentiments from the

> *We get our supplies from KEMSA after long lead time, and donations, at time HCPs buy PPEs for their own protection, same applies to patients at times they buy gloves. (Medical Supplies Logistician).*
> *Some of the supplies required depend on the patient's presentation, we may need oxygen supply, steroids, nutritional supplements, and specialized treatment that may not be available in Busia County Referral Hospital (Clinical Officer in Charge).*

Table 4.12: Association between availability of COVID-19-related health products in last two months and prevention practices

Independent variable	Categories	n	Prevention practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Gloves	Yes	34	79.4	20.6	2.5	1.0 – 6.3	0.05
	No	92	60.9	39.1			
Gown	Yes	78	67.9	32.1	1.3	0.6 – 2.7	0.53
	No	48	62.5	37.5			
Apron	Yes	63	63.5	36.5	0.8	0.4 – 1.7	0.57
	No	63	68.3	31.7			
Goggles	Yes	44	65.9	34.1	1.0	0.5 – 2.2	0.99
	No	82	65.9	34.1			
Surgical face mask	Yes	115	68.7	31.3	3.8	1.1 – 13.9	0.04
	No	11	36.4	63.6			
Sanitizer	Yes	115	67.6	32.4	1.8	0.6 – 5.4	0.27
	No	11	53.3	46.7			
Liquid soap	Yes	107	67.3	32.7	1.5	0.6 – 4.1	0.43
	No	19	57.9	42.1			
Jik	Yes	111	68.5	31.5	2.5	0.8 – 7.4	0.09
	No	15	46.7	53.3			
Thermo-gun	Yes	115	68.7	31.3	3.8	1.1 – 13.9	0.04
	No	11	36.4	63.6			
Screening triage	Yes	120	67.5	32.5	4.1	0.7 – 23.7	0.18
	No	6	33.3	66.7			
Designated person at triage	Yes	115	69.6	30.4	6.1	1.5 – 24.3	0.008
	No	11	27.3	72.7			
Screening checklist at the triage	Yes	105	70.5	29.5	3.2	1.2 – 8.3	0.01
	No	21	42.9	57.1			

4.6.6 Association between mitigation strategies adopted by the hospital and prevention practices

Table 4.13 present results on bivariate analysis on the association between Prevention practices adopted by the hospital and the prevention practices. Two strategies with statistically significant association with good practice are facility having an infection prevention and control (IPC) committee in place (OR: 5.2; 95% CI: 1.3 – 21.2; p = 0.03) and availability of N95.FFP2 or equivalent respirator to last for two months (OR: 0.3; 95% CI: 0.1 – 1.0; p = 0.05). Respondents who stated that the facility had IPC

committee were five times more likely to have reported good practice as opposed to those who expressed lack of such committee. It is also important to report that respondents who agreed that patients in the unit/department were screened for COVID-19 were up to 7.4 times more likely to report good practice (p = 0.09) although results were not statistically significant.

Table 4.13: Association between mitigation strategies adopted by the hospital and prevention practices

.Independent variable	Categories	n	Prevention practices		OR	95% CI	P value
			Good ≥ 60%	Good ≥ 60%			
Facility has an Infection Prevention and Control committee in place	Yes No	116 10	69.0 30.0	31.0 70.0	5.2	1.3 – 21.2	0.03
Facility has emergency response plan for COVID-19 or other respiratory pathogens in place	Yes No	107 19	68.2 52.6	31.8 47.4	1.9	0.7 – 5.2	0.19
Facility has a COVID-19 emergency committee	Yes No	105 21	68.6 52.4	31.4 47.6	2.0	0.8 – 5.1	0.15
Have filled an attestation form in the unit / department	Yes No	40 86	72.5 62.8	27.5 37.2	1.6	0.7 – 3.5	0.28
Patients in the unit/department screened for COVID-19	Yes No	111 15	68.5 46.7	31.5 53.3	2.5	0.8 – 7.4	0.09
Availability of N95.FFP2 or equivalent respirator to last for 2 months	Yes No	11 115	90.9 63.5	9.1 36.5	5.7	0.7 – 46.5	0.10

CHAPTER FIVE

DISCUSSION

5.1. Overview

This chapter discusses the study findings such as knowledge on clinical manifestations, management, critical PPEs and waste management supplies, awareness on availability of Health Products and Technologies, mitigation strategies adopted by the facility to prevent COVID-19 pandemic, in relation to other study findings globally. COVID-19 is a zoonotic communicable infectious disease. The World Health Organization (WHO) Infection and Prevention Control (IPC) standards *(WHO, 2019)* recommended that IPC should be in place at all the level of the health care system right from the National to Facility level, to offer minimum protection and safety to healthcare workers, patients, and visitors. These recommendations were anchored on the WHO core components for IPC programs, including strategies to control the outbreak, such as early recognition, source control, and taking necessary standard and transmission-based precautions *(WHO, 2020b).* So, this study aims to assess the healthcare provider's skills in managing COVID-19 infection at Busia County Referral Hospital in Kenya.

5.2 Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of prevention practices

The study revealed that Healthcare providers who had worked for a shorter time 1 to 3 years, and trained for a shorter period 1 to 2 days had higher odds to report correct practice in management of COVID-19 infection. This could be attributed to the

enthusiastic nature of new staff who wants to learn and implement the concepts geared towards breaking the chain of disease transmission.

Concerning demographic characteristics of the studied respondents, it was revealed that the female gender aged 25 to 35 years from the Christian faith in the nursing cadre was the majority, with more than fifty-seven point two percent. This finding was proportionate to the population of the health workforce, where nurses of the female gender were the majority, and the facility has a huge Christian faith populace. Most of the opportunities presented were at the medical wards, followed by outpatients, maternity, and laboratory. This service delivery point has a high human traffic flow seeking healthcare services or coming to check on their loved ones admitted to the hospital.

The pandemic has affected many people across the globe whom healthcare providers were managing. The study agreed with more than two-thirds of the respondents who reported interacting with COVID-19 patients in their line of duty. COVID-19 virus does not walk; it is transmitted through respiratory droplets from the infected person to the vulnerable person, who can be a patient/client or healthcare provider. It was mandatory to observe standard and transmission-based precautions. Those who did not comply got infected *(Wang et al., 2020).*

5.3 Association between knowledge of COVID-19 pandemic and prevention practices

In multimodal approach, you must know what you want to prepare and sustain the execution process. For anyone to execute their mandate they ought to have knowledge attained either formally or informally and be aware of the resources within the hospital environment. Hence, it forms critical component in management of COVID-19

pandemic, just like in China, after realization of the disease, the staff had to be trained on the clinical manifestations, mode of transmission and prevention of the pandemic to minimize and contain the spread. Fewer CDC and Primary Healthcare Institutions (PHI) staffs were utilizing standard precautions measures but later 47.6% of CDC and 52.3% of PHI were trained for 16 hours to improve their knowledge on the fight against the COVID-19 infection from 78% to 87% (Li, 2021). The findings in the study also revealed that after the training more than 60% of staffs in Busia County Referral Hospital were able to identify cardinal clinical manifestations and five moments of hand hygiene that was paramount on detection of COVID-19 cases and breaking its chain of transmission respectively. In Siera Leone, 72.7% knowledgeable on COVID-19, and it was from this that 77.5% acknowledged that their facilities were ill prepared to respond to the outbreak and requested the policy maker and health authorities to provide the necessary essential supplies (Kanu *et al.,* 2021). Having knowledge on the mode of transmission, doctors and nurses in Libya had to buy personal protective equipment for use at work place because 86.6% of the staff perceived the hospital was constrained to provide PPEs, the system challenges occasioned the hospital to be an epicenter for the disease transmission predisposing the infection to the health care providers, their families and community (Elhadi *et al.,* 2020). Knowledge on COVID-19 improves HCW's confidence on its management. More than 83% of respondent in Busia County Referral Hospital had knowledge on the essential Health Products and Technologies required to manage COVID-19. Therefore, they had high probability to request for relevant HPT such as gloves, face masks, sanitizers, liquid soap, face shield, apron, gown, gumboot, waste bin, bin liners, safety boxes, paper towel, thermogun, and sodium hypochlorite.

This cleared the infodemics among the frontline Healthcare providers. In early 2020, mask use was not mandatory, it was unclear how long a suspected COVID-19 patient should stay in quarantine and Healthcare providers used azithromycin to treat and manage COVID-19. Later, updated knowledge enforced mandatory use of face mask by all persons', suspected individuals were quarantined for 10 to 14 days and azithromycin was stopped in COVID-19 infection treatment, because it may lead to antimicrobial resistant gene traits (Albahri *et al.,* 2020).

Hand hygiene has been the cornerstone in the fight against all infectious communicable diseases globally. Meta-analysis of eight studies reported 6% to 44% reduction of respiratory infections for Asian flu (H5N1) and severe acute respiratory syndrome (SARS) by adherence to hand hygiene with soap and running water (Rabie & Curtis, 2006). In the study, HCPs with knowledge on five moments of hand hygiene reported correct practice although the significance level was marginal (p-value = 0.07). Furthermore, those with knowledge on COVID-19 clinical manifestation, were 3 time more likely to have correct practice in detection and management. The study was in congruence with the South West Saudi Arabia study, where 97.7% were knowledgeable on mode of transmission and 92.3% adhered to transmission-based precautions that reduced the number of infections in the population drastically (Tripathi *et al.,* 2020). In Siera Leone, knowledge decay phenomenon had set in, after successfully winning the battle against Ebola epidemic in 2014. The same concept was required in management of COVID-19. Therefore, the government had to conduct refresher training programs for its front-line health workforce in the fight against COVID-19 (Kanu *et al.,* 2021) to keep abreast with the current correct practice. Therefore, staffs were to be taken through mentorship frequently, either by on-the-job training or continuous medical education, to keep abreast and adhere to the skills of 5

moments of hand hygiene and current clinical manifestation and management of COVID-19. In Malasia, people were knowledgeable on COVID-19 mode of transmission and prevention modalities. Therefore, 83.4% avoid crowded places, 87.8% practice proper hand hygiene and 51.2% wore face masks (Azlan *et al.,* 2021) this action contained the pandemic.

This study reveals that healthcare providers who had been in service for 1 to 3 years and trained for two days or less on COVID-19 demonstrated good skills in COVID-19 management. Capacity building of healthcare providers through short-term training improves their competency and the right attitude to fight the menace; this was confirmed by a study in China where healthcare providers trained for 16 hours demonstrated good skills in fighting COVID-19 *(Zhang et al., 2020)*. On the flip side, the knowledge deficit perpetuates phobia amongst healthcare providers, resulting in increased infection rates, as was realized with increased incidents during the initial phases of COVID-19 infection in 2020 (W.H.O., 2021).

This study finding reveals that most respondents with knowledge of five moments of hand hygiene and interacted with COVID-19 patients were two point nine times more likely to demonstrate adherence to good hand hygiene skills where health products and technologies were available. Knowledge and practical exposure to real life-threatening condition(s) improved adherence to good skills such as appropriate use of face mask and sticking to the five moments of hand hygiene to curb the pandemic and save lives. Furtherance the good skills cannot be achieved without the availability of essential health products and technologies to synergies the knowledge acquired and enhance adherence to five moments of hand hygiene and appropriate use of personal protective equipment, as was confirmed by a study conducted in Siera Leone, where 98.8% of knowledgeable health care providers adhered to five moments of hand hygiene, and

practice regular hand hygiene in the fight against the pandemic successfully *(Kanu et al., 2021).*

The triage area was dedicated to screening all persons entering the health facility; this provided an opportunity for early detection of COVID-19 via symptoms and signs, then referring the suspected client(s) or patient(s) to a clinician for further investigation and confirmation of the diagnosis. Almost all of the supplies required at the triage were always available, and most persons visiting the health facility, whether as patients, clients, or health care providers, had to be screened for the disease at the triage. Early disease detection makes it easier to conduct defaulter tracing to contain the spread from the source and save the vulnerable population. Therefore, Countries need to focus on early detection of the outbreak at the triage and filling attestation forms to minimize contamination *(Hanvoravongchai et al., 2010).*

5.4 Association between awareness of COVID-19-related health products and prevention practices

Hand hygiene program remains paramount in winning the battle against the infectious pandemics COVID-19 included. The respondents who were aware of this program existence had 4.4 odds to have the correct practice (OR: 4.4; 95% CI: 1.5 – 12.9; p = 0.004) unlike their counterparts. Adherence to correct hand hygiene practice has the ability to reduce the spread of infections at the portals of exit from the reservoirs, mode of transmissions and portals of entry to the susceptible host that accounts for 50% mechanisms in breaking the chain of transmission for all infections, (W.H.O., 2021).

In addition, those who were aware of the availability of designated infection Prevention and Control Focal Person, the phone number to report COVID-19, and presence of the emergency committee had more than 67% probability of engaging the system when the need arose. This was the correct practice because it allowed the decision makers to appreciate the positivity rate within the facility and brought the impetus to make informed decisions on strategies to contain the infection. It gives opportunity for further studies to be done on the impact of the strategies employed to fight the COVID-19 pandemic.

Personal protective equipment's were paramount in the breaking the chain of transmission, more than 60% had knowledge on the essential PPEs required in COVID-19 management to prevent Healthcare associated infections. Without adherence to appropriate use of PPEs, HCPs could be super spreaders of infections in healthcare facility set ups. Knowledge and awareness synergies good practice, Southern Ethiopia study revealed that Healthcare providers who were knowledgeable and were aware of relevant supplies required to manage COVID-19 had higher odds to implement correct preventive practice (Yesse *et al.,* 2021). Those Health Care Providers (HCPs) had good grasp of what, when and how to use relevant PPEs and curtailed nosocomial infection in the healthcare setting.

Hospital wastes must be handled with great care from the point of generation to final disposal. In the study, there were only 4.6% of the respondents who were informed on proper waste management, and these possess great danger to personnel deployed in waste disposal area and the community around the hospital. Therefore, it is important to capacity every health care provider in the hospital, avail and inform them of available supplies to promote correct practice.

5.5 Association between awareness on availability of COVID-19-related health products in last two months and implementation of Prevention practices

Health Products and Technologies are essential additives to correct practice. Without which the standards of health care services stand to be compromised. Key resources required to manage COVID-19 include the following personal protective equipment: hand washing facilities, gown, eye protector, N95, surgical mask, gloves. Diagnostics: pulse oximeter, Arterial Blood Gas, radiological studies especially chest x-ray and ultrasound. Treatment: oxygen (MoH, 2020).

In this study, the respondents who agreed that gloves, surgical face masks, thermo-gun, having designated person at triage or having screening checklist at the triage were available had higher odds of reporting correct practice as opposed to their counterparts. These were some of the essential supplies that were required to screen all persons entering the hospital to seek for services and/or offer services. The supplies were to promote standard based precautions and transmission-based precautions by preventing nosocomial infections among health care providers and patients. In Lebanon and Libya, these Health Products and Technologies (HPTs) supplies were inadequately provided by the employer to the Healthcare providers. Due to their high level of exposure to infections linked to healthcare (Zeenny et al., 2020), healthcare professionals were forced to purchase personal protective equipment for themselves in order to stop the spread of infections from patients to healthcare providers and vice versa, which led to incorrect practices. Although 47.3% of physicians and 54.7% of nurses in Libya have received training on managing COVID-19, and 43.2% are informed about hand hygiene, they still have the potential to transmit the illness if hand hygiene practices are not maintained via the provision of HPTs (Elhadi et al., 2020). In order to promote appropriate practice in reducing health care-associated infections

in the facility, it is necessary that, in addition to the knowledge gained through various methods of capacity building, essential health products and technologies be made available and health care providers informed of their availability.

The chain of transmission can be broken by adherence to appropriate use of face mask, hand hygiene and observing physical distancing. This can be actualized with availability of HPTs.

More than 83% respondents affirmed the study site had the following crucial supplies for efficiency and effective utilization to curb the menace: face masks (91.5%), alcohol-based hand rub (87.6%), liquid soap (83.7%), hospital-grade disinfectants (86.9%), colour coded waste bin buckets (94.8%), thermo-gun (90.9%), screening or triage area for COVID-19 (95.4%), a designated person to work at the screening or triage area in (95.4%), a screening or triage area for COVID-19 (91.5%), safety boxes (98.7%) and a screening checklist at the triage (85.0%).

Less than half, agreed availability of utility gloves (28.1%), eye protection gadgets (face shields or goggles) (35.3%), N95, FFP2, or equivalent respirators (7.8%) and paper towels (3.9%). It was clear that those who were aware of the HPTs availability had 3 folds' probability to report correct practice.

This study finding demonstrates that the availability of gloves, surgical face masks, thermal guns, having a designated person at triage, and screening checklists were significantly associated with good skills. Triage was manned by a COVID-19-trained healthcare provider equipped with essential supplies to pick up COVID-19 signs and symptoms early and refer them as appropriate to clinicians. Hence, appropriately quantifying and forecasting these essential supplies for COVID-19 was paramount to minimize the spread and promote good practice and skills. To curb COVID-19

infection, healthcare providers were provided with portable alcohol hand rubs and face masks on a need basis to protect them from spreading the virus by observing transmission-based precautions like the use of face masks and adherence to five moments of hand hygiene. This finding was confirmed in a study conducted in Sierra Leone *(Kanu et al., 2021),* wherein the availability of supplies promoted good skills.

Contrary to this approach, inadequate supplies of health products and technology (HPTs) compromise COVID-19 management *(Zeenny et al., 2020).* This finding echoed live science, where inadequate medical facilities and supplies to manage the COVID-19 pandemic surge of severe and critically ill patients compounded the skills required to mitigate its spread (Aubree, 2020). Some countries like New Zealand, Germany, Hong Kong, and South Korea reported lower case fatalities than Europe and the United States, attributed to early detection, many testing population samples, and swift preventive measures (Worldmeter, 2020).

Hand hygiene has been the best strategy to contain most communicable infections like COVID-19. The availability of critical supplies like alcohol, hand rub, soap, running water, and paper towels is of paramount importance to promote adherence to the five moments of hand hygiene. The study finds that most supplies were within reach in the health facility at the service delivery point, apart from a paper towel only in the tuberculosis clinic. WHO emphasizes hand hygiene to prevent COVID-19 infection as a standard precaution (CDC, 2002). This finding was emulated in a Malaysian study, where 87.8% successfully practiced proper hand hygiene in the fight against COVID-19 *(Azlan et al., 2020).*

5.6 Association between mitigation strategies adopted by the hospital and implementation of standard practices

The W.H.O., (2019) and Basu, (2020) identified 8 to 10 standard thematic areas that each health facility ought to consider in dealing with the pandemic. For an effective and efficient provision of essential health services to curb the escalating infection, the hospital management requires prioritization and well coordination of interventions, with clear and accurate internal and external communication strategies. The WHO recommends establishment of Infection Prevention and Control Committee, triage and source control of suspected COVID-19 patients, adherence to five moments of hand hygiene, appropriate use of personal protective equipment such as medical face mask, gloves, etc and proper waste management as strategies to prevent or limit transmission in healthcare settings (WHO, 2020). It must have the ability to seamlessly adapt the increasing demands, prudently utilize the scarce resources in a safe environment for health care providers (Gul & Yucesan, 2021). This was the case in this study where the responds who knew the existence of infection prevention and control committee had higher odds as opposed to their counterparts to report correct practice ($p = 0.03$).

Good prioritization and coordination required the facility to have an Infection Prevention and Control (IPC) and emergency rapid response committees with its plan in place to ease execution. Edo health facilities in Nigeria were subjected to a standard assessment tool to check on conformity mitigation standards required in readiness to manage COVID-19, and 34.2% of the hospital complied (Obaseki *et al.,* 2020). In this study, the health care providers who filled the attestation forms were 72.5%, while 68.5% of patients were screened using COVID-19 checklist at the entrance to detect the infection early and prevent subsequent transmission. Therefore, leadership and

governance, health financing, health product and technologies are some of the W.H.O building blocks that ought to synergies to foster correct practice.

The respondents who acknowledged presence of IPC committee to coordinate prevention of communicable disease like COVID-19 had p = 0.03, availability of mask to prevent droplet infection which was the main mode of transmission between human beings had p = 0.05 and filled the self-attestation forms to screen themselves against the infection, had 7.4 probabilities to report good practice. The study was in sync with other studies conducted in Wuhan, China that reported 31 infected HCPs in general ward, 17.5% in emergency department and 5% in Intensive Care Unit (ICU) in a non-communicable disease health facility, during the initial outbreak (Wang *et al.,* 2020). In Henan, China, HCPs with knowledge proposed that visitors with significant risk factor ought to be screened for COVID-19 at the triage (Zhang *et al.,* 2020). Despite the fact that microorganism do not walk, we facilitate their transmission across the globe. They can infect anybody irrespective of their social status whether patient, visitor or healthcare provider, if infection preventive and control measure are not adhered to. Therefore, it was imperative that all persons entering the health facilities/institutions must be screened for COVID-19 at the triage and/or fill self-attestation forms at their respective service delivery points to declare their status before engaging in the day's activities at the work place. This was agreed during the key informant interview.

> *When someone comes s/he must put on mask, then they are directed by the security guard at the main gate, to the triage desk under a tent for COVID-19 screening. Those who have respiratory symptoms are set aside in respiratory waiting area under a tent for further examination by clinician and sample collected for investigation. Those who turn out positive for COVID-19 are admitted or send home for home-based care" (Hospital IPC Focal Person).*

Understanding Healthcare Providers' knowledge, attitudes, and practices (KAPs) and possible risk factors helps to predict the outcomes of planned behavior. However, knowledge does not necessarily translate to practice even with the right attitude. A study done in Silte Zone in Southern Ethiopia agreed with the sentiment where 74.9% were knowledgeable while 84.2% had the right attitude towards COVID-19 interventions but only 68.9% demonstrated good practice (Yesse *et al.,* 2021). The same was replicated in Uganda study, where 83.9% were knowledgeable, 78.4 had positive attitude but only 37.0% had good practice (Kamacooko & Kitonsa, 2021). Therefore, Healthcare providers in Busia, Dubai and Uganda were well informed, with the positive attitude but wanting practice which might be attributed to inadequate supplies for Health Products and Technologies essential to contain COVID-19.

5.7 Prevention practices

To fight the zoonotic infection spread through droplets within humans, it was critical for Healthcare provider to be equipped with knowledge on prevention and mode of transmission in order to adopt the appropriate skills and practice to curb the menace (Polychronis G, 2020). The study was concerned about the appropriate use of personal protective equipment and adherence to 5 moments of hand hygiene to prevent transmission of COVID-19 pathogens to and from health care providers and patients/ clients. Majority of the respondents had worn personal protective equipment appropriately such as face mask and gloves and adhered to hand hygiene after exposure to body fluids and after touching the COVID-19 patient(s). This were considered good skills practiced to break the chain of the droplet infection causing the pandemic. The findings were in agreement that besides hospitals being epicenters for the infection, it took personal initiative to take charge of their own health with the inadequacies in the acquisition of HPTs in the hospitals. Therefore, healthcare care providers had to buy

personal protective equipment and use them appropriately at work place to protect themselves and patients from the infection (M. Elhadi, 2020).

There was no treatment for COVID-19; patients had to be managed symptomatically, adhering to precautionary measures such as appropriate use of personal protective equipment and five moments of hand hygiene. This study identified that most of the respondents had personal protective equipment in their respective service delivery points, while around three-fourths of them adhered to hand hygiene to facilitate reducing its spread. It was important for healthcare workers to be equipped with the right knowledge, attitude, and health products and technologies to facilitate adherence to the standard and transmission-based precautions in the pandemic battle. Hence, strict adherence to contact and airborne precautions by the Health Care Providers caring for the infected patients were the key measures to be observed (W.H.O, 2020). Therefore, skills in the appropriate wearing of personal protective equipment and adherence to five moments of hand hygiene were and still are important in the fight against COVID-19.

However, the study conducted in Wuhan, China, reported 31% infected HCPs in the general ward, 17.5% in the emergency department, and 5% in Intensive Care Unit (ICU) in a non-communicable disease health facility,[36] during the initial outbreak, due to poor adherence to hand hygiene and inappropriate consistent use of personal protective equipment *(Wang et al., 2020).* According to the *MOH (2010)*, Infection Prevention and Control strategies to prevent or limit transmission in healthcare care settings include the establishment of an infection prevention and control committee, triage and source control of the suspected COVID-19 patients, five moments of hand hygiene, appropriate use of personal protective equipment. It is, therefore, imperative to adhere to the guidelines (MOH, 2021) and (MOH, 2020).

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusions

The officers who had worked for less than three years and were trained for less than two days had higher odds to report correct practice as opposed to their counterparts. This support skill decay phenomenon where knowledge acquired tends to wade off if not used after four months and sub subsequently. The respondents who were trained recently and practice the skills still had retained knowledge and skills from the training.

Majority of the health care providers adhered to 5 moments of hand hygiene and appropriate use of personal protective equipment like face mask to prevent drop form suspected individual which was the main mode of transmission for COVID-19.

Health product and technologies forms W.H.O. health building block, some of the supplies were available in inadequate supplies while some were perennially out of stock. Furthermore, it revealed the inadequacy compelled both Healthcare providers and patients to buy for themselves personal protective equipment such as face mask and gloves. From the finding it was realized that some respondents were not informed of the stock status of commodities in the facilities, which points to infrequent or lack of departmental meeting/briefs on stock status. Inadequate supplies (HPTs) perpetuate spread of the pandemic to health care workers, patients and their families.

The facility had the necessary mitigation strategies in place but some of the respondents were not aware of their existence and coordination structures. The facility had a fully functional Public Health Emergency Operation Centre with its contact number 0800721009 to report in case of suspected or confirmed COVID-19 case(s) printed on the wall, an emergency COVID-19 response committee that ensured referral

and follow up of clients with COVID-19, there were self-attestation forms at each service delivery points for health care providers' screening and triage at the main gate for screening everyone entering the hospital, but majority of the respondents acknowledge the infection prevention and control committee that carried out hand hygiene audits frequently. The respondent who were aware of the coordination and existence of the mitigation strategies had higher odds to report correct practice as per the expected standards of practice unlike their counterparts.

Given the gaps identified in the study on knowledge, skills, HPTs and mitigation practice were also identified in the Dubai study (Albahri *et al.,* 2020). The use of Azithromycin was so conspicous to manage viral disease (60.1%) this potrayed some level of knowledge deficit, anxiety and desperate state among health care providers. The study revealed that management of COVID-19 requires deliberate concerted effort and synergy to train, avail HPTs, strict adherence to IPC guidelines: appropriate use of Personal Protective Equipment's and adherence to the 5 moments of hand hygiene.

6.2 Recommendations

From the foregoing conclusion the study recommends that the National training team at the Ministry of Health to update the COVID-19 training materials frequently on evidence based scientific studies from reputable organizations like WHO and CDC.

The Ministry of Health should to develop checklist of key essential Health Products and Technologies required in the management of COVID-19 and disseminate to all the Counties, as a guide to subsequent interventions in case of remerging condition.

The Department of Health and Sanitation, and the facility need to strengthen policy on regulation, establish standard operating procedures (SOPs) for sharing Health Products and Technologies (HPTs) stock status on daily and/or weekly basis, to facilitate

prompt informed decision-making process and promote correct practice in management of COVID-19.

The Ministry of Health and Department of Health and Sanitation should to strengthen operationalization of the coordination structures in management of COVID-19 such as; infection prevention and control, rapid emergency response team, attestation forms, screening of patients and Healthcare providers, communication structures and availability of Health Products and Technologies to promote correct practice in management of COVID-19.

The Ministry of Health and the Department of Health and Sanitation should customize and disseminate the COVID-19 policy documents and guidelines to suit facility needs to ease implementation at the facility.

There was need to frequently conduct drills to instill skills among healthcare providers on appropriate use of face mask and 5 moments of hand hygiene and audit the practice periodically by the Department of Health and Sanitation Busia County.

Further in-depth study on impact of strategies employed to fight COVID-19, and COVID-19 vaccine hesitancy among health care providers.

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APPENDICES

1C/2016/HNR/G/2022/01

APPENDIX I: INFORMED CONSENT

My name is…….. I am conducting a study on '**ASSESSMENT OF COVID-19 MANAGEMENT BY HEALTHCARE PROVIDERS IN BUSIA COUNTY REFERRAL HOSPITAL, BUSIA COUNTY, KENYA.'** The infection affects everybody irrespective of someone's social status and it has claimed live across the globe.

You have been selected to assist in the research study by responding to the questions intended for this study. The information you provide shall be treated with utmost confidentiality, to be used for the purpose of the study only.

It is anticipated that the session may take 30 minutes of your time; the questions shall include those related to COVID-19 preparedness. The data collection tool is divided into several sections to address different content in relation to COVID-19.

It is expected that you complete all the questions to enhance the validity and reliability of the findings. Your participation in the study is voluntary. You may skip any question you are not comfortable with, and it is your right to stop your participation in the study at any time. However, finding from the study shall be used to improve the provision of health care services geared to curb the rapidly spreading menace (COVID-19) both in healthcare set-ups and community.

Respondent Agreement - informed consent form

The research agenda has been explained to me. I had an opportunity for my questions to be answered. I therefore voluntarily consent to participate in the study.

_____ _____

Respondent signature Date

SQ/2016/HNR/G/2022/01

APPENDIX II: QUESTIONNAIRE FOR HEALTH CARE WORKERS

Date: …….

Starting time: …….

Ending time: ……...

	SOCIO-DEMOGRAPHIC	
1	What is your gender?	1 = Male 2 = Female 3 = Transgender
2	What is your age in completed years?	1 = Below 25 years 2 = Between 26 to 35 years 3 = Between 36 to 45 years 4 = Between 46 to 55 years 5 = Above 55 years
3	What is your religion?	1 = Christian 2 = Muslim 3 = Atheist
4	Which cadre are you?	1 = Nurse 2 = Medical Officer 3 = Clinical Officer 4 = Laboratory staff 5 = Mortician 6 = Others
5	Currently which service delivery points are you stationed at?	1 = Outpatient 2 = Maternal child health 3 = Inpatient medical 4 = Inpatient surgical 5 = Maternity 6 = Laboratory 7 = Mortuary 8 = Other specify …….

6	How long have you worked in this service delivery point in completed years?	1 = less than 1 year 2 = between 1 and 3 years 3 = between 4 and 6 years 4 = between 7 and 10 years 5 = above 11 years
	KNOWLEDGE OF HEALTH CARE WORKERS TRAINING	
7	Are you trained/sensitized in recognition of COVID-19 symptoms?	1 = Yes 2 = No
8	How long did your training/sensitization take? (In completed days)	1 = 1 day to 2 days 2 = Between 3 to 4 days 3 = Between 5 to 6 days 4 = More than 7 days 99 = Not applicable
9	What are the cardinal symptoms of COVID-19? (Pick what is your appropriate response)	1 = Coughing 2 = Difficulty in breathing 3 = Fever 4 = Diarrhea 5 = General body malaise 6 = Loss of smell 7 = Loss of taste
10	How do you manage patients with COVID-19?	1 = Administer antibiotics 2 = Administer antiviral 3 = Administer anti-fungal 4 = Administer herbal concoction 5 = Observe Infection prevention and Control Measure 6 = Isolate from the general public 7 = Send for home-based care 8 = Administer Vitamin C 9 = Administer Zinc tablets

		10 = Administer sanitizer 11 = Administer liquid soap 12 = Oxygen 13 = Others specify …… ……..…… …….
11	What are the five moments of hand hygiene?	1 = After visiting the toilet 2 = Before eating 3 = Immediately you enter the hospital 4 = Before entering patient ward/room 5 = Before the aseptic procedure 6 = After handling patient fluid 7 = After touching the patient environment 8 = Before leaving patient ward/room
12	What are examples of Key personal protective equipment for the prevention of COVID-19 transmission?	1 = Mask 2 = Gown 3 = Apron 4 = Goggles 5 = Face shield 6 = Gumboot 7 = Hair Cover 8 = Gloves 9 =Bucket for IPC 10 = Bucket for waste bin 11 = Bin liners 12 = other specify …… ……..…… ……

	Prevention practices	
	For the following questions, please quantify the frequency with which you wore PPE, as recommended: ▪ "Always, as recommended" should be considered as wearing the PPE when indicated more than 95% of the time; ▪ "Most of the time" should be considered 50% or more, but not 100%; ▪ "Occasionally" should be considered 20% to under 50%; and ▪ "Rarely" should be considered less than 20%.	
13	Have you ever interacted with a COVID-19 patient?	□ Yes □ No
13 a	If 'Yes', how many on average	……
	If "No", kindly proceed to question 31 (mitigation section)	
	Preventive practices	
13 b	During the period of health care interaction with the COVID-19 patient(s), did you wear any personal protective equipment (PPE)? If Yes, continue with question 30 b (i) If No, move to question 31	□ Yes □ No
13 b. i	Single-use gloves	□ Always, as recommended □ Most of the time (50% or more but not 100%) □ Occasionally (20% to fewer than 50%)

		□ Rarely (less than 20% of the time)
13 b. ii	Medical mask	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 b. iii	Face shield or goggles/protective glasses	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 b. iv	Disposable gown	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 c	During the period of health care interaction with the COVID-19 patient(s), how often did you remove and replace your PPE according to the protocol (for example, when your medical mask became wet, did you dispose of the wet PPE in the waste bin, perform hand hygiene, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 d	During the period of health care interaction with the COVID-19 patient(s), how often did you perform hand hygiene before touching the COVID-19 patient? NB: Irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 e	During the period of health care interaction with the COVID-19 patient(s), how often did you perform hand hygiene before any clean or aseptic procedure was performed (for example, inserting a peripheral vascular catheter, urinary catheter, intubation, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely

13 f	During the period of health care interaction with the COVID-19 patient(s), how often did you perform hand hygiene after exposure to body fluid?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely □ No exposure to body fluid during that period
13 g	During the period of health care interaction with the COVID-19 patient(s), how often did you perform hand hygiene after touching the COVID-19 patient(s)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
13 h	During the period of health care interaction with the COVID-19 patient(s), how often did you perform hand hygiene after touching the COVID-19 patient's surroundings (bed, door handle, etc.)? Note: This is irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely

	HEALTH PRODUCTS AND TECHNOLOGY	
14	Does the facility have a process to request additional supplies?	1 = Yes 2 = No 99 = Don't Know
15	Are you able to estimate the consumption rate per week for critical supplies including Personal Protective Equipment, hand hygiene supplies, and disinfectant materials? If No or Don't know, respond to question 16 then skip to question 31	1 = Yes 2 = No 99 = Don't know
16	Does the facility have a hand hygiene program for monitoring hand hygiene compliance by all cadres of healthcare workers?	1 = Yes 2 = No 99 = Don't know
	Availability of the following supplies to last for 2 months?	

17	Utility gloves	1 = Yes 2 = No 99 = Don't know
18	Gown	1 = Yes 2 = No 99 = Don't know
19	Apron	1 = Yes 2 = No 99 = Don't know
20	Eye protection (face shields or goggles	1 = Yes 2 = No 99 = Don't know
21	Face masks	1 = Yes 2 = No 99 = Don't know
22	N95, FFP2, or equivalent respirators	1 = Yes 2 = No 99 = Don't know
23	Alcohol-based hand rub	1 = Yes 2 = No 99 = Don't know
24	Liquid Soap	1 = Yes 2 = No 99 = Don't know
25	Hospital-grade disinfectants (e.g. sodium hypochlorite)	1 = Yes 2 = No 99 = Don't know
26	Paper towels	1 = Yes 2 = No 99 = Don't know
27	Bin liners (black, Yellow, and Red)	1 = Yes

		2 = No 99 = Don't know

	Equipment	
28	Color-coded waste bin buckets	1 = Yes 2 = No 99 = Don't know
29	Thermo-gun	1 = Yes 2 = No 99 = Don't know
30	Safety boxes	1 = Yes 2 = No 99 = Don't know
	Mitigation	
31 a	Does the facility have an IPC focal person in place? (If the answer is Yes, then answer 31 b If No or Don't know, skip 31 b).	1 = Yes 2 = No 99 = Don't know
31 b	If yes, specify which cadre?	……
32	Does the facility have an IPC committee in place?	1 = Yes 2 = No 99 = Don't know
33	Does the facility have an emergency response plan for COVID-19 or other respiratory pathogens in place?	1 = Yes 2 = No 99 = Don't know
34	Does the facility have a COVID-19 emergency committee?	1 = Yes 2 = No 99 = Don't know
34 a	Have you ever filled an attestation form in your department/unit?	1 = Yes 2 = No 99 = Don't know

34 b	Are patients in your department/unit screened for COVID-19?	1 = Yes 2 = No 99 = Don't know
34 c	Do you have hard copies of policy guidelines on COVID-19	1 = Yes 2 = No 99 = Don't know

	Communication and reporting	
35	Are you aware of the facility-designated focal person(s) who is available at all times to file reports of suspected or confirmed COVID-19 cases?	1 = Yes 2 = No 99 = Don't know
36	Do you have the phone number(s) of facility focal person(s) available at all hours to report suspected or confirmed COVID-19 cases?	1 = Yes 2 = No 99 = Don't know
37	Do you know COVID-19 focal person(s), facility leadership, and/or emergency committee or health authorities at the national or County level to report suspected or confirmed COVID-19 cases?	1 = Yes 2 = No 99 = Don't know
	Screening and Triage Area	
38	Does your facility have a screening or triage area for COVID-19?	1 = Yes 2 = No 99 = Don't know
39	Is there a designated person to work at the screening or triage area in your facility?	1 = Yes 2 = No 99 = Don't know
40	Do you have a screening checklist at the triage?	1 = Yes 2 = No 99 = Don't know
41	Any recommendations on COVID-19 management?	

Adapted from W.H.O. Facility Readiness Assessment tool and Healthcare Worker Risk Assessment tool.

APPENDIX III: KEY INFORMANT INTERVIEW

Socio-demographic

1. Which cadre are you?
2. How long have been serving at Busia County Referral Hospital?
3. What are your main responsibilities?

Knowledge

1. A) Have you been trained on IPC and COVID-19? Yes /No

   B) If Yes, what are some of the sectioned you covered?

2. How many of your staff have been trained on IPC/COVID-19 out of the total staff you have?
3. Which service delivery points can one be screened for COVID-19 in the hospital?
4. What would you require to manage COVID-19 patients?
5. Probe for more information.

Health products and technologies

1. Which health product and technologies (HPTs) do you require to manage COVID-19 infection?
2. How do you acquire your health product and technologies (HPTs)/supplies?
3. Which of the mentioned HPTs are currently available to manage COVID-19?
4. Which of the available HPTs can last you for two weeks?
5. What do you recommend concerning supplies of HPTs?
6. Probe for more information.

Mitigation measures

1. In case of surge of COVID-19 patients, how are you going to handle them?
2. Please explain any measures that have been put in place to manage COVID-19 infection?

3. Do you have any tool(s) to monitoring health workers and/or patient for COVID-19 infection?
4. Any recommendations you have on management on COVID-19?

Prevention practices

1. A) Have you ever come in contact with a COVID-19 Suspected/ probable or confirmed patient? Yes/No

   B) If Yes, kindly tell me where was the patient, how did you manage the patient and the outcome?
2. Probe for more information.

APPENDIX IV: APPROVAL LETTER FROM DIRECTORATE OF POSTGRADUATE STUDIES

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

12th October, 2021

Tito Tabu Kwena,
HNR/G/11/2016,
P.O. Box 190-50100,
KAKAMEGA.

Dear Mr. Tabu,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: ***"Assessing Capacity of Busia County Referral Hospitals in the Management of Covid–19 Infection –Busia County, Kenya"*** and appointed the following as supervisors:

1. Dr. Tecla Sum Psusma - SONMAPS, MMUST
2. Dr. Vincent Kiprono Mukthar - Egerton University

You are required to submit through your supervisor(s) progress reports every three months to the Director of Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Nursing & Midwifery Graduate Studies Committee and Chairman, Department of Nursing Research, Education and Management and Graduate Studies Committee. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

Prof. Stephen O. Odebero, PhD, FIEEP
DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

APPENDIX V: APPROVAL LETTER FROM IERC

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

Tel: 056-31375
Fax: 056-30153
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke

P. O. Box 190,
50100.
Kakamega,
KENYA

Institutional Ethics and Review Committee (IERC)

REF: MMU/COR: 403012 Vol 5 (01)

Date: December 16th, 2021

To: Mr. Tito Tabu Kwena

Dear Sir,

RE: CAPACITY OF BUSIA COUNTY REFERRAL HOSPITAL IN MANAGEMENT IF COVID-19 INFECTIONS IN BUSIA, KENYA.

This is to inform you that ***Masinde Muliro University of Science and Technology Institutional Ethics and Review Committee (MMUST-IERC)*** has reviewed and approved your above research proposal. Your application approval number is **MMUST/IERC/038/2021.**The approval period is ***December 16th, 2021-December 16th, 2022.***

This approval is subject to compliance with the following requirements;

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

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

Yours Sincerely,

Prof. Gordon Nguka
Chairperson, Institutional Ethics and Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

APPENDIX VI: APPROVAL LETTER FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **784950**

Date of Issue: **21/December/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Tito Tabu Kwena of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Busia on the topic: CAPACITY OF REFERRAL HOSPITAL IN THE MANAGEMENT OF COVID19 INFECTION BUSIA COUNTY, KENYA for the period ending : 21/December/2022.

License No: **NACOSTI/P/21/15030**

784950

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
5. The License does not give authority to tranfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of the research
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

APPENDIX VII: REQUEST TO CONDUCT STUDY FROM BUSIA COUNTY

Tito Tabu Kwena
School of Nursing, Midwifery and Paramedical Sciences
P.O. Box 190 -50100
Kakamega (K)
5th January 2022

The County Director of Health
Department of Health and Sanitation
P.O. Box 1040 – 50400
Busia (K)

COUNTY DIRECTOR OF HEALTH
05 JAN 2022
BUSIA COUNTY

Appmved. to share the study findings.
07.01.2021

Dear Sir/Madam,

RE: REQUEST TO CONDUCT STUDY AT BUSIA COUNTY REFERRAL HOSPITAL

In reference to research license reference number 784950 by NACOSTI herein attached, I hereby request to conduct the research study in Busia County Referral Hospital in Matayos Sub County on **'CAPACITY OF REFERRAL HOSPITAL IN THE MANAGEMENT OF COVID-19 INFECTION - BUSIA COUNTY, KENYA' for my Master of Science in Nursing study**.

The study has the following objectives to accomplish:

1. To determine competencies of front-line health professionals to manage COVID-19 at Busia County Referral Hospital.
2. To determine the knowledge of health care workers to manage COVID-19 in Busia County Referral Hospital
3. To establish the health product and technologies (HPT) required to manage COVID-19 infection at Busia County Referral Hospital.
4. To determine the mitigation strategies put in place to manage COVID-19 infection at Busia County Referral Hospital.

A sample of 153 study subjects (98 nursing, 8 medical officers, 21 laboratory staff, 23 clinical officers and 3 morticians) who get in direct contact with the COVID-19 infection in their line of duty, shall be interviewed using structured questionnaire and key informant guide for a maximum period of two months.

The information derived from the study shall be disseminated to the relevant institution and forums. In addition, it shall be used as a resource mobilization tool, to improve or maintain the quality of health care service provision in the management of COVID-19, as captured in the Department of Health and Sanitation mission statement and the Bill of rights enshrined in the Constitution of Kenya.

I hereby seek your authority to pursue the venture. Thank you for your continued support.

Your faithfully,

Tito Tabu Kwena

APPENDIX VIII: REQUEST FOR PILOT STUDY

Tito Tabu Kwena
School of Nursing, Midwifery and Paramedical Sciences
P.O. Box 190 -50100
Kakamega (K)
5th January 2022

The Hospital Administrator
Holly Family Nangina Mission Hospital
P.O. Box 57 – 50406
Funyula – Samia Busia (K)

HOLY FAMILY MISSION HOSPITAL-NANGINA
P.O. Box 57-50406-FUNYULA.
SAMIA- KENYA.
PHONE No: 0710929822

Dear Sir/Madam,

RE: REQUEST TO PILOT/PRE-TEST DATA COLLECTION TOOLS

In reference to research license reference number 784950 by NACOSTI herein attached, I hereby request to pre-test data collection tools to be utilized in research study in Busia County Referral Hospital in Matayos Sub County on **'CAPACITY OF REFERRAL HOSPITAL IN THE MANAGEMENT OF COVID-19 INFECTION - BUSIA COUNTY, KENYA' for my Master of Science in Nursing study.**

The study has the following objectives to accomplish:

1. To determine competencies of front-line health professionals to manage COVID-19 at Busia County Referral Hospital.
2. To determine the knowledge of health care workers to manage COVID-19 in Busia County Referral Hospital
3. To establish the health product and technologies (HPT) required to manage COVID-19 infection at Busia County Referral Hospital.
4. To determine the mitigation strategies put in place to manage COVID-19 infection at Busia County Referral Hospital.

A sample of 153 study subjects (98 nursing, 8 medical officers, 21 laboratory staff, 23 clinical officers and 3 morticians) who get in direct contact with the COVID-19 infection in their line of duty. They shall be interviewed using structured questionnaire and key informant guide for a maximum period of two months.

The information derived from the study shall be disseminated to the relevant institution and forums. In addition, it shall be used as a resource mobilization tool, to improve or maintain the quality of health care service provision in the management of COVID-19, as captured in the Department of Health and Sanitation mission statement and the Bill of rights enshrined in the Constitution of Kenya.

I hereby seek your authority to pursue the venture. Thank you for your continued support.

Your faithfully,

Tito Tabu Kwena

APPENDIX IX: PERMISSION TO CONDUCT RESEARCH

DEPARTMENT OF HEALTH AND SANITATION
OFFICE OF THE MEDICAL SUPERINTENDENT

Telegram: 'MEDICAL', Busia
Telephone: 055 22126, /22136
Fax: 05522136
E-mail: busiahospital@gmail.com
When replying please quote

OFFICE OF THE MEDICAL SUPERINTENDENT
BUSIA COUNTY REFERRAL HOSPITAL
P. O. BOX 87
BUSIA (K)

REF. : BSA/CRH/R/5 VOL.II/113

Date: 7th January, 2022

TITO TABU KWENA
SCHOOL OF NURSING, MIDWIFERY AND PARAMEDICAL SCIENCES
P.O. BOX 190 – 50100
KAKAMEGA

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT RESEARCH

I am pleased to inform you that permission is hereby granted in respect of your research request for the study titled: **CAPACITY OF REFERRAL HOSPITAL IN THE MANAGEMENT OF COVID-19 INFECTION – BUSIA COUNTY, KENYA.**

The department of health acknowledges the importance of the study on informing health policy formulation and programming.

I would also like to nominate Violet Omoto – Nursing Manager of Telephone no. 0722 365 603 as the focal person to work closely with you during the study period.

We wish you all the best

Thank you.

Yours faithfully

MEDICAL SUPERINTENDENT
07 JAN 2022
P.O. Box 87, 50400
BUSIA (K)
BUSIA COUNTY REFERRAL HOSPITAL

DR. NAMDALA [illegible]
MEDICAL SUPERINTENDENT
BUSIA COUNTY REFERRAL HOSPITAL.