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UPTAKE AND PERCEPTIONS OF COVID-19 TESTING BY HEALTH CARE WORKERS AT HARARE CITY HEALTH FACILITIES, HARARE, ZIMBABWE

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES OF AFRICA UNIVERSITY

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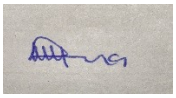
Abstract

The World Health Organization highlighted the importance of testing for COVID-19 surveillance to limit the spread of the disease, enable public health authorities to manage its risk, and thereby restoring normal economic and social activities. Health care workers (HCWs) are more at risk of becoming infected with COVID-19 thereby transmitting the disease to patients who are already battling with other ailments. There is limited information on COVID-19 testing uptake by HCWs in Harare. An analytical cross-sectional study using a mixed methods approach was conducted at Mbare, Mabvuku and Warren Park Polyclinics. A checklist was used to collect secondary data from the COVID-19 testing registers for 103 HCWs from January to September 2021 and an in-depth interview guide was used to collect data from participants. Quantitative data analysis was performed using STATA 16. All categorical variables like gender were presented as frequencies and percentages. Logistic regression analysis was performed reporting odds ratios (univariate) and adjusted odds ratios (multivariate analysis). Qualitative interviews were transcribed, interview summaries were written, a coding framework was developed and thematic analysis through NVIVO 11 was used to identify, analyze, and interpret patterns of meaning within the data. Overall, 331 COVID-19 tests were performed among 103 HCWs from January to September 2021 and 71 of them were positive representing 21% of total tests performed. Age ranges of HCWs with positive tests were 28 for 30-39 years (42.4%), 21 for 40-49 years (31.8), 10 for 50-59 years (15.2%). At Mbare polyclinic, 92 tests were negative (36.5%), 34 were positive (47.9) and 8 were invalid, at Mabvuku polyclinic, 97 tests were negative (38.5%) and 21 were positive (29.6%), at Warren Park polyclinic, 63 tests were negative (25.0%) and 16 were positive (22.5%). Among the HCWs that tested positive, the symptoms reported included dry cough (n=12, 14.1%), fever/chills (n=12, 14.1%), runny nose (n=11,12.9%), sore throat (n=9, 10.6%), tiredness/fatigue (n=6, 7.1%). The number of positive results at Mbare compared to Mabvuku and Warren Park polyclinics with borderline odds ratio of OR=0.59 [95% CI: 0.32-1.09, p=0.088] and OR= 0.69 [95% CI: 0.35-1.35, p=0.276]. The multivariate model showed that HCWs who tested because at risk were (OR=3.07, 95% CI:1.28-7.38, p=0.012), and symptomatic were (OR=1.32,95% CI: 0.59-2.96, P=0.497]. Uptake of COVID-19 testing among HCWs was positive with staff being tested at least more than once and testing was largely influenced by the epidemiological waves, being symptomatic, at high risk and known benefits of testing. Barriers to uptake included fear of pain, perceived low severity of disease, inaccessibility, and cost of testing services. The researcher recommends the HCH department to mobilize funds for intense research and provision of COVID-19 self-testing kits.

Key words: COVID-19; Health care workers; Health facilities; Uptake

Declaration page

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted and will not be submitted to any other university for the award of a degree.



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Dedication page

This dissertation work is dedicated to my children Benjamin and Emily, for understanding as I could not spend time with them. I also dedicate this dissertation to my husband Emmerson who is a pillar of strength and has been a constant source of encouragement and support during the challenges of post graduate school. I am truly thankful for having you in my life.

List of Acronyms and Abbreviations

CDC	-	Centers for Disease Control and Prevention
HCH	-	Harare city health
HCW	-	Health care worker
IPC	-	Infection prevention and control
PC	-	Primary counsellor
RGN	-	Registered general nurse
WHO	-	World Health Organisation
PPE	-	Protective personal equipment

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CHAPTER 1 INTRODUCTION

1.1 Introduction

COVID-19 is an acute respiratory tract infection that arose in late 2019. The causative pathogen of COVID-19 was confirmed to be a novel coronavirus. The virus was named SARS-CoV-2 by the WHO (You, Yang, Hung, Yang, Wu, & Deng, 2021). From a sudden outbreak in Wuhan, China, in December 2019 to a worldwide pandemic, the disease has spread to all parts of the world, including Zimbabwe, The World Health Organisation (WHO) declared COVID-19 a global health emergency on 30th January 2020, before characterising it as a pandemic on 11th March 2020 (You et al., 2021). The COVID-19 pandemic has forced many countries, states, and territories to enact public health measures to reduce its spread, including social distancing, contact tracing, stay-at-home orders, shuttering of schools, closure of public spaces, and border closures, (Kuster & Overgaard, 2021).

A new assessment by the WHO in October 2021 showed that only 14.2% or one in seven COVID-19 infections are being detected in Africa. Since the start of the pandemic and as of 10 October, more than 70 million COVID-19 tests have been reported by African countries, which is a fraction of the continent's 1.3 billion people (World Health Organisation [WHO], 2021). In Zimbabwe, 675 659 PCR tests have been conducted, 111 010 RDT tests and 775 164 Antigen tests have been conducted, (Ministry of Health and Child Care [MoHCC], 2021). Testing, case identification, and isolation are critical activities to breaking the transmission chain. This is also coupled by social distancing use of face masks and sanitizing hands, (Kuster & Overgaard, 2021).

Several studies indicated that frontline health workers have been severely infected, and others have died with more deaths occurring in countries across the globe, Rusakaniko, Sibanda, Mduluza, Tagwireyi, Dhlamini, Ndhlovu, Chandiwana, … Mutapi, 2021). Health care workers are essential to the functioning of a health system. Therefore, testing of those who are asymptomatic and pre-symptomatic serves a huge purposed which translates to the control of COVID-19 and reduce transmission rates.

Currently, no review of trends of health care worker testing from the onset of the outbreak in Zimbabwe has been published. This study aims to understand the trends of COVID-19 testing among health care workers from the first wave through to the third wave, perceptions towards COVID-19 testing, barriers and facilitators to COVID-19 testing by health care workers.

1.2 Background to the study

In December 2019, the outbreak of the novel coronavirus was first reported in Wuhan city, Hubei province, China (Taleghani & Taghipour, 2021). By mid-November 2021 over 250 million cases have been reported globally, with over 5.1 million deaths, (John Hopkins University, 2021). The SARS-CoV-2 pandemic reached the African continent in March 2020 exposing African health systems to an additional infectious disease challenge, (Rusakaniko et al., 2021). Currently, Africa has experienced more than 6.1 million cases of COVID-19 and more than 151 thousand deaths, (World Health Organisation [WHO], 2021a). Zimbabwe received its first case of COVID-19 on the 21st of March 2020. Up to 16 November 2021, there have been 133 505 confirmed cases of COVID-19 with 5,104,899 deaths,

reported to WHO (World Health Organisation [WHO], 2021b). The early COVID-19 cases highlighted the need to strengthen the country's response to the SARS-CoV-2 pandemic (Rusakaniko et al., 2021).

Ensuring diagnosis of COVID-19 is essential in limiting spreading of the virus and for clinical management. Since its first report, COVID-19 has caused significant morbidity and mortality and it continues to wreak havoc among different population groups. Health care workers are critical for the functioning health system, and they need to be protected from COVID-19. The World Health Organization highlighted the importance of testing for COVID-19 surveillance to limit the spread of the disease, enable public health authorities to manage its risk, and thereby restore normal economic and social activities (Linares, Pérez-Tanoira, Carrero, Romanyk, Pérez-García, Gómez-Herruz, Arroyo, & Cuadros, 2020).

With the progression of COVID-19 and increased knowledge of the pandemic, initially testing was targeting those with symptoms. Most tests are carried out on people with symptoms, but much of the transmission is driven by asymptomatic people, emergence of asymptomatic patients with COVID-19 poses new challenges for infection prevention and control (You et al., 2021). More testing means rapid isolation, less transmission and more lives saved through targeted action, (WHO, 2021b). There is evidence that asymptomatic and pre symptomatic transmission rate is high. This discovery justifies the need to have HCW tested at intermittent times as this will reduce transmission**.** Having many unsuspected asymptomatic COVID-19 carriers in communication with other people increases the risk of infecting healthy people and enables the virus to spread much more, (Taleghani & Taghipour, 2021). Asymptomatic COVID-19 carriage among hospital staff conceivably act as a potent

source of ongoing transmission as well as increased risk of transmission outside the hospitals (Black, Bailey, Przewrocka, Dijkstrak, & Swanton, 2020).

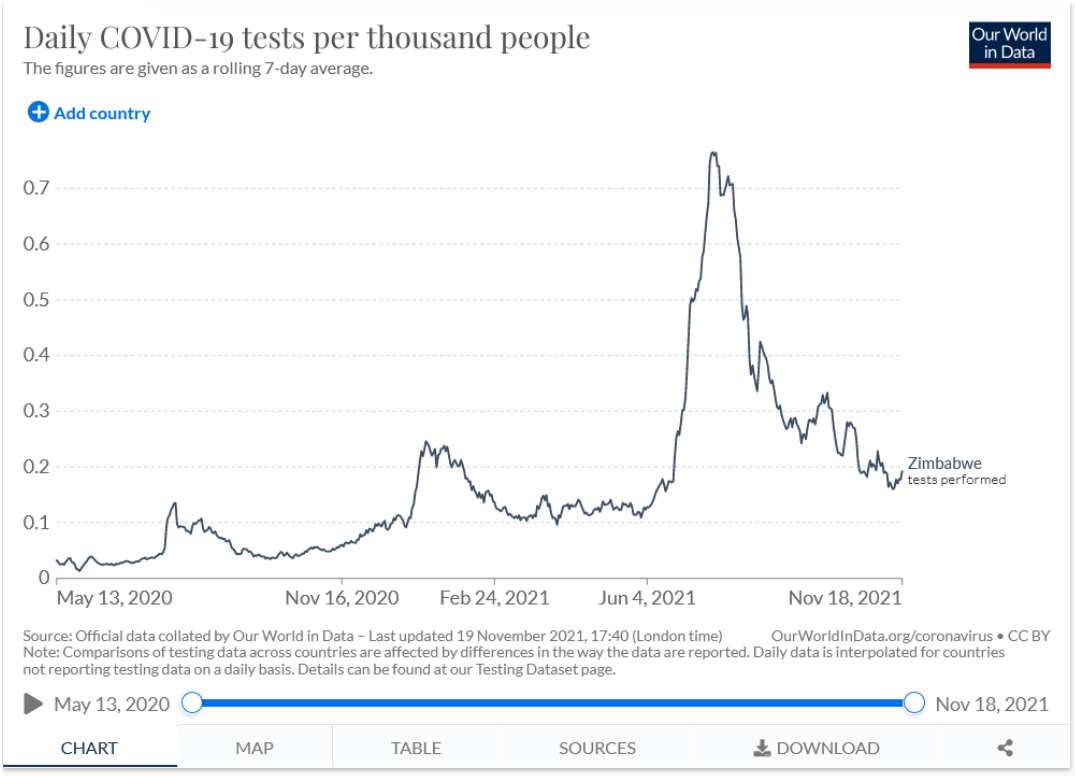

Figure 1. 1 Chart showing daily COVID-19 tests per thousand people for Zimbabwe.

1.3 Statement of the Problem

Uptake of COVID-19 testing among health care workers is not known, yet they are more at risk of becoming infected with COVID-19 thereby transmitting the disease to patients who are already battling with other ailments and to the community at large. COVID-19 testing among health care workers was carried out throughout the different waves of the pandemic. This study seeks to understand the uptake of COVID-19 testing among health care workers throughout the different waves of the pandemic and to identify barriers and facilitators to COVID-19 testing and understand their perceptions towards COVID-19 testing.

1.4 Broad Objective of the study

To determine the uptake and perceptions of COVID-19 testing by health care workers at 3 Harare City Health facilities.

1.4.1 Specific Objectives

i. To determine the uptake of COVID-19 testing by Health care workers in 3 Harare City Health facilities from January 2021 to September 2021.
ii. To conduct a trend analysis of COVID-19 testing by Health care workers in 3 selected Harare City Health facilities during the period of January 2021 to September 2021.
iii. To understand perceptions about COVID-19 testing by Health care workers.
iv. To identify barriers and facilitators to uptake of COVID-19 testing by Health care workers.

1.5 Research Questions

i. What are the characteristics that are associated with uptake of COVID-19 testing among Health care workers in 3 Harare City Health facilities from January 2021 to September 2021?
ii. What is the trend of COVID-19 testing among Health care workers in 3 selected Harare City Health facilities from January 2021 to September 2021?
iii. What are Health care workers perceptions about COVID-19 testing?
iv. What are the barriers and facilitators to uptake of COVID-19 testing among Health care workers?

1.6 Significance of the Study

The control of COVID-19 relies heavily on universal access and uptake to testing to identify those infected, tracking and tracing people they have been in contact with to make sure they do not spread the disease further. Though addressing the need for HCW testing during the COVID-19 pandemic is considered a high priority, data to inform such initiatives are scarce, particularly data on preferences, perceptions, barriers, and facilitators to testing which can help identify gaps and scale up testing. The findings of the study will contribute to the much-needed body of evidence to help control the spread of COVID-19.

1.8 Delimitation of the Study

Study was conducted in 3 health facilities which are equally busy therefore it was assumed that the findings from the facilities can be generalized to all Harare City Health facilities.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter focuses on reviewing existing literature and looking at the theoretical framework and its relevance.

In December 2019, a cluster of acute respiratory illness, known as novel coronavirus–infected pneumonia (NCIP), occurred in Wuhan, Hubei Province, China (Wang, Hu, Hu, Zhu, Liu, Zhang, Wang, … Peng, 2020). From Wuhan, the disease rapidly spready all over the world causing a global panic. On the 11th of March 2020, the World Health Organization declared the COVID-19 outbreak a pandemic, sending millions into a state of panic and emergency, with many federal governments developing strategies to protect their citizens (Gholami, Fawad, Shadan, Rowaiee, Ghanem, Hassan Khamis, & Ho, 2021). COVID-19 is highly transmissible and rapidly spread, as it can be transmitted by respiratory droplets and contact. The common symptoms observed in patients with COVID-19 were fever, cough, severe headache, myalgia, and fatigue (Tian, S., Hu, N., Lou, J., Chen, K., Kang, X., Xiang, Z., Chen … Zhang, 2020). In a study by Rusakaniko et al (2021) among the 57 participants who tested positive, 8 reported having at least one symptom, of which 2 reported fever at the time of the study and of the remaining participants, a total of 19 participants reported either anosmia or ageusia.

It is unclear how many HCWs have been infected with COVID-19 due to work, and how many HCWs have died in line of duty. It is foreseeable that despite the best protection, there also will be more HCWs infections. To know the specific situation of HCWs infection with COVID-19, further statistics and analysis are needed for

subsequent studies after the epidemic is under control, (Xiao, Fang, Chen, & He, 2020).

2.2 COVID-19 burden

Within weeks of onset, COVID-19 had spread to over 100 countries across the world. By the end of June 2020, over 10 million cases had been reported to the WHO, with over 500 000 fatalities. The WHO regional situation reports indicated that by 1st July 2020, the American region had reported an estimated 5,218,590 confirmed cases, making it the most affected continent, (Murewanhema, Burukai, Mazingi, Maunganidze, Mufunda, Munodawafa, & Pote, 2020). The African continent was ranked the fifth most affected region according to the WHO as of 1st July 2020. South Africa was leading as of 1st July 2020, with 151 209 cases and 2 657 deaths, followed by Egypt with 68 311 cases and 2 957 deaths. According to the World Health Organisation, as of 16 November 2021 over 250 million cases were recorded, and more than 5.1 million deaths were recorded, (World Health Organisation, 2021).

Furthermore, according to the Ministry of Health and Child Care Situational Report, as of 31st January 2021, Zimbabwe had recorded 229 666 cases and 5338 deaths.

2.3 COVID-19 and HCWs

Health care workers are often at risk of infection due to their patient facing roles and accidental contact with infected patients. According to the WHO COVID-19 situation report-82, as of 8 April 2020, 22,073 HCW infected cases from 52 countries had been reported globally. Meanwhile, the COVID-19 cases among HCWs are still on the increase (Xiao et al., 2020).

Frontline Health care workers globally in Italy by April 3rd, 2020, around 10,000 healthcare workers had been infected and 74 had died with more deaths recorded in countries across the globe. On July 23rd, the WHO reported about 10% of all COVID-19 cases globally were among Health care workers and more than 10 000 Health care workers in the 40 African countries which had reported on COVID-19 infections in health care workers had been infected with COVID-19. In neighbouring South Africa as of August 2020, 27 000 had been infected and 240 lost their lives to COVID-19 in the line of duty (Rusakaniko et al., 2021). This highlighted the importance of protecting Health care workers from COVID-19 infections.

Hospitals are the important places for secondary transmission of COVID-19. In a retrospective, single-centre study in Wuhan, 41.3% of 138 patients were presumed to have acquired the infection in hospital, (Wang et al., 2020). Densely staffed and packed public facilities and people with compromised immunity, hospitals provide objective conditions for the secondary transmission of these infectious diseases. Generally, emergency department, infectious disease department, fever clinic, intensive care unit and respiratory medicine department are the main departments that cause the spread of these diseases, (Xiao et al., 2020). This goes to show that HCWs are at increased risk of getting infected, transmitting the virus to patients as well as to the communities they live.

In the early phase of the COVID-19 outbreak, the number of HCWs and personal protective equipment (PPE) was both insufficient, and the continuous working hours of HCWs were relatively longer. HCWs were exhausted physically and mentally and an increased chance of infection could occur in HCWs, (Sabetian, Moghadami, Hashemizadeh Fard Haghighi, Shahriarirad, Fallahi, Asmarian, & Moeini, 2021). HCWs were shown to face an ever-present risk of acquiring or spreading the virus to

patients. A recently published rapid review identified lack of and/or inadequate personal protective equipment (PPE), exposure to infected patients, work overload, poor infection control and pre-existing medical conditions as important risk factors for nosocomial COVID-19 infection among HCWs, (Dzinamarira, Mhango, Dzobo, Ngara, Chitungo, Makanda, Atwine, … Musuka, 2021).

Infection prevention and control (IPC) are measures or initiatives that aim to protect healthcare workers, patients and visitors from acquiring an infection in a healthcare organization, and to control infection transmission when identified, (O'Brien, Flott, Bray, Shaw, Durkin, 2022). Examples include the provision and use of personal protective equipment (PPE), safe injection practices, and the promotion of hand hygiene. It has been noted that such initiatives are not necessarily simple to implement given financial and human resource constraints, Notably, securing of PPE for health workers was a challenge, (Dzinamarira et al., 2021). These shortages were attributed to international market shortages, low resources. It cannot be dismissed that corruption and misuse of funds, contributed to the shortages of PPE and testing services.

2.3.1 Psychological impact of COVID-19 on HCWs

Several studies have shown that the group of health-care workers who are in direct contact with patients are exposed to the highest levels of risk for contracting COVID-19 (Cabarkapa, Nadjidai, Murgier, & Ng, (2020). Nurses are particularly vulnerable to many job-related hazards and undergo a considerable number of emotional pressures in relation to their jobs because they mostly have the highest level of occupational stress among health-care workers as they are often the first frontline health workers who respond to patients (Ali, Diab, & Elmahallawy. 2021). However,

another study showed that there was little change in perceived stress between, practice setting, job title, amount of health care experience, knowledge about COVID-19, and whether or not the individual dealt with a suspected or confirmed case, Maraqa, Nazzal, & Zink, (2020).

More importantly, health-care workers adjust to a stressful working environment, but stressors might have a cumulative effect, resulting in psychological distress, (Ali et al., 2021). Maraqa et al., (2020) conducted a study on 430 frontline health-care workers in Palestine and detected that approximately three-quarters reported high stress levels during the outbreak. In addition, the factors causing the highest anxiety levels include providing care for infected colleagues and worrying about transmitting the virus and infecting their family, and also thinking about the lacking protection measures and continuous screening for infection, (Ali et al., 2021). Also, a study by Cabarkapa et al, (2020) identified fear of the unknown, becoming infected and threats to their own mortality as stressors which kept creeping in.

Another factor was anxiety where HCWs high anxiety was because of being suspected of having COVID-19 infection when compared to those who were not suspected of infection, (Cabarkapa et al., 2020). The levels of anxiety, stress, and self-efficacy exhibited amongst HCWs in Wuhan during the COVID-19 pandemic appeared dependent on their degree of social support and quality of sleep, (Xiao et al., 2020).

2.4 COVID-19 Testing

Testing is a central pillar of clinical and public health response to global health emergencies, including the COVID-19 pandemic, (Mina & Andersen, 2021). Ending the pandemic involves the accurate application of diagnostic testing in high volumes

and the rapid use of the results to help implement the appropriate therapy and prevent further spread. The value of integrated diagnostics in the management of the current COVID-19 wave and possible future COVID-19 waves is high.

During the early phase of the coronavirus disease 2019 (COVID-19) pandemic, design, development, validation, verification, and implementation of diagnostic tests were actively addressed by many diagnostic test manufacturers, (Vandenberg, Martiny, Rochas, van Belkum, & Kozlakidis, 2021). Tests for detecting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were developed within days of the release of the virus genome, (Mina & Andersen, 2021).

Africa's dependency on external suppliers considerably has limited the expansion of COVID-19 testing. Africa has had to compete with higher income nations to access COVID-19 in vitro diagnostics and, despite the pooled procurement of tests facilitated by WHO global access to COVID-19 tools, the continent remains underserved, (Ondoa, Kebede, Loembe, Bhiman, Tessema, Sow, Sall, & Nkengasong, 2020). During the early months of the pandemic, African countries were struggling to get more people tested, (Adebisi, Oke, Ademola, Chinemelum, Ogunkola, & Lucero-Prisno Iii, 2020).

COVID-19 testing initially started with RT-PCR whereby the test sample is collected via nasopharyngeal swab. The RT-PCR is a genetic test combining reverse transcription of Ribonucleic acid (RNA) into complementary Deoxyribonucleic acid (DNA), and amplification of specific DNA targets using RT-PCR, (Alsharif & Qurashi, 2021). PCR is the gold standard for diagnosing SARS-CoV-2 infection, However, PCR testing is expensive and not routinely afforded by low-to-middle income countries such as those in sub-Saharan Africa. Beyond individual and

workplace factors, national testing supply shortages, failure of a cohesive national testing policy, and changing testing guidelines, among others, have resulted in perceived and experienced difficulties in COVID testing, even among HCWs (Byhoff et al., 2021).

However, laboratory testing is not without challenges as African nations have limited well-equipped laboratories that can cater for its population. The dearth of clinical laboratory scientists on the continent is also another challenge that is likely to contribute to the diagnostic insufficiency. Shortages of testing supplies, requirements for skilled laboratory personnel, high costs and logistical challenges often mean that demand for tests exceeds supply, (Mina & Andersen 2021). Because of such reasons, the Rapid antigenic tests (RAT) were recently incorporated to complement the practical limitations of PCR, (Candel, Barreiro, San Roman, Abanades, Barba, Barberan, Bibiano… Zapatero, 2020).

The introduction of rapid tests in Zimbabwe was a game changer as it increased the number of tests performed. In May 2021, 600 sites were set up across the country to ease the burden of COVID-19 diagnosis crisis, (World Health Organisation, 2021). According to Ministry of Health and Child Care, 675 659 PCR tests have been conducted, 111 010 RDT tests and 775 164 Antigen tests have been conducted, (Ministry of Health and Child Care, 2021). On May 16, 2020, the Nigeria Centre for Disease Control activated 26 COVID-19 testing sites, using high-throughput HIV molecular testing and tuberculosis GeneXpert instruments. Similarly, Ethiopia increased its capacity to 7600 tests per day after Abbott agreed to reconfigure its closed platform to accommodate COVID-19 testing, (Candel et al., 2020).

A study conducted by Linares in 2020 suggested that Panbio COVID-19 AG Rapid Test Device can rapidly identify SARS-CoV-2-infected individuals with moderate to high viral loads. Antigenic tests have shown 1.0 % specificity in all types of patients and can be a powerful tool of high positive predictive value to control the COVID pandemic. (Linares et al., 2020).

2.4.1 Factors associated with COVID-19 testing

Front-line health-care workers have at least a threefold increased risk of reporting a positive COVID-19 test and predicted COVID-19 infection, compared with the general community, even after accounting for other risk factors (Nguyen, Drew, Graham, Joshi, Guo, Ma, Mehta., … Davies, 2020). A study by Wang, Zhou and Liu (2020b) showed that long-time exposure to large numbers of infected patients directly increased the risk of infection for healthcare workers and also, pressure of treatment, work intensity, and lack of rest indirectly increased the probability of infection for healthcare workers.

Persons with underlying health conditions such as obesities, diabetes and cardiovascular diseases are at increased risk for developing severe diseases and therefore tested when they develop COVID-19 like symptoms (Pengid, Peltzer, de Moura Villela, Fodjo, Siau, Chen, Bono, Colebunders, et al. (2022). A review done by Mhango, Dzobo, Chitungo and Dzinamarira (2020) showed that old age alongside pre-existing health conditions such as hypertension, diabetes mellitus, cardiovascular disease, chronic lung disease, and immunosuppression were important COVID-19 risk factors.

The possibility for health-care workers to perpetuate infections or contribute to community spread, particularly when asymptomatic or mildly symptomatic, and

justify calls to increase testing to reduce hospital-based transmission, (Nguyen *et al,* 2020). Transmission of COVID-19 before symptoms onset has been reported and the number of asymptomatic cases is quite significant. In a study of COVID-19 symptomatic and asymptomatic infection on the *Diamond Princess* cruise ship, 328 of the 634 positive cases (51·7%) were asymptomatic at the time of testing, (Bai, Yao, Wei, Tian, Jin, Chen, & Wang, 2020).

Symptomatic HCWs, rather than asymptomatic HCWs, are currently prioritised in testing and this means that HCWs who are capable of transmitting the virus are not being tested; if they were tested and found to be COVID-19 positive, they could be advised to isolate and await the onset of symptoms or, if no symptoms develop, undergo repeat testing, (Black et al., 2020).

Characteristics of HCWs who wanted testing were more likely to be younger, white, working part-time, a nurse or doctor, worried about using up paid sick time, and felt that their job responsibilities have changed substantially during the pandemic (Byhoff, Paulus, Guardado, Zubiago, & Wurcel, 2021).

socioeconomic disparities and financial hardships facing HCWs during the pandemic, with 28 % of respondents reporting at least one financial concern, 20 % worry about affording next month's rent, and 17 % living at or below 200 % of FPL. Socioeconomic factors were not significantly associated with interest in COVID testing, but were significantly associated with receipt of COVID testing, (Byhoff et al., 2021).

2.5 Theoretical Framework

The Health Belief Model (HBM) is a health behaviour change model used to predict individuals' responses and change in their behaviour to prevent diseases. It was

developed in the 1950s by social psychologists in the U.S. Public Health Service. The HBM has six core constructs: 1) perceived severity, 2) perceived susceptibility, 3) perceived benefits, 4) perceived barriers, 5) cues to action and 6) self-efficacy (Glanz et al., 2002). An individual must believe they are at risk of a health problem (perceived susceptibility). The level of perceived severity must be high for an individual to take the recommended action. To adhere to the recommendations, the individual must believe doing so will be beneficial. They also consider possible barriers, weighing the pros and cons. Cues to action are events, people, or things that move people to change their behaviour. An individual also considers how capable (self-efficacy) they are to carry out the recommendations given the barriers (Gipson & King, 2012).

2.6 Relevance of the Theoretical Frame to the Study

The Health Belief Model was selected for this study as it is the best-known model which is frequently used in behavioural health-related research and has successfully predicted health-promoting behaviour (Chin & Mansori, 2019). The Health Belief Model helped predict why HCWs at Harare City Health facilities were likely or not likely to get test for COVID-19.

HCWs who perceived themselves to be susceptible to COVID-19 due to other underlying conditions such as diabetes mellitus, high blood pressure and other chronic illnesses perceived COVID-19 as a threat and led to increased testing uptake. This theory explains that the perceived benefits of COVID-19 testing among HCWs outweighed the perceived barriers as pain and discomfort of testing or fear of a positive result.

2.7 Summary

The burden of COVID-19 is heavy on HCWs who are at an increased risk of infection and transmission. HCWs find themselves at an increased risk because of their patient facing roles, brain drain, lack of adequate PPE to protect them from COVID-19 acquisition. The World Health Organisation recommends testing through infection prevention and control measures which can help quarantine those infected to control COVID-19. COVID-19 diagnostics have evolved over time with more cheaper tests available. The Health Belief Model explained the perceptions, barriers and facilitators to uptake of COVID-19 diagnosis.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter highlights the methodology adopted in undertaking the research. Among other things, the chapter details the research design, population and sampling techniques, the sources of data and the research instruments. The chapter also discusses the presentation and analysis of data as well as the issues of data validity and reliability.

3.2 The Research Design

The researcher adopted the analytic cross-sectional research design for this study. The methodology adopted is a pragmatic approach where both qualitative and quantitative was applied to capture key elements of the research purpose and objectives. The advantages of analytical cross-sectional studies are 1. Fast and easy to conduct and less expensive compared with other study designs, 2. Allow estimation of odds ratios for examination of associations between exposures and outcomes, 3. Allow estimating of the burden of the disease or traits, 4. Useful for hypothesis generation for potential associations between the exposure or the disease that can be confirmed or refuted using more rigorous study designs. 5. Useful for public health planning, monitoring, and evaluation, (Pandis 2014).

3.3 Population and sampling

The city of Harare has 9 Health Districts consisting of 43 health facilities under the City of Harare's Department of Health, including 2 hospitals, 12 poly clinics (one of which is an enhanced polyclinic), 6 family health service clinics and 23 satellite clinics. According to the 2012 population and housing census area specific profiles,

the city of Harare has an area of 960.6 km2 (371 mi2) and a population 2,123,132 and an estimated 3,120,917 in its metropolitan area in 2019 (Zimbabwe National Statistics Agency (ZimStat), 2012). The study looked at 3 clinics namely Mabvuku Polyclinic, Mbare Polyclinic and Warren Park Polyclinic which were selected from 3 districts according to the catchment area and staffing. Health care workers from these clinics consist of all patient facing workers.

The sampling frame included all cleaning staff, community Health care workers, nurse aids, registered general nurses, primary counsellors, and laboratory technicians at each facility. Figure 3.1 below shows the Harare City's Department of Health's administrative districts.

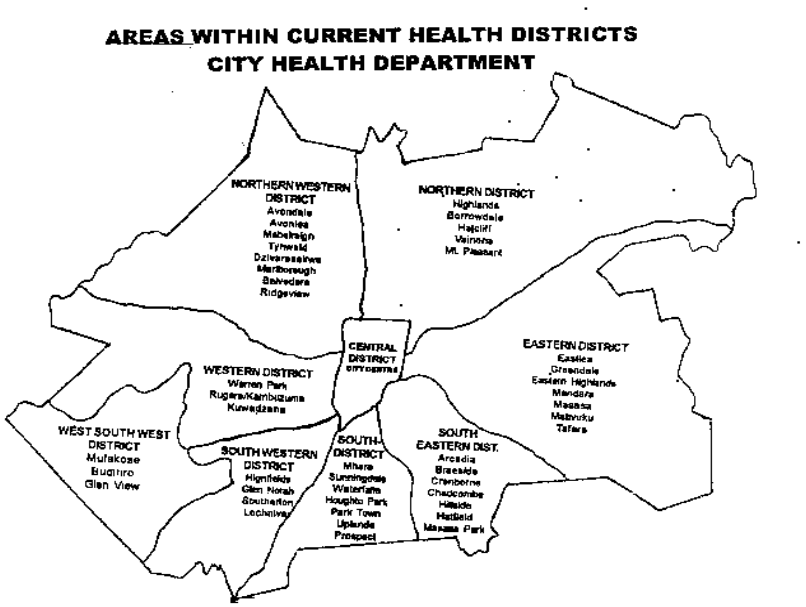

Figure 3.2 Harare City Department of Health Districts

Source, City of Harare, City Health Department 2017 Annual Report

3.4 Sample size and procedure

The population of HCWs at Mabvuku Polyclinic, Mbare Polyclinic, Warren Park Polyclinic and Budiriro Polyclinic is 187. Yamane (1967:886) provides a formula to calculate sample sizes. A 95% confidence level and P = .5 are assumed.

n is sample size

N is the population size (187).

e is the level of precision (.05)

$$n = \frac{N}{1 + N(e)^2}$$

$n = 187/1+187(.05)^2$

n=127

Assuming 90% response rate minimum sample size:

127/.9 = 141.

Data on COVID-19 testing for 103 HCWs at Mabvuku, Mbare and Warren Park Polyclinics was collected. Health care providers for in-depth interviews were selected using purposive sampling from these 3 polyclinics. 20 In-depth interviews were conducted, these were stopped when the researcher reached theme saturation.

3.5 Data collection instruments

A checklist was used to collect secondary data from 3 Harare City Health facilities.

An in-depth interview guide was used in collecting data from participants. The guide comprised of questions on views on uptake to COVID-19 testing, barriers and facilitators to uptake and views and perceptions on COVID-19 testing.

3.6 Pretesting of instruments

The pre-testing of the in-depth interview guide and understanding of informed consent was done through conducting interviews with 4 HCWs at Mbare Satellite Clinic. These were purposively selected according to gender, age, and willingness to participate.

3.7 Data collection procedure

Quantitative Data collection was performed from Mbare Polyclinic, Mabvuku Polyclinic and Warren Park Polyclinic COVID-19 testing registers to Microsoft excel (2016) where it was further managed. During data curation, all variables were assessed for consistencies and missingness of responses. All missing variables were referred to the data sheet. However, if found missing, the researcher assumed data was missing at random and performed complete case analysis.

Qualitative data collection was done for HCWs from 3 selected Harare City Health facilities were purposively selected for in-depth interviews to understand their perceptions about COVID-19 testing, barriers and facilitators to COVID-19 testing and their views on the Anterior nares (AN) testing. The researcher arranged for interview appointments at the clinics, informed consent was sought, and the consent form was signed prior to the in-depth interview. The interviews were conducted in a private counselling room where privacy and confidentiality were maintained.

3.7.1 Inclusion and exclusion criteria

Quantitative

Inclusion criteria:

i. HCWs tested for COVID-19 and appearing in COVID-19 testing registers.

ii. HCWs working at the 3 selected polyclinics.

Exclusion criteria

i. General population appearing in COVID-19 testing registers.

ii. HCWs not working at the 3 selected polyclinics.

Qualitative

Inclusion criteria

i. Working at the 3 selected polyclinics

ii. Tested or not tested for COVID-19.

iii. Willing and able to provide written informed consent.

Exclusion criteria

i. HCWs not working at the 3 selected polyclinics.

3.8 Analysis and Organization of Data

Quantitative data analysis was performed using STATA 16 for Windows. Continuous variables like age of healthcare workers were first assessed for normality using histograms and the Shapiro Wilk test and presented as means (standard deviation). Nonetheless, if skewed, quantitative variables were presented as medians (interquartile range). Also, all categorical variables like gender were presented as frequencies and percentages. All categorical variables, e.g., site of COVID-19 test against COVID-19 test results, were compared and evaluated for associations. All comparisons present a p-value<0.05 if there is a significant difference/association between variables.

Firstly, to determine the effect of staff characteristics on COVID-19 results, logistic regression analysis was performed reporting odds ratios (univariate) and adjusted odds ratios (multivariate analysis). The odds ratio represents the magnitude of association between specific staff characteristics and COVID-19 positivity results. Secondly, we conducted multivariate logistic regression to determine the adjusted magnitude of association between healthcare workers characteristics in particular symptoms reported and reasons for test on COVID-19 outcomes.

Qualitative interviews were transcribed verbatim, interview summaries were written, and a coding framework was developed. Thematic analysis, through NVIVO 11 was used to identify, analyze, and interpret patterns of meaning within the data. Important statements were extracted, coded, and discussed. Codes were summarized into themes and a continuous comparison of codes and categories was carried out.

3.9 Ethical Consideration

Permission to conduct the study was sought from the Africa University Research Ethics Committee, (AUREC) and the Harare City Health department. Written informed consent was sought from all persons who were interviewed during the study. Participants were free to refuse to participate without any consequences arising from their refusal. Confidentiality of responses were assured and maintained. All data collected was stored securely on a password protected computer.

3.10 Chapter Summary

An analytic cross-sectional study was conducted at 3 health facilities namely Mabvuku Polyclinic, Mbare Polyclinic and Warren Park Polyclinic. Using a checklist to identify HCW COVID-19 testing uptake from the facility COVID-19 testing registers a total of 103 HCWs had been tested over a period from January

2021 to September 2021. In-depth interviews were also conducted with HCWs to answer questions on perceptions about COVID-19 testing and barriers and facilitators to COVID-19 testing by HCWs. Written informed consent was sought prior to the interviews and all the collected information was kept in a password protected computer. Permission to conduct the study was sought from the Harare city health department director and Africa University Research Ethics Committee.

CHAPTER 4 DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter focuses on data analysis and the presentation of the study findings. The study uses frequency and percentages, and logistic regression analysis to draw conclusions.

4.2 Characteristics of COVID-19 testing

Table 4. 1 Participant characteristics of those tested

	Tested negative (n=252)	Tested positive (n=71)	Invalid (n=8)
Age			
20-29	21(8.5)	6(9.1)	2(28.6)
30-39	86(35.0)	28(42.4)	1(14.3)
40-49	82(33.3)	21(31.8)	1(14.3)
50-59	50(20.3)	10(15.2)	3(42.9)
60-69	7(2.9)	1(1.5)	0
Gender			
Female	220(89.1)	54(79.4)	7(87.5)
Male	27(10.9)	14(20.6)	1(12.5)
Job title			
SIC	4(4.1)	1(4.0)	0
RGN	40(40.8)	11(44.0)	0
PC	29(30.0)	5(20.0)	0
Nurse Aide	9(9.2)	4(16.0)	0
Lab Tech	4(4.1)	2(8.0)	0
Pharmacy Tech	4(4.1)	0	0
General Hand	8(8.2)	2(8.0)	0
Site			
Mbare	92(36.5)	34(47.9)	8(100)
Mabvuku	97(38.5)	21(29.6)	0

	Tested negative (n=252)	Tested positive (n=71)	Invalid (n=8)
Warren/Park	63(25.0)	16(22.5)	0

The study identified that over the study period, 331 COVID-19 tests were performed and 71 of them were positive, thus representing 21.5% of the tests performed. Most of the positive tests conducted were on staff aged 30-39 (42.4%) and female (79.4%). In addition, most positive cases were reported by RGN (n=11; 44%), whilst Mbare site had the highest number of positive cases overall. Notably, 2.4% (8/331) of the tests performed were invalid and they were all from Mbare, mostly for female participants (87.5%) and among the older staff (42.9%).

4.3 Uptake and trend of COVID-19 testing

The bar chart below shows the number tests conducted in relation to the number of HCWs per site over the three quarters. In the first quarter, Warren Park had the highest uptake of tests done on the HCWs at the site with each staff being tested at least twice. This was followed by Mabvuku and lastly Mbare. In the second quarter, there was a general decline in the number of HCWs tested at all the three sites. However, in Mabvuku and Warren Park, all HCWs were tested at least once. In contrary, less than half of the staff were tested in Mbare.

In the last quarter under study, there was an improvement in the number of HCWs tested in Mbare though not every HCW was tested which was similar to Warren Park. Mabvuku was the only site with all HCWs tested in the last quarter.

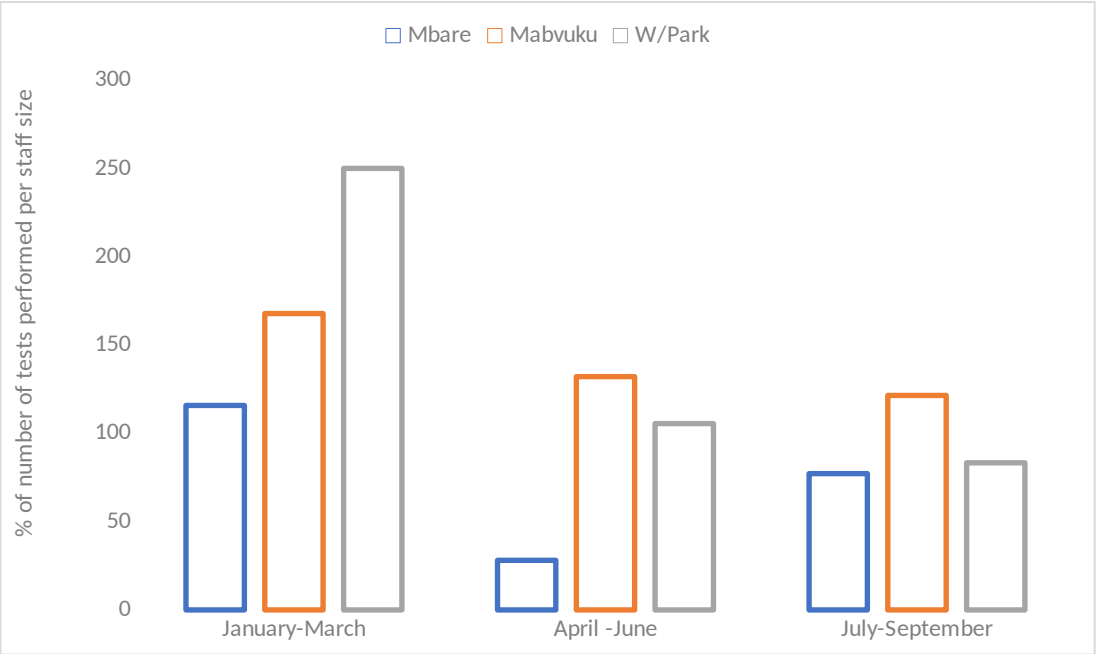

Figure 4. 1 Uptake and trend of COVID-19 testing at three sites in Harare

Table 4. 2 Symptoms, reasons for test and other COVID-19 related assessments

	Tested negative	**Tested positive**	**Invalid**
Symptoms			
Fever or chills	21(7.6)	12(14.1)	0
Dry cough	20(7.3)	12(14.1)	0
Tiredness or fatigue	6(2.2)	6(7.1)	0
Difficulty breathing	4(1.5)	1(1.2)	0
Muscle/body pain	6(2.2)	0	0
Loss of taste or smell	0	2(2.4)	0
Sore throat	11(4.0)	9(10.6)	0
Runny nose	13(4.7)	11(12.9)	0
Nausea or vomiting	1(0.4)	0	0
Diarrhoea	3(1.1)	0	0
No symptoms	150(54.4)	17(20.0)	0
Other	41(14.9)	13(15.3)	0
Period of testing			
January-March	128(50.8)	38(53.5)	0

	Tested negative	Tested positive	Invalid
April-June	59(23.4)	13(18.3)	0
July-September	65(25.8)	20(28.2)	8(100)
Sample type			
Nasopharyngeal	252(100)	71(100)	8(100)
Reason for test			
Symptomatic	96(38.0)	37(52.1)	5(62.5)
High risk group	58(23.0)	18(25.4)	0
Contact	102(40.0)	16(22.5)	3(37.5)
Type of test			
Panbio Ag test	77(30.6)	32(45.1)	8(100)
Standard Q Ag test	136(54.0)	32(45.1)	0
RT-PCR	16(6.4)	6(8.5)	0
LumiaDX POC test	1(0.4)	0	0
DGT	22(8.7)	1(1.4)	0

Among the HCWs that tested positive, the most common symptoms reported were dry cough (n=12, 14.1%), fever/chills (n=12, 14.1%), runny nose (n=11, 12.9%) and (n=9, 10.6%) with the highest number of new cases reported in the first three months (53.5%). However, a sizeable number of HCWs reported other symptoms which are not necessarily conventional (n=13, 15.3%). The Nasopharyngeal sample was the only one used on mostly symptomatic staff members (n=37, 52.1%), whilst the Panbio Ag test and Standard Q Ag test were equally used. A quarter of HCWs (n=18, 25.4%) that tested positive were tested as considered themselves a high-risk group, whilst 22.5% were contacts. Furthermore, the period April-June had the fewest number of participants tested (n=72, 21.8%) and the least positivity rate (18.3%).

4.4 Logistics regression analysis

4.4.1 Univariate logistic regression for factors associated with COVID-19 result

Table 4. 3 Univariate logistic regression

	Positive (n=71)	Negative (n=252)	Odds ratio [95% CI]	p-value
Age				
20-29	6(9.1)	21(8.5)	Ref	
30-39	28(42.4)	86(35.0)	1.14[0.42, 3.11]	0.798
40-49	21(31.8)	82(33.3)	0.90[0.32, 2.50]	0.834
50-59	10(15.2)	50(20.3)	0.70[0.23, 2.17]	0.537
60-69	1(1.5)	7(2.9)	0.50[0.05, 4.90]	0.552
Gender				
Female	220(89.1)	54(79.4)	Ref	
Male	27(10.9)	14(20.6)	2.11[1.04, 4.30]	0.039
Job title				
SIC	4(4.1)	1(4.0)	Ref	
RGN	40(40.8)	11(44.0)	1.1[0.11, 10.87]	0.935
PC	29(30.0)	5(20.0)	0.69[0.06, 7.51]	0.760
Nurse Aide	9(9.2)	4(16.0)	1.78[0.15, 21.39]	0.650
Site				
Mbare	92(36.5)	34(47.9)	Ref	
Mabvuku	97(38.5)	21(29.6)	0.59[0.32, 1.09]	0.088
Warren/Park	63(25.0)	16(22.5)	0.69[0.35, 1.35]	0.276
Symptoms				
Fever or chills	21(7.6)	12(14.1)	Ref	
Dry cough	20(7.3)	12(14.1)	3.75[0.66, 21.15]	0.134
Tiredness or fatigue	6(2.2)	6(7.1)	5.00[0.67, 37.26]	0.116
Sore throat	11(4.0)	9(10.6)	6.36[1.12, 36.08]	0.037
Runny nose	13(4.7)	11(12.9)	6.15[1.12, 33.67]	0.036
No symptoms	150(54.4)	17(20.0)	1.20[0.26, 5.57]	0.819
Other	41(14.9)	13(15.3)	6.11[1.30, 28.71]	0.022
Period of testing				
January-March	128(50.8)	38(53.5)	Ref	
April-June	59(23.4)	13(18.3)	0.74[0.37, 1.50]	0.405
July-September	65(25.8)	20(28.2)	1.04[0.56, 1.92]	0.910
Reason for test				
Contact	96(38.0)	37(52.1)	Ref	
High risk group	58(23.0)	18(25.4)	1.98[0.94, 4.17]	0.073
Symptomatic	102(40.0)	16(22.5)	2.56[1.34, 4.91]	0.005

The study identified that healthcare workers were likely to be positive if they were of age 30-39 years as compared to those in the youngest age group (20-29 years). In addition, other older age groups were protective though there was no statistical evidence to support this finding at 95% confidence level. However, evidence has shown that male health care workers were twice likely to have a positive COVID-19 result as compared to female staff (OR=2.11, 95% CI: 1.04-4.30, p=0.039]. At 95%

significance level, there was no evidence suggesting specific health care worker roles (job titles) were likely to test positive as compared to others over the study period. Likewise, there was limited evidence highlighting an association between study sites and COVID-19 test results. However, the results show that, Mbare had the highest number of positive results as compared to Mabvuku and Warren Park with borderline odds ratio of OR=0.59 [95% CI: 0.32-1.09, p=0.088] and OR= 0.69 [95% CI: 0.35-1.35, p=0.276].

Furthermore, we report that staff members who tested positive for COVID-19 at the study sites during the study period were likely to report a sore throat (OR=6.36, 95% CI: 1.12-36.08, p=0.037), runny nose (OR=6.15, 95% CI: 1.12-33.67] and other symptoms (OR=6.11, 95% CI: 1.30-28.71).

Stillmore, more cases were reported during months of January-March as compared to April-June 2021, though comparable to the months of July-September of the same year. Of note, healthcare workers were likely to test positive for COVID-19 if they were symptomatic (OR=2.56, 95% CI: 1.34-4.91, p=0.005] as compared to being contacts. Additionally, staff members who got tested because they considered themselves being in a high-risk group were likely to test positive than those that were contacts though statistical evidence was borderline (OR=1.98, 95% CI: 0.94-4.17, p=0.073).

4.4.2 Multivariate logistic regression for the factors associated with COVID-19 result

Table 4. 4 Multivariate logistic regression

	Adjusted odds ratio [95% CI]	p-value
Gender		
Female	Ref	
Male	2.11[0.96, 4.63]	0.062
Symptoms		
Fever or chills	Ref	
Dry cough	4.39[0.76, 25.31]	0.098
Tiredness or fatigue	4.95[0.64, 38.16]	0.124
Sore throat	7.64[1.31, 44.71]	0.024
Runny nose	6.63[1.18, 37.36]	0.032
No symptoms	0.93[0.19, 4.59]	0.925
Other	4.77[0.99, 23.09]	0.052
Reason for test		
Contact	Ref	
High risk group	3.07[1.28, 7.38]	0.012
Symptomatic	1.32[0.59, 2.96]	0.497

In the multivariate analysis, we considered factors that were significant and or borderline in the univariate analysis. We observed that, males were twice likely (OR=2.11, 95% CI:0.96-4.63) to be positive for COVID-19 than female staff after adjusting for symptoms reported and reason for test, though statistical evidence was limited (p=0.062). The multivariate model also showed that, staff members who tested positive for COVID-19 were likely to present with a sore throat (OR=7.64, 95% CI: 1.31, 44.71, p=0.024] and or runny nose (OR=6.63, 95% CI: 1.18-37.36, p=0.032). In addition, HCWs tested because they considered themselves as high risk were thrice (OR=3.07, 95% CI:1.28-7.38, p=0.012) likely to be positive than those who were contacts adjusted for symptoms and HCW gender.

4.5 Demographic characteristics of Study Participants for Qualitative interviews

20 Participants went through the in-depth interviews. Table 4.5 below shows that 75% were female and 25% were male. Their ages ranged from 22 years to 55 years old, and all were tested for COVID-19. 45% of participants were registered general nurses, 30% primary counsellors, 15% were lab technicians and 10% were nurse aids. In-depth interviews were conducted at the three health facilities, with 30% from Mbare Polyclinic, 35% at Mabvuku Polyclinic and 35% from Warren Park Polyclinic. Only 5 (25%) male HCWs were interviewed across all 3 health facilities. All participants reported to have been tested for COVID-19, and 55% had a reactive result.

Table 4. 5 Participant characteristics (N=20)

Participant characteristics	**N (%)**
Age	
20-29	4 (20%
30-39	7 (35%)
40-49	7 (35%)
50-59	2 (10%)
Sex	
Female	15 (75%)
Male	5 (25%)
Site	
Mbare	6 (30%)
Mabvuku	7 (35%)
Warren Park	7 (35%)
Job category	
Registered general nurse	9 (45%)
Primary counsellor	6 (30%)
Lab technician	3 (15%)
Nurse aid	2 (10%)
Tested for COVID-19	
Yes	20 (100%)
No	0
Tested positive for COVID-19	
Yes	
No	11 (55%)
	9 (45%)

4.6 Perceptions of COVID-19 testing

4.6.1 Perceptions testing is painful

80% of participants highlighted negative attitude towards COVID-19 nasopharyngeal sample collection method because of the pain associated with it. Participants shared that the current nasopharyngeal sample collection method causes discomfort and leads to nose bleeding. One participant shared the risk of broken swabs stuck inside the pharyngeal passage. Those who have never been tested for COVID-19 shared that they heard that the sample collection method is painful and chose to get tested when there are other methods which are not painful.

4.6.2 Perceived susceptibility

Participants felt they were at risk of getting infected with COVID-19 because of their patient facing roles and the risk is further exacerbated by lack of screening tools which hinder testing at the point of care of patients. It was added that some patients are not truthful about their symptoms, do not practise correct wearing of masks and do not follow social distancing guidelines. Being at high risk of getting infected due to the prolonged exposure which translates to long working hours and shortage of PPE. 30% of the participants shared that they are at risk of COVID-19 because of the pre-existing underlying conditions like heart problems, diabetes, high blood pressure and being overweight.

4.6.3 Myths and misconceptions

Participants shared that that in December 2021, during the Omicron variant, positive cases were many and the tests were said to be producing positive results for those

who just have a flue. Participants thought this was a flaw on the antigen tests which produced false positives for people who only had a flue. Other participants described mistrust of test since people would present with all symptoms but still test negative,

> *"you come with all the symptoms but still test negative, it shows these tests are not reliable" (38 years; PC).*

4.6.4 Perceived benefit of COVID-19 testing

Participants described COVID-19 testing as beneficial to the health sector as this helps gather statistics of the severity of the epidemic through diagnostics and to find ways to acquire resources and the quantities. It was shared that COVID-19 testing reduces the spread of the diseases by installing reduction of disease spread through isolation and quarantine. One participant specifically referred to COVID-19 testing as

> *"an assessment tool for how fatal and fast spreading COVID-19 is",*
>
> *(39 years; RGN-Midwife).*

HCWs used to have negative attitude and did not encourage patients to get tested, due to lack of knowledge and lack of experience.

4.6.5 Perceptions about Self-isolation

All participants concurred that due to economic challenges in the country, self-isolation may not be realised, because HCWs rely on their jobs for the upkeep of families. One participant shared that,

> *"you will be given 2 weeks to self-isolate, but they will not pay for those 2 weeks… so if not presenting with symptoms they may continue coming to work" (34-year-old; PC).*

Other participants described stigma associated with testing positive at the workplace which may also hinder self-isolation. Shedding more light, COVID-19 infection still carries stigma whereby a HCW who tests positive may be considered responsible for infecting colleagues. Lack of disclosure of results to colleagues was also cited by participants because of fear of stigma and discrimination,

> *"there is still some stigma just like with HIV back in the day… one will keep quiet and keep coming to work"*
>
> *(22 years; RGN)*.

Two participants shared their experience where they felt discriminated when they came back to work after the isolation period, it was highlighted that lack of health education among fellow HCWs contributed to ignorance on the COVID-19 infection cycle. Behaviour change was described as a major contributor to reduction of the spread of COVID-19will help reduce the spread of COVID-19. It was however noted that the severity of infection facilitates self-isolation.

4.7 Facilitators to COVID-19 testing

All participants were tested for COVID-19, and 45% tested negative on all accounts. HCWs were tested because there were many recorded cases at their facilities, and they are patient facing thus exposure to infections is high. Contacts of colleagues or direct patients who tested positive facilitated HCWs to get tested for COVID-19. As first-time testers, 60% were symptomatic presenting with sore throat, coughing, headache, nasal congestion, body pains or fever. One participant expressed that COVID-19 testing was a requirement at work whenever colleagues or patients tested positive for COVID-19,

> *"it's a passport like"*.

(42 years; RGN)

Another participant expressed that they had to go to the Laboratory for testing every day because of the rising cases within the facility and in most cases they were contacts,

Out of a team of 10, 7 tested positive within a week, so we had to get tested everyday"

(32 years; PC).

The frequency of testing is also supported by the uptake of testing whereby HCWs tested more than once in a single quarter. It was shared that the frequency of testing reduced once COVID-19 cases reduced.

To add on, constant contact with patients increased the risk of getting infected with COVID-19, thus whenever slight symptoms developed. HCWs would get tested due to fear of testing positive and fear of death,

"early diagnosis saves lives".

(55 years; PC)

One participant shared that increased knowledge levels of HCWs facilitated uptake of COVID-19, in 2020, HCWs had a negative attitude towards testing and discouraged patients from getting tested. She added that end of 2020 HCWs had increased knowledge, they also willingly tested and informed patients correctly about the benefits of testing.

Participants described that early testing facilitates self-isolation and reduces the spread of infection to colleagues, patients, and family members. Participants highlighted that provision of other testing methods like COVID-19 self-testing which

allows users to collect saliva or nasal swab specimens facilitates convenient testing for early detection of COVID-19 cases to trigger isolation and quarantine precaution, thus ultimately decreasing rates of community transmission. Furthermore, participants suggested availing more testing stations for example drive through testing facilities which offers convenience and fast results. Even though PCR testing is painful, brings in discomfort and irritation, participants thought HCWs would still choose it since it is highly sensitive and produces accurate results.

4.8 Barriers to COVID-19 testing

Participants described their experience with COVID-19 testing mentioning that,

"you can never get used to the pain associated with inserting that swab"

(32 years; Lab technician)

They shared that because of the painful nasopharyngeal sample collection method, they only got tested as a last option. 25% of the participants shared that they resorted to traditional medicines and means like drinking *zumbani* and steaming with guava, gumtree, and lemon leaves to alleviate the symptoms everyday to avoid getting tested. Regardless of testing requirements, health care workers concurred that colleagues are now afraid to get tested because sample collection is painful,

"usually they are afraid to get tested"

(42-year-old; RGN)

It was added that HCWs felt like they were being coerced to get tested because they work in the health sector. Also, HCWs are reluctant to get tested if they were not in contact with a positive person and they are likely to get tested if they were in contact with a severely ill person.

Fear of a positive result was also cited as one of the barriers to uptake of COVID-19 testing by HCWs. Also, lack of privacy which leads to stigma at health facilities was cited to hinder COVID-19 testing. Belief that COVID-19 severity has decreased thus there is no need to get tested

"we are working with the virus so there is no need to get tested"

(34-year-old; PC).

Whilst the desire to get tested is present, participants pointed out that the testing algorithm has changed whereby if one is not presenting with symptoms will not be tested. Participants also raised that unavailability of testing kits in health facilities pose as a barrier to COVID-19 testing, as health facilities tend to end up prioritising patients presenting with symptoms. It was further elucidated that rural health facilities also face a major challenge on scarcity of testing services which leaves HCWs and patients in need of testing.

In addition to unavailability of COVID-19 testing services, accessibility and cost of these services was cited to be another barrier, considering seeking testing at the health facilities requires user fees of US$5 and consultation fees. Accessible testing services are privatised and costly,

"if you go to private clinics its US $30,

(39-year-old; RGN).

4.9 Chapter summary

331 COVID-19 tests were performed on 103 HCWs over 3 quarters from January to September 2021. 71 tests were positive and the majority who tested positive were for staff aged between 30-39 years. The most common symptoms presented with were a

cough, fever/chills and runny nose. The majority of HCWs got tested because they were symptomatic or contacts. The study identified that HCWs were likely to be positive if they were aged between 30-39 years compared to the other age groups. Male HCWs were shown to be twice likely to have a positive COVID-19 result at (OR=2.1, 95% CI:0.96-4.63) as compared to female HCWs. There was limited evidence highlighting an association between study sites and COVID-19 results.

20 participants were interviewed for perceptions and barriers and facilitators to COVID-19 testing uptake. It came out that uptake to COVID-19 testing is influenced by both positive and negative factors. Perception of risk was high, with participants mentioning exposure due to their role and other underlying conditions like high blood pressure, and diabetes. Facilitators to COVID-19 uptake by HCWs included desire to know status, known benefits of diagnosis, requirement at work, symptomatic or being a contact of a known case. Barriers to COVID-19 mentioned were fear of a positive result, painful process, fear of stigma and myths and misconceptions among others.

CHAPTER 5 DISCUSSION OF RESULTS AND CONCLUSION

5.1 Introduction

This chapter gives a summary of the study findings and discusses whether the research met its objectives then gives conclusions on the hypothesized phenomena. The researcher will also give recommendations to the policy makers and suggest areas of interest to increase uptake of COVID-19 testing uptake by health care workers.

5.2 Discussion

5.2.1 Characteristics of COVID-19 testing

Overall, the study has shown that uptake of COVID-19 testing among healthcare workers is positive with staff being tested at least once for the time under study. We have however, also shown that, one site has healthcare workers who has gone for three months without being tested for COVID-19, whilst the remaining three having favorable attitude towards testing. Review of the clinic records has also indicated that, most and second most staff members were tested/repeat tested during the first and third quarter of 2021 respectively. However, the least number of health care workers were tested between July and September 2021.

The study has highlighted the positive attitude among healthcare workers towards COVID-19 testing in the majority of 2021 in Harare. Health care personnel are essential to the operation of a health-care system, and they must be safeguarded from illness (Rusakaniko et al., 2021). Furthermore, by reducing nosocomial infections, they create a protective barrier between hospital patients and the communities in which they live. There is overwhelming evidence showing that health systems and

health workers have been at the vanguard (Armocida et al., 2020) of the global response to the SARS-COV-2 epidemic (Schwartz et al., 2020). As a result, the WHO (World Health Organization, 2019) has identified biosecurity and biosafety as top objectives for infection prevention and control (IPC) for health professionals(Ali et al., 2020).

In Zimbabwe, through the Ministry of Health and Child Care and in response to the health needs of Zimbabwean health workers and the WHO's advice on COVID-19 tests, routine tests are being provided to front-line health workers with the overall aim of strengthening the country's COVID-19 response. The study characterised the health care centres, the several kinds of patient-facing health employees including nurses, nursing aides, general hands, administration personnel, groundsmen, and drivers. The majority of these health workers were assigned to wards and outpatient departments (OPD). According to the study, females made up the majority of the health workforce in our context (79.4%).

Evidence has also shown that healthcare workers COVID-19 infections result in a shortage of HCWs due to isolation and treatment durations, contact quarantining, hospitalization, mortality, and a long recovery period. During the early waves of the pandemic, countries like the United Kingdom, the United States, France, Italy, and South Africa reported large numbers of HCW infections and fatalities, putting a strain on human resources (Chitungo et al., 2020; Mhango et al., 2020). More-so, COVID-19 fatalities in the past, which mostly occurred in people over 50 years old, often caused in the loss of highly experienced HCWs who serve as pillars for teaching and mentoring younger HCWs (Dzinamarira et al., 2022). Therefore, the positive attitude towards testing on the sites under study is highly commended. Regardless of the attempts to test healthcare workers, there is little doubt that

frontline healthcare workers (HCWs) have a higher risk of infection than other infectious diseases (Sabetian et al., 2021). This places additional demands on healthcare systems, including personal protective equipment (PPE) and infection prevention and control (IPC) procedures, which are already stretched thin in low-resource settings (Nguyen et al., 2020).

5.2.2 Uptake and trend of COVID-19 testing

The study also found that, the highest number of tests were performed at the start of 2021, whilst the least were undertaken during the second quarter of the same year. Overall, 28.2% of the COVID-19 tests done returned positive and this relatively suggests the levels of exposure to COVID-19 as well as infection was higher in the health workers than general population (Rusakaniko et al., 2021). As explained earlier, this is not surprising as they would be more likely to make contacts with infected people due to their occupation, working in the COVID-19 health centres in the country especially returnees from South Africa where levels of infection were higher than in Zimbabwe at the time. In addition, this pattern may have been due to the fact that the study was conducted during the COVID-19 dominant waves in 2021.

Of note, the number of tests performed on the healthcare workers followed the COVID-19 epidemiological waves. The first wave, which ended in late August 2020, left the country with less than 1000 verified cases after taking a deceptive path (Murewanhema et al., 2020). The second wave was more severe than the first, with a case burden increase of almost 300 percent from December 2020 to January 2021 and the case fatality rate was reported to be 3.4 percent in both waves (Murewanhema et al, 2022).

5.2.3 Factors associated with COVID-19 result

Our study findings report the behavioural adjustment towards testing among health care workers during the second wave of the pandemic in Zimbabwe and hence shows the highest numbers of staff members tested. Though the country experienced its harshest wave of the COVID-19 pandemic to date from June 2021, to end of July 2021, the case fatality ratio was significantly lower than that of the second wave. As a result, during the third quarter, the number of healthcare workers tested were lower than those tested in the first quarter. Of note the lowest number of HCWs tested were in-between the 2nd and 3rd wave.

Of note, the vast majority of cases recorded in the first wave were imported from other countries like South Africa, Botswana, and the United Kingdom, with only a small percentage related to local community transmission (Murewanhema, 2021). In contrast, the majority of cases in the second wave (more than 90%) were due to various patterns of local transmission, such as clustering, sporadic, and widespread community transmission.

The clinical manifestation of COVID-19 has been thoroughly characterized, ranging from asymptomatic infection to severe lethal illnesses (Chen et a*l*, 2020). The study identified that most healthcare workers presented with sore throat, runny nose, cough and fatigue. This is consistent to other studies as reported in the meta-analysis that highlighted the most common symptoms as fever, cough, and fatigue and consistent with the general symptoms of a viral infection and pneumonia (Alimohamadi et al, 2020). Other studies has shown fever in 81.2% of cases, cough in 58.5% of cases, and fatigue in 38.5% of cases (Guan et al., 2020; Yang et al., 2020).

Therefore, combining the findings of studies on the prevalence of COVID-19-related symptoms should aid in the most accurate detection and diagnosis of infection.

However, the study did not identify measure the severity of the disease in order to identify its relationship with age and or symptoms. The study identified that female healthcare workers were likely to return a COVID-19 positive result. Studies have however shown that, both males and females have the same prevalence, though men with COVID-19 are more at risk for worse outcomes and death, independent of age (Jin et al., 2020). As such, the study findings could be an indicator of the overall differences in the number of males (13%) working as healthcare workers as compared to females (87%).

5.3 Perceptions of COVID-19 testing

Perceptions on the benefits of COVID-19 testing were more than perceived barriers to COVID-19 testing. This is a positive finding as it shows that most HCWs were willing to get tested. The health care workers at Mbare, Mabvuku and Warren Park Polyclinics perceived that getting tested for COVID-19 could be a good way to diagnose, treat and isolate if infected to protect the loved ones and would be a responsible thing to do so.

Nasopharyngeal sample collection method, even though painful, causes discomfort and irritation, they have a high sensitivity. These findings were also found by McElfish et al., 2021 that among all sources of samples tested, those obtained from the lower respiratory tract and nasopharyngeal area are viewed to have the highest sensitivity, compared to saliva, sputum, blood, (McElfish et al., 2021).

COVID-19 brought with it some stigma and discrimination which is prevalent even among HCWs. From the in-depth interviews, participants purported that COVID-19 positive results warrants self-isolation and that in turn causes stigma among colleagues.

5.4 Barriers and facilitators to uptake of COVID-19 testing

Provision of COVID-19 self-testing services were identified to facilitate uptake of COVID-19 testing. McElfish et al., 2021 also had similar findings where Antigen testing and point-of-care tests that can be self-administered may prove to be a more effective approach for diagnostic testing. It was noted in a study conducted in Greece and Cyprus that there is a preference for self-testing as it can also be critical during a rapid surge in cases, (Goggolidou, Hodges-Mameletzis, Purewal, Karakoula, & Warr, 2021).

Also, provision of drive through COVID-19 facilities will increase uptake of COVID-19 testing among HCWs as they can have access to testing even outside working hours. A study among the general public in the US reported a preference for home-based COVID-19 self-testing over drive-through or clinic-based testing. This can enable patients to maximize their individual contributions to slowing the spread of COVID-19 disease. Similarly, reducing the contact between patients and health care workers which improves health care worker safety by reducing their risk of exposure, (Hall et al., 2020).

The majority of participants reported that risk perception influenced them to get tested. A study done in Ohio and Maryland found that risk perception was one of the drivers to COVID-19 testing, (Nwaozuru, Obiezu-Umeh, Diallo, Graham, Whembolua, Bourgeau, Ritchwood, … Conserve, 2022). This shows that if people perceive to be at risk, they will take up COVID-19 testing as compared to when they are not at risk. More than half of the participants tested for COVID-19 because they experienced COVID-19 symptoms.

Risk of COVID-19 due to pre-existing comorbidities was shared by 1 participant who had diabetes and afraid that she may be at risk. Several studies indicated that some comorbidities predispose to COVID-19 disease. A study done by Rusakaniko et al in 2021 Zimbabwe surveyed the participants for self-reported comorbidities that have been listed by the CDC as potential risk factors for SARS-CoV-2 infection and disease. The most prevalent co-morbidity was hypertension (22%), followed by asthma (7%) and diabetes (6%), (Rusakaniko et al., 2021). Other studies have also shown that because HCWs are patient facing, they are more exposed to the COVID-19 disease, frequency of testing, contacts of colleagues or patients who test positive facilitate testing,

Fear of pain and discomfort associated with nasopharyngeal sample collection posed a barrier to COVID-19 testing. All participants echoed the painful process and how it limits testing uptake More participants were willing to have an antibody test than nasopharyngeal swab and the main reasons for the reluctance to have the swab collection procedure were fear of pain and discomfort associated with swab taking based on previous experience and lack of trust of the procedure, (Rusakaniko et al., 2021).

Unavailability, inaccessibility, and user fees were hinder uptake to COVID-19 testing. A qualitative study conducted by McElfish et al, (2021) showed that testing locations are not accessible due to distance and should be provided everywhere around the neighbourhood. HCWs suggested that COVID-19 testing services should be available as per need and all those who request testing should not be hindered by the price or unavailability.

5.5 Limitations of the study

This study had several limitations. Firstly, the first 2 Objectives of the study were based on COVID-19 testing registers and relied on the recorded information. Some health care workers were tested for COVID-19 but not recorded in the COVID-19 testing registers.

Secondly, all 3 health facilities did not have COVID-19 testing data for the period March to December 2020, testing at facility started in January 2021. The researcher had to reduce the time frame from March 2020 to August 2021 and changed it to January 2021 to September 2021.

Finally, the researcher had proposed to conduct the study at 4 Harare city health facilities namely Mbare Polyclinic, Mabvuku Polyclinic, Warren Park Polyclinic and Budiriro polyclinic. Due to time restrictions, the researcher only managed to collect data at 3 facilities and left out Budiriro Polyclinic which was furthest.

5.6 Conclusion

The study found that, the highest number of tests were performed at the start of 2021, whilst the least were undertaken during the second quarter of the same year, and the number of tests performed on the healthcare workers followed the COVID-19 epidemiological waves. The study identified that most healthcare workers presented with sore throat, runny nose, cough and fatigue. Combining the findings of studies on the prevalence of COVID-19-related symptoms should aid in the most accurate detection and diagnosis of infection.

By using a qualitative method, participants were able to voice their concerns in their own words. The perceptions articulated by participants suggest that HCWs perceive COVID-19 as beneficial, perceive that they are susceptible to COVID-19. Barriers to COVID-19 among HCWs include fear of pain through nasopharyngeal sample

collection method, fear of a positive result, fear of being stigmatized after getting a positive result and inaccessibility and cost of testing services. High risk due to patient facing roles exposes HCWs to COVID-19 infections thus they equally seek testing to know their status, presentation of symptoms was also noted as one of the facilitators to COVID-19 testing among HCWs.

5.7 Recommendations

The HCH department should mobilize funds for intense research and provision of COVID-19 self-testing kits which are less painful, accessible and less costly. These should be availed for both HCWs and the general population. Future work should consider implementing interventions that leverage the benefits of COVID-19 self-testing and further assess the extent to which these identified facilitators and barriers may influence COVID-19 ST uptake.

The Harare city health department to facilitate continuous availability of COVID-19 testing at health facilities and to source more COVID-19 testing kits. Multisectoral collaboration between private institutions offering COVID-19 testing and the Harare city health department.

Campaigns on COVID-19 testing to be done regularly to increase knowledge and reduce stigma. Continuous information provision on preventative measures

Timeliness of data entry on COVID-19 testing registers should be emphasized at all health facilities by the Harare City Health.

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Appendix 1. 1 Informed consent form

TITLE: UPTAKE AND PERCEPTIONS OF COVID-19 TESTING BY HEALTH CARE WORKERS AT HARARE CITY HEALTH FACILITIES.

Informed consent form: In-depth interviews

Principal Investigator: Lindiwe Mancitshana

Name of Organization: Africa University

Introduction

My name is Lindiwe Mancitshana, I am pursuing my studies in the Master of Public Health degree with Africa University. I am doing research on uptake and perceptions of COVID-19 testing by Health Care Workers.

What you should know about the study:

- I give you this consent form so that you may read about the purpose, risks, and benefits of this research study.
- You have the right to refuse to take part or agree to take part now and change your mind later.
- Please review this consent form carefully. Ask any questions you may have before you decide.
- Your participation is voluntary.
- You will be given a copy of this consent form to keep.

Purpose of the study:

Health care workers are frontline workers who are employed to provide a health care service to the general population. This includes, nurses, nurse aides, cleaners, clerks, lab technicians, pharmacy staff, security staff and anyone who works within the health service. Since the beginning of the COVID-19 pandemic there have been many health care workers, across the world, who have come in contact with patients who have had COVID-19. Working in a health care service can make you more exposed to COVID-19 than other service providers. In addition, COVID-19 testing by health care workers helps minimise transmission of the disease. This study seeks to understand the perceptions, barriers and facilitators to uptake of COVID-19 testing.

Procedures and duration

I am inviting you to take part in an individual in-depth interview. Due to the nature of the COVID-19 pandemic, should a face-to-face interview not be possible, we may have the interview over the telephone. I will only begin recording the interview once you have agreed to be part of the study. I will audio record these interviews and take notes, but your real name will not be recorded, your voice record will only be identified by a study number and not by your name. I may quote what you say when reporting the results, but no one will be able to link what you say back to you. You are being invited to take part in this research because you are a health care worker or work at a health care facility. It is expected that this will take about 30-45 minutes. Your participation in the study will end on the same day on which we do the interview.

Risks and discomforts

The interviews are not designed to ask any sensitive questions. However, there is a risk that you may feel uncomfortable talking about some of the topics. The researchers will keep everything that you say strictly confidential and what you tell us will only be reported anonymously and in a way that stops you being identified. Please remember that you do not have to answer any question or take part in the discussion if you feel the questions are too personal or if talking about them makes you uncomfortable.

Benefits and/or compensation

There is no financial benefit for you participating in the study but the information we get may be used by policy makers to ensure there is an increase on HCW testing.

Sharing the Results

The results of the study will be shared with Harare City Health Department and Africa University faculty, but nothing in the report will be attributable to you.

Confidentiality

If you agree to take part in this study by signing this document, all the information that you give us will be stored without using your real name. No one will be able to get hold of the information about you except for the researcher. No one will be able to identify you from the information we collect about you.

I would like to audio record the discussion in order to make sure that I do not miss any valuable information. I may also take notes during the discussion. I may use some of what you say as an example of the opinions and views of health care workers in reports about this research, but your name will not be mentioned.

Voluntary participation

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your access to health services or with the Harare City Health. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

Offer to answer questions

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Authorisation

If you have decided to participate in this study, please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

---------- ----------

Name of Research Participant (please print) **Date**

Signature of Research Participant

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 email aurec@africau.edu

Name of Researcher ----------

Signature of Researcher----------

Appendix 1. 2 Interview Guide

COVID-19 Testing Interview Guide

The first section of this guide seeks to know you as my research participant. I will ask basic information just to know you and understand your role as a healthcare worker.

1) **Please can you tell me a bit about yourself and your background**
    a. **Your age, marital status, education.**
    b. **What specific roles and responsibilities does your work involve?**
2) **I would like to know a bit more about your health. Do you have any chronic or underlying conditions that you know of? Explain to me how you feel about your risk of COVID-19 in relation to this underlying issues.**

This study is being conducted in a time where COVID-19 is a global concern. Healthcare workers in their various roles play a vital role in trying to fight this pandemic. We would like to understand your lived experience and encounters in relation to COVID-19.

3) **Describe to me your experience with COVID-19.**
    - **How many times were you tested for COVID-19 from March 2020 to August 2021?**
    - **Have you or someone close to you ever been diagnosed with COVID-19? If yes, please explain the testing procedure.**
    - **Have you lost someone close to you due to COVID-19? If yes, please explain.**
    - **How concerned are you about getting COVID-19?**
        - **Why do you feel the way you do?**

The next section seeks to get an understanding about COVID-19 testing from what is being said both from a global or local perspective. This will help inform us on the perceptions of COVID-19 testing.

4) **Describe what you heard about COVID-19 testing.**

- **Describe what you heard when the global discussion about testing started.**
- **Describe what you heard when the discussions were started in Zimbabwe (through social media, official work or government channels, religious channels)**
- **What is the importance of COVID-19 testing?**
- **What have you heard about testing that worries you/others?**
- **What do other health care workers think about testing?**
    - **What are their attitudes towards testing?**
- **Do you think those who are diagnosed with COVID-19 will follow the guidelines of isolating?**

Having understood the various information and perceptions about COVID-19 testing, I would want to zone in on barriers and facilitators to COVID-19 testing.

5) **What do you think are the facilitators to uptake of COVID-19 testing?**

- **How do health care workers react when they are told to get tested?**
- **What are the reasons for willingness to get tested?**
- **Do you think testing can help mitigate the spread of COVID-19? Please explain.**

6) **In your opinion what could be the barriers to uptake of COVID-19 testing?**

- **What are the common reasons that are normally given when health care workers refuse to go for COVID-19 testing?**

Do you have any questions or other things related to this topic that you feel might help understand these issues better?

Appendix 1. 3 Approval letter from City of Harare Department of Health

Appendix 1.4 Africa University Research Ethics Committee (AUREC) Approval

AFRICA UNIVERSITY
A United Methodist-Related Institution
Investing in Africa's future

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 website: www.africau.edu

Ref: AU2341/22 24 January, 2022

LINDIWE N MANCITSHANA
C/O CHANS
Africa University
Box 1320
Mutare

RE: **UPTAKE AND PERCEPTIONS OF COVID-19 TESTING BY HEALTH CARE WORKERS AT HARARE CITY HEALTH FACILITIES, HARARE, ZIMBABWE**

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.
a) Research proposal
b) Data collection instruments
c) Informed consent guide

- **APPROVAL NUMBER** AUREC 2341/22
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** January 24, 2022
- **EXPIRATION DATE** January 24, 2023
- **TYPE OF MEETING** Expedited
  After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before expiration date.
- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

MARY CHINZOU –
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE