Knowledge, Perception of Risk and Preparedness for COVID-19 among Healthcare Workers in Kenya

Hafso Mohamed Abdulle

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DECLARATION

I declare that this is my original work and has not been presented to any other institution

Investigator

Hafso Mohamed Abdulle, MBChB;

Signature: .....Date: .....06/06/2021.....

This research project has been submitted for examination with our approval as University Supervisors

Supervisors:

Prof. Julius Oyugi Otieno; BSc, MSc, Ph.D.;

Department of Medical Microbiology,

School of Medicine, University of Nairobi

Signature: ....Date: .....19th July, 2021.....

Dr. Moses Muia Masika; MBChB, MSc.:

Department of Medical Microbiology and KAVI Institute of Clinical Research

College of Health Sciences, University of Nairobi

Signature: .....Date: ..... 19 JUL 2021.....

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LIST OF ACRONYMS

CoV	-	Coronavirus
SARS	-	Severe Acute Respiratory Syndrome
MERS	-	Middle East Respiratory Syndrome
ACE2	-	Angiotensin-Converting Enzyme 2
WHO	-	World Health Organization
COVID-19	-	Coronavirus Disease 2019
2019-nCoV	-	2019 novel Coronavirus
HCW	-	Health Care Workers
PPE	-	Personal Protective Equipment
IPC	-	Infection Prevention Control
MoH	-	Ministry of Health
UoN	-	University of Nairobi
KNH	-	Kenyatta National Hospital
UNITID	-	University of Nairobi Institute of Tropical and Infectious Diseases
REDCap	-	Research Electronic Data Capture

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Abstract

Background

COVID-19 is highly contagious and healthcare workers are at a higher risk of contracting the disease since they are at the frontline in an effort to control and manage it. Inadequate knowledge on COVID-19 and poor practices and preventive measures among healthcare workers may lead to the rapid spread of the disease thereby limiting the ability to manage the COVID-19 pandemic.

The objective of this study was to assess the level of knowledge, risk perception, and preparedness for COVID-19 among healthcare workers in Kenya.

Methods

A cross-sectional study was conducted from December 2020 to January 2021 to assess healthcare workers' level of knowledge, perception of risk and preparedness to handle COVID-19 in Kenya. A link to an online self-administered questionnaire hosted on the Research Electronic Data Capture application (REDCap) was disseminated to health workers across the country via text messages, emails and social media. We collected data on demographics, knowledge, perception of risk and preparedness for COVID-19 and vaccine acceptance. Data collected in REDCap was then transferred to SPSS version 20 for analysis. Bivariate correlation analyses were used to determine associations between variables. P-value of <0.05 was considered statistically significant.

Results

A total of 997 participants including doctors (34%), nurses (26%), clinical officers (21%) and lab technologists (12%) were enrolled in the study. About half (53%) of the participants were female. The mean age was 36.54 years (SD = 8.31) and 46% of the participants were aged between 31-40years. About half (55%) of participants worked in county facilities and 64% of the respondents had at least bachelor's degree. The overall knowledge score of health workers for COVID-19 was 80%. Most of the health workers (89%) perceived that they were at high risk of infection. Seventy-two percent of the participants felt that they were either partially or fully prepared to handle patients with COVID-19. Overall, 71% of all health workers would take a vaccine if provided free by the government.

Conclusion

Knowledge of health workers on transmission, clinical manifestations and risk factors for development of severe COVID-19 was good. Majority of the health workers perceived the risk of infection with COVID-19 as high and a significant number felt that they were not fully prepared to handle the pandemic.

1.0 INTRODUCTION

Coronaviruses are infectious disease-causing viruses that range from the common cold to Severe Acute Respiratory Syndrome (SARS). There are five genera of CoV and they include, β, α, ð and γ-CoV. While birds are found to be infected by ð and γ-CoV, the mammals can be infected by both α and β-CoV. Previously, six CoV were found to affect humans. These viruses had low pathogenicity hence similar to common cold since they presented with mild respiratory symptoms (Guo, Y. R.,2020).

About 8,000 cases and 916 deaths were recorded during a SARS outbreak in 2002-2003 while between 2012 and August, 2017, the Middle East respiratory syndrome (MERS) resulted to at least 2066 confirmed cases and 720 deaths (Yin, Y., & Wunderink, R. G., 2017). MERS-CoV and SARS-CoV are two of the already known β-CoV which lead to respiratory infections that are severe and fatal. In December 2019, in Wuhan, China, a number of cases of pneumonia of unknown origin were reported and a new strain of β-CoV was soon after identified as the cause (Yin, Y., & Wunderink, R. G., 2017). The genome sequence of this new β-coronavirus (SARS-CoV-2) that was isolated from a patient in a short time on 7 January 2020 was found to be 96.2% identical to SARS-CoV. It is thought that for humans to be infected, SARS-CoV-2 might have originated from bats to humans through intermediate hosts that are not known yet (Guo, Y. R.,2020). Initially, on 12 January 2020, the coronavirus disease was named as 2019 novel coronavirus (2019-nCoV), which later on 11 February 2020, was officially named as coronavirus disease 2019 (COVID-19) by the WHO (Guo, Y. R.,2020). To prevent COVID-19 from rapidly spreading, WHO asked for a united effort of all countries as it declared on 30 January 2020 this disease to be a Public Health Emergency of International Concern (PHEIC) (WHO,2020).

The COVID-19 pandemic is spreading at a very high rate. 210 countries had been affected by this virus as of 16 April 2020 and thereby infecting 1,991,562 people out of the world population (WHO, 2020). As of that date, 130,885 deaths were recorded. Italy, the USA, Spain, UK, France, Turkey, Germany, and Belgium were some of the countries in the world that had been most severely affected by COVID-19 (WHO, 2020). 52 countries in Africa had been affected by April 14, 2020, registering a total of 11,853COVID-19 cases that were confirmed with 550 deaths being reported (WHO, 2020). As of 16 April 2020, there were 228 confirmed cases of COVID-19 in Kenya with 9 deaths being reported by the Ministry of Health (MoH) of Kenya.

Transmission of COVID-19 from human to human occurs through direct contact, droplets (Borak, J., 2020) and this disease has an incubation period of 2 days to 2 weeks. For control of the COVID-19 infection, social distancing, wearing of masks, cleaning of hands etc., are some of the preventive measures that have been emphasized by WHO.

COVID-19 has caused widespread panic and fear across the globe. Perception, knowledge, and attitude among other factors have played a role in causing this panic and fear in people. Pure emotion of fear represents an individual's removal from an immediate risk position (Harper, C. A., et al. (2020). Healthcare workers are at a higher risk of exposure since some of the patients handled may be infected, some without any symptoms

(Chen, X., et al. 2020). At the end of January, both the WHO and the CDC, in order to prevent and control this disease published vital information for use by HCWs (Bhagavathula, A., et al. 2020).

A cross-sectional study survey by Bhagavathula, A., *et al.* (2020) reported that sessions meant for training and materials containing information on COVID-19 were written and put online in different languages, raising awareness, preparedness training of HCWs and they are some of the strategies employed by the WHO to strengthen prevention and curb COVID-19. This disease has endangered both the life of the patients and HCWs and as of April 12, 2020, WHO had reported that there were a total of 22,000 HCWs infected with COVID-19 in 52 countries (WHO, 2020).

A cross-sectional study where data was collected by way of conducting online survey using REDCap application was utilized. The data collected was analyzed and then interpreted to provide an understanding of the research study on the knowledge, perceived risk and preparedness of HCWs on COVID-19 across the country.

The study sought to collect primary quantitative data on the healthcare workers' knowledge on the origin, clinical manifestation, transmission, treatment and fatality of COVID-19. Data was also collected on risk perceptions of healthcare workers and it involved their perceptions on the risk of infection for instance on healthcare workers and on average Kenyans, their concerns on contacting and infecting their family members, and their concerns on working with colleagues that have recovered from COVID-19. The benefits that arise from this research study include an increase in confidence by HCWs on response to emergencies of diseases such as this in the future as well as improved competence of the HCWs in responding to diseases that are highly communicable. This will be as a result of the information available, increased training and adequacy of equipment to be used during such incidents.

2.0 LITERATURE REVIEW

2.1 Introduction

With the emergence of COVID-19, there is a need to put into perspective whether Kenya, through its HCWs is ready to handle a disease with such a magnitude as COVID-19. The study focused on the preparedness, knowledge, attitude, and perceptions of HCWs in Kenya towards this new viral infection. For hospitals to respond to various threats of infectious diseases, the expertise of HCWs and the guidance from the programs for infection prevention and control have to be relied upon.

2.2 Knowledge of HCWs on COVID-19

Knowledge and attitudes of people affect and thus influence the seriousness and extent of adherence of these people to the measures of personal protection and the clinical outcome. In previous studies, HCWs have been found to exhibit high degree of knowledge on emergent diseases or infections. For instance, for the Romanian HCWs, attitude, knowledge and perception of the Ebola disease that had emerged in Romania, it was found out that they were generally well informed about the disease (Pitigoi, D.et al, 2018). It is crucial that the COVID-19 clinical symptoms are known and well understood, this is even as the clinical symptoms are indicated as being nonspecific (Li, Q et al, 2020). According to Bhagavathula, S. A., et al. 2020, the study that was carried out revealed that the healthcare workers had insufficient knowledge on COVID-19. However, the study also showed that in terms of prevention of transmission of COVID-19, there were positive perceptions. To understand this disease, 33% of the HCWs involved in the study were found to rely on official government websites for information as their primary source. The level of knowledge of HCWs was improved due to the updates given by the government thus, leading to positive implication (Bhagavathula, S. A., et al. 2020). In comparison, in terms of knowledge and practices, both the rural and urban health centers were found not to have considerable difference overall. However, HCWs from urban areas were found to have scored slightly lower than their counterparts in precautionary practices such as doing a physical exam on suspected case (Raab. M., et al. 2020).

The study collected data on the level of knowledge of healthcare workers on the origin of COVID-19, clinical manifestation, the transmission mechanism, treatment and the rate of fatality. It is therefore important that the knowledge and attitudes of HCWs are studied so that necessary departments can use the information gathered to ensure easy and proper control of emerging diseases.

2.3 Preparedness of HCWs for COVID-19

The general public has responded to the COVID-19 pandemic from its onset by considering some precautions to prepare for COVID-19. For instance, resources in the markets have been exhausted because of the increased use of masks as well as sanitizers (Feng et al., 2020). The health safety of HCWs has been endangered more than any other person due to the close contact during the caring of the patients and also due to the shortage of Personal Protective Equipment (PPE) in some facilities (WHO, 2020). The medical personnel are highly concerned about the lack of appropriate protective measures as observed in many countries. This has become

a cause of worry for HCWs especially in a country such as Kenya with densely populated cities like Nairobi and a fragile healthcare system.

This study sought to find out the perception of level of preparedness of the individual healthcare workers and the country as a whole. To determine this, the study factored in the availability of personal protective equipment, whether healthcare workers received any training on COVID-19 and the infection control as well as their readiness to handle COVID-19 patients. Good practices for prevention of emerging diseases were found to be equal between healthcare respondents who were trained in Infection Prevention Control (IPC) than those who were not (Raab. M., *et al.* 2020). Healthcare workers are important care providers especially when outbreaks of infectious diseases occur. Fear of contacting the disease themselves and even spreading it to their families is reported by HCWs most of the time (Gee. S., &Skovdal.M., 2017). Therefore, there is need to stockpile the necessary equipment and provide all the necessary training for diseases that seem to inflict fear to the general population as well as HCWs.

2.4 Risk perceptions and attitude of HCWs towards COVID-19

The severity and likelihood are the two components that are involved in determining risk perception. Emotion such as concern and worry, and control illusions are some of the psychological components that can be used to influence and estimate likelihood. On the other hand, severity is estimated by the perception of how a disease can be severe e.g., morbidity and mortality of a given disease. A person can develop an illusion of control over circumstances which may have adverse effects and as a result, the person gets more relaxed and thereby gets involved in risky affairs. Therefore, unrealistic optimism may arise where the person erroneously estimates that his/her counterpart's risk of being affected by undesirable circumstances e.g. diseases is higher than his/her personal risk (Sridhari, S.,et al, 2016). HCWs are not spared from this reality since they also experience psychological pressures.

A study in Hong Kong revealed that most of the participants (97%) were very worried about COVID-19. Their daily routines were affected according to them and therefore their anxiety levels had risen. The study suggested that as new incidences and new cases were reported, more and more anxiety became evident in the community over time (Kwok, K. O., et.al. 2020). With this in mind, there is need to understand the anxiety and worry that is experienced by HCWs and thus understand their risk perceptions on COVID-19.

2.5 Conceptual Framework

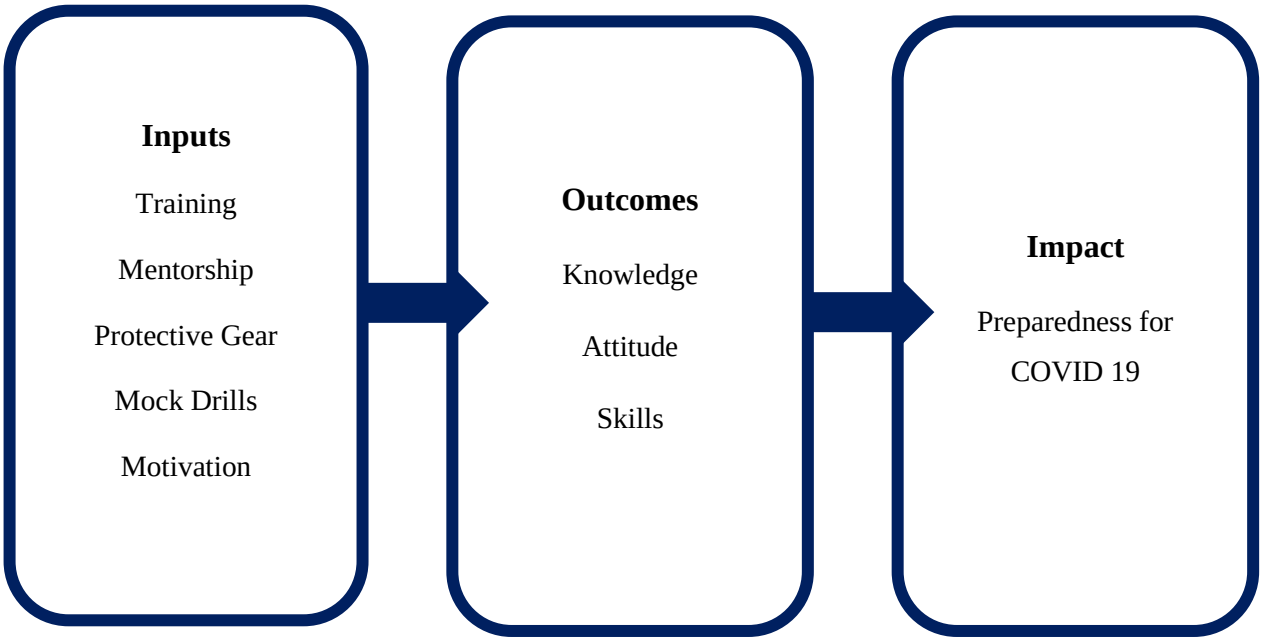


Figure 1: Conceptual Frame on Preparedness for Covid-19 among healthcare workers in Kenya

In order to prepare healthcare workers for Covid-19, several inputs are required. These include training on Covid-19 management and infection control, supply with tools for management of the disease including personal protective gear and putting measure in place to ensure each health facility is adequately prepared to handle patients. Such efforts would arm the healthcare workers with knowledge, skills, attitudes and tools required to combat COVID-19.

2.6 Rationale

Generally, there are people who underestimate risks that come with certain events that could be catastrophic, they exhibit optimistic biases and as a result they show less interest in taking action in preventive measures put in place by experts. Accepting risk and perceiving it well can be achieved by putting in place personal control which plays a role that is important in management of emergence of diseases such as COVID-19. More efforts in terms of relaying correct information to boost the knowledge of HCWs and the general public needs to be put in place to avoid misinformation. This can be achieved by carrying out targeted campaigns on HCWs as this threat of COVID-19 continues to emerge worldwide. Preparedness to handle emergence of diseases such as COVID-19 need to be emphasized in healthcare sector by both the ministry of health as well as the HCWs associations to ensure that there is enough equipment such as PPE and training in order to boost confidence in beating diseases at the times of outbreak. Previously, no study had been done in Kenya on perception of risk and preparedness and knowledge, and on the ministry of health's involvement in training activities of HCWs in relation to COVID-19. Therefore, this study on the knowledge, risk perceptions and the preparedness of the HCWs on COVID-19 in Kenya was designed to fill this gap.

2.7 Study questions

1. What is the perceived risk of infection with COVID-19 among healthcare workers in Kenya?

2. What is the level of knowledge of COVID-19 among healthcare workers in Kenya?

3. What is the perception of the level preparedness for COVID-19 among healthcare workers in Kenya?

2.8 Main objective

To determine level of knowledge, risk perception and preparedness for COVID-19 among healthcare workers (medical doctors, nurses, clinical officers, and lab technologists) in Kenya

2.9 Specific objectives

1. To assess perception of the risk of infection of COVID-19 among healthcare workers in Kenya

2. To assess the level of knowledge on COVID-19 among healthcare workers in Kenya

3. To assess the perception of the level of preparedness for COVID-19 among healthcare workers in Kenya

3.0 METHODOLOGY

3.1 Study design and period

An online cross-sectional study was conducted to assess healthcare workers' level of knowledge, perception of risk and preparedness to handle COVID-19 in Kenya. The study was conducted between December 2020 to January 2021. A self-administered questionnaire hosted on the Research Electronic Data Capture application (REDCap) was disseminated to HCWs across the country via text messages or email. The study participants were recruited using convenience sampling technique to achieve the desired sample size.

3.2 Study site

The study sites comprised of health facilities both the public and private hospitals throughout the country. We requested to use National professional associations such as Kenya Medical Association, Kenya medical practitioners and dentists board, Kenya medical laboratory technicians and technologist's board, Kenya National Union of Nurses and Kenya Clinical Officers Association networks to distribute the link to the online questionnaire to healthcare workers in various health institutions around the country.

3.3 Study population

All healthcare workers (medical doctors, nurses, clinical officers, and lab technologists) who work in Kenya. This study was carried out across the entire country. To enroll participants, the link to the online questionnaire was shared via text messages or emails through National professional associations for healthcare workers.

3.3.1 Inclusion criteria

- Healthcare workers (medical doctors, nurses, clinical officers, and lab technologists)
- HCWs who give consent for participation
- Working in Kenya

3.3.2 Exclusion criteria

Healthcare workers who submit partially filled questionnaires (<40% of all questions answered)

3.3.3 Sample Size

We used Fischer's formula $\left(n = \frac{Z^2PQ}{e^2}\right)$ confidence level (1.96) for 95%, with; estimated prevalence (p) = 50% to estimate the sample size for our study.

$$n = \frac{Z^2PQ}{e^2} = \frac{1.96^2 * 0.5(1-0.5)}{0.05^2} = 384; \qquad n = 384$$

However, we enrolled and collected data from a total sample size of 997 participants (health workers)

3.3.4 Sampling technique and Enrolment strategy

We used convenience sampling method to enroll healthcare workers into the study. This sampling method was used as it made it easier to access healthcare workers and it was convenient for this study. The sample we obtained was a relative reflection of the study population and it involved the four cadres of healthcare workers namely; medical doctors, nurses, laboratory technologists and the clinical officers in representative proportions. The link to the online questionnaire was shared through text messages and emails through National professional associations for healthcare workers. These associations have platforms for reaching their members which made it easier to reach the target population and the desired sample size. By sharing the link through text message, HCWs with limited internet access were also reached. The questionnaire was mounted online through the Research Electronic Data Capture (REDCap) application. This is a web-based application that was developed by Vanderbilt University to capture data for clinical research and create databases. The link was used to connect the participant to an online informed consent form where only those HCWs who consented to participate were able to access the questionnaire. Enrolment was done sequentially until the target sample size was obtained.

3.3.5 Variables

A variable is a feature of an object or phenomenon which takes various values.

Dependent variables; these are used to measure or describe the problem that this study focuses on and they include:

- Level of Knowledge of measures on effective prevention
- Awareness of COVID-19 and knowledge about it
- Perception of risk

Independent variables – these are used to measure or describe factors which are assumed to affect the problem of study and they include:

- Demographics (age, sex, Profession, experience in years)
- County of work
- Type of facility (private, public, level of hospital, etc.)
- Any training on COVID-19

3.4 Study Procedure

3.4.1 Data Collection

Primary data were collected by use of a questionnaire that contained both open-end and closed questions which ascertained the knowledge level, perception of risk and preparedness of the healthcare workers on handling the COVID-19 pandemic. Because of the nature of COVID-19 pandemic, to minimize the risk of COVID-19

transmission during the conduct of this study, the questionnaire was administered online via the Research Electronic Data Capture application (REDCap). This minimized the need for travelling or getting into close contact with participants. Transmission through handling of paper was also avoided. Participants were not put at any risk of contracting covid-19 while filling the questionnaire since they could do it at their own time and at any preferred location and neither did they need to come into contact with the investigators or with other participants. Healthcare workers were sent a request to participate in the study through a text message or by email. A link to the questionnaire hosted on REDCap application was attached to both the text message and the email. The questionnaire contained five sections (demographics, knowledge, perception of risk, preparedness for COVID-19 and vaccine acceptance). The knowledge section had questions on clinical features of COVID-19, risk factors and fatality rate. On the other hand, the section on risk perception explored the perception of risk of COVID-19 to the country, health care workers, self and family while the preparedness section had questions on training, supplies and confidence. The data collected from the participants on REDCap application were then transferred to the IBM SPSS Statistical Software version 20 for analysis.

3.5 Pilot survey, validity and reliability

We used a pilot survey of the questionnaire on 20 masters' students from the University of Nairobi Institute of Tropical and Infectious Diseases (UNITID). The students were drawn from various cadres of healthcare workers – nurses, medical doctors, clinical officers, and medical lab scientists. This enabled us to test whether the questionnaire is user-friendly and enabled us to assess the validity of the data collected. We tested the reliability of the questions in the questionnaire to check on their clarity in order to produce consistent results when measuring the same study phenomenon. This helped us to detect and correct any questions that may have been ambiguous before using the questionnaire in the final study.

3.6 Data management

IBM SPSS Statistics Software was utilized for data analysis. This included use of Univariate analysis using frequencies or proportion or as a measure of central tendency: bivariate analysis where assessment of the relationship between independent and dependent variables were factored. This analysis utilized the use of chi-square for comparison between expected and observed frequencies, and t-test for the comparison of the differences in the mean of the dependent variables between two groups to test association.

3.7 Ethical considerations

This protocol was submitted to KNH-UoN Ethics and Research Committee for review. We sought for approval to conduct the study from UoN-KNH ERC before sharing the consent form and the questionnaire to collect data from the respondents. Once the study was approved (**P338/06/2020**), participants were provided with informed consent form through an online link on the REDCap application. After reading the consent form, the participants confirmed their decision to participate or decline to give consent by clicking a button. Those who consented clicked on "I AGREE TO PARTICIPATE IN THIS STUDY" and then were able to access the questionnaire. Those who declined to give consent clicked on "I DO NOT AGREE TO PARTICIPATE IN THIS STUDY" and were not able to access the questionnaire.

We requested the Ethics and Research Committee for authorization to obtain informed consent through the online platform which would not be documented through writing.

To ensure integrity and confidentiality, the data were hosted in a secure cloud server that was only accessed by the investigators. No identifiable information was collected, analyzed or reported. The questionnaires were filled anonymously. Handling and processing of the collected data was in compliance with the Kenya Data Protection Act No.24 of 2019. No personal identifiers were published or shared publicly.

3.7.1 COVID-19 Containment Measures

In order to minimize the risk of transmission of COVID-19 during the conduct of this study, we proposed to use the REDCap application to administer the study questionnaire. This minimized the need of travelling or getting into close contact with participants. Transmission through handling of paper was also avoided. Participants were not put at any risk of contracting COVID-19 while filling the questionnaire since they could do it at their own time and at any preferred venue/location and they did not need to come into contact with the investigators or with other participants.

3.8 Study result dissemination plan

The findings from this study will be presented at the University of Nairobi Institute of Tropical and Infectious Diseases (UNITID). They were shared with the KNH research department, peer-review publication, journal club. The findings (a brief communiqué) were also shared with the Ministry of Health and the county health departments through the Council of Governors. They were also shared with healthcare workers through their professional bodies such as the Kenya Medical Association, National Nurses Association of Kenya, Pharmaceutical Society of Kenya, Kenya Dental Association, Kenya Clinical Officers Association, the Association of Kenya Medical Laboratory Scientific Officers, Association of Public health Officer (Kenya) as well as their unions.

4.0 RESULTS

4.1 Study participants Characteristics

Nine hundred and ninety-seven HCWs were enrolled from all counties in Kenya. Fifty-three percent of all the respondents were female. The proportion and gender of the respondents per cadre is shown in **figure 2** below. The mean age of all the respondents was 36.54 years (SD = 8.31). The respondents' age ranged from 22 to 78 years with the largest age group being 31 – 40 years (51%). The respondents' distribution by age group is shown in figure 2. The mean age was 36 years for doctors, nurses 39, clinical officers 36, lab technologists 36 and others 34 years. The mean age for nurses was significantly higher than that of other respondents (38.8 vs 35.7 years, p value < 0.001. Overall, 47% of all respondents were 36 years or older. This included 49% of doctors, 57% of nurses, 41% of clinical officers, 43% of lab technologists and 31% of other respondents. Respondents were drawn from county health facilities (54%), national hospitals (14%), private health facilities (16%), faith-based organizations (4%), training and research institutions (8%), and other institutions were 4%. Refer to **figure 4**

Table 1: Respondents' Characteristics.

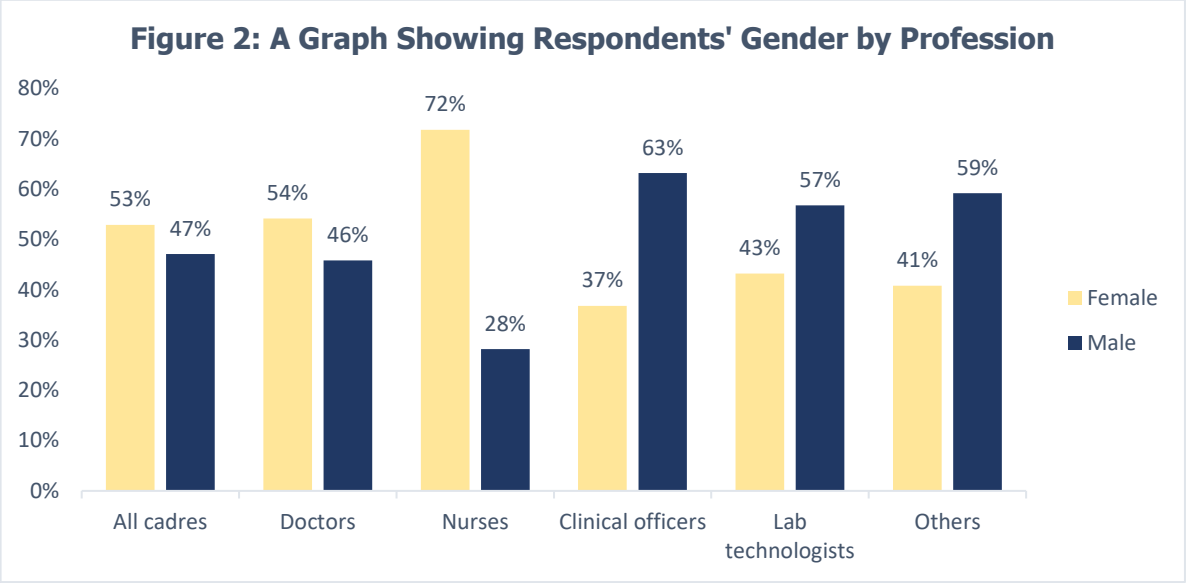
Parameter	Groups	n (%)
Gender	Male	469 (47%)
	Female	526 (53%)
Age **Mean** **SD** **Median** **IQR** **Range(min-max)**	 36.54 8.310 35.00 10 22-78	
Age groups	22-30 years	226 (23%)
	31-40 years	458 (46%)
	41-50 years	150 (15%)
	51 and above years	66 (7%)
Profession	Doctors	344 (34%)
	Nurses	262 (26%)
	Clinical officers	209 (21%)
	Lab technologists	118 (12%)
	Others	73 (7%)
Place of work	National hospital	143 (14%)
	County facility	541 (54%)
	Private facility	160 (16%)

	Training and research institution	81 (8%)
	Faith-based facility	36 (4%)
	Others	40 (4%)
Level of education	Certificate	17 (2%)
	Diploma	336 (34%)
	Bachelor's degree	390 (39%)
	Post-graduate qualification	248 (25%)
Work experience	Less than 2 years	72 (7%)
	2-5 years	184 (19%)
	6-10 years	261 (26%)
	11-20 years	277 (28%)
	More than 20 years	193 (19%)
County	Urban	323 (32%)
	Rural and semi-rural	645 (65%)
Working in a COVID-19 isolation facility	Yes	206 (20%)
	No	778 (78%)
Frequency of working in a COVID-19 isolation or testing facility	Every day	107 (11%)
	2 to 3 times a week	50 (5%)
	Once a week or less	47 (5%)
Live alone	Yes	140 (14%)
	No	848 (85%)

A fifth of the respondents (21%) were working at a COVID-19 treatment center or testing lab at the time of study. This included 19% of doctors, 16% of nurses, 17% of clinical officers, 45% of lab technologists and 20% of other cadres who responded. The frequency of HCWs working in a COVID-19 isolation facility differed across the respondents with 10.7%. Eleven percent of the participants reported that they worked in a COVID-19 isolation facility every day, with 50 (5%) working 2 to 3 times per week while 4.7% of the HCWs reported working in an isolation facility once a week or less. Refer to **table 1**.

On level of education attained, 39% of the 997 HCWs had a bachelor's degree, 34% had diploma, 25% had post-graduate qualification and 1.7% had certificate. Work experience of healthcare workers varied across the participants with 28% reporting between 11-20 years of experience, followed by 6-10 years (26%), and those with more than 20 years of experience accounted for 19% while healthcare workers with the lowest work experience i.e., less than 2 years were accounted by 7%. Counties were grouped into two; urban and rural counties. A third of the respondents were from urban counties while 65% were from rural and semi-rural

counties. Of all respondents, 6% reported that they had contracted the Covid-19 (lab-confirmed). A majority (85%) of the healthcare workers who took part in the research study did not live alone. Refer to **table 1**.



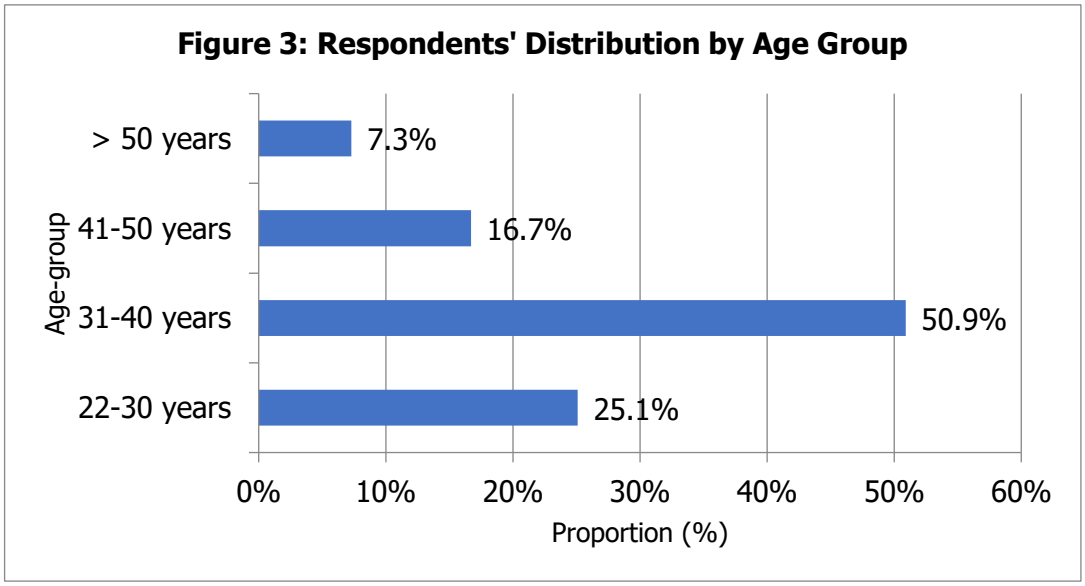
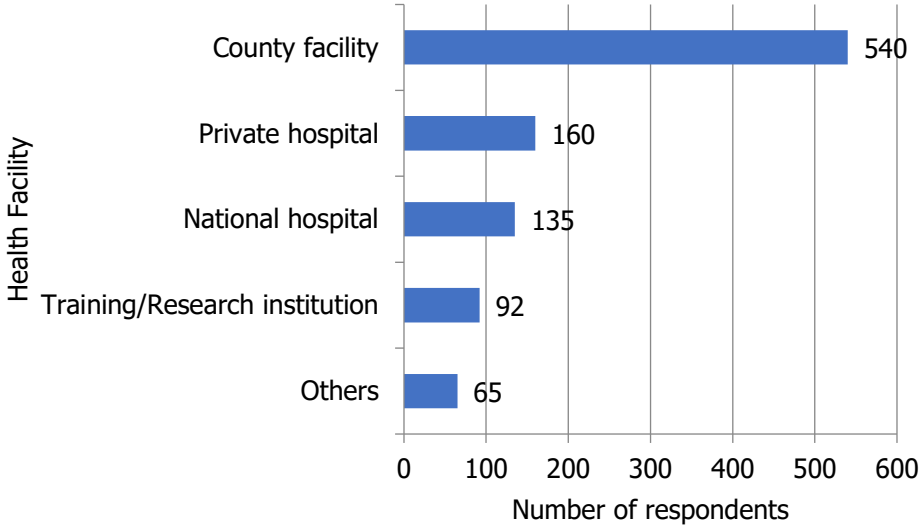


Figure 4: Distribution of respondents by place of work



4.2 Level of knowledge of HCWs for COVID-19

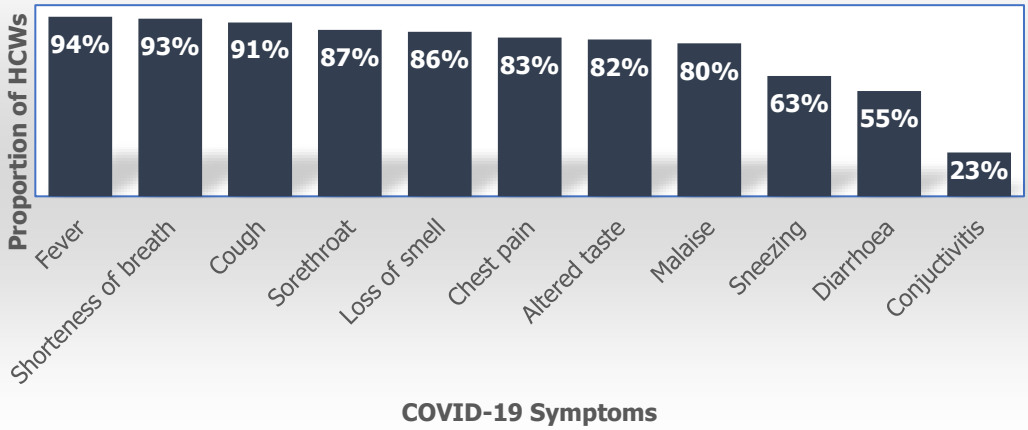
Knowledge score was compared across different professional cadres. There was a statistically significant difference in knowledge score across different groups. The results from these tests are shown in **table 2**, below:

Table 2: Comparison of Knowledge score among Health Workers

	Compare groups	Knowledge score (%)	P-value
Health workers	Doctors (n= 329)	82	**<0.0001**
	Rest of HCWs (n=634)	77	
	Nurses (n=249)	76	**0.034**
	Rest of HCWs (n=713)	79	
	Clinical officers (n=203)	81	**0.019**
	Rest of HCWs (n= 760)	78	
	Lab technologists (n=113)	75	**0.022**
	Rest of HCWs (n=850)	79	
	Others (n=69)	79	**<0.0001**
	Rest of HCWs (n=894)	69	
Region	Urban (n=314)	80	0.080
	Rural (n=624)	77	
Age	35 years and below (n=458)	77	**0.014**
	36 years and above (n=413)	80	
Education	Certificate (n=15)	68	**0.044**
	Other qualification (n=944)	79	
	Diploma (n=321)	76	**0.001**
	Other qualification (n=638)	80	
	Bachelor's degree (n=382)	79	0.811
	Other qualification (n=577)	78	
	Post-graduate qualification (n=241)	83	

	Other qualification (n=718)	77	**<0.0001**
Training	Had training COVID-19 Yes (n=549)	79	0.497
	Had training COVID-19 No (n=411)	78	

Figure 5: Knowledge on COVID-19 Clinical Manifestation



Most (94%) of all the respondents identified fever as a symptom of COVID-19. Refer to figure 4 for other identified symptoms. The majority of HCWs were able to identify key risk factors for sever COVID-19 such as diabetes (94%), heart disease (84%), Cancer (78%) and HIV (69%). Meanwhile, 13% of the respondents wrongly identified young age as a risk factor for development of severe COVID-19.

4.3 Perception of risk of infection with COVID-19 for HCWs

A majority (88%) of the respondents (n=997) perceived the level of risk of infection for the general public as high while 9% of the HCWs perceived it as low. Compared to the rest of the cadres, nurses reported the highest number for the level of risk of infection for COVID-19 to general public as high. Doctors had the lowest number of respondents (85%) who felt that the level of risk for the general public getting infected with COVID-19 was high. There were significant relationships between the perceived level of risk of infection for the general public and the nurses ($P<0.001$) and that of doctors ($P=0.001$).

Ninety-seven percent of nurses perceived the level of risk of contracting COVID-19 among the HCWs as high as did 94% of the lab technologists. There was no significant relationship between the risk of getting a COVID-19 infection for HCWs and different health cadres. Most nurses and lab technologists felt that there was a high level of risk of infection with COVID-19 for individuals (self). There were significant relationships between risk to COVID-19 infection for self and nurses (94%, $P=0.006$) and with lab technologists (80%, $P=0.005$). On whether the study respondents would be comfortable to work with a colleague who had recovered from COVID-19, a majority (91%) of the healthcare workers indicated that they would. Ninety-six percent of doctors reported that they would work with a colleague who had recovered from COVID-19 as compared to the 89% of the clinical officers who reported that they would.

Table 3: Health Workers Perception of level of risk for COVID-19

Perceived risk of Covid-19 infection for different groups	Response	Doctors	Nurses	Clinical officers	Lab technologists	Others	Overall
The general public	High	280 (86%)	245 (97%)	188 (91%)	100 (86%)	68 (96%)	881 (91%)
	Low	46 (14%)	9 (3%)	18 (9%)	16 (14%)	3 (4%)	93 (9%)
Health workers	High	323 (97%)	256 (99%)	197 (95%)	108 (94%)	68 (96%)	953 (97%)
	Low	9 (3%)	4 (1%)	10 (5%)	7 (6%)	3 (4%)	33 (3%)
Self	High	282 (86%)	236 (93%)	188 (91%)	93 (80%)	65 (91%)	865 (88%)
	Low	47 (14%)	17 (7%)	19 (9%)	23 (20%)	6 (9%)	112 (12%)
family member	Always	268 (97%)	227(100%)	186 (99%)	98 (100%)	59 (98%)	962 (97%)
	Rarely	8 (3%)	1 (0%)	1 (1%)	0 (0%)	1 (2%)	28 (3%)
Comfortable to work with colleague recovered from COVID-19	Yes	320 (96%)	231 (90%)	185 (88%)	112 (96%)	61 (86%)	909 (92%)
	No	13 (4%)	25 (10%)	24 (12%)	5 (4%)	10 (14%)	78 (8%)

4.4 Concerns of Health Workers

Participants highlighted their main concerns about COVID-19. A majority of the participants were more concerned about getting infected with the disease and then in-turn passing it to their family members or colleagues. This is especially if their family members or colleagues had a chronic disease that may lead to a medical complication.

These are some of the comments on concerns raised by the respondents:

"Lifelong complications of COVID-19 on the heart, lungs, brain in case I contract the disease" 38-year-old, doctor.
"Getting infected…Infecting family members" 49-year-old, nurse.
"I am asthmatic and hypertensive. My age also puts me at risk" 60-year-old, clinical officer.

Some of the health workers were concerned about the availability of personal protective equipment in order to enhance their safety. Other health workers were more concerned about the ignorance displayed on measures put in place to control the infection and how generally naïve the public is in regards to risks associated with COVID-19.

"Lack of appropriate PPEs for health care workers. Burn out of health care workers…" 45-year-old, public health officer.

"Ignorance among the population on containment measures they don't fully observe [prevention measures]" 38-year-old, clinical officer.
"Am not well protected at my work place, the public is not keen on protective measures for Covid-19" 41-year-old, clinical officer.

Others were more concerned and afraid that if they get infected with COVID-19, they might end up dying. Some of their fears were as shown below:
"Getting infected and not getting adequate prompt treatment leading to death" 42-year-old, doctor

4.5 Preparedness for COVID-19 among HCWs

To assess whether the healthcare workers and the health institutions they work in the country were well prepared to handle the COVID-19 pandemic, various questions were prepared and presented to them. The HCWs were asked whether they felt prepared to handle a patient with COVID-19 diseases, 27% of the 997 HCWs felt unprepared while the other 72% either felt partially prepared or fully prepared. Lab technologists (26%) reported that they felt fully prepared, while less than 20% of each of the cadres i.e. nurses, doctors and clinical officers felt fully prepared. A chi-square test for association between each cadre and preparedness to handle COVID-19 patients revealed that there was a significant association between the preparedness of

healthcare workers to handle patients with COVID-19. Clinical officers were less likely to be prepared to handle COVID-19 patients than other healthcare workers (8.7% Vs19.4%, P=0.001).

Doctors (29%) and lab technologists (33%) felt that their health facilities were fully prepared to handle COVID-19 patients. Only 8% of the clinical officers felt that their facilities were fully prepared. More than half of the respondents felt that their institutions were partially prepared to handle COVID-19 patients. Chi-square tests showed that there were significant relationships between doctors (P=<0.001), clinical officers (P=<0.001) as well as lab technologists (P=0.001) and the preparedness of their facilities to handle COVID-19 patients.

A small proportion (14%) of all the respondents reported that they had all the PPE they need to protect themselves from COVID-19 infection. On the other hand, 19% of all the HCWs reported that they did not have PPE while a majority (67%) of the respondents reported that they only had some PPE. While doctors (22%) reported that they had all the PPE they require to handle patients with COVID-19, only 3% of clinical officers reported that they had all PPEs. It was determined that there were significant relationships between specific cadres and having the required PPEs. Doctors (P<0.001) were more likely to have all the required PPE for protection against COVID-19 while clinical officers (P<0.001) were least likely.

The proportion of health professionals who bought PPE using their own funds within three months prior to the study differed across the groups. Clinical officers reported the highest number (45%) of HCWs who often bought PPE using own funds while the lowest number was reported by lab technologists (29%). There was a significant relationship between being a clinical officer and having bought PPE using own funds. Clinical officers were more likely to buy PPE using own funds than the rest of the other HCWs (45% Vs 29%, P=0.015).

On whether any training was offered to various cadres, it was determined that there were no significant differences across the groups except for 75% of doctors and clinical officers (63%) who reported that they had received training on COVID-19. There was a significant relationship between health cadre i.e. doctors and having had training on COVID-19 (P=0.001).

Table 4: Perception of the Level of Preparedness for COVID-19 against healthcare Cadre

Questions	Response	Doctors (n=344)	Nurses (n=262)	Clinical officers (n=209)	Lab technologist (n=118)	Others (n=73)	Overall
Do you feel prepared to handle COVID-19 patient	Fully Prepared	66 (20%)	43 (17%)	18 (9%)	30 (26%)	12 (17%)	169 (17%)
	Partially prepared	184 (56%)	140 (54%)	124 (60%)	62 (54%)	36 (50%)	546 (55%)
	Unprepared	81 (25%)	78 (30%)	66 (32%)	23 (20%)	24 (33%)	273 (28%)
Is your institution prepared to handle COVID-19 patients	Fully Prepared	95 (28.7%)	45 (17%)	16 (8%)	39 (33%)	16 (22%)	211 (21%)
	Partially prepared	165 (49.8%)	144 (55%)	115 (55%)	58 (50%)	37 (51%)	519 (52%)
	Unprepared	71 (22%)	72 (28%)	78 (37%)	20 (17%)	19 (26%)	261 (26%)
Do you have PPE you need for COVId-19	Have all PPE	71 (22%)	29 (11%)	6 (3%)	22 (19%)	8 (11%)	136 (14%)
	Have some PPE	216 (65%)	185 (71%)	146 (70%)	81 (69%)	40 (56%)	669 (68%)
	Have none PPE	44 (13%)	47 (18%)	57 (27%)	14 (12%)	24 (33%)	186 (19%)
In the last three months how often have you had to buy any PPE for use at work using your own funds	Always	35 (11%)	16 (6%)	24 (12%)	11 (9%)	12 (17%)	98 (10%)
	Often	132 (40%)	93 (3%)	94 (45%)	34 (29%)	24 (33%)	378 (38%)
	Rarely or never	164 (50%)	151 (58%)	91 (44%)	72 (62%)	36 (50%)	514 (52%)
Have you had any training on Covid-19?	Yes	250 (75%)	168 (64%)	131 (63%)	79 (68%)	45 (63%)	673 (69%)
	No	82 (25%)	93 (36%)	78 (37%)	38 (33%)	26 (37%)	318 (32%)
Have you had any training on infection control for COVID-19	Yes	209 (63%)	136 (52%)	104 (50%)	79 (68%)	40 (56%)	568 (57%)
	No	121 (37%)	125 (48%)	104 (50%)	38 (33%)	32 (44%)	421(43%)

Healthcare workers from private facilities (32%) felt that they were fully prepared to handle patients with COVID-19 as opposed to HCWs from national hospitals (12%) who felt that they were prepared. HCWs from faith-based health facilities (33%) felt that they were unprepared to handle patients with COVID-19. On the other hand, private facilities (41%) were reported as to be prepared to handle patients with COVID-19 while only 12% of the national hospitals was reported to be fully prepared.

Sixty-eight percent of the 988 respondents indicated that they received training on COVID-19. While private facilities reported the highest number (78%) of HCWs who received a COVID-19 training, 63% of respondents from national hospitals reported that they had received training on COVID-19 infection. A chi-square test revealed that there was a significant relationship between place of work (health facility) and whether one got training for COVID-19 or not (P=0.019).

Table 5: Perception of the Level of Preparedness for COVID-19 against Institution

Questions	Response	National hospital (n=143)	County facility (n=541)	Private facility (n=160)	Training & research institution (n=81)	Faith-based facility (n=36)	Others (n=40)	Overall
Do you feel prepared to handle a patient with COVID-19	Prepared	16 (12%)	79 (15%)	51 (32%)	11 (14%)	6 (17%)	6 (15%)	169 (17%)
	Partially prepared	79 (59%)	298 (56%)	81 (51%)	46 (58%)	18 (50%)	21 (54%)	543 (55%)
	Unprepared	40 (30%)	159 (30%)	27 (17%)	23 (28.8%)	12 (33.3%)	12 (31%)	273 (28%)
Is your institution prepared to handle COVID-19 patients	Prepared	46 (34%)	62 (12%)	65 (41%)	20 (22%)	8 (32%)	9 (24%)	210 ((27%)
	Partially prepared	63 (47%)	302 (56%)	65 (41%)	51 (55%)	16 (64%)	20 (53%)	517 (53%)
	Unprepared	25 (19%)	176 (33%)	29 (18%)	21 (23%)	1 (4%)	9 (24%)	261 (20%)
Have you had training on infection control for COVID-19	Yes	75 (56%)	276 (51%)	116 (73%)	56 (69%)	26 (72%)	17 (45%)	566 (61%)
	No	59 (44%)	263 (49%)	42 (27%)	25 (31%)	10 (28%)	21 (55%)	420 (39%)
Have you had any training on COVID-19	Yes	84 (63%)	350 (65%)	124 (78%)	57 (70%)	27 (75%)	30 (77%)	672 (71%)
	No	50 (37%)	189 (35%)	35 (22%)	24 (30%)	9 (25%)	9 (23%)	316 (29%)

Most respondents from urban counties (64%) reported that they had received training specifically for COVID-19 infection control as opposed to respondents from rural and semi-rural counties (54%) who reported that they received this kind of training. There was a significant association between the location of the counties in which the HCWs work and having had training specifically for COVID-19 infection control (P=0.003).

Respondents (35%) from urban counties reported that their facilities were fully prepared to handle COVID-19 patients while 15% of respondents from rural and semi-rural counties felt they were fully prepared. There was a significant relationship between county location and its facility's preparedness to handle patients with COVID-19. Health facilities in urban counties were more likely to be prepared to handle COVID-19 patients as compared to facilities in rural and semi-rural counties (P<0.001).

Table 6: Perception of the Level of Preparedness for COVID-19

Questions	Response	Urban counties (n=323)	Rural and semi-rural counties (n=645)	Overall	P-value
Have you had any training on infection control for COVID-19	Yes	207 (64%)	347 (54%)	554(59%)	
	No	115 (36%)	294 (46%)	409 (41%)	**0.003**
Have you had any training on COVID-19	Yes	226 (70%)	431 (67%)	657 (69%)	
	No	96 (30%)	211 (33%)	307 (31%)	0.337
Is your institution prepared to handle COVID-19 patients	Fully Prepared	113 (35%)	93 (15%)	206 (24%)	
	Partially prepared	157 (49%)	347 (54%)	504 (52%)	
	Unprepared	51 (16%)	203 (32%)	254 (24%)	**<.001**

4.6 Facilities' preparedness for COVID-19

In order to control and curb the spread of the virus, participants felt there was a need to train more HCWs on COVID-19 infection control, create more awareness and sensitize both the health staff and the general public among other measures. The following are some of the comments made by the respondents when asked about what they feel should be done to prepare their health institutions to handle COVID-19:

"Training of all health workers and equipping the dental clinics with the correct equipment such as high-volume suctions and not just purchasing PPE as a magic bullet" 35-year-old doctor.

"Training more people, we have few people who have been trained on handling COVID-19" 25-year-old, lab technologist.

"To stock full PPE kit, to put up a functional ICU, motivate health workers and enhance COVID-19 training" 32-year-old, clinical officer.

A majority of the respondents in this group felt that in order for their health institutions to be prepared to handle COVID-19, a number of things had to be improved hiring of more health workers, procurement of additional medical equipment such as ventilators, availing more PPEs, installation of oxygen plants at the hospitals, setting up well-equipped isolation facilities where there were none and expanding the existing COVID-19 isolation facilities where they existed. The following are some of their comments on how their facilities can enhance preparation for COVID-19:

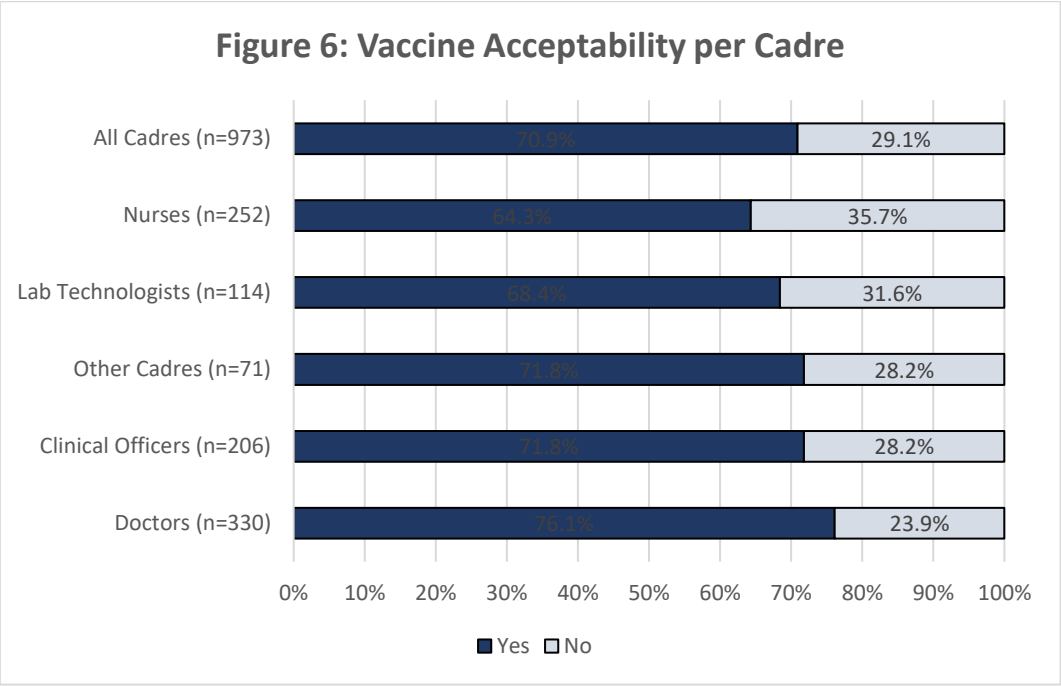
"Supply adequate PPE, train all the staffs, create enough space - well ventilated and ensure water is available throughout." 45-year-old, clinical officer.

"Install oxygen plants in hospitals, provide complete and functioning ICU, employ more health workers in the facilities to avoid shortage and provide comprehensive medical cover for health workers" 36-year-old, nurse.

4.7 Acceptability of COVID-19 vaccine among health professions

Overall, 71% of all healthcare workers would take a COVID-19 vaccine if provided free by the government. Doctors were most likely (76%) while nurses were least likely (64%) to accept the vaccine.

There was a significant relationship between professional cadre and acceptability of COVID-19 vaccine as shown in table 7. Vaccine acceptability for each cadre is shown in Figure 3.



4.8 Reasons for declining a COVID-19 vaccine

Reasons for declining a COVID-19 vaccine were mainly concerns about the efficacy, unknown side effects and safety of the vaccine. While other respondents felt that vaccines were developed as a monetary scheme, some felt that the vaccine developed might not be safe for use due to the "hurried" approval or that it may not be effective due to the mutative nature of the virus. Respondents' comments on these concerns were as follows:

"The current (COVID-19) vaccines don't meet the vaccine trial period of at least 10 years plus" 37-year-old, lab technologist.

"I fear the side effects of the (COVID-19) vaccine" 38-year-old, nurse.

"The issue of vaccines which are not very clear in that most individuals believe that it is a scheme" 45-year-old, lab technologist.

"Hurried approval of vaccine and mutation of the virus" 48-year-old, nurse.

"Am just not comfortable with that vaccine, not sure whether it will protect me from contacting the disease." 34-year-old, clinical officer.

Some of the respondents reported that they don't trust the government and therefore, they would not accept to take a vaccine even if provided for free. Other respondents reported that for them to take the COVID-19 vaccine, politicians should take it first in order to observe their reactions towards it. These are some of the comments made by HCWs who took part in answering this section:

"I don't trust this government's effort in this fight against COVID-19. I may just get infected after the vaccination due to hidden agendas" 33-year-old, clinical officer.

Other healthcare workers felt that they did not have enough information or knowledge on the COVID-19 vaccine and require more information on the vaccine before using it. Others indicated that they would rely on herd immunity and therefore did not need to take the vaccine.

Table 7: Vaccine Acceptability among Healthcare Workers

Parameters	**Groups**	**Vaccine acceptability**	**P-value**
Gender	Male (n=460)	77%	<0.0001
	Female (n=513)	66%	
Age	Below 35 years (n=347)	74.8%	0.004
	Above 36years (n=276)	66%	
County of work	Nairobi (n=272)	70%	0.78
	Other counties (n=674)	71%	
Doctor	(n=330)	76%	0.01
Others	(n=643)	68%	
Nurses	(n=252)	64%	0.007
Others	(n=721)	73%	
Previous infected COVID-19	Yes (n=56)	73%	0.7
	No (n=918)	71%	
Work at a COVID-19 treatment centre or testing lab	Yes (n=201)	62%	0.002
	No (n=763)	73%	
Live alone	Yes (n=135)	77%	0.08
	No (832)	70%	

5.0 DISCUSSION

It is critical that health facilities and most importantly health workers are prepared to handle any highly infectious disease at any given time. This will enable them to protect themselves and the general public against such infections. The objective of this study was to determine the level of knowledge, perception of risk and the preparedness of HCWs for COVID-19 in Kenya.

A majority of the respondents had knowledge on the risk factors and clinical manifestation of COVID-19 with at least 63% identifying the symptoms of the disease. Our findings were in tandem with some of the other similar studies done in other countries. A similar study in Northwest Ethiopia reported that 73.8% of the health workers had good knowledge on COVID-19 (Kassie, B. A., *et al*. 2020). Our finding was lower than that in Ethiopia. In contrast, a study on dental practitioners from 23 countries across the world reported a lower mean knowledge score of 34.9% (Sarfaraz, S., *et al*. 2020). The possible reason for the difference in the knowledge scores between these studies may be due to the different settings for healthcare in these countries. Time may have also played a role in the difference due to more awareness on COVID-19 being created. Knowledge on key risk factors associated with development of severe COVID-19 was also found to be high. However, a proportion of the respondents (12.6%) wrongly highlighted that 'young age' was one of the risk factors that was associated with severe COVID-19 development.

Overall, level of perception of risk of infection with COVID-19 for health workers was found to be high (97%). Respondents also felt that the risk of infection with COVID-19 for the general public was also high (90%). In another study on the Turkish health workers, 69.32% of the respondents perceived the infection with COVID-19 as dangerous (Arslanca, T., *et al*. 2021). The sense of preparedness could be the reason for the difference between the two studies and therefore might explain why the nurses perceived the risk of infection with COVID-19 as high for everyone.

Most health workers would be comfortable to work with a colleague who had recovered from COVID-19. This could be associated with the good knowledge score of the participants on the modes of transmission, and the level of education attained by an individual like a health worker having attained at least a bachelors' degree.

Of all the participants who took part in the study, a majority felt at least partially prepared (72%) to handle the COVID-19 pandemic. However, some gaps such as inadequate PPE and training for COVID-19 infection control were identified. In comparison with a study in Ethiopia, the participants who reported that they were prepared for COVID-19 were lower (59.5%) (Zewudie, A., *et al.* 2021) than in our study. Health workers may feel a sense of preparedness to handle a pandemic when they are trained adequately and provided with the necessary PPE. This may in-turn lead to change of attitude towards improved health service delivery. Inadequate PPE and lack of training are likely to put the health workers at a risk of contracting the infection. This in turn affects the expected service delivery and therefore complicates the fight against COVID-19. While more doctors and lab technologists felt that their institutions were fully prepared to handle patients with COVID-19, only 8% of the clinical officers felt the same leaving room for exploring why this difference in particular exists.

There was a difference between the urban counties and the rural and semi-rural counties in terms of preparedness for control the COVID-19 pandemic. Sixty-four percent of the participants from the urban counties indicated that they had received training specifically for COVID-19 infection control unlike their colleagues from the rural and semi-rural counties that was accounted for by 54.1% (Table 6). This shows that there are factors that could contribute to such an occurrence. Since there are often fewer and isolated health workers in the rural and semi-rural counties as compared to their counterparts in the urban counties, the reasons for the difference in level of knowledge and preparedness to handle the pandemic might be due to poor connectivity and poor networking among health workers as well as government policies that are urban centered.

A significant number of the respondents (29%) would not take a COVID-19 vaccine if one was offered at the time of the study. Most of the reasons such possible side effects, efficacy and the 'hurried vaccine approval' cited for the hesitancy can be addressed by providing the correct information on Covid-19 vaccines. In a similar study done in the United States, the reasons for vaccine hesitancy among healthcare workers included safety concerns, the approval speed and effectiveness, however, only 36% of the participants would take the vaccine (Shekhar. R., *et al.* 2021). The concern on the efficacy of vaccines (Oxford–AstraZeneca) under clinical trial have been explained, in that, these vaccines reportedly have more than 90% efficacy against COVID-19 (Knoll, M. D., & Wonodi, C. (2021).

From our study it was determined that male health workers were more likely to accept the COVID-19 vaccine than the female (77% vs 66%). In comparison to a similar study in Saudi Arabia, it was also found that male health workers were more likely to take a COVID-19 vaccine unlike their female counterparts (67% vs 33) (Qattan. *et al.,* 2021). From the two studies, being a female health worker lowered the probability of taking a COVID-19 vaccine.

5.1 Study limitations

- Some healthcare workers who participated in the research study did not fully fill the questionnaire. The questionnaire was made as short as possible and by using a user-friendly design hence a response rate of 95%.
- There may have been a selection bias by leaving out healthcare workers who may not have had access to internet.
- The REDCap application is configured for ease of use on a smart phone or a computer; thus, any health worker without one of these may have been unable to participate. This is an inherent weakness in the study.

CONCLUSION

We assessed the level of knowledge, perception of risk and preparedness of health workers for COVID-19. Generally, the health workers had good knowledge on COVID-19, although it was not a perfect knowledge score. Doctors were found to have good knowledge on clinical manifestation and risk factors for development of severe COVID-19 when compared to other health cadres. Majority of the health workers perceived the risk of infection with COVID-19 as high and a significant number felt that they were not fully prepared to handle the pandemic.

RECOMMENDATIONS

There is need to fill the knowledge gap among different health cadres to avoid the differences observed. There is also need for robust training on COVID-19 infection control and provision of PPE to boost knowledge and enhance preparedness and improve perception of risk of infection with the disease.

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Appendices

1A)

Study Questionnaire

Knowledge, perception of Risk and Preparedness for COVID-19 among HealthCare Workers in Kenya

Investigators: **Dr. Hafso Mohamed Abdulle, Dr. Moses Masika, Prof. Julius Oyugi**

University of Nairobi Institute of Tropical and Infectious Diseases (UNITID)

1. What is your Profession?

- ☐ Medical Doctor
- ☐ Dentist
- ☐ Pharmacist
- ☐ Nurse
- ☐ Clinical Officer
- ☐ Lab technologist
- ☐ Public Health Officer
- ☐ Other: _____

2. What is your place of work?

- ☐ National Hospital
- ☐ County Hospital
- ☐ Sub-county Hospital
- ☐ Health centre/dispensary
- ☐ Private Hospital
- ☐ Private Clinic
- ☐ Training institution
- ☐ Other: _____

3. Which County do you work in? _____ *(drop down list)*

4. Do you work in a Covid isolation facility or Covid testing Lab? Yes No

5. How many times do you work in a Covid Isolation facility or testing Lab?

- ☐ Everyday
- ☐ 2 to 3 times a week
- ☐ Once a week
- ☐ Less often than once a week

6. What is your gender: Male Female

7. What is your age: _____

8. How long is your work experience?

- ☐ Less than 2 years
- ☐ 2 – 5 years
- ☐ 6 – 10 years
- ☐ 11 – 20 years
- ☐ More than 20 years

9. What is the risk of infection with Covid-19 for the average Kenyan?

- ☐ Very high
- ☐ High
- ☐ Low
- ☐ Very low
- ☐ I don't know

10. What is the risk of infection with Covid-19 for health care workers in Kenya?

- ☐ Very high
- ☐ High
- ☐ Low
- ☐ Very low

- ☐ I don’t know

11. What is the risk of infection with Covid-19 for you?

- ☐ Very high
- ☐ High
- ☐ Low
- ☐ Very low
- ☐ I don’t know

12. Do you live alone? YES NO

13. Are you concerned that you may infect your family members with Covid-19?

- ☐ Always concerned
- ☐ Very often concerned
- ☐ Sometimes concerned
- ☐ Rarely concerned
- ☐ Never concerned

14. What is/are your main concerns about Covid-19?

Text box

15. What is the fatality rate of Covid-19?

- ☐ Less than 1%
- ☐ 2 – 10%
- ☐ 20 – 50%
- ☐ Over 50%

16. What are the clinical manifestations of COVID-19? (Tick all that apply)

- ☐ Fever
- ☐ Cough
- ☐ Malaise
- ☐ Sorethroat
- ☐ Sneezing
- ☐ Shortness of breath
- ☐ Diarrhoea
- ☐ Chest pain
- ☐ Ear ache
- ☐ Skin rash
- ☐ Insomnia
- ☐ Loss of smell
- ☐ Altered taste
- ☐ Conjunctivitis

17. When is the infection with Covid-19 mostly likely to occur during?

- ☐ While putting on PPE
- ☐ While attending to Covid-19 patients in full PPE
- ☐ While taking off PPE after work

18. Do you feel prepared to handle a patient with Covid-19?

- ☐ Prepared
- ☐ Partially prepared
- ☐ Unprepared

19. Is your facility/institution prepared to handle covid-19 patients?

- ☐ Prepared

- ☐ Partially prepared
- ☐ Unprepared

20. Do you have the personal protective equipment (PPE) you need for Covid-19?

- ☐ I have all the PPE I need
- ☐ I have some PPE
- ☐ I have no PPE

21. In the last three months, how often have you had to buy any PPE for use at work using your own funds?

- ☐ Always
- ☐ Very often
- ☐ Often
- ☐ Rarely
- ☐ Never

22. Have you had any training on Covid-19? YES NO

23. Have you had any training specifically for infection control for COVID-19? YES NO

24. Would be comfortable to work with a colleague who has recovered from Covid-19? YES NO

25. What more do you think your facility/institution needs to do to prepare for Covid-19?

Text box

26. Would you accept a COVID-19 Vaccine if the government provides one for all Healthcare workers? Yes No

27. Please indicate your reason for declining the vaccine

Text box

28. Which conditions are associated with a high risk for severe Covid-19 (Check all that apply)

- ☐ Diabetes
- ☐ Heart disease
- ☐ Young age
- ☐ HIV5
- ☐ Cancer

29. Have you been infected with Covid-19? (Laboratory confirmed infection) Yes No

1B)

Online Consent Information Form

I would like to invite you to participate in a research study on **Knowledge, Perception of Risk and Preparedness for COVID-19 among Healthcare Workers in Kenya** being conducted by **Dr. Hafso Mohamed Abdulle, Dr. Moses Masika and Prof Julius Oyugi** from the University of Nairobi. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Once you understand and agree to be in the study, proceed by clicking on the **agree** button to answer the questionnaire. Your decision to participate is entirely voluntary and you may choose not to answer any question that makes you uncomfortable

Who can participate in this research study?

Healthcare workers – medical doctors, pharmacists, dentists, nurses, laboratory technologists, and clinical officers who are currently working in Kenya

What will I be asked to do and how much time will it take?

You will be asked to complete an online questionnaire. This questionnaire will ask about your perceptions on risk, knowledge and the level of preparedness for COVID-19 in the country. The questionnaire will take about 10 minutes to complete

Any benefit for taking part in this study?

You may not directly benefit from this study; however, we hope that through your participation you will contribute to science and inform efforts for control of COVID-19.

How will my personal information be protected?

Participation in this study is anonymous; we will not analyze or report any information that can identify you.

What if I say yes and later on I change my mind?

It is voluntary to participate in the research study and therefore, you are free to decline from participating in the study, and you can withdraw from the study at any time without suffering any consequences or penalties.

Who can I talk to if I have questions?

If you have further questions or concerns about participating in this study, please call or send a text message to the Principal Investigator, **Dr. Hafso Mohamed Abdulle Tel. +254 721212208**.

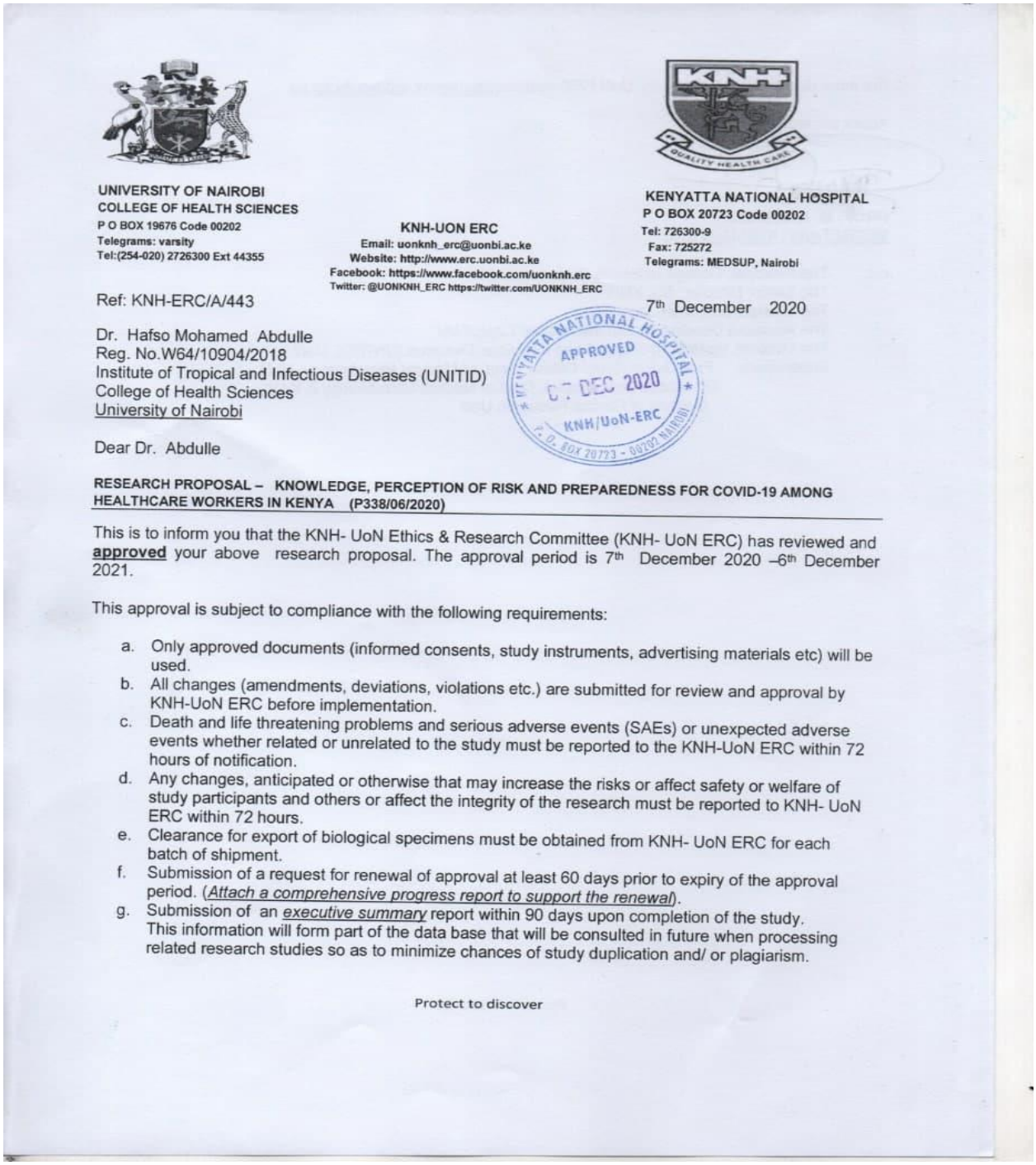
For more information about your rights as a research participant, you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke

Please confirm if you wish/do not wish to participate in the study by clicking below. If you click 'agree' you are confirming that you have read this consent form and agree to participate in this research study.

I **Agree** to Participate in this study	I **Do Not Agree** to Participate in this study

2)

Approval Letter



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

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

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

Ref: KNH-ERC/A/443

7th December 2020

KENYATTA NATIONAL HOSPITAL APPROVED 07 DEC 2020 KNH/UoN-ERC P. O. BOX 20723 - 00202 NAIROBI

Dr. Hafso Mohamed Abdulle
Reg. No.W64/10904/2018
Institute of Tropical and Infectious Diseases (UNITID)
College of Health Sciences
University of Nairobi

Dear Dr. Abdulle

RESEARCH PROPOSAL – KNOWLEDGE, PERCEPTION OF RISK AND PREPAREDNESS FOR COVID-19 AMONG HEALTHCARE WORKERS IN KENYA (P338/06/2020)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 7th December 2020 –6th December 2021.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. 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*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

For more details consult the KNH- UoN ERC website**http://www.erc.uonbi.ac.ke**

Yours sincerely,

PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information Dept, KNH
The Director, Institute of Tropical and Infectious Diseases (UNITID), UoN
Supervisors: Prof. Julius Oyugi Otieno, Dept. of Medical Microbiology, UoN
Dr. Moses Muia Masika, Dept.of Medical Microbiology & KAVI-Institute of Clinical Research UoN