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PREDICTORS OF COVID 19 HOSPITALIZATION: A CASE OF THORNGROVE HOSPITAL BULAWAYO CITY, ZIMBABWE

BY

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Abstract

COVID19 pandemic has negatively impacted health care systems in many countries. Properly understanding risk factors for hospitalization will help improve clinical management and facilitate targeted prevention messaging and forecasting and prioritization of clinical and public health resource needs. A case control study was conducted in Bulawayo City to identify predictors COVID 19 for hospitalization.An interviewer-administered questionnaire was used to collect data from the study participants. The data collection was done in private and at the most convenient place for the study respondents. Overall, 204 patients were included in the study comprising 102 hospitalised and 102 non-hospitalized patients controls.Two sampling frames were created from the Bulawayo city health department COVID-19 line-list. The first sampling frame was for the COVID-19 patients that were hospitalized at Thorngrove hospital. This sampling frame was used to systematically sample 102 cases. The second sampling frame was for the COVID-19 patients that were not hospitalized. This sampling frame was used to systematically sample 102 controls.The excel rand function was used to randomly select the first case or control. Both hospitalised and non hospitalized patients were systematically selected from the Bulawayo COVID 19 linelist. Data was analyzed using Epi-Info version 7. The statistical software was used to generate means, frequencies, proportions, and to perform bivariate, and multivariate logistic regression to determine the independent predictors for the hospitalization of COVID-19 patients. Hospitalized and non-hospitalized patients were identified from laboratory-confirmed COVID-19 cases reported to the Bulawayo City health and were linelisted. The results of the study showed that the independent predictors for being hospitalized were being HIV positive (adjusted Odds Ratio(aOR) =6.07; 95% CI: 2.0-18.3;p =0.01), and being hypertensive (adjusted Odds Ratio(aOR) =20.73; 95% CI 6.6-64.9;p =0.01). COVID-19 patients with hypertension were 20.73 times more likely to be hospitalized compared to those who were not hypertensive. The study also showed that the independent protective factor for not being hospitalized was being female (adjusted Odds Ratio(aOR) 0.41; 95% CI 0.2-0.9; p=0.002). Females had 59% reduced odds of being hospitalized compared to men.The researcher recommends that case management pillar within City health should prioritize vaccine allocation, diagnosis, and treatment to high risk groups like the hypertensive and HIV positive population groups as well as optimisation of care by ensuring that high risk groups like HIV and hypertensive patients are compliant with their medication, monitoring of BP, viral load and follow up of non compliant patients by community health nurses.

Keywords: COVID 19; Pandemic; Predictors: Hospitalization;

Declaration Page

I declare that this dissertation proposal is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it be submitted to another university for the award of a degree.

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Dedication Page

I would like to dedicate this work to my late mother Shanangurai Whicho, my husband Milton and granddaughter Tadiwanashe and niece Mexine for support they gave me as l carried out this study.

List of Acronyms and Abbreviations

AFR	Africa
ART	Anti Retroviral Therapy
CDC	Africa Centre for Diseases Control and Prevention
COVID-19	Coronavirus Disease 2019
HIV	Human Immune Deficiency Virus
MoHCC	Ministry of Health and Child Care
PLHIV	People Living Positively with Human Immune Deficiency virus
SARS CoV 2	Severe Acute Respiratory Syndrome Corona Virus 2
UN	United Nations
W. H.O	World Health Organization

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV 2) is the virus that causes COVID-19, coronavirus disease 2019. It was first identified in Wuhan, China in December and spread all over the world by March 2020 and was then declared by WHO as a global pandemic AIDS (World Health Organization [WHO], 2020).

By the end of 2020, around 80 million confirmed cases and 1.8 million deaths had been reported globally to WHO, making COVID-19 the leading cause of death among infectious diseases (WHO, 2021). Public health care systems were affected with sudden increase in hospitalizations, demand of financial and human resources needed to help it grapple with the escalating numbers of COVID-19 cases.

Maintaining adequate health care services and planning for resources during the COVID-19-pandemic was a core goal for the health authorities at national, regional and local levels. The knowledge of predictors of COVID 19 hospitalizations are key in the planning of resources need to deal with the pandemic.

This study seek to identify the predictors of COVID 19 hospitalizations in Bulawayo city in Zimbabwe. A case control study will be carried out focusing on first isolation hospital for COVID 19 patients in Bulawayo, Thorngrove hospital. The study will involve all confirmed COVID 19 admission between the period March 2020 and July 2021 and control cases in the community who did not require hospitalization.

1.2 Background to the study

The virus quickly spread across the globe, causing significant morbidity and mortality. The pandemic is still ongoing. Globally as of 13 August 2021 there were 200 million confirmed cases of COVID 19, including 4 million deaths. United States of America and Europe had the highest number of cases globally whilst Africa had the least number of cases 4 million cases and 129 thousand deaths (WHO 2021).

The hardest hit country in sub-Saharan Africa is South Africa with close to 3 million confirmed cases and 89 thousand deaths by 5 November 2021 (WHO, 2021). Zimbabwe recorded the first imported case on 21 March 2020. As of 5 November 2021, around 133 thousand confirmed cases and close to 5000 deaths have been reported (Ministry of Health and Child Care [MoHCC], 2021).

The virus spreads mainly between people who are in close contact with each other, typically within 1 metre when aerosols or droplets containing the virus are inhaled or come directly into contact with the eyes, nose, or mouth. The virus can also spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols remain suspended in the air. People may also become infected by touching surfaces that have been contaminated by the virus when touching their eyes, nose or mouth without cleaning their hands. The virus incubation period is 2-14 days (WHO 2020).

The clinical manifestations of diagnosed individuals with COVID 19 can be predominantly characterized via a cluster of flu-like symptoms (fever, cough, dyspnoea, myalgia, fatigue, diarrhea, and smell or taste disorder. However asymptomatic cases have also been confirmed (WHO 2020).

Testing for COVID-19 is done using Polymerase chain reaction (PCR). It is a molecular test commonly used. Samples are collected from the nose or throat with a swab. Molecular tests detect a virus in the sample by amplifying viral genetic material to detectable levels (CDC, 2019).Evidence suggests that SARS-COV-2 RNA can be detected in people 1 to 3 days before the onset of their symptoms (WHO 2020).

The prevention of transmission is best achieved by identifying suspect cases as quickly as possible testing and isolating infectious cases also identifying all close contacts of infected people so that they can be quarantined to limit the onward spread and break the chain of transmission. Face masks must be used as part of comprehensive package measures which includes frequent hand hygiene, physical distancing, respiratory etiquette, environmental cleaning and disinfection (WHO, 2019). A number of vaccines have been developed. On 22 February 2021 Zimbabwe began its vaccination program. By 5 November 2021 above 3 million people had been vaccinated against COVID 19.

COVID19 affects people differently approximately 80% of most people with COVID-19 develop mild to moderate disease, approximately 15% develop severe disease that requires oxygen support, and 5% require critical care (WHO, 2021). The 20% who get hospitalised necessitate the need for adequate health care services. Effective health care services and resource allocation in COVID 19 management depends on the prediction of COVID 19 hospitalizations (Telle et al., 2021).

Understanding predictors of COVID 19 hospitalizations is of critical importance to health authorities, clinicians, policy makers and program planners as new strategies, plans for resource allocation and policies are developed to mitigate and manage the

COVID-19 pandemic. Hence this study is focusing on the predictors of COVID 19 hospitalization.

1.3 Problem Statement

The Ministry of Health and Child Care, and local authorities in Zimbabwe designated institutions for the management of COVID-19 patients who require hospitalization in response to increased hospital admissions. Bulawayo city council`s Thorngrove hospital was the first COVID-19 treatment unit set up for the management of COVID-19 patients who required hospitalization in Bulawayo. The first patient was admitted on the 16 of March 2020 and there was a sustained increase in the hospital admissions from January 2021. Hospitalized COVID-19 patients have higher adverse outcomes when compared to non-hospitalized cases, and hospitalization has significant costs on the health system. The proposed study will therefore, determine predictors of COVID-19 hospitalization.

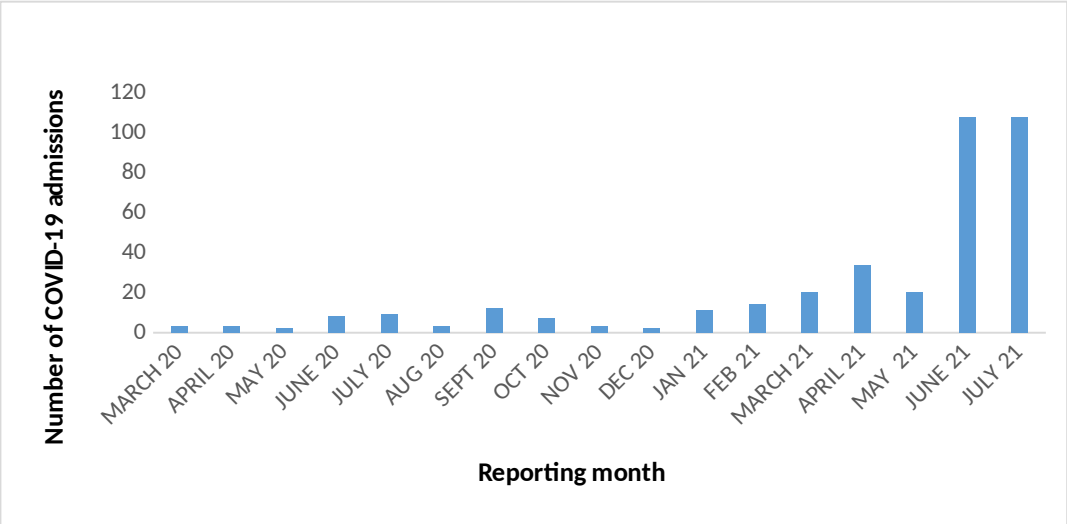


Figure 1.1 Thorngrove hospital COVID-19 admissions, March 2020 to July 2021

1.4 Study Objectives

1.4.1 Broad objective

To determine predictors of COVID-19 hospitalization, Thorngrove hospital, Bulawayo city, 2021

1.4.2 Specific objectives

The research sought specifically to:

i. To determine the socio-demographic predictors of COVID-19 hospitalization, Thorngrove, Bulawayo City, 2021.

ii. To determine clinical characteristics associated with hospitalization among patients with COVID19 , Thorngrove Hospital, Bulawayo City, 2021

1.5 Research question:

i. What are the socio-demographic predictors of COVID 19 hospitalization, Thorngrove hospital Bulawayo city 2021?

ii. What are the clinical characteristics associated with hospitalization among patients with COVID19, Bulawayo City, 2021?

1.6 Significance of the study

The findings of the study revealed the predictors of COVID 19 hospitalization which enhances understanding of predictors of COVID 19 hospitalization and informs health authorities, police makers, program planners and clinicians involved in health care services and resource allocation. Finding from this study enables clinicians, health authorities and program managers can plan better for future out breaks. There is no documented evidence on the predictors of hospitalization of COVID 19 patients in Bulawayo city and Zimbabwe. Findings from this study has added onto the body

of knowledge and bring a better understanding of the disease with the ultimate goal of preventing morbidity and mortality due to the pandemic.

1.7 Delimitation of the study

The study is confined to the Thorngrove hospital of the City of Bulawayo excluding other facilities which started admitted COVID 19 patients in 2021. Lack of funding for the research project resulting in data collection done by the researcher alone. Researcher is not a full time student so time was a limiting factor.

1.8 Summary

COVID-19 pandemic has led to a dramatic loss of human life worldwide. No definitive treatment found. This chapter introduced the study and provided its background. The objectives, research questions and justification of the study were laid out. The scope of the study was mentioned.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The previous chapter provided brief background information on COVID-19 globally, regionally and in Zimbabwe. This chapter provides a review of recent journal articles, academic reports, professional publications and textbooks around willingness to work in the COVID-19 centre amongst health care workers. The first part of chapter 2 begins with a conceptual framework showing the dependent variable and the independent predictors of COVID 19 hospitalization. The review of related literature is based on the sociodemographic predictors and clinical characteristics associated with hospitalization among patients with COVID19, Bulawayo City, 2021?

2.2 Conceptual framework

The author hypothesizes that an association exists between COVID 19 hospitalizations and multidirectional independent variables such as sociodemographic predictors and clinical characteristics. Sub-variables of each variable are in the circles of the conceptual framework. Figure 2 below shows the conceptual framework on predictors of COVID 19 hospitalizations

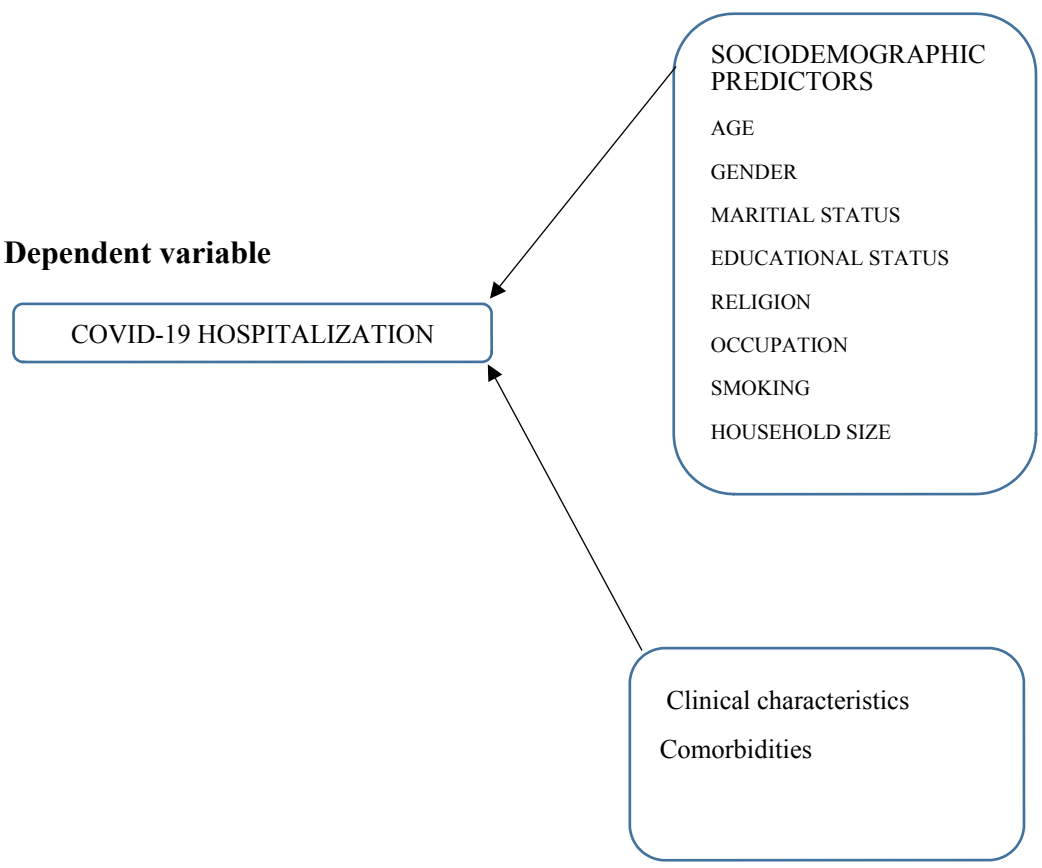


Figure 2.1 Adapted and modified from Takahashi et al. (2015).

2.3 Sociodemographic predictors of COVID 19 hospitalizations

An assessment of the sociodemographic predictors of COVID 19 hospitalizations assist the researcher to identify the common social and demographic features amongst the COVID 19 patients which could have resulted in them having severe form of COVID 19 which warranted admission into hospital. WHO (2020) indicated that 80% of people who contract COVID 19 virus do not require hospitalization. 15% get admitted with severe form of the disease and 5% end up in intensive care unit requiring mechanical ventilation.

A study done by Telle at al. (2021) revealed that old age and gender were most strongly associated with COVID 19 hospitalization. These findings were consistent

with previous studies done by Killerby et al. (2020) which found that old age as measured by age 65years above was a predictor of COVID 19 hospitalization. The same study also revealed that males were 30% more likely to be hospitalized than females citing non biological factors such as increased exposure.

In Atlanta, USA studies revealed that males were 30% more likely to be hospitalized than females citing non biological factors such as increased exposure in terms of exposure (Ko et al., 2020). These studies were consistent with other studies by Killerby et al., (2020) which reported that 52% of the hospitalized patients were man. Killerby et al. 2020 also brought in race and ethnicity and indicated that 79% of COVID 19 were black. Telle et al. (2021) noted that findings for ethnic groups as predictors of COVID 19 hospitalizations are more mixed, though in a large study from the UK, Blacks and South Asian people were at higher risk of severe disease than people with white ethnicity. Living conditions have been attributed to explain the severity of COVID 19 in blacks than whites but no study have been done to ascertain that. This study will not focus on race, the study being done in a population that is predominantly black but will consider the household sizes of the COVD 19 patients and assess the association with hospitalisation.

It is important to note that all these studies with the same findings of age and male sex as predictors of COVID 19 hospitalizations were done in United States of America, their findings may not apply to African settings let alone in Zimbabwean because of difference in population distribution. In Georgia 14% of the population is above 65years (U.S census bureau, 2019). In South Africa only 5% of population is over 65years compared to 9 % in Brazil and 38% in UK (Boulle, 2020). According to the Zimbabwe demographic health Survey (ZDHS) 2015 half of the population in Zimbabwe is below age 18, while 2.4% percent are aged 65 or older.

The mode of transmission of the virus which is airborne puts both male and females at risk of contracting the disease therefore exposure may not be the best explanation to justify the findings which indicate that more males than female suffered severe form of COVID 19 and were hospitalized

The previous studies did not assess other socio-demographic predictors among COVID 19 patients such as educational status, occupation, alcohol consumption, smoking, marital status, religion and living conditions which might be related to COVID 19 hospitalization which will be considered in this study.

2.4 Clinical characteristics as predictors of COVID 19 hospitalizations

2.4.1 Comorbidities

CDC (2020) reported that surveys done in the United States and European Union revealed that individuals with major comorbidities including CVD, HTN, diabetes, COPD, CKD, and malignancy seem to be at higher risk than those without these conditions for severe COVID-19 complications. It goes further to highlight that requirement for hospitalization and intensive care unit (ICU) admissions with COVID-19 have been observed in about 20% of cases with polymorbidity, with case fatality rates as high as 14%.Overall, composite data suggests that individuals with chronic underlying illness may have severe outcome risks as high as 10-fold as compared to individuals without any comorbidity. The findings were consistent study done in Michigan, in USA where medical comorbidities were identified as independent correlates of hospitalization in COVID-19 patients presenting to the emergency department (Imam, 2020). Obesity was mentioned as a predictor of COVID 19 hospitalizations in the same study. Baigan et al. (2021) revealed same

finding in their study where they analyzed a total of 27 articles consisting of 22,753 patient cases from major epicenters worldwide. Studies done in Ghana concurred with findings from all other studies that comorbidities contribute towards COVID 19 hospitalization (Ashinyo et al., 2021). Obesity was not measured however Kompaniyets et al. (2021) indicated that obesity is a recognized risk factor for COVID 19 hospitalization

Study done in Democratic republic of Congo notes the same trend of comorbidities contributing to severe form of COVID 19 disease which resulted in hospitalization of patients (Nachega et al., 2020). The same study further highlighted that among the comorbidities evaluated, hypertension and diabetes were clearly associated with more severe presentation and poorer prognosis for COVID-19. This is in line with findings published from China, the United States, and Europe. These two comorbidities were strongly co-prevalent. Obesity was not identified as predictor of COVID 19 hospitalization in the studies done in Ghana and DRC which are African countries which may be the same case as Zimbabwe. The prevalence of obesity (body mass index (BMI) in the USA has been reported to be 42.2% in adults according to 2017–2018 data from the Centers for Disease Control compared to 5.8% for Zimbabwe(Plataki, 2021).

In the discussion on socio-demographic predictors the researcher highlighted that European countries have an older age population compared to countries like Zimbabwe with a younger population. Comorbidities are common in old age and that could explain the prevalence of comorbidities like diabetes mellitus and hypertension in the hospitalized COVID 19 patients.

It is important to note that Zimbabwe is a Low to Middle Income Country with chronic infectious diseases like HIV and TB (MoHCC, 2017) therefore understanding whether the medical underlying conditions like HIV/TB are predictors of COVID 19 hospitalisation is important to countries like Zimbabwe with high HIV epidemics. WHO (2021) noted that Zimbabwe has an HIV prevalence of 13.8 percent among women and men age 15-49 compared to European countries like UK with 0.16%. This study will include the chronic infectious underlying diseases such as HIV and TB and their contribution as predictors of COVID 19 hospitalization. Other comorbidities will be considered as well in this study in order to identify their contribution as predictors of COVID 19 hospitalizations in Zimbabwean context and environment.

WHO (2020) indicated that severe form of COVID 19 is characterized fever, cough, dyspnoea, fast breathing together with either respiratory rate above 30 or severe respiratory distress or SpO2 below 90% on room air. Studies done in USA, Michigan concurred by indicating tachycardia, tachypnea and hypoxia with oxygen saturation below 90% as common among COVID 19 hospitalized patients (Imam et al., 2020). Whilst Study done in DRC hospitalized patients reported headaches, fever, cough, sore throat, rhinorrhea and dyspnoea (Nachega 2020).

Finding in USA studies revealed that fever or cough were commonly reported among both hospitalized and nonhospitalized patients, whereas shortness of breath was reported more often among hospitalized patients. Chills, headache, loss of smell or taste, or sore throat were reported more often among nonhospitalized patients (Killerby et al., 2020). In Ghana a study indicated that the most common clinical

symptoms were cough, fever, headache, sore throat, and nausea (Ashinyo et al., 2020). Garg et al. (2020) concurred with previous studies by indicating that most common signs and symptoms at admission included cough, fever or chills, and shortness of breath. However gastrointestinal symptoms which had not been identified in the previous studies was indicated that it was also common in the form of diarrhea, nausea or vomiting.

COVID 19 affects primarily the respiratory system (WHO, 2020) and this is consistent with the studies highlighted above where respiratory symptoms were more common. Of note headache is mentioned in all the study findings above and gastro intestinal symptoms were also mentioned indicating that more studies need to be done to identify more clinical features which can predict COVID 19 hospitalizations. WHO (2021) highlighted that they are different variants of the COVID19 virus have been identified namely alpha, beta, gamma and Delta. The report goes further to indicate that the variants have been demonstrated to be associated with increase in virulence and subsequent change in clinical disease presentation hence the need for ongoing studies to identify health related predictors such as clinical features of COVID 19 that predict hospitalization.

2.5 Chapter Summary

The chapter discussed the various predictors of COVID 19 hospitalizations. Conceptual framework categorised the dependent and independent variables such as sociodemographic predictors and clinical characteristics associated with hospitalization among patients with COVID19. The next chapter covers methodology, study design; sampling, data collection methods as well as ethical considerations were discussed.

CHAPTER 3 METHODOLOGY

3.1 Introduction

According to Gwinhi and Dirwain (2015), the study methodology section provides information connected to the various methods used in undertaking particular research. Chapter three described the various stages of the study that included the selection of respondents and participants from the linelist in Bulawayo City. It has also provided the processes of collecting data and such data was analyzed paying attention to appropriate research ethics that included seeking consent from the subjects before collecting data.

3.2 Research philosophy

The researcher assumed and believed that there were differences between COVID-19 patients who are hospitalized, and those that are not hospitalized. These differences were quantified, and analyzed. The positivism research philosophy was therefore chosen and used. This research philosophy allowed for the measurement, and quantification of the differences between the COVID-19 patients hospitalized and those that were not hospitalized.

3.3 Research design

A 1:1 unmatched case-control study was conducted. A case-control study design was chosen as both exposure and outcome have already occurred. Given the time and financial resource limitations to conduct the study, a case-control study design was the most appropriate design. The case-control study was conducted to answer the research question on what are the predictors of hospitalization, among COVID-19

patients. The study compared COVID-19 patients who were hospitalized, and COVID-19 patients that were not hospitalized.

A case will be defined as any COVID-19 patient diagnosed in Bulawayo city using a polymerase chain reaction (PCR) test from 01 January 2021, to 30 August 2021, line-listed by the Bulawayo City Health department, and was hospitalized at Thorngrove hospital, Bulawayo city.

A control will be defined as any COVID-19 patient diagnosed in Bulawayo city using a PCR test from 01 January 2021, to 30 August 2021, line-listed by the Bulawayo City Health department, but was not hospitalized at any institution.

3.4 Study setting

The study was conducted in Bulawayo city which is the second capital city of Zimbabwe. The city is located in the Southwestern part of the country and is approximately 440 kilometers from Harare the capital city of Zimbabwe. Bulawayo city council is mandated to provide primary health care, and disease control services to the residents of the city. The local authority has 19 health facility including Thorngrove infectious diseases hospital. Patients with COVID-19 infection, and who require hospitalization are admitted at Thorngrove infectious diseases hospital

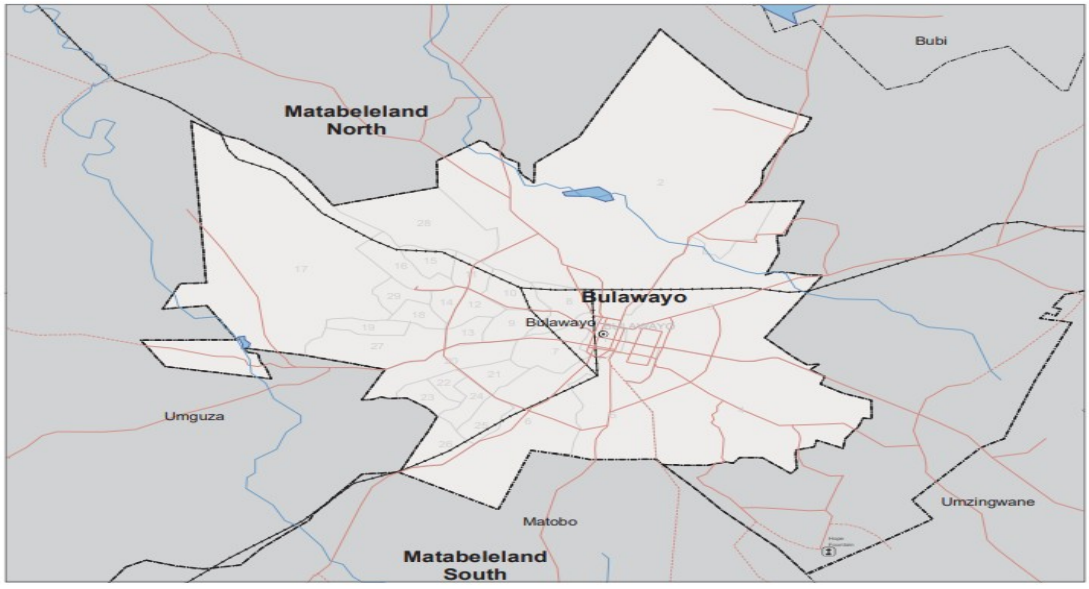


Figure 3.1 Map of Bulawayo health facilities (Rusakaniko et al. 2020).

Source, City of Bulawayo, City Health Department 2019 Annual Report

3.5 Study Population

The study population were patients who contracted COVID-19 in Bulawayo city, and were line-listed by the Bulawayo City health department.

3.5.1 Target population

The target population were the residents of Bulawayo city. The province has a population of 653 337 according to the ZIMSTAT population census (2012).

3.5.2 Inclusion

- All COVID-19 patients in Bulawayo city diagnosed with a PCR test, line-listed by Bulawayo city council health department, from 01 January 2020, to 30 August 2021.

3.5.3 Exclusion

- All COVID-19 patients in Bulawayo city who died.
- All COVID-19 patients line-listed by Bulawayo city health department, but not resident in Bulawayo city.
- All COVID-19 patients who refused to consent to the study.
- All COVID-19 patients who are too ill, and not able to stand the interview.

3.6 Sample size and sampling procedure

3.6.1 Sample size

The sample size was calculated using the Fleiss formula embedded in the Epi Info stat cal function. Assuming 95% confidence interval, a significance level of 0.05, 80% power of the study, an Odds Ratio of 2.4, 30.0% exposure among controls, and 50.7% exposure among cases based on a study by Killerby, 2020 where males were

2.4 times more likely to be hospitalized compared to females. An optimal sample size of 90 was calculated, and assuming a 5% refusal rate a sample size of 102 cases and 102 controls for the COVID-19 patients was calculated.

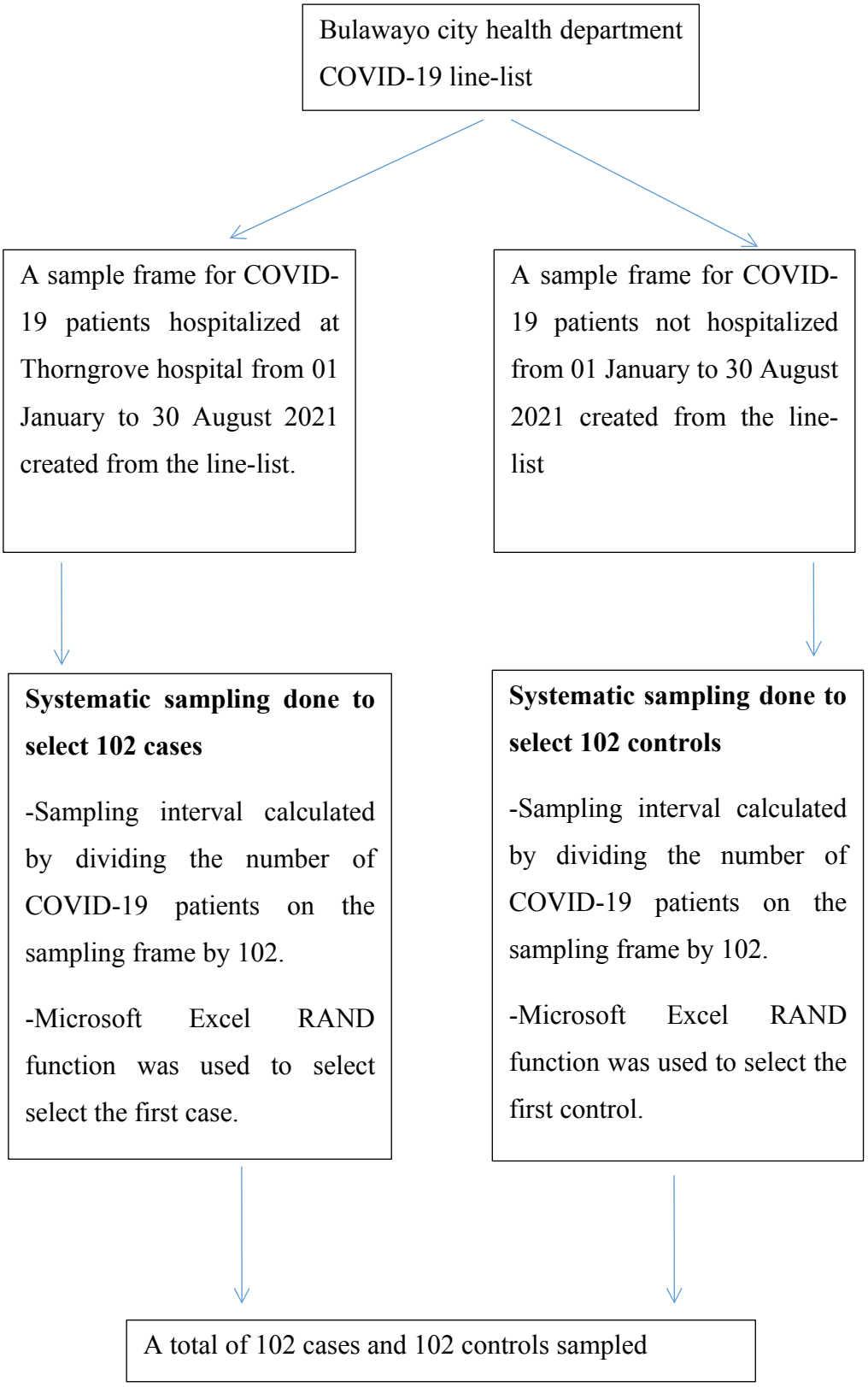
3.6.2 Sampling Procedure

Two sampling frames were created from the Bulawayo city health department COVID-19 line-list. The first sampling frame was for the COVID-19 patients that were hospitalized at Thorngrove hospital. This sampling frame was used to systematically sample 102 cases. Where n_1= the total number of COVID-19 patients on the sampling frame for the COVID-19 patients hospitalized, the sampling interval was calculated by using the formula: $n_1/102$. A total of 102 cases were sampled from this sampling frame.

The second sampling frame was for the COVID-19 patients that were not hospitalized. This sampling frame was used to systematically sample 102 controls. Where n_2=the total number of COVID-19 patients on the sampling frame for the COVID-19 patients not hospitalized, the sampling interval was calculated using the formula: $n_2/102$. A total of 102 controls were sampled from this sampling frame (Figure 4 below).

The EXCEL RAND function was used to randomly select the first case or control.

Figure 3.1 Flow chart for the sampling procedure for cases and controls.



3.7 Data Collection tools

3.7.1 Questionnaire

A questionnaire was used to collect data from the study respondents. The tool was used to capture data on the clinical characteristics and socio-demographic predictors for hospitalizations of COVID-19 patients.

3.8 Pretesting of instruments

Declared pretesting of data collection tools was done at Filabusi district hospital. This was done to assess the validity of the tools, the time required to administer the questionnaires, the willingness of respondents to answer questions and relevance of the answers, and subsequently making amendments where necessary before the study participants were interviewed.

3.9 Data collection procedure

3.9.1 Questionnaire

An interviewer-administered questionnaire was used to collect data from the study participants. The data collection was done in private and at the most convenient place for the study respondents. All COVID-19 prevention protocols were adhered to during the data collection exercise.

3.10 Data Analysis

3.10.1 Quantitative data

Data was analyzed using Epi-Info version 7. The statistical software was used to generate means, frequencies, proportions, and to perform bivariate, and multivariate logistic regression to determine the independent predictors for the hospitalization of COVID-19 patients.

3.11 Ethical considerations

Permission to conduct the study was sought from the Bulawayo City Director for Health Services, and the Africa University department of health sciences. Ethical clearance was sought from Africa University Research and Ethics Committee (AUREC).

Informed consent was obtained from each study participant before recruitment into the study. The researcher read out the details of the consent form to the potential participant. The participant were informed about the aim of the study. The researcher obtained consent after the participant understood the study procedures. The participant's preferred language was used for clear understanding thus the consent form had both English and local languages.

3.12 Chapter Summary

Chapter 3 provided a continuum of the processes of data collection and analysis procedure adopted in this study. It began with a diagnosis of research philosophical views. The determination of the population and the random sampling which was used to select the participants The chapter then details the steps by step processes involved in collecting the structured data. Ethical issues were also deliberated on. The next chapter presents and discusses the study results.

CHAPTER 4 DATA ANALYSIS AND PRESENTATION

4.0 Introduction

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

4.1 Socio-demographic characteristics of the study participants

The researcher recruited 204 study participants and 180 completed the interview, 8 (4%) declined to participate, and 16 (7%) were unreachable. Therefore yielding a response rate of 88%. Saunders (2015) highlighted that a high response of more than 80% is required.

4.1.1 Gender of the study participants

The majority 101(56.11%) of the participants were male. Cases had more males 57(63.33) than controls 44(48.9).

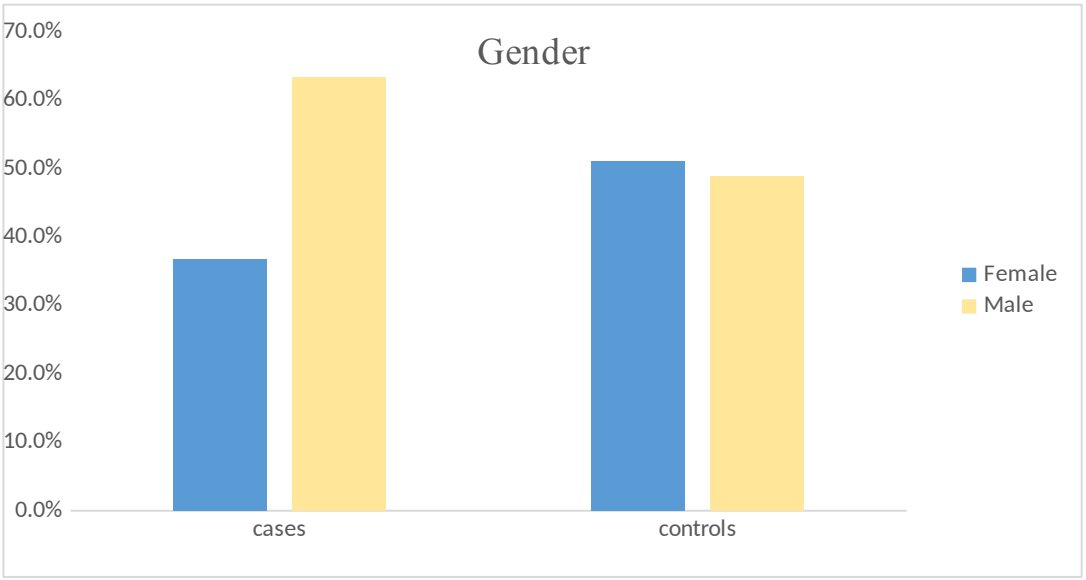


Figure 4.1 Distribution of participants by gender

4.1.2 Marital status of the study participants

The commonest marital status was being married with 52/180 (28.89%) of the study participants being married followed by being single with 43(23.89%) and being divorced was the least with 4 (2.22%). Marital status for the cases was 29(32.22%) whilst controls had 23(25.56%).

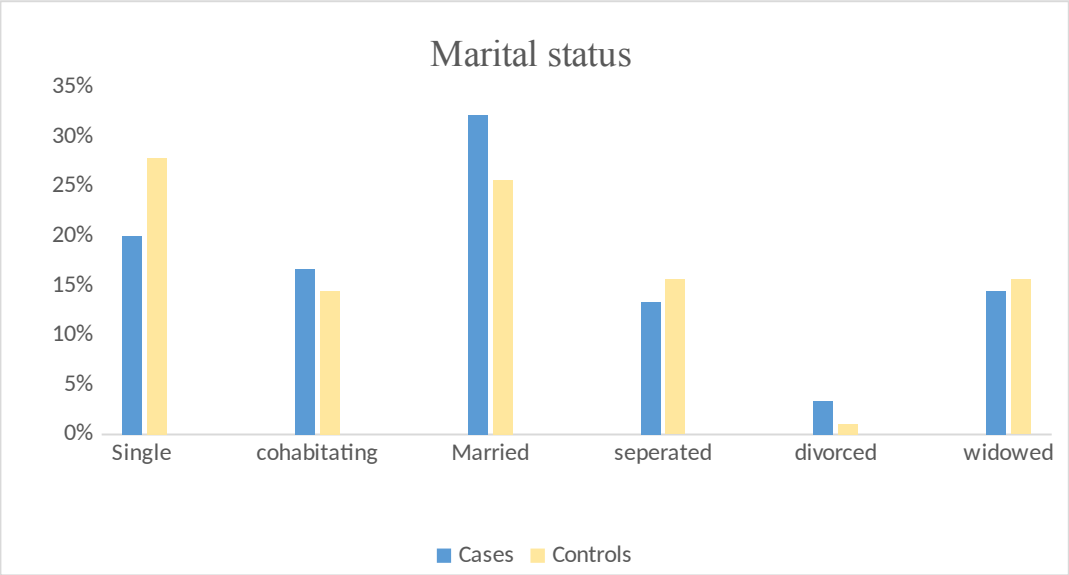


Figure 4.2: Marital status of the participants

4.1.3 Highest level of education of the study participants

None of the participants never went to school, the majority 100 (55.56%) of the participants held a tertiary level qualification. Secondary education was attained by almost a third 68(37.78%) of the participants. Very few had primary education only 12 (6.67%). Cases had 57(63.33%) participants who held tertiary education whilst controls had 43(47.78%) who held tertiary education.

Table 4.1 Distribution of participants by level of education

Variable	category	Cases N=90(%)	Controls N=90(%)
Highest level of education	Primary	9 (10.0)	3(3.33)
	Secondary	24 (26.67)	44(48.89)
	Tertiary	57 (63.33)	43 (47.78)

4.1.4 Place of residence of the study participants

Place of residence is another variable that was researched on. Over half of the study respondents, 93/180 (51.67%) of the study participants resided in high density area, cases had 46 (51.1 %) of participants staying in high density and controls were 47(52.2 %) followed by medium density area and finally the low-density area. This is summarised in table 2.

Table 4.2 Distribution of participants by place of residence

Variable	category	Cases N=90(%)	Controls N=90(%)
Place of residence	High density	46 (51.11)	47 (52.22)
	Low density	23 (25.56)	7 (7.78)
	Medium density	21 (23.33)	36 (40.00)

4.1.5 Age of the participants

The median age for the cases was 52 years (Q1:45 Q3:59) and that of controls was 37 years (Q1:26, Q3:45). The median age for those who were Hospitalised was higher than than that of those who were not Hospitalised

Table 4.3 Distribution of participants by age

Variable	Category	Cases		Controls	
		N=90(%)		N=90(%)	
Age	Median age	52		37	
	Q1 Q3	45	59	26	45

4.1.6 Employment status of the participants

Results show that majority of the participants were self employed where cases were 56(62.22%) whilst those not hospitalised were 40 (44.44%) followed by formal employment where those who were hospitalised were 12(18.9%) and those not hospitalised were 25(27.78) followed by the unemployed where those hospitalised were 11(12.2%) and those not hospitalised were 12(13.33%) and lastly students where the hospitalised were only 4(4,44%) and those not hospitalised were 12(13.33%)

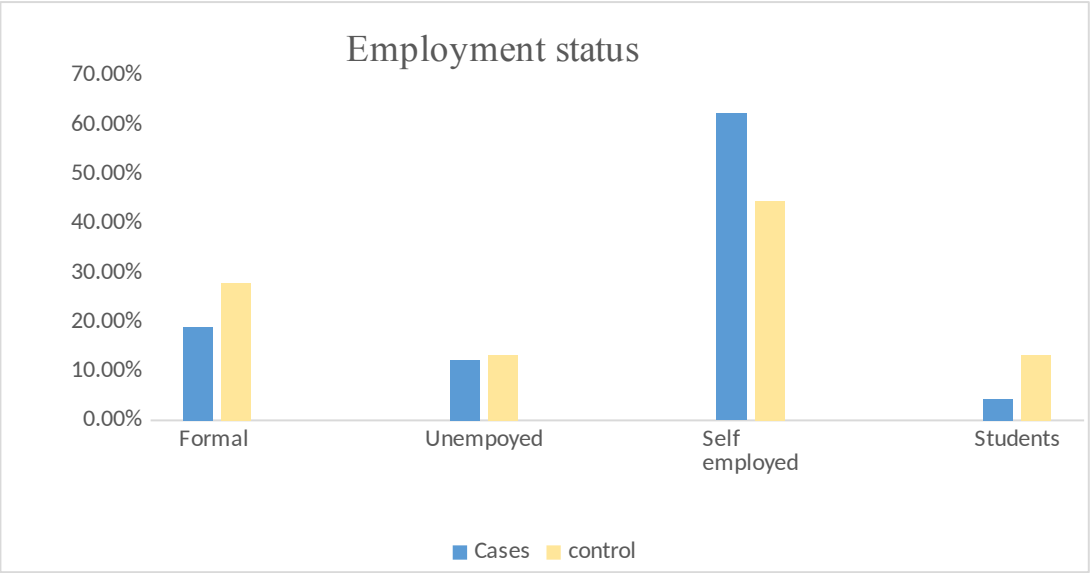


Figure 4.3 Distribution of the participants by employment status

4.1.7 Religion of the participants

Table 4.4 Distribution of the participants by religion

Variable	**Category**	**Cases** N=90%(%)	**Controls** N=90(%)
Religion	Apostolic	4 (4.44)	6 (6.67)
	Islam	3 (3,33)	4 (4.44)
	Orthodox	33 (36.67)	32 (35.56)
	Pentecostal	34 (37.78)	30 (33.33)
	Traditional	16 (17.77)	18 (20.0)

The research results in Error: Reference source not found indicate that each participant belonged to a religion, a third of the participants were pentecostal by religion, 34(37.8%) were hospitalised and 30 (33.33%) were not hospitalised. The religion with least number of participants was Islam with 7(3.89%).

4.1.8 Cigarrete smoking status of the participants

The research showcased that 156(86.67%) participants indicated that they do not smoke. 76 (88.44%) of them were cases who were hospitalised and 80(88.89%) were controls who were not admitted.

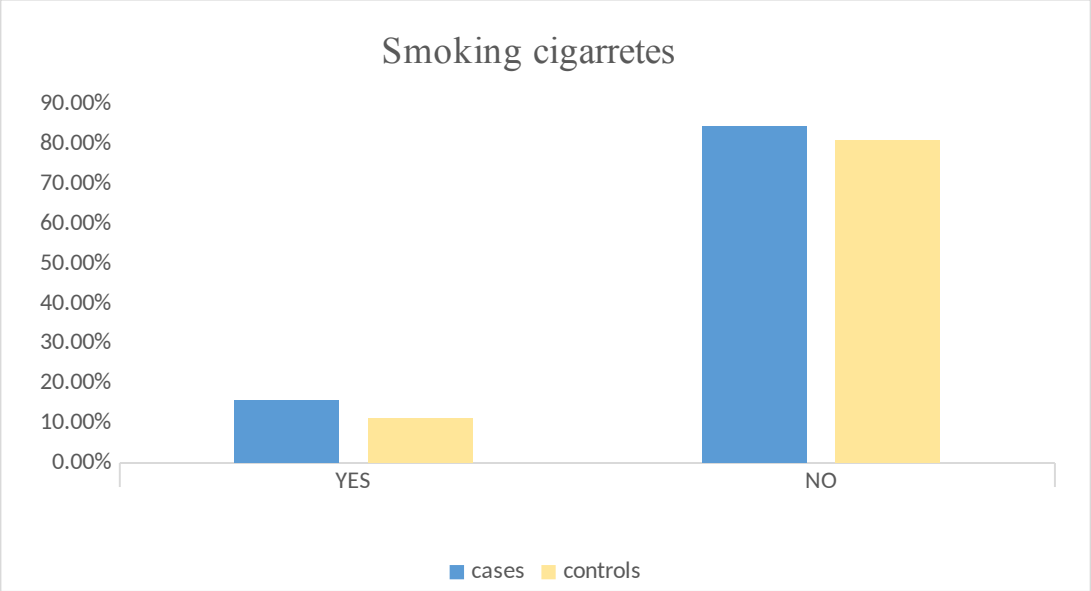


Figure 4.4 : Distribution of participants by cigarrete smoking status

4.1.9 House hold income of the participants

The research results in figure 5 indicate that most of the participants 78(43.33%) highlighted that their income is below $100. The As income increased, the number of people reduced or decreased exponentially for the participants who were hospitalised and those who were not hospitalised.

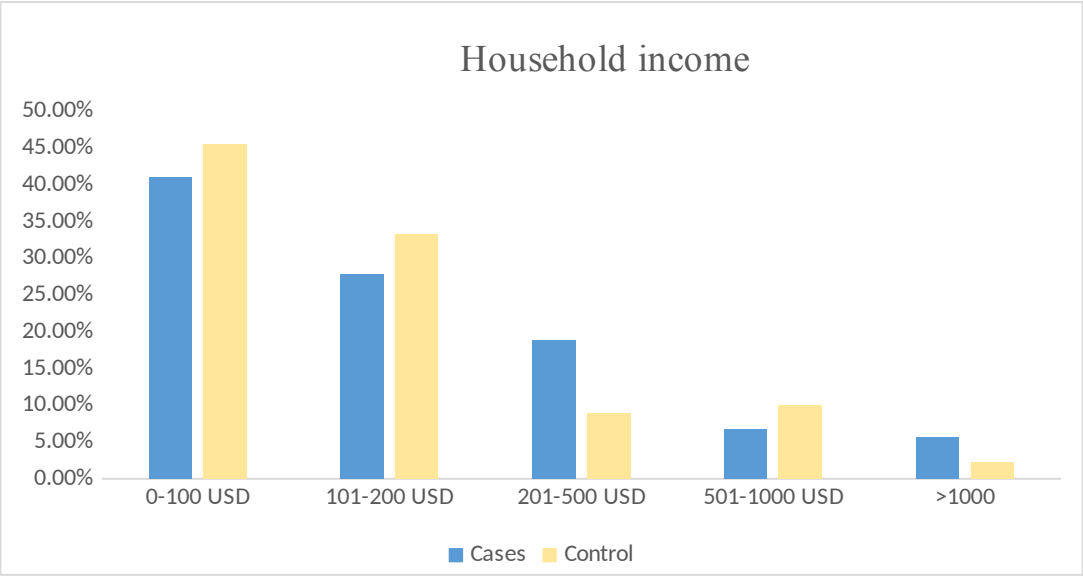


Figure 4.5 Distribution of the participants by household income

4.1.10 Summary of the socio-demographic attributes

The socio-demographic attributes of the study participants are summarised in table 5 below. At 95.0% level of confidence, differences in highest level of education, place of residence and median age with $p<0.001$ showed a significant differences between cases and controls as predictors of COVID 19 hospitalisation. While the differences in gender $p=0.05$ and marital status $p=0.67$ showed no significant differences between cases and controls on predicting COVID 19 hospitalisation. Cases and controls were comparable as statistically significant differences existed for the variables of level of education, age and place of residence.

Table 4.5 Socio-demographic attributes of the study participants

Variable	Category	Cases	Controls	p-value
		N=90 (%)	N=90 (%)	
Gender	Female	33 (36.7)	46 (51.1)	0.05
	Male	57 (63.3)	44 (48.9)	
Marital status	Single	18 (20.0)	25 (27.8)	0.67
	Cohabiting	15 (16.7)	13 (14.4)	
	Married	29 (32.2)	23 (25.6)	
	Separated	12 (13.3)	14 (15.6)	
	Divorced	3 (3.4)	1 (1.1)	
	Widowed	13 (14.4)	14 (15.6)	
Highest level of education	Primary	9 (10.0)	3(3.3)	<0.01*
	Secondary	24 (26.7)	44(48.9)	

	Tertiary	57 (63.3)	43 (47.8)	
	High density	46 (51.1)	47 (52.2)	
Place of residence	Low density	23 (25.6)	7 (7.8)	<0.01*
	Medium density	21 (23.3)	36 (40.0)	
	0-100 USD	37 (41.1)	41 (45.6)	
	101-200 USD	25 (27.8)	30 (33.3)	
Household income	201-500 USD	17 (18.9)	8 (8.9)	0.22
	501-1000 USD	6 (6.7)	9 (10.0)	
	>1000	5 (5.6)	2 (2.2)	
Employment status	Formally employed	12 (18.9)	25 (27.8)	0.07
	Unemployed	11 (12.2)	12 (13.3)	
	Other	2 (2.2)	1 (1.1)	

	Self employed	56 (62.2)	40 (44.4)	
	Student	4 (4.4)	12 (13.3)	
	Apostolic	4 (4.4)	6 (6.7)	
	Islam	2 (2.2)	2 (2.2)	
	None	1 (1.1)	2 (2.2)	
Religion	Orthodox	33 (36.7)	32 (35.6)	0.74
	Other	2 (2.2)	0 (0)	
	Pentecostal	34 (37.8)	30 (33.3)	
	Traditional	14 (15.6)	18 (20.0)	
Median age in years		52 (Q_1=45; Q_3=59)	37 (Q_1=26; Q_3=45)	<0.01*

4.2 Bivariate analysis of Socio-demographic characteristics of the study participants

Table 4.6: Bivariate analysis of the Socio-demographic characteristics

Variable	Category	Cases N=90 (%)	Controls N=90 (%)	Odds Ratio (95% CI)	p-value
Age over 65 years	Yes	13 (14.4)	6(6.7)	2.36 (0.86-6.53)	0.09
	No	77(85.6)	84(93.3)		
Smoke cigarretes	Yes	14 (15.6)	10 (11.1)	1.47 (0.62-3.52)	0.38
	No	76 (84.4)	80 (88.9)		
Being female	Yes	33 (36.7)	46 (51.1)	0.55 (0.31-1.00)	0.05
	No	57 (63.3)	44 (48.9)		
Being employed	Yes	79 (87.8)	78 (86.7)	1.10(0.46-2.65)	0.82
	No	11 (12.2)	12 (13.3)		
Having tertiary education	Yes	57 (63.3)	43 (47.8)	1.88(1.04-3.43)	0.04
	No	33 (36.7)	47 (52.2)		

In table 6 above, comparing cases and controls, study participants over 65 years of age they were 13(14.44%) for the cases and 6(6.67%) for the controls, with an odds ratio of 2.58(0.94-7.05) at 95% CI giving a p value of 0.06 which is not statistically significant. Therefore age over 65 years was not a risk factor for COVID 19 hospitalisation. Most of the study participants 159 (88.33%) were non cigarette smokers, cases had 14(15.56%) cigarette smokers whilst controls had 10(11.11%) cigarette smokers. At 95% CI cigarette smokers had an odds ratio of 1.47 (0.62-3.52) and p value of 0.38 of no statistical significance to COVID19 hospitalisation.

4.3 Bivariate analysis of the comorbidities.

The table 6 below shows the bivariate analysis of the predictors of COVID 19 hospitalisation in Bulawayo. The following variables in the table below where entered in statistics table form Epi Info to come up with bivariate analysis.

Table 4.7: Bivariate analysis of comorbidities

Variable	Category	Cases N=90 (%)	Controls N=90 (%)	Odds Ratio (95% CI)	p-value
Being HIV positive	Yes	14 (15.6)	6(6.7)	2.58 (0.94-7.05)	0.06
	No	76(84.4)	84(93.3)		
Being hypertensive	Yes	41 (45.6)	6 (6.7)	11.71 (4.64-29.58)	<0.01*
	No	49 (54.4)	84 (93.3)		
Being diabetic	Yes	5 (5.6)	5 (5.6)	1.00 (0.28-3.58)	1
	No	85 (94.4)	85 (94.4)		
Chronic pulmonary disease	Yes	3 (3.3)	4 (4.4)	0.74(0.16-3.41)	0.7
	No	87 (96.7)	86 (95.6)		
Having cancer	Yes	2 (2.2)	1 (1.1)	2.02(0.18-22.71)	0.56
	No	88 (97.8)	89 (98.9)		
		28 (31.1)	19 (21.1)		

***Significant**

The table shows the results for the Bivariate analysis. Being hypertensive [Odds Ratio 11.71; 95%CI (4.64-29.58)], was the only significant comorbid condition risk factor for hospitalization.

4.4 Multivariate analysis for the Independent predictors for COVID19 hospitalisation

Logistic regression is a statistical analysis method used to predict a data value based on prior observations of a data set. The model predicts a dependent data variable by analysing the relationship between one or more existing independent variables. The purpose of logistic regression is to estimate the probabilities of events, including determining a relationship between features and the probabilities of particular outcomes. Logistic regression provides a constant output.

Bivariate analysis was performed to select variables for multivariate analysis. Hence variables with p-values < 0.25 in bivariate were taken as candidates for multivariable analysis. Logistic regression analysis was used to examine the association of independent variables with dependent variable which is COVID19 hospitalisation. Finally multivariable logistic model was created to predict independent predictors for COVID19 hospitalisation. Probability value less than 0.05 were considered as statistically significant.

Table 4.8 : Multivariate analysis for independent predictors for hospitalisation

Variable	Exposure status	Cases N=90 (%)	Controls N=90 (%)	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P-value
Age over 65 ye	Yes	13 (14.4)	6(6.7)	2.36 (0.86-6.53)	0.09	0.67 (0.15 -3.08)	0.61

ars							
	No	77(85.6)	84(93.3)				
Being HIV positive	Yes	14 (15.6)	6(6.7)	2.58 (0.94-7.05)	0.06	6.07 (2.02-18.25)	0.01*
	No	76(84.4)	84(93.3)				
Having tertiary	Yes	57 (63.3)	43 (47.8)	1.88(1.04-3.43)	0.04	1.51 (0.74-3.10)	0.26
Education	No	33 (36.7)	47 (52.2)				
Being female	Yes	33 (36.7)	46 (51.1)	0.55 (0.31-1.00)	>0.05	0.41 (0.20-0.86)	0.02*
	No	57 (63.3)	44 (48.9)				
Being Hypertensive	Yes	41 (45.6)	6 (6.7)	11.71 (4.64-29.58)	<0.01	20.73 (6.62-64.94)	0.01*
	No	49 (54.4)	84 (93.3)				
Household income	Yes	62 (68.9)	71 (78.9)	0.59 (0.30-1.16)	0.13	0.98 (0.37-2.36)	0.71
below 200USD	No	28 (31.1)	19 (21.1)				

***Significant**

The table 7 shows the results for the multi-variate logistic regression to determine the independent risk factors for hospitalization. The independent risk factors for being hospitalized were being HIV positive [adjusted Odds Ratio 6.07; 95% CI (2.02-18.25)], and being hypertensive adjusted Odds Ratio 20.73; 95% CI (6.62-64.94)]. COVID-19 patients with hypertension were 20.73 times more likely to be hospitalized compared to those who were not hypertensive.

The independent protective factor for not being hospitalized was being female [adjusted Odds Ratio 0.41; 95% CI (0.20-0.86)]. Females had 59% reduced odds of being hospitalized compared to men.

4.5 Chapter summary

This chapter appraised the findings and analysis of the quantitative results for the research. The findings and results of the research was deliberated in relation to the previous research and related literature, with the objective of revealing predictors of COVID 19 hospitalisation. This chapter offered a comprehensive research data analysis. Data presented for this research was in tandem with set objectives. In order to present and analyse data/findings properly, data was presented in form of tables and graphs. Chapter 5 will present conclusions and recommendations of this research.

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 further study.

5.2 Socio-demographic predictors of COVID-19 hospitalization.

In this study over 65 years of age had an adjusted odds ratio of 0.67 (0.15-3.08) at 95% CI giving a p value of 0.61 which is not statistically significant. Therefore age over 65 years was not a predictor for COVID 19 hospitalisation.This differs from a study that was conducted in Georgia in United states of America by Killerby et al (2020) that indicated that Older age, as measured by age ≥65 years, was associated with hospitalization.

It is important to take note of the differences in population distribution. In Georgia 14% of the population is above 65years (U.S census bureau, 2019). In South Africa only 5% of population is over 65years compared to 9 % in Brazil and 38% in UK (Boulle, 2020). According to the Zimbabwe demographic health Survey (ZDHS) 2015 half of the population in Zimbabwe is below age 18, while 2.4% percent are aged 65 or older. This could explain the reason for age above 65 years was not found as a predictor of COVID 19 hospitalisation.

The results on gender showed that the independent protective factor for not being hospitalized was being female [adjusted Odds Ratio 0.41; 95% CI (0.20-0.86)]. Females had 59% reduced odds of being hospitalized compared to men. Therefore this means that being male is a risk factor for COVID19 hospitalisation. This could

be due to the fact that generally women seek health care services earlier than men. Delays in care seeking resulting in late presentation at health facilities may have led to a greater proportion of males being hospitalized.

These results are in sinc with a study done Killerby et al 2020 which also noted that males were more likely to be hospitalized than females.Furthermore, this outcome also supports another study by Telle et al (2021) whose results showed that male sex predicted COVID 19 hospitalization.

5.3 Clinical characteristics associated with hospitalization among patients with COVID19.

The study outcome revealed that being hypertensive adjusted Odds Ratio 20.73; 95% CI (6.62-64.94)] p value 0.01 is a statistically significant comorbid condition predictor for COVID 19 hospitalisation. Therefore this means that COVID 19 patients with hypertension were 20.73 times more likely to be hospitalized compared to those who were not hypertensive. These results are in congruence with findings of studies done by Killerby et al., (2020) and Nachega et al., (2020) which revealed that Hospitalized patients with COVID-19 were more likely to have hypertension than were nonhospitalized patients, suggesting a relationship between hypertension and increased severity of illness.

Previous studies done by Karakiulakis and Roth (2020) have revealed that Severe acute respiratory syndrome Coronavirus 2 (SARS CoV 2), the virus that causes COVID-19 has a strong affiliation to angiotensin converting enzyme(ACE2). Some anti hypertensive medication increases expression of ACE2 on target organs thereby increases the risk of hypertension patients to develop severe and fatal COVID-19.

However this study did not capture information regarding the severity or control of hypertension so we do not know how much of our observed effect might be because of uncontrolled hypertension. Therefore more research is necessary to investigate type of anti hypertensive medication being taken by the hospitalised hypertensive patients prior to COVID 19 infection.

The study findings portrayed that one of the independent risk factors for being hospitalized was being HIV positive [adjusted Odds Ratio 6.07; 95% CI (2.02-18.25)] with a p value of 0.01 on multiviate analysis.

It is important to note that Zimbabwe is a Low to Middle Income Country with coinciding chronic infectious diseases like HIV(MoHCC, 2017). Prevalence of HIV among adults ages 15 to 64 years in Zimbabwe is 14.6 percent: 16.7 percent among females and 12.4 percent among males. This corresponds to approximately 1.2 million people living with HIV (PLHIV) ages 15 to 64 years in Zimbabwe (WHO, 2020). Furthermore among PLHIV ages 15 to 64 years who know their HIV status, 86.8 percent self-report current use of ART: 87.3 percent of HIV-positive females and 86.0 percent of HIV-positive males who know their HIV status self-report current use of ART (WHO, 2021).

These results differs from a study that was conducted by Killerby et al., (2020) in United states and Telle et al., (2021) from high income countries with relatively small numbers of HIV infected people did not find HIV as a risk factor to COVID 19 hospitalisation. However Potential confounding variables and differing regional factors such as socioeconomic status, viral load suppression, and access to anti-retroviral therapy may have contributed, so more research is necessary.

5.4 Limitation of the Study

Study did not assess for the optimization of care for the HIV and hypertensive patients, checking on compliance to treatment of underlying medical condition. Recall bias due the nature of case control study. Residual confounding even after logistic regression which may not cater for all confounding factors.

5.5 Conclusion

From the outcomes of this study, it can be concluded that the independent predictors for being hospitalized were being HIV positive and being hypertensive COVID-19 patients with hypertension were 20.73 times more likely to be hospitalized compared to those who were not hypertensive.The independent protective factor for not being hospitalized was being female. Females had reduced odds of being hospitalized compared to men.

Understanding predictors of COVID hospitalization can inform strategic planning and resource allocation at multiple levels including prevention measures such as vaccine allocation, diagnosis, and treatment of high risk population.

5.6 Recommendations

The researcher recommends that risk communication pillar within City health to tailor make public health messages targeting men in order for men to improve health seeking behaviors

The researcher also recommends that case management pillar within City health should prioritize vaccine allocation, diagnosis, and treatment to high risk groups like the hypertensive and HIV positive population groups.

The researcher recommends that case management pillar should ensure optimisation of care by ensuring that high risk groups like HIV and hypertensive patients are compliant with their medication, monitoring of BP, viral load and follow up of non compliant patients by community health nurses.

5.7 Dissemination of results and any action was taken in response to the findings

Study results were shared to the City health department, Africa University department of Public Health and Nursing and the Africa University Library. There are plans to present the findings at upcoming workshops, webinars and symposium to disseminate the information and also publish in reputable peer reviewed journals.

5.8 Chapter summary

This chapter has given a summary of the whole research and its major findings of the study which are linked to the primary aim and objective of the study as illustrated in chapter one. Major findings which have been are discussed highlight the independent predictors of COVID19 hospitalisation at Thorngrove hospital in Bulawayo.

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Appendices

Appendix 1. Researcher questionnaire

Questionnaire number: ……

Section A: Sociodemographic factors

Question number	Question	Response	Instruction
1	Date of interview		……/……/…….. DD/MM/YY
2	What is your age on your last birthday in years?		
3	Gender	[ ] Female [ ] Male	
3	Which of the following is the appropriate classification for your place of residence?	[ ]High density [ ]Medium density [ ]Low density	

4	What is your marital status?	[ ]single [ ]Married [ ]Separated [ ]Divorced [ ]Widow [ ]Cohabiting [ ] Other ,Specify ……	
5	What is the highest level of education you attained?	[ ] None [ ] Primary [ ] Secondary [ ] Tertiary	
6	What is your employment status?	[ ]Not employed [ ]Self-employed [ ]Formally employed [ ]student [ ]Other, specify ……	

7	What is your religion	[ ]Apostolic [ ] Pentecostal [ ] Orthodox [ ] Traditional [ ] Islam [ ] None [ ] Other, Specify ……	
8	Do you smoke cigarettes?	[ ] Yes [ ] No	
9	How many are you in your household?	[ ] <3 people [ ] 3 – 5 people [ ] Over 5 people	
10	What is your household income?	[ ] 0-100 USD [ ] 100-200 USD [ ] 200-500 USD [ ] 500-1000 USD [ ] Over 1000 USD	

Section B: Case Status

Question number	Question	Response	Instruction
11	Were you diagnosed with COVID-19?	[ ] Yes [ ] No	
12	If yes to 10, were you hospitalized?	[ ] Yes [ ] No	Required
13	Case Status	[ ] Case [ ] Control	Required

SECTION C: Clinical characteristics

Question number	Question	Response	Instruction
26	Do you have any medical conditions you are being managed for?	[ ] Yes [ ] No	
27	If yes to 26, which one?	[ ] Diabetes Mellitus [ ] Hypertension [ ] Cardiac disease [ ] Chronic Pulmonary disease	

		[ ] Cancer [ ] HIV infection [ ] Other, specify ……	
28	What is your HIV status?	[ ] Positive [ ] Negative [ ] I don't know	
29	When you had COVID-19 infection, did you have symptoms?	[ ] Yes [ ] No	
30	If yes, which symptoms did you have?	[ ] Headache [ ] Fever [ ] Shortness of breath [ ] Gastro-intestinal symptoms [ ] Other, specify……	

Appendix 2. Informed consent for the questionnaire

My name is Lucy Shoniwa, a final year MPH student at Africa University. I am carrying out a study on predictors of COVID 19 hospitalization in Bulawayo city, Zimbabwe. Knowledge of who among the patients will be admitted into hospital assist in planning for the resources needed for every patient who gets admitted. You were selected for the study as you are among the admitted patients at Thorngrove or you contracted COVID 19 and were not admitted into hospital. The rest of the participants to take part is 202 in total. Should you decide to participate you will take about twenty minutes to answer questions asked by the interviewer. The researcher will address the sensitive questions in a respectable manner and maintain the information obtained confidential. The participant is also free to divulge the information voluntarily. It is essential to note that there are no material benefits attached to the study. The participants will only get health benefits. All the information obtained would be kept confidential, no names or any other identification will appear on questionnaires. However coding of questionnaires will be done using serial numbers. Privacy will also be maintained. Participation in this study is on voluntary basis. Should the participant feel unable to participate, the

action will not affect their relationship with the participant organization or any authority. If they chose to participate they are free to withdraw their consent and discontinue participation without penalty. Please feel free to ask any questions pertaining to the study. You may take as much time as necessary to make a decision. If you have decided to participate in this study a recording will be done as evidence that you agree to participate in this study.

Name of Research Participant

Please print Date …….

Legally authorized representative

If you have any queries, questions or concerns beyond those addressed by the researcher or anything to with the research, like your rights as a research participant. If you feel you have been treated unfairly, and would like to talk to someone other than the researcher feel free to contact, the Africa University Research Ethics Committee on telephone. (020) 60075 or 60026 extension 1156 or email aurec@africa.edu.

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L/Takawira & J/Tongogara
BULAWAYO
Tel: (09) 75011
Fax (263-9) 63650
E-mail: **hsdept@citybyo.co.zw**

Your Reference:
Our Reference: MPH

29 October 2021

TO WHOM IT MAY CONCERN

PERMISSION TO CONDUCT A STUDY IN BULAWAYO. TOPIC: PREDICTORS OF COVID 19 HOSPITALIZATION A CASE OF BULAWAYO CITY 2021

This letter serves to inform you that Lucy Shoniwa an MPH student with Africa University is granted permission to carry out her study in Bulawayo City for academic purposes only. The researcher is mandated to observe ethical standards of the highest degree.

The information gathered in the study should only be used for academic purposes and the applicant would be obliged to share findings with relevant stakeholders.

Yours faithfully,

~~DIRECTOR OF HEALTH SERVICES~~
ES/sn

Appendix 3. Approval letter from Bulawayo City Director of Health Services

Appendix 4. Approval letter from Africa University Research Ethics Committee

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: AU2368/22 8 February, 2022

Lucy Shoniwa
C/O CHANS
Africa University
Box 1320
MUTARE

RE: PREDICTORS OF COVID 19 HOSPITALIZATION: A CASE OF THORNGROVE HOSPITAL BULAWAYO CITY, 2021

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 2368/22
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** February 8, 2022
- **EXPIRATION DATE** February 8, 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 –

Appendix 5: Plagiarism Report