AFRICA UNIVERSITY
(A United Methodist Related Institution)

EFFECT OF COVID 19 ON MALARIA INTERVENTIONS IN MUTASA DISTRICT, MANICALAND PROVINCE 2019 – 2022

BY

CEPHAS FONTE

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE MASTER DEGREE IN PUBLIC HEALTH IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

2022

Abstract

The COVID-19 pandemic is disrupting critical health services and undermining years of progress fighting other deadly diseases, such as human immunodeficiency virus (HIV), tuberculosis (TB), and malaria, which continue to be the leading causes of death in the region. Attainment of critical health services delivery was noted to have been compromised to include promotion and education, which was a prelude to programme implementation. A mixed qualitative and analytical cross-sectional study was carried out to determine the effects the COVID 19 scourge had caused in malaria interventions in Mutasa District from 2019 to 2022. The objectives of the study determined how COVID 19 affected malaria programming, social behaviour communication change (SBCC), indoor residual spraying (IRS), intermittent preventive treatment for malaria (IPTp) and case management Mutasa district. Simple random sampling was conducted using record review of data on COVID 19, malaria data and activities for the period during COVID 19 and pre-COVID19 with a sample size of 378. Systematic sampling was engaged in the selection of health facilities. Questionnaires and interviews with both open and close-ended questions were used to collect data. The data collection tools were pre-tested at Mupotedzi clinic in the district. The results highlighted that those receiving SBCC messages on IRS reduced by 50% during the Covid period compared to pre – Covid period [pOR 0.5; 95% CI 0.01 – 1.4; p=0.004], with a statistical p-value of 0.004, which is significant, while for IPTp was statistically insignificant with a p-value of 0.1. Participation in IRS meetings came down by approximately 40% during the Covid period [pOR 0.6; 95% CI 0.4 – 1.0; p=0.003], while household spraying fell by 66% during the Covid period, with p<0.001[pOR 0.34; 95% CI 0.2 – 0.4; p<0.001]. IPTp and case management were not significant (p values 0.40 and 0.06 respectively) while, a shift to community services for both respectively were statistically significant at 95% CI, with p values of 0.01 and 0.02. The findings of this study suggest the need to institute tailor-made health promotions to cater for diverse community settings during the pandemic, decentralisation of IPTp and case management services to the community health workers and institute further detailed consultation on the IRS uptake in the community.

Key Words: COVID 19; Effects; Intermittent Preventive Treatment for Malaria (IPTp); Indoor Residual Spraying (IRS); Social Behaviour Communication Change (SBCC)

Declaration

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

CEPHAS FONTE	25/04/22
Student Full Name	Student's Signature (Date)
MRS KAPFUNDE	25/04/22
Main Supervisor's Full Name	Main Supervisor's Signature (Date)

Copyright

Acknowledgment

I would like to acknowledge the unwavering support and technical guidance I got from my academic supervisor Mrs A. Kapfunde, field supervisor Dr Alex Ingwani and generous morale support from fellow friends who kept me charged to the hard work of sleepless nights to ensure that I realised this ultimate goal. My classmates deserve special mention for all the support and team spirit rendered that kept on propelling me when my momentum had declined. My gratitude is also extended to Mutasa District Health Executive and the District Health Team for their support, which made it possible for this project to be a success. Mr Mwoyoweshumba an expert in Malaria is equally heartily acknowledged by his assiduous encouragement for me to endure all the ordeals that intended to stall timeliness.

Dedication

This work is dedicated purely to my one and only lovely wife, Kezia and our daughter Nelisha, who motivated me to persevere when I had valid reasons to give up. I also dedicated this work to the Almighty Jehovah for His extraordinary grace that pulled me through when confronted the seemingly insurmountable roadblocks.

List of Acronyms and Abbreviations

DDT	Dichlorodiphenyltrichloroethane
DHE	District Health Executive
DMO	District Medical Officer
EPR	Emergency Preparedness and Response
IPTp	Intermittent Preventive Treatment in Pregnancy
IRS	Indoor Residual Spraying
OPD	Outpatient Department
PMD	Provincial Medical Director
WHO	World Health Organization

Definition of Key Terms

COVID19 A severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), linked to a series of atypical pneumonia cases first reported in the Wuhan city of China in November 2019.

Effect a desirable or undesirable event on the malaria interventions/or activities following the coming in of the COVID 19 scourge in specifically Mutasa District during the time of the study.

Lockdown restrictions the interdiction of unwarranted movements during the time the COVID 19 was quite prevalent with an aim to prevent transmission or thus confining the disease.

Malaria interventions relate to social-behaviour Change Communication (SBCC) that is health promotion activities, malaria case management, Intermittent Preventive Treatment (IPTp) and the Indoor Residual Spraying (IRS) coverage on which COVID 19 could have had some effects.

Suspected malaria cases relate to the presumptive cases of malaria exhibiting the generic signs and symptoms and thus require to be confirmed as positive or negative by a laboratory diagnostic test.

Sect objectors relates to the part of the community members of the religious congregation who detest medicinal interventions for their ailments.

Religion relates to a system of faith and worship that promotes or inhibits the uptake of malaria interventions and activities.

Trans-border mobility the movement across the borders especially that is rampant between the Honde Valley residents into Mozambique and the Mozambicans into Zimbabwe during the COVID 19 pandemic.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1 INTRODUCTION

1.1 Introduction

A new coronavirus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was linked to a series of atypical pneumonia cases reported the previous month in Wuhan city, Hubei province, China in early January 2020. The virus spread rapidly within China, and then onto Europe, the United States of America (USA) and the rest of the world, causing the disease known as COVID-19. On 11 March 2020, the World Health Organization (WHO) declared COVID-19 to be a global pandemic. There were 80 million confirmed cases and 1.8 million deaths had been reported globally to the WHO, making COVID-19 the leading cause of death among infectious diseases (WHO, 2020). In April 2020, one month after the pandemic had been declared, the epicentres were China, Europe and the USA, and with large volumes of air traffic between these regions and Africa, sub-Saharan Africa was predicted to be the next region to be hard hit by COVID-19 (Gilbert, Pullano, Pinotti, Valdano, Poletto, Boelle, D'Ortenzio, Yazdanpanah, Eholie, Altmann, et al., 2020; Nkengasong & Mankoula, 2020). At the start of the COVID-19 crisis, political attention, resources and finances were redirected within the health sector to help it grapple with the escalating numbers of COVID-19 cases. National and local lockdowns restricted movement and forced people to spend more time indoors, limiting access to health facilities (Nkengasong & Mankoula, 2020). Globally, COVID-19 has the potential to overburden health systems. Interventions aimed at curbing transmission of SARS-CoV-2, such as restrictions to movement, absenteeism, behavioral changes, closure of institutions and interruption of supply chains, are also expected to result in malaria prevention activities being scaled back (Sherrard-Smith, Hogan, Hamlet, Watson, Whittaker, Winskill, & Churcher, 2020).

Similar reductions in the demand and provision of essential health services were observed during the 2014–2016 Ebola outbreak in West Africa (Wilhelm, & Helleringer, 2019).

In addition to directly causing the deaths of at least 200,000 people in Africa, the COVID-19 pandemic is also disrupting critical health services and undermining years of progress fighting other deadly diseases, such as human immunodeficiency virus (HIV), tuberculosis (TB), and malaria, which continue to be the leading causes of death in the region. In order to better understand the extent of this impact, a recent report by The Global Fund utilizes data from urban and rural health care facilities in 24 African countries and seven Asian nations to investigate and compare the spill - over impacts of the pandemic on essential health care services for HIV, TB, and malaria (WHO, 2020 & WHO, 2019). Several modelling analyses have assessed the potential impact of disruptions in health service provision on malaria morbidity and mortality. Findings from these analyses have asserted that lack of continuity and disruption of malaria programmes could cause a COVID-19-induced malaria crisis, potentially reversing the gains towards malaria control and elimination (Weiss, Bertozzi-Villa, Rumisha, Amratia, Arambepola, Battle, & Gething, 2021).

In 2020, access to health care services declined significantly throughout the world compared to 2019. The authors attribute this unprecedented decline in patient attendance to challenges facing both medical facilities and the patient community. For patients, the fear of contracting COVID – 19 from their visit was the most cited reason for not seeking medical care. The inability to reach health care facilities due to disruptions in public transportation and stay – at – home orders was also a prominent challenge for patients looking to access health care (Global, 2021).

Another factor that could diminish capability during the periods of highest demand is health-care staff shortages due to COVID-19 illness (Black, Bailey, Przewrocka, Dijkstra, & Swanton, 2020).

It has been warned that the disruption to critical health care services poses a serious threat to undiagnosed individuals, their local communities, and global health security. The risk that undiagnosed individuals will infect others with HIV or TB or succumb to malaria without pursuing treatment was higher than before the pandemic (Nkengasong & Mankoula, 2020). Moreover, the authors warn that the pandemic has effectively derailed years of progress in reducing the disease burden in Africa and the rest of the developing world. The Global Fund recommends health care facilities implement adaptive measures to reduce the disease burden in Africa and the rest of the developing world. Although many malaria-endemic African nations have shown remarkable resilience and adaptivity in the face of previous global health threats, they nevertheless face the unprecedented challenge of COVID-19 with a comparatively lower health-care system capacity and a higher baseline level of malaria burden (Sewankambo, Agyepong, Binagwaho, Coll-Seck, Corrah, Ezeh, Piot, 2017). In response to these challenges, The Global Fund recommends health care facilities implement adaptive measures to reduce the volume of visits to clinics and improve health services delivery. Such actions include providing long-term drug prescriptions to ensure uninterrupted access to medication, door – to –door decentralised distribution of long – lasting insecticidal nets, and incorporating TB screening in digital health screenings for COVID 19 (Global Fund, 2021).

The ongoing COVID-19 pandemic places an extra burden on health systems worldwide, and especially in countries with fragile health systems. Many countries,

particularly in sub – Saharan Africa which accounts for more than 90% of global malaria cases and deaths, are facing a double challenge of protecting their citizens against existing and emerging threats to public health. Recognition of the threat posed to malaria control by COVID-19 has been widespread, and there is an urgent need to properly contextualise these threats amid rapidly evolving global health priorities (Sands, 2020).

The RBM Partnership to End Malaria is working to ensure that efforts to limit the spread of COVID-19 do not compromise access to malaria prevention, diagnosis and treatment services, which are saving almost 600,000 lives and preventing nearly 100 million infections each year. Our top priority is to ensure the supply of vital malaria control tools used to protect millions of people across the world, particularly in countries with a high burden of the disease, as well as their safe delivery, including availability of personal protective equipment (PPE) for frontline health workers.

Working in close partnership with the WHO, the Global Fund to Fight AIDS, Tuberculosis and Malaria, – affected countries, we are closely monitoring the situation to address possible disruptions in the supply chains of essential malaria commodities—such as insecticide treated nets (ITNs), rapid diagnostic tests (RDTs) and anti-malarial medicines—resulting from lockdowns and restrictions on the importation and exportation of goods in response to COVID-19 (Global Fund, 2021)

Globally, malaria is still the most important parasitic disease and responsible for a quarter of all deaths among children under 5 years old in sub-Saharan Africa (SSA). The efforts for global malaria control and elimination have achieved large successes during the last two decades, but progress has stalled in recent years, and the COVID-19 pandemic could largely reverse the overall trend (WHO, 2020).

1.2 Background to the Study

In the COVID 19 pandemic had track of effects in the malaria interventions and other diseases of public importance in the world including Zimbabwe, Manicaland Province and Mutasa District as well. Haste and wholesome attention were thus granted to COVID 19 at the expense of the rest of the diseases thus shortfall in prevention and control.

The COVID 19 compromised the seeking of malaria and the rest of the diseases of public health importance. The communities were overwhelmed by the fear of COVID 19 and ignored the harms of the rest of the diseases (Global Fund, 2021). The demand for essential health services has been adversely affected by stay-at-home orders, stigma and fear of contracting COVID-19 infection, travel restrictions, increased financial barriers and misinformation about COVID-19 (Murewanhema, & Makurumidze, 2020).

1.3 Statement of the Problem

Malaria morbidity and mortality for Mutasa District has been a perennial challenge whereas the access of malaria services since the onset COVID 19 remained strained. The peak periods of malaria also coincided with the peak period of COVID 19 where the management of both the conditions rendered challenges and also challenges due to the commonality and coincidence of the signs and symptoms like the exhibition of fever, body malaise/lethargy. The Indoor Residual Spraying (IRS) the mainstay of malaria prevention that require accessing rooms failed to meet the impact level/coverage as the residents denied access to their houses for fear of contracting COVID 19 disease from the Spray operators. The health promotion imperative for

Social Behaviour Change and Communication (SBCC) a precursor to the actual spraying did not yield desirable audience as the various lockdown restrictions the country had since the declaration of COVID 19 as national emergency in March 2020 interdicted groupings necessary for interface and sharing of views and dispersing speculation that hamper IRS program uptake. The IRS coverage for 2020 - 2021 season declined to 75% from an average of 87% rooms' coverage to in the 2019-2020 IRS seasons.

1.4 Broad Objective

1.4.1 To determine effect of COVID 19 on malaria activities in Mutasa District in 2019-2022.

1.5 Specific Objectives

The research objectives are to:

1.5.1 Determine how COVID 19 affected malaria case management (caseload, outbreaks, and incidence) in Mutasa District since 2019.

1.5.2 Determine how COVID 19 affected health promotion activities (sessions).

1.5.3 Determine how COVID 19 hindered with the Indoor Residual Spraying programme (trends).

1.6 Research Questions

The research was guided by the following questions:

1.6.1 To what extent did the COVID 19 affected malaria case management?

1.6.2 To what extent did the COVID 19 affected health promotion activities?

1.6.3 To what extent was the Indoor Residual Spraying affected by COVID 19?

1.7 Justification of the Study

The evaluation of the COVID 19 effect on malaria prevention and curative activities would help to highlight how COVID 19 impacted the delivery of preventive and curative services thus help to seek mitigation since the disease may not end soon. The study would help to bring about consistent malaria services despite pandemics like COVID 19 hence help end malaria morbidly and mortality.

1.8 Delimitations of the Study

The study shall be carried out retrospectively in Mutasa District covering period from 2019-2021.

1.9 Limitations of the Study

Since it is a retrospective study there may be recall bias and continuous probing shall be done to overcome the shortfall.

1.10 Chapter Summary

The chapter dwells on introduction, background of the study, the problem statement, broad objectives, specific objectives, research questions, justification of the study and the delimitations.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The Literature review described, evaluated and summarised the literature that was found on this the subject of interaction between COVID 19 and malaria activities. It shall give a theoretical basis for the research which accredited scholars and researchers wrote on the topic. The material of this chapter shall be used to guide the discussion of findings of the study in chapter 5.

2.2 Conceptual Framework

Malaria /Interventions /activities

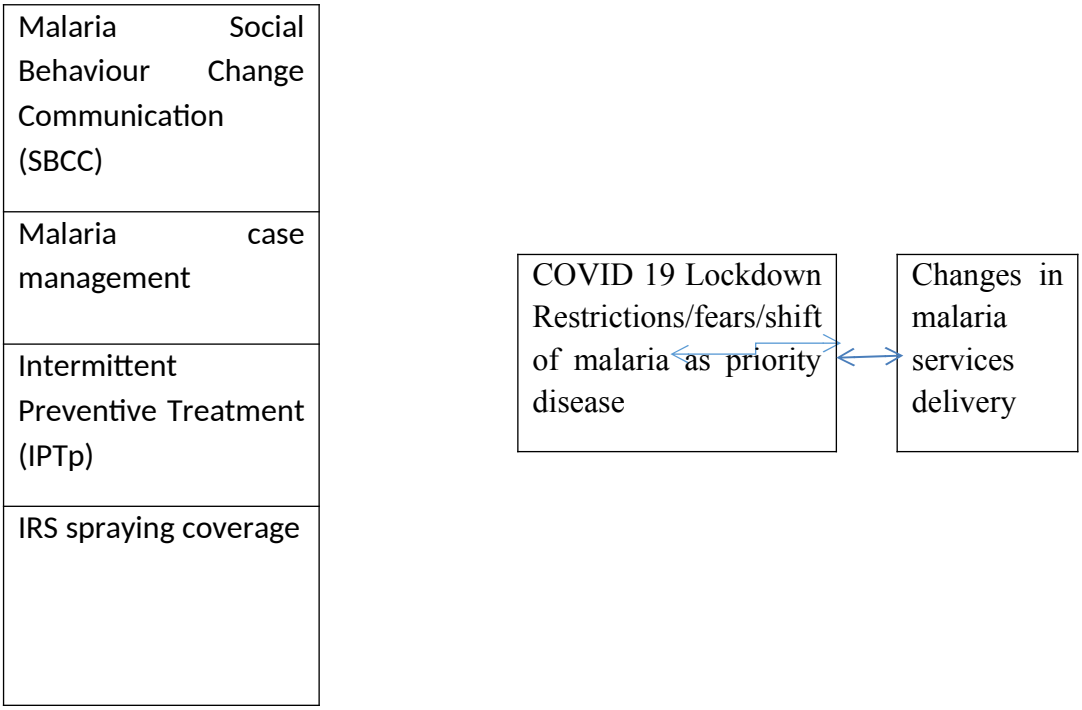


Figure 1 Conceptual Framework Modified and Adapted

(Ravitch & Riggan, 2017)

2.3 Relevance of the Conceptual Framework

2.3.1 Interaction of COVID 19 on Malaria Interventions

The conceptual framework explains the path of a research and grounds it firmly in conceptual constructs. Conceptual frameworks provide evidence of academic standards and procedure. They also offer an explanation of why the study is pertinent and how the researcher expects to fill the gap in the literature. A research plan that contains a theoretical framework allows the study to be strong and structured with an organized flow from one chapter to the next (WHO, 2020).

The model examines the interaction between COVID 19 and malaria intervention and activities in Mutasa District.

2.4 COVID 19 on Malaria Social Behaviour and Change Communication (SBCC) on Malaria Interventions/Activities

Social Behaviour Change and Communication (SBCC) is an elementary requisite in promoting uptake of malaria interventions like malaria case management, Insecticide Treated Nets (ITNs) distribution, Intermittent Preventive Treatment prophylaxis (IPTp) in pregnancy and the Indoor Residual Spraying (IRS) programme. COVID 19 restrictions and lockdown had quite some detrimental effect on the malaria activities in Mutasa District. The essential interpersonal communication where grey areas are noted and clarification made was not possible especially with groups.

It has been highlighted that this shift in focus to COVID 19 resulted in a reduction of "general health communication campaigns… [That] encourage people to seek out health care" As a consequence, testing and treatment of diseases like HIV/AIDS, TB and malaria have dipped (Global Fund, 2021).

Lessons learned from previous public health crises, including the 2003 SARS outbreak (Frost, Moolenaar, Mao and Xie 2019) and the H1N1 influenza pandemic. Driedger,

Maier and Jardine (2018) suggest that inappropriate communication can greatly compromise efforts to control disease transmission and that "even the best strategies can be rendered ineffective by inadequate health risk communications or failure to integrate a communication perspective (Erika-Kalocsanyiova, Ryan-Essex & Damian-Poulter, 2021).

The COVID 19 pandemic presents numerous new challenges to public health communication. Social Behaviour and Change Communication fundamental in promoting the uptake of the various malaria interventions was constrained by the COVID 19 thus handicapping wholesome programme implementations.

2.5 COVID 19 on Malaria Case Management

When the community suspects malaria it travels to facilities to access services of testing and treatment. COVID 19 had travel restrictions and prohibitive procedures for those who dared to visit health facilities.

The RBM Partnership to End Malaria is working to ensure that efforts to limit the spread of COVID-19 do not compromise access to malaria prevention, diagnosis and treatment services, which are saving almost 600,000 lives and preventing nearly 100 million infections each year. Our top priority is to ensure the supply of vital malaria control tools used to protect millions of people across the world, particularly in countries with a high burden of the disease, as well as their safe delivery, including availability of personal protective equipment (PPE) for frontline health workers. With COVID 19 restrictions there is possible disruptions in the supply chains of essential malaria commodities—such as insecticide treated nets (ITNs), rapid diagnostic tests (RDTs) and anti-malarial medicines (Global Fund, 2021).

The COVID-19 pandemic in SSA endangers access to health care services due to several factors. Direct factors include restricted services and closures of health facilities because of reduced health care worker (HCW) capacity due to lack of personal protective equipment (PPE), stigmatization, fear of getting infected, or absence due to COVID-19 quarantine, disease or death (Kusotera & Nhengu 2020; The Global Fund, 2020; Mbunge, Millham, Sibiya & Takavarasha, 2021). Delayed treatment results in prolonged gametocyte carriage and additional opportunities for transmission. Compared with the responses to COVID-19 in high-income nations, however, the measures taken in Africa come amid the backdrop of more acute health-system resource limitations3 and persistently higher morbidity and mortality from other infectious diseases (Fullman, Yearwood, Abay, Abbafati, Abd-Allah, Abdela, Chang, 2018).

Moreover, because of overload of COVID-19 patients and consequently reduced time to manage other diseases, or due to movement and travel restrictions and for fear of becoming infected with COVID-19, sick individuals with diseases other than COVID-19 no longer attend health facilities (Aborode, David, Uwishema, Nathaniel, Imisioluwa, Onigbinde et al, 2021). As older people fear severe COVID-19 disease and may thus avoid visiting health facilities, this might affect children the most as they depend on their care givers if sick, including for malaria (Di Gennaro, Marotta, Locantore, Pizzol & Putoto, 2020). Stay-at-home advice for febrile diseases, especially at the beginning of the pandemic, enhanced such behaviour, (WHO, 2020). Contrary to potential decrease of cases following COVID 19 restrictions, a study from one rural district in Zimbabwe reported a large increase in malaria cases in 2020 compared to previous years, which was associated with delayed IRS in 2020 (Mbunge, Millham, Sibiya & Takavarasha, 2021).

Community – based malaria workers work in close proximity to febrile patients and are at high risk of COVID-19. Despite the risks, adequate personal protective equipment is often lacking, and workers suffer the stigma of being potential sources of viral infection thus some community members may fear seeking medical attention from them lest may transmit them infection (Kusotera & Nhengu, 2020). Providing Community Health Workers with PPE in malaria-endemic countries so they can continue to conduct campaigns safely, and deliver safe treatment to patients at home or at health centres during COVID 19 pandemic.

Of interest, the importation of cases from cross border activities could be reduced by COVID 19 lockdown restriction measures. Human travel history is important for SARS-CoV-2 and malaria, as for both of them asymptomatic persons can spread and/or maintain transmission of the infectious agent. Malaria might have been reduced by the COVID-19 movement restrictions, especially in heterogeneous malaria-endemic settings where transmission frequently results from migration flows of infected individuals across different regions (Chanda-Kapata, Kapata & Zumla, 2020).

A host of COVID 19 circumstances would have had both detrimental and beneficial effects to malaria case management in Mutasa District malaria burden.

2.6 COVID 19 on Intermittent Preventive Treatment (IPTp)

COVID 19 lockdown restrictions have a bearing on the pregnant mothers accessing the IPTp. Out of the restrictions and fear of contracting the disease some pregnant women would desist from going to access IPTp service.

As the COVID-19 pandemic takes its toll, millions of people, particularly pregnant women and young children, remain vulnerable to malaria because access to routine health services - such as antenatal care and malaria diagnosis and treatment is at risk of disruption as a result of COVID-19 (WHO, 2019). Another study from Uganda reported a 54% decrease in pregnant women IPTp visits for preventive malaria treatment in pregnancy. In the context of COVID-19 pandemic, it is essential that other deadly diseases such as malaria are not overlooked, or deaths will increase dramatically. Intermittent preventive therapy for pregnancy is simple and cost-effective; it saves new-born lives and prevents adverse outcomes on child development (Global Fund, 2021).

2.7 COVID 19 on Insecticide Treated Nets (ITNs)

ITNs are important to the prevention of malaria and its distribution may be affected by other infectious health emergencies like COVID 19 and Ebola where equally attention may be shifted to cater for the highly infectious conditions.

The Ebola epidemic disrupted distribution of ITNs and resulted in increased malaria transmission, while poor access to malaria treatment led to dramatic increases in deaths in children (Walker, White, Griffin, Reynolds, Ferguson, Ghani & Walker, 2015). According to the WHO, ensuring access to malaria prevention, such as insecticide-treated nets and preventive medicines for children, also supported the response to COVID-19 by reducing the number of malaria infections and, in turn, easing the strain on health systems (WHO, 2020). For national malaria control programmes, the reduced access to and availability of malaria services, disruptions in the production and supply of malaria commodities, and the suspension of IRS and ITN distribution campaigns have hindered the continued provision of malaria

services during the COVID-19 pandemic (Penjor, Zangpo, Clements, Gray, Wangdi, 2021).

The effects of the COVID pandemic have had multiple, connected impacts on the distribution of LLINs in Western Kenya: mass community-based campaigns were delayed; supply chains were affected, leading to temporary declines in routine distributions; and COVID-related health worker strikes disrupted healthcare delivery (LaurissaSuiyanka, Victor, Alegana & Robert, 2021).

2.8 COVID 19 on Indoor Residual Spraying (IRS)

Accelerated malaria control efforts since the early twenty-first century have significantly reduced the malaria burden in Africa and worldwide. Control strategies include ITN and IRS interventions, early diagnosis and rapid treatment with ACT, and intermittent preventive treatment for infants, children and pregnant women (WHO, 2020).

COVID-19 pandemic continues disrupting international, regional, national, provincial and districts malaria control programmes like IRS complicating malaria surveillance and monitoring activities as well as slowing down planning and resource mobilization processes, especially in low-income tropical malaria-endemic countries (Brooke, Raman, Frean, Rundle, Maartens, Misiani et al., 2020). Due to fear of the potential of contracting COVID 19 many communities' households have resisted entertaining the IRS team thus hosts of houses were noted as locked therefore affecting the ultimate coverage and failed to reach impact coverage the confer protection to the residents. More so by the inadequate IRS social and behaviour change communication done due to COVID 19 restrictions and interdictions

householders would not permit their houses to be sprayed thus low coverage (Kusotera & Nhengu, 2020).

Also, Kusotera and Nhengu (2020) revealed that malaria confirmed cases increased tremendously in 2020 as compared to the previous years, particularly from 2015-2019 because of delayed IRS coverage, COVID-19 restrictions, heavy rains, differed and inconsistent social and behaviour change communication, lack of community engagement, delayed procurement of equipment and lack of funding among others all that centre on COVID 19 restrictions and erratic cyclones disasters. It was therefore suggested be imperative to integrate mobile phones into malaria control strategies during COVID-19 pandemic to strengthen awareness campaigns while maintaining COVID-19 regulations although not every member of the community had the gadget (Gilbert, Pullano, Pinotti, Valdano, Poletto, Boelle, D'Ortenzio, Yazdanpanah, Eholie, Altmannet al., 2020).

The COVID 19 mandatory national lockdowns and the COVID 19 as highly infectious conditions bore drawback to the execution of SBCC sessions prior IRS implementation, the issuance of IEC material to the community members as they dreaded any material as potentially contaminated by the COVID 19 virus and the community had fears that led to low IRS uptake (Nkengasong & Mankoula, 2020).

2.9 Chapter Summary

The chapter dwelt on the literature that was written on the interaction between COVID 19 and malaria on the activities thus social behaviour change and communication, malaria case management, Intermittent preventive treatment in the pregnant women and the indoor Residual Spraying programme.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter described the methodological strategy that was employed in this study. It addressed aspects of the study design and its appropriateness, study setting and rationale for selection, study population, sample size and sampling procedure, data collection instruments, validity and reliability, data collection procedure, analysis and organisation of data. In addition, the chapter highlighted aspects of ethical considerations that were made in the study and dissemination of findings.

3.2 Study Setting

The study was conducted in Mutasa District retrospectively 2021 -2019.Mutasa District has a total population 180 009 and has 31administrative wards. Mutasa District has a total area of 2774 square km and shares common boundaries with Mutare District to the south, Nyanga district to the north, Makoni district to the west and Mozambique to the East. Temperature ranges from 19-26 degrees Celsius; altitude ranges 600-1500m and rainfall pattern is between 650-1000ml.

The district has 46 health facilities, 9 belong to the government, 22 Council, 8 missions, 7 private, the major referral hospitals are Hauna, Bonda and Old Mutare

hospitals. Since the onset of the COVID 19 pandemic, the district recorded 2009 cases and 82 deaths. The cases and the deaths were spread across the district with different magnitude.

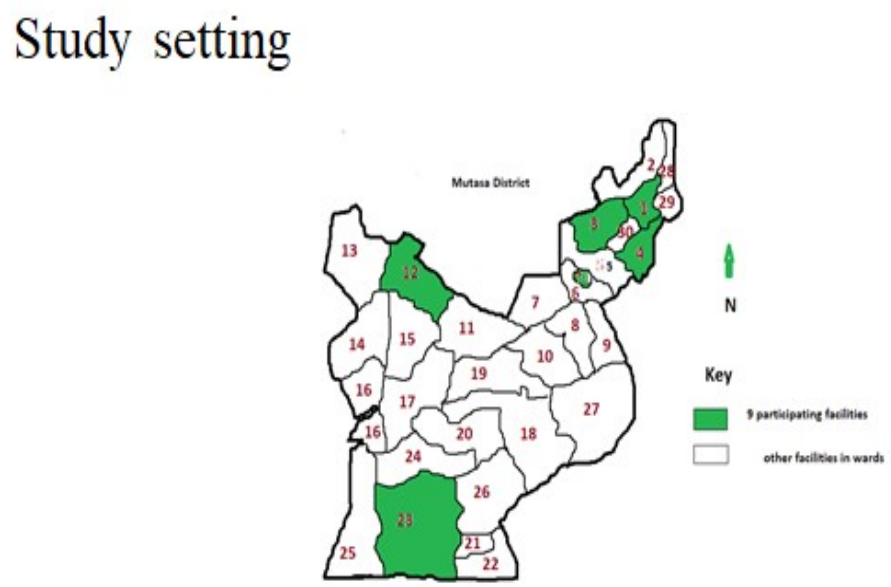


Figure 2 Map of Mutasa District Showing the 9 Study Sites

3.3 Study Design

A combined qualitative and quantitative analytical cross-sectional study was conducted using record review of data on COVID 19, malaria data and activities for the period during COVID 19 and pre-Covid 19 that is, 2019-2021 in Mutasa District. Data on COVID 19 and malaria was being traced from January 2019 to March 2021. Interviews on IRS and IPTp were held with malaria patients as well as the pregnant women.

3.4 Study Population

The study primary population were the people who had malaria and pregnancy during the period from January 2019 to march 2021. Malaria activity registers and outpatient registers in selected sites were sampled for the participants. Key informants were recruited in the study; these were the district health promotion officer (DHPO), district environment health officer (DEHO), the district nursing officer (DNO), the district health information officer (DHIO) and village health workers (VHW).

3.4.1 Inclusion Criteria

All Malaria patients and registers, Social Behaviour and Change Communication sessions carried (SBCC) Registers, Indoor Residual Spraying Coverage Registers, Intermittent Preventive Treatment (IPTp) registers, Larvicide documents statistics and COVID 19 cases/statistics and registers, malaria activities within the period January 2019 to March 2021.

3.4.2 Exclusion Criteria

Anyone or documents that did not meeting the inclusion criteria.

3.5 Sample Size and Sampling Procedure

3.5.1 Sample Size

The sample size (n) is calculated according to the formula: n= [z2*p*(1-p)/e2}/ {1+ (z2*p*(1-p)/e2*N))]

Where: Z=1.96 for Confidence level of 95%, p= proportion (expressed as decimal), N=population size, e margin of error

Z=1.96, p=0.5 N=20500, e =0.05

N= [1.96^2 *0.5*(1-0.5)/0.05^2]/1+(1.96^2 *0.5*(1-0.5*20500))]

N=384.16/1.0187=377.093

N =378

Proportional representation of the 9 participating facilities

Table 1 Proportional Representation of the 9 Participating Facilities

Facility (9)	Total Population	Sample size of Health workers (n = 378)
4 referral hospitals		
Hauna Hospital	3800	70
Bonda Hospital	3089	57
Old Mutare Hospital	3267	60
Tsonzo Rural Hospital	1302	24
5 big Rural Health Centres		
Chisuko clinic	1918	35
Hauna clinic	1845	34
Sagambe clinic	1769	33
St Peters Mandeya clinic	2107	39
Zindi clinic	1403	26
Total	**20500**	**378**

3.5.2 Sampling Procedure

Nine locations that is the high burdened malaria centres were purposively selected, that was, 4 hospitals as Hauna, Tsonzo, Bonda and Old Mutare hospitals and 5 clinics Sagambe, Chisuko, Zindi, Hauna, St Peters Mandeya. The 378 participants from the nine facilities were picked by simple random. Systematic using the selected health facilities based on proportion.

3.6 Data Collection Instruments

An Interviewer administered questionnaires with both open and close ended questions was used to collect data from the 378 enrolled participants. Included Checklists for capturing data from the various registers.

3.6.1 Dependent Variable

The outcome variable for the study were malaria cases, malaria incidence, health promotion activities (SBCC sessions) carried out, Intermittent Preventive Treatment (IPTp) coverage, Indoor Residual Spraying (IRS) coverages.

3.6.2 Independent Variables

The COVID 19 effects were the independent variable. Since we are looking at how it affected malaria programming.

3.7 Data Collection Procedure

Health promotion sessions done were reviewed from March 2019 to March 2022 using the SBCC register, malaria suspected cases, malaria cases, malaria outbreaks and high cases including malaria deaths were checked from the DHIS2, T12 and IMCI registers for the period March 2019 to March 2021 and data compiled by year with March 2019 –March 2020 as pre-COVID 19 period and March 2021 – March 2022 as the COVID 19 period. IRS coverage was checked from respective registers. Interviewer administered questionnaires were dispatched and filled by the 378 enrolled participants and checked for completeness by the investigator.

3.8 Pretesting

Pretesting of the instruments was carried out at Mupotedzi clinic to check for validity and reliability of the tools. At least 37 participants were selected that is 10% of the

sample size to take part in the pre-test. All the errors identified were corrected before the start of the actual study.

3.8.1 Validity and Reliability

Validity of an instrument is its ability to measure what it is actually set out to measure. Content validity shall be accessed through the use of literature on effect of COVID 19 on malaria activities. A questionnaire was translated into the local language Shona and back translated them to English to check if they still had the same meaning. The researcher also had time to review the tools before and after pretesting. Reliability is the degree of consistence with which an instrument measures the variables of interest. This includes dependability, consistency, accuracy and comparability. In the study reliability was checked through the pretest. The researcher administered all the questionnaires to try and avoid problems associated with interpreter reliability.

3.9 Data Organization and Analysis

Data were captured and analyzed using Epi Info version 7 to generate frequencies, means and proportions. Trend analysis was conducted, and R squared calculated for each trend. T tests and chi-square were conducted to compare summary statistics between variables and to check for independence.

3.10 Ethical Consideration

Permission to carry out the study was sought from the District Health Executive (DHE) Mutasa District, the Provincial Medial Directorate (PMD) Manicaland and

Africa University Research Ethics Committee (AUREC). The participants were asked to consent to participate in the study and voluntarily withdraw when longer interested to proceed with the study.

3.10.1 Right to Confidentiality

Throughout the study the raw data were kept locked up to ensure confidentiality was maintained. Confidentiality was maintained by not sharing participants' responses or making the participants to write names on the questionnaire.

3.10.2 Anonymity

Anonymity was maintained by excluding any names or any form of identification from the questionnaires so that no questionnaire could be linked to a specific respondent.

3.10.3 Voluntary Withdrawal

Participants were permitted to withdraw from the study any time they so wished without punishment or forfeiture of benefits.

3.10.4 Information Dissemination

Findings from the study were disseminated through reports and feedback meetings with the Mutasa District Health Executives, the local leadership and the participants.

3.11 Summary

The chapter dealt with research methodology, study site, study population, sample size calculation and sampling, data collection instrument, pretesting, validity and reliability, ethical considerations and information dissemination

CHAPTER 4DATA PRESENTATION ANALYSIS&INTERPRETATION

4.1 Introduction

This chapter looks at the results of data collection. The analysis was categorized per theme. All the 378 participants sampled in medical registers consented to participate in the study. This is inclusive of 42 and 38 women who were pregnant pre – Covid and during Covid respectively.

4.2 Distribution of Participants According to Demographic Characteristics

Table 2 Socio-Demographic Characteristics of Respondents

Characteristic	Subcategory	Covid period 2020 – 2022 n = 189 (%)	Pre – Covid 2019 – 2020 n =189 (%)	P value
Sex	Male	92 (48.7)	85 (45.0)	0.471
	Female	97 (51.3)	104 (55.0)	
Education	Primary or less	28 (14.8)	23 (12.2)	0.871
	Secondary	129 (68.2)	141 (74.6)	
	Tertiary	32 (17.0)	25 (13.2)	
Religion	Apostolic	8 (4.2)	13 (6.9)	0.02
	Mainline - Christian	72 (38.1)	60 (31.7)	

	Pentecostal - Christian	30 (15.9)	80 (42.3)	
	Moslem/Tradition	79 (41.8)	36 (19.0)	
Residence	Growth Point	113 (59.8)	108 (57.1)	0.679
	Rural	76 (40.2)	81 (42.9)	
Occupation	Not employed	68 (36.0)	73 (38.6)	0.286
	Formally employed	36 (19.0)	38 (20.1)	
	Informally employed	43 (22.8)	46 (24.3)	
	Student	26 (13.8)	22 (11.6)	
	Child	16 (8.5)	10 (5.3)	

Format adopted from (Di Gennaro, F et al, G., 2020).

The distribution of participants among females and males was comparable with 53.2% and 46.8% respectively. The majority of participants (above 75%) had attained at least secondary education. The study participants were homogenous (p value > 0.05) for the socio-demographic characteristics except for religion which had $p < 0.05$ at 0.02.

4.3 Section A: Health Promotion and Education on Malaria Interventions

Table 3 Reception of Health Promotion and Education Session

Variable	Covid period 2021 – 2022 n (%)	Pre – Covid 2019 – 2020 n (%)	pOR (95% CI)	P-value
Reception of health promotion and education prior to IRS	Yes 92 (48.7)	Yes-120 (63.4)	0.5 (0.4 – 0.8)	0.004

implementation	No 97 (51.3)	No 69 (36.6)		
Reception of health promotion and education on the importance of taking ITPp when pregnant	Yes 32 (78.9)	Yes 40 (95.2)	0.27(0.01– 1.4)	0.10
	No 6 (21.1)	No 2 (4.8)		

Displayed in table 3 above is the reception of health education conducted before the indoor residual spraying begins. There was an almost 50% decline in the reception of health promotion and education on IRS prior to the implementation of the IRS in the Covid – 19 period compared to the pre – Covid 19 period [pOR = 0.5; 95% CI (0.4 – 0.8); p value = 0.004] and it was statistically significant. Among the pregnant women who participated, almost all received health education in the pre – Covid and Covid 19 period and the difference in reception of the health education on IPT to pregnant women was statistically not significant with a p value of 0.1 comparing the two periods.

Table 4 Case Management Pre-COVID 19 and during in Mutasa District

Variable	**During COVID 19 2021-2022 n =189 (%)**	**Pre COVID 19 2019-2020 n = 189 (%)**	**Odds Ratio (95% CI)**	**P value**
Presence of fever when you presented to the facility or the VHWs	Yes 120 (63.5)	Yes 102 (54.0)	1.5 (1.0 – 2.2)	0.06
	No 69 (36.5)	No 87 (46.0)		

Treated at health facility or by a Village Health Workers in the community	HF (48.1)	91	HF (60.0)	113	0.6 (0.4 – 0.9)	0.02
	VHW (51.9)	98	VHW (40.0)	76		
Perceived increased malaria cases in their places of residence during the reported period	Yes 18 (7) No 171 (93)		Yes 22 (15) No 167(85)		0.8 (0.4 – 1.5)	0.50
Perceived disruptions of health services and affected health seeking behaviour	Yes 183 (97) No 6 (3)		Yes 172 (69) No 17 (31)		3.0 (1.2 – 7.8)	0.02

Table 4 above, explains the health seeking behaviour of the participants in terms of the most common symptom presentation of fever, which by the way, is common to both malaria, and as can be seen, it was 1.5 times more likely to present with fever in the Covid period compared to before the Covid pandemic and this was not statistically significant with a p-value > 0.05, [pOR1.5; 95% CI 1.0 – 2.2; p value 0.40]. 60% of participants were more likely to receive treatment in the community through the VHW during the Covid period compared to the pre-Covid period and this was statistically significant having a p-value of 0.02 at 95% confidence interval [pOR 0.6; 95 CI 0.42 – 0.93; p value = 0.02,]. On enquiring whether Malaria cases were increasing in the district, most opinions before the Covid pandemic, were that the burden has remained constant (p value 0.50), while during Covid most participants actually thought that Covid 19 was increasing. Participants acknowledged that Covid 19 was interfering with their health seeking behaviour inhibiting people from accessing health service as shown in table 3 above, there is a

3 times more disruption to get services as compared to the pre – Covid 19 period, [pOR 3.0; 95% CI 1.2 – 7.8; p value 0.02], the results were statistically significant.

4.5 Section C. Intermittent Preventive Treatment (IPTp)

Table 5 Accessing IPTp

Variable	Covid19 period 2020 – 2022 n = 38	Pre – Covid, 2019 – 2020 n = 42	Odds Ratio (95% CI)
Did you receive pills which prevent Malaria?	Yes 32 (84.2)	Yes 38 (90.5)	0.6 (0.1 – 0.40 2.2)
	No 6 (15.8)	No 4 (9.5)	
If yes, did you receive it from clinic or VHW?	Clinic 17 (44.7)	Clinic 31 (73.8)	0.3 (0.1 – 0.01 0.7)
	VHW 15 (39.5)	VHW 7 (26.2)	

The intermittent preventive therapy, IPTp, programme continued with the same success for both the pre – Covid 19 and Covid 19 period. Most of the participants accessed their preventive treatment in both periods, p value = 0.40, which is statistically insignificant. There was a shift in accessing the IPTp medication from the health facilities to accessing the medication from the community health workers (VHW) in the community as highlighted in the table, a 70% decrease and a statistical significance of p-value of 0.01 [pOR 0.3; 95 CI 0.1 – 0.7; p value 0.01].

4.6 Section D: IRS Spraying Coverage

The Indoor Residual Spraying is preventive intervention carried to deposit chosen chemical on the indoor walls especially sleeping and resting rooms so that protection

is conferred to the occupants. As the mosquitoes seek to feed on the human blood and rest on the sprayed walls before attacking, they meet their fate thus reducing host malaria transmission.

Table 6 Reception of Awareness Message for the Pending Spraying Team

Total N= 378

Variable	During COVID 19 2021-2022 n = 189 (n%)	Pre COVID 19 2019-2020 n = 189 (n%)	pOR (95% CI)	P Value
Did you attend any awareness meetings on the IRS programme?	Yes 134 (71.0)	Yes 152 (80.4)	0.6 (0.4 – 1.0)	0.030
	No 55 (29.0)	No 37 (19.6)		
Was your house sprayed?	Yes 123 (65.1)	Yes 141 (74.6)	0.34 (0.2 – 0.6)	0.001
	No 66 (34.9)	No 29 (25.4)		

Indoor residual spraying activities – the meetings held with the communities to sensitise and educate on the benefits of having their homes sprayed and the actual house spraying – were negatively affected by the Covid 19 pandemic. As can be seen in table 6 above, there was a 40% reduction in awareness meetings, had a statistical significance, p-value of 0.03 [pOR0.59; 95% CI 0.37 –0.96; p value = 0.03]. The accompanying programme of spraying houses was severely affected by Covid pandemic which saw a 62% reduction of those whose houses got sprayed during the Covid period compared to those sprayed before the Covid pandemic [pOR 0.38; 95% CI 0.23 – 0.63; p value of 0.0001].

Qualitative Results

The study successfully recruited key informants. These were the DNO, DEHO, DHPO, DHIO and some VHWs.

The key informants highlighted that the pandemic brought in many challenges in the malaria programming. The national lockdowns brought in restrictions in movements, there was no public transport, there were many road blocks on the roads, and special permits were required for one to travel from one point to the other. Gatherings were also banned. The fear of the new disease compounded the situation, with a lot of misinformation being spread.

The VHWs who are the community cadres and were trained by the MOHCC to diagnose, classify and treat malaria, were the hard hit due to the fact that they were not provided with PPE at first and when the Covid 19 integrated trainings were rolled they were left out. To add to their predicaments, they use their own homes or have to visit the patients' homes, thereby, putting themselves at risk of contracting Covid. The similarity of symptoms between Covid 19 and malaria made things worse. The fear which arose ended up with VHWs shying away from giving the service expected of their work.

The DNO as the direct manager of nurses who manners the local clinics had to guide the team under the DHE, on innovative ways of continuing the provision of a comprehensive and quality health care to the people. There were industrial actions at the beginning of the Covid pandemic with health care workers requesting PPEs and risk allowances. This compromised all the services. The MOHCC had earlier on rolled out community health strategy; therefore, a move was made to provide IPTp to

pregnant mothers in their communities rather than for them to walk long distances to clinics, when there was no transport.

The DHPO failed to carry out activities of community engages due to restrictions which banned travelling and gathering of people. This had a negative impact on the IRS which ended performing poorly, leaving a lot of rooms not sprayed. The fear by the people of contacting Covid made them reluctant to allow people in their homes.

According to the DHIO, the malaria positive went down, with increase in suspects due to similarity of symptoms while the incidence of malaria actual went down as the incidence of Covid went up during each wave. This resulted in high numbers of suspects and low percentage of confirmed cases.

4. 9 Chapter Summary

The chapter dwelt on centring on the demographics, health promotion and education, the intermittent preventive treatment in the pregnant women, malaria case management, and the indoor residual spraying programme in the context of the implementation of malaria intervention in the Covid 19 pandemic.

CHAPTER 5 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5.1 Introduction

This chapter discusses the findings of the study and draws conclusions and recommendations based on those findings.

5.2 Discussion

The study explored the effect the Covid 19 pandemic has had on the malaria program, focusing on the parameters of SBCC, IRS, IPTp and case management. The results revealed that the COVID 19 pandemic had effects on the malaria

interventions. The effect ranged from the execution of health promotion and education on the various malaria interventions that included the intermittent preventive treatment prophylaxis in the pregnant, malaria case management at facility and community levels and the indoor residual spraying programme.

There was an almost 50% decline in the acceptance of the information in the Covid – 19 period compared to the pre – Covid 19 period [pOR = 0.54; 95% CI 0.36 – 0.82; p value = 0.004], this is in keeping with a study by (Kusotera, T., Nhengu T.G., 2020) & (Global Fund, 2021) which stated that, health promotion and education were compromised thus inhibiting the desired uptake of programmes like the Indoor Residual Spraying programme that called for intensive and extensive desirable modification of behaviours before implementation of the programme. There was thus a notable reduction on the overall IRS programme coverage and uptake against the targeted rooms in the district during the pandemic. The participants enrolled largely revealed that they detested interaction with the IRS team citing fear of contracting the novel pandemic as also highlighted (WHO, 2021). The pregnant women who participated, almost all received health education in the pre – Covid and Covid 19 period and the difference in reception of the health education on IPT to pregnant women was statistically not significant with a p value of 0.1. The study showed that there was no change in accessing IPTp with most of the pregnant participants accessed their preventive treatment in both periods (90.5% and 84.2% respectively), p value = 0.40, which is statistically insignificant. This is in contrast to a world malaria report of 2019 published by W.H.O., (2019), which reported that, before the pandemic hit, only an estimated 31 per cent of pregnant women in Sub-Saharan Africa were receiving the WHO-recommended minimum three doses of preventive treatment.

Health seeking behaviour of the participants in terms of the most common symptom presentation of fever, which by the way, is common to both malaria and Covid and was not statistically significant [pOR 1.18; 95% CI 0.79 – 1.75; p value 0.40]. Most participants would visit the health facility for treatment in the pre – Covid period, and from the results a stead trend towards being treated in the community by the VHWs is observable, 1.6 times, during the Covid period [pOR 1.6; 95 CI 0.42 – 0.93; p value = 0.02,], where to get treatment was statistically significant. On enquiring whether Malaria cases were increasing in the district, most opinions before the Covid pandemic were that the burden has remained constant (p value 0.50), while during Covid most participants actually thought that Covid was the disease going up, this was statistically not significant. There was a 3 times interference in health seeking due to Covid 19 pandemic, inhibiting people from accessing health service as shown in table 3 above [pOR 3.0; 95% CI 1.16 – 7.82; p value 0.02], the results were statistically significant. Participants believed that malaria have remained constant (p value 0.50), this is contrary to a study from one rural district in Zimbabwe reported a large increase in malaria cases in 2020 compared to previous years, which was associated with delayed IRS in 2020 (Mbunge, Millham, Sibiya & Takavarasha, 2021). Most participants would visit the health facility for treatment in the pre – Covid period, and from the results a stead trend towards being treated in the community by the VHWs is observable during the Covid period [pOR 1.6; 95 CI 1.07 – 2.41; p value = 0.02,], where to get treatment was statistically significant, this finding in the study is in keeping with the study done by Mbunge E (2021) et al and WHO, (2021). The decentralisation drive was anchored on the Primary health care concept and enhanced by the community health strategy functioning under the

national development strategy 1 that had its impetus within COVID 19 pandemic period (Mbunge et al., 2021 & WHO, 2021).

The results of the study showed that the awareness campaigns/meetings and indoor residual spraying were significantly affected by Covid 19 (p values of 0.03 and 0.043 respectively. Due to fear of the potential of contracting COVID 19 many communities' households have resisted entertaining the IRS team thus hosts of houses were noted as locked therefore affecting the ultimate coverage and failed to reach impact coverage the confer protection to the residents, more so by the inadequate IRS social and behaviour change communication done due to COVID 19 restrictions and interdictions householders would not permit their houses to be sprayed thus low coverage (Kusotera & Nhengu, 2020). This study is keeping with the findings of this study.

5.3 Conclusion

It was noted that COVID19 had effects on the malaria interventions in Mutasa District. Favourably the lockdown restrictions seemed confined malaria transmission thus low transmission and a sharp decline of the malaria cases, outbreaks, severe cases and deaths. Equally favourably there was quite commendable transition of malaria caseloads from facility to the community health workers where the community would promptly receive treatment and therefore the transmission cut in time also that enabled community ownership of the malaria intervention, (Kusotera, T., Nhengu T.G., 2020 & Global Fund,2021).

5.4 Recommendations

The district to uphold health services delivery decentralisation with the intensive training of VHWs and establishment of Health Post in a way health services would be retained to the community despite the COVID 19 pandemic.

Table 7 Recommendations

Recommendation	Who	When
New health promotion strategies be sought that get along with conditions like COVID19	The District Health Promotion Officer	Ongoing
Work to improve on IPTp uptake in the pregnant by decentralising the service to the Village Health Workers	District Nursing Officer	Ongoing
Wide consultation on Indoor Residual Spraying programme to improve IRS coverage	District Environmental Health Officer	Ongoing

5.5 Suggestions for Further Research

More robust research should be executed to establish what could be leading to low cases of malaria, the factor of lockdown or climate changes.

REFERENCES

Brooke, B. D., Raman, J., Frean, J., Rundle, K., Maartens, F., & Misiani, E., (2020). Implementing malaria control in South Africa, Eswatini and southern Mozambique during the COVID-19 pandemic. *South African Medical Journal*, 4(3), 45-66.

Black, J. R., Bailey, C., Przewrocka, J., Dijkstra, K. K., & Swanton, C. (2020). COVID-19: the case for health-care worker screening to prevent hospital transmission. The Lancet, 395(10234), 1418-1420.

Di Gennaro, F., Marotta, C., Locantore, P., Pizzol, D., & Putoto, G., (2020). *Malaria and COVID-19: Common and different findings*. USA, New York: Sage.

Driedger, S. M., Maier, R., & Jardine, C., (2018). Damned if you do, and damned if you don't": Communicating about uncertainty and evolving science during the H1N1 influenza pandemic. *Journal of Risk Research*, 24(5), 574–592. https://doi.org/10.1080/13669877.2018.1459793.

Erika-Kalocsanyiova, E. K., Ryan-Essex, R., & Damian-Poulter, D., (2021). Risk and health communication during Covid-19. *A Linguistic Landscape Analysis, Health Communication*, 7(3), 345. DOI: 10.1080/10410236.2021.1991639.

Frost, M., Li, R., Moolenaar, R., Mao, Q., & Xie, R., (2019). Progress in public health risk communication in China: Lessons learned from SARS to H7N9. *BMC Public Health*, 19(3) 1-9. https://doi.org/10.1186/s12889-01.

Fullman, N., Yearwood, J., Abay, S. M., Abbafati, C., Abd-Allah, F., Abdela, J., ... & Chang, H. Y., (2018). Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016. The Lancet, 391(10136), 2236-2271.

Gilbert, M., Pullano, G., Pinotti, F., Valdano, E., Poletto, C., Boelle, P. Y., D'Ortenzio, E. M., Yazdanpanah, Y., Eholie, S. P., & Altmann, M., (2020). *Preparedness and vulnerability of African countries against importations of COVID-19: A modelling study*. London, New York: Lancet.

Gilbert, M., Pullano, G., Pinotti, F., Valdano, E., Poletto, C., Boelle, P. Y., D'Ortenzio, E., Yazdanpanah, Y., Eholie, S. P., & Altmann, M., (2020). *Preparedness and vulnerability of African countries against importations of COVID-19: A modelling study.* USA: New York: Lancet.

Global Fund. (2021). *Impacts of COVID-19 on the delivery of essential malaria services in Africa*, *Geneva.* Geneva: Local Printers.

Kusotera, T., & Nhengu, T. G., (2020). Coronavirus-19 and malaria: The great mimics. *African Journal Primary Health Care Family Medicals,* 7(7), 456-501.

Laurissa-Suiyanka, L., Victor, A., Alegana, A., Robert, W., & Snow, A., (2021). *Insecticide-treated net distribution in Western Kenya: Impacts related to COVID-19 and health worker strikes*. USA: WHO.

Mbunge, E., Millham, R., Sibiya, M. N., & Takavarasha, S., (2021). *Impact of COVID 19 on malaria elimination: Juxtaposing indoor residual spraying and mobile phones in Buhera Rural District, Zimbabwe.* Zimbabwe: Government Printers.

Murewanhema, G., & Makurumidze, R. (2020). Essential health services delivery in Zimbabwe during the COVID-19 pandemic: perspectives and recommendations. The Pan African Medical Journal, 35(Suppl 2).

Nkengasong, J. N., & Mankoula, W., (2020). *Looming threat of COVID-19 infection in Africa: Act collectively, and fast.* London, New York: Lancet.

Penjor, K., Zangpo, T., Clements, A. C., Gray, D. J., & Wangdi, K. (2021). *Has COVID19 derailed Bhutan's national malaria elimination goal?* A commentary. Malaria Journal, 20(1), 1-3.

Ravitch, S. M., & Riggan, M., (2017). *How conceptual frameworks guide research*. Los Angeles, California: Sage.

Sands, P. (2020). *COVID-19 threatens the poor and marginalized more than anyone.* The Global Fund to Fight AIDS, Tuberculosis and Malaria.

Sewankambo, N., Agyepong, I. A., Binagwaho, A., Coll-Seck, A. M., Corrah, T., Ezeh, A., ... & Piot, P. (2017). *The path to longer and healthier lives for all Africans by 2030: The Lancet Commission on the future of health in sub-Saharan Africa.* The Lancet, 390(10114), 2803-2859.

Sherrard-Smith, E., Hogan, A. B., Hamlet, A., Watson, O. J., Whittaker, C., Winskill, P., ... & Churcher, T. S. (2020). *The potential public health consequences of COVID-19 on malaria in Africa.* Nature medicine, 26(9), 1411-1416.

Walker, P. G., White, M. T., Griffin, J. T., Reynolds, A., Ferguson, N. M., Ghani, A. C., (2015). *Malaria morbidity and mortality in Ebola-affected countries caused by decreased health-care capacity, and the potential effect of mitigation strategies: a modelling analysis*. London: Lancet.

Wilhelm, J. A., & Helleringer, S. (2019). *Utilization of non-Ebola health care services during Ebola outbreaks: a systematic review and meta-analysis*. Journal of global health, 9(1).

Weiss, D. J., Bertozzi-Villa, A., Rumisha, S. F., Amratia, P., Arambepola, R., Battle, K. E., ... & Gething, P. W. (2021). *Indirect effects of the COVID-19 pandemic on malaria intervention coverage, morbidity, and mortality in Africa: a geospatial modelling analysis.* The Lancet Infectious Diseases, 21(1), 59-69.

World Health Organisation. (2019). *World malaria report 2019*. Geneva: WHO.

World Health Organization. (2021). *Coronavirus disease (COVID-19) weekly epidemiological update and weekly operational*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports.

APPENDICES

APPENDIX 1: Survey Questionnaire: English Version

From March 2019-March2020

1) Did you receive any health promotion &education session on IRS, IPTp, and importance of early treatment seeking behaviour on malaria?

IRS Yes ( ) No ( )

IPTp Yes ( ) No ( )

2) Importance of early treatment seeking on malaria Yes ( ) No ( )

3) If No, what made you not to access the health promotion &education?

Was busy away ( ) the cadres never reached our area ( ) was never informed ( )

From March 2020-March 2021

1b) did you receive any health promotion &education session on IRS, IPTp, and importance of early treatment seeking behaviour on malaria?

IRS Yes ( ) No ( )

IPTp Yes ( ) No ( )

2b. Importance of early treatment seeking on malaria Yes ( ) No ( )

3b. If No, what made you not to access the health promotion &education?

Was busy away ( ) the cadres never reached our area ( ) was never informed ( )

Section B. Malaria Case management

From March 2019-March2020

4. Had you any signs & symptoms suggesting of malaria?

Yes ( ) No ( )

5. If yes did you visit the health facilities for treatment?

Yes ( ) No ( )

6. If no what made you not go to the clinic or CHW?

Had alternative place for treatment ( )

Feared going to facility because might contract COVID 19 ( )

7. Do you think that the COVID 19 cases had been increasing in your area?

Yes ( ) No ( )

8. Do you think that the malaria cases had been increasing in your area?

Yes ( ) No ( )

From March 2020-March2021

4b. had you any signs & symptoms suggesting of malaria?

Yes ( ) No ( )

5b. If yes did you visit the health facilities for treatment?

Yes ( ) No ( )

6b. If No what made you not go to the clinic or CHW?

Had alternative place for treatment ( )

Feared going to facility because might contract COVID 19 ( )

7b. Do you think the COVID 19 cases had been increasing in area?

Yes ( ) No ( )

8b. Do you think that the malaria cases had been increasing in your area?

Yes ( ) No ( )

Section C. Intermittent Preventive Treatment (IPTp)

From March 2019-March2020

9. Did you fall pregnant and deliver during mentioned period?

Yes ( ) No ( )

10. Did you get to health facility and receive IPTp

Yes ( ) No ( )

11. If No what made you not to go and receive IPTp

Had alternative place for treatment ( )

Feared going to facility because might contract COVID 19 ( )

Tried from the CHW who had the medicine ( )

From March 2020-March 2021

9b. Did you fall pregnant and deliver during mentioned period?

Yes ( ) No ( )

10b. Did you get to health facility and receive IPTp

Yes ( ) No ( )

11b. If No what made you not to go and receive IPTp

Had alternative place for treatment ( )

Feared going to facility because might contract COVID 19 ( )

Tried from the CHW who had the medicine ( )

Section D IRS Spraying Coverage

From March 2019-March2020

12. Did you receive awareness on the IRS programme?

Yes ( ) No ( )

Was your house sprayed?

Yes ( ) No ( )

13. If No why it was not sprayed?

Was busy with other commitments ( )

Feared COVID 19 by getting in contact with the IRS team ( )

Do not like the programme ( )

GENERAL QUESTIONS

14. COVID 19 Lockdown Restrictions/fears shifted malaria as priority disease, do you agree?

Yes ( ) No ( )

15. Do you think the COVID 19 affected the IRS coverage in your community?

Yes ( ) No ( )

16. If yes how do you think it affected the IRS programme?

Everyone feared coming in contact with strangers to avoid being infected ( )

The fear for COVID 19 was exaggerated ( )

Fear for malaria as disease was submerged by COVID 19 ( )

APPENDIX 2: Survey Questionnaire Shona Version

From March 2019-March2020

1. Makambopihwa rudzidziso here pamusoro pekufiritirwa mudzimba, kupihwa kwemapiritsi kwemadzimai akazvitakura uye kurudziro yekuti mukurumidze kuenda kundorapwa malaria? Kufiritirwa Hongu () kwete ( ) mapiritsi evakazvitakurwa hongu ( ) kwete ( ),

2 kukosha kwekukurumidza kundobatsirwa chirwere chemalaria hongu ( ) kwete ( )

3. Kana arikwete pamusoro, chii chikonzero chakakutadzisai kupihwa kurudziro?

Ndainge ndisipo ( ) hapana akambosvika munharaunda ( ) handina kumboudzwa ( )

From March 2020-March 2021

1b.Makambopihwa rudzidziso here pamusoro pekufiritirwa mudzimba, kupihwa kwemapiritsi kwemadzimai akazvitakura uye kurudziro yekuti mukurumidze kuenda kundorapwa malaria? Kufiritiwa Hongu ( ) kwete ( ) mapiritsi evakazvitakura hongu ( ) kwete ( ),

2b. Kukosha kwekukurumidza kundobatsirwa chirwere chemalaria Hongu ( ) kwete ( )

3. Kana ari kwete pamusoro, chii chikonzero chakakutadzisai kupihwa kurudziro?

Ndainge ndisipo ( ) hapanaakambosvikamunharaunda ( ) handinakumboudzwa ( )

Section B. Malaria Case management

From March 2019-March2020

4. Makambonzwa kurakidzirwa zviratidzo zvemalaria

Hongu () Kwete ( )

5. Kana iri hongu, makaenda here kundobatsirwa kuchipatara.

Hongu ( ) kwete ( )

6. Kana ari kwete chii chakakutadzisai kuenda kuchipatara kana kuna VHW?

Ndainge ndiine kumwe kwekubatsirwa ( )

Ndaitya kubatwa nechirwereche COVID 19 kuchipatara ( )

7. Munofunga here kutidambudziko re COVID 19 rainge rechiedzerera munharaunda yenyu? Hongu ( ) kwete ( )

8. Munofunga kuti dambudziko remalaria raiwedzera munharaunda yenyu

Hongu ( ) kwete ( )

From March 2020-March2021

4bMakambonzwa kuradzirwa muinezviratidzo zvemalaria

Hongu ( ) Kwete ( )

5b.Kana iri hongu, makaenda here kundobatsirwa kuchipatara.

Hongu ( ) kwete ( )

6b.Kana ari kwete chii chakakutadzisai kuenda kuchipatara kana kunaVHW?

Ndainge ndiine kumwe kwekubatsirwa( )

Ndaitya kubatwa nechirwere cheCOVID 19 kuchipatara ( )

7b. Munofunga here kutidambudziko re COVID 19 rainge rechiedzerera munharaunda yenyu? Hongu ( ) kwete ( )

8b. Munofunga kuti dambudziko remalaria raiwedzera womunharaunda yenyu here?

Hongu ( ) kwete ( )

Section C. Intermittent Preventive Treatment (IPTp)

From March 2019-March2020

7. Makamboita pamuviri here panguva March 2019-March 2020?

Hongu ( ) Kwete ( )

8. Makaenda here kuchipatara kundopihwa mapiritsi ekudzivira malaria?

Hongu ( ) kwete ( )

9. Kana iri kwete chii chakakutadzisai kuenda kundobatsirwa?

Ndainge ndiine kumwe kwekobatsira ( )

Ndaitya kuzobatira COVID 19 kuchipatra ( )

Ndakaedza kubatsirwa nemaVHWs( )

From March 2020-March 2021

7b.Makamboita pamuviri here panguva March 2019-March 2020?

Hongu ( ) Kwete ( )

8b.Makaenda here kuchipatara kundopihwa mapiritsi ekudzivira malaria?

Hongu ( ) kwete ( )

9b.Kana iri kwete chii chakakutadzisai kuenda kundobatsirwa?

Ndainge ndiinekumwe kwekobatsira ( )

Ndaitya kuzobatsirwa COVID 19 kuchipatara ( )

Ndakaedza kubatsirwa nemaVHWs( )

Section D IRS Spraying Coverage

From March 2019-March2020

10. Makawana kudziridzo here pamusoro pekufiritwa kwedzimba?

Hongu ( ) kwete ( )

11Dzimba dzenyu dzakafiritwa here?

Hongu ( ) kwete ( )

12. Kana iri kwete chii chakakukonesai?

Ndainge ndakambatikana ( )

Ndaitya kutapurirwa COVID 19 nevanofirita ( )

Ini handidichirongwa chekufiritwa ( )

From March 2020-March2021

10b. Makawana kudziridzo here pamusoro pekufiritirwa kwedzimba?

Hongu ( )kwete ( )

11 b.Dzimbadzenyu dzakfiritwa here?

Hongu ( ) kwete ( )

12 b. Kana iri kwete chii chakakukonesai?

Ndainge ndakambatikana ( )

Ndaitya kutapurirwa COVID 19 nevanofirita ( )

Ini handidi chirongwa chekufiritwa ( )

GENERAL QUESTIONS

13. Dambudzikore COVID 19 nekurambidzwa kufamba munyika zvakakonzeresa dambudzo kuchirwere chemalaria

Hongu ( )kwete ( )

14. Unofunga here kutidambudzikore COVID 19 rakakonzera kusatambirwa kwechirongwa chekufiritwa mudzimba

Hongu ( ) Kwete ( )

15. Kana mati Hongu munofungakuizvakakonzera sei?

Vanhu vaitya kusangana nevanhu nekutya COVID 19( )

Vanhu vainyanya kubatikana neCOVID 19 ( )

Kutyiwa kwemalaria kwainge kwavhara nedambudziko re COVID 19 ( )

APPENDIX 3: Documents Reviews Checklist

Number of SBCC sessions done on IRS,

Number of severe malaria cases recorded

Number of malaria outbreaks recorded

Number of malaria deaths recorded

Number of imported malaria cases recorded

Number of pregnant women who received at least 6 IPTp doses

IRS coverage of at least 85 %

APPENDIX 4: Consent Form

My name is Fonte Cephas a student from Africa University studying towards the Masters of Public Health degree. I am conducting a study on the Effects of COVID 19 on malaria prevention and curative services in Mutasa District for the period (2019-2021). I am kindly asking you to participate in the study. If you are comfortable with participating in the study, I will interview you for approximately 15 minutes. Results of this interview will be kept under a high degree of privacy and confidentiality. Your names will only be used for the study only and will not be used for any other purposes and will not appear anywhere else in the research related documents.

Only minimal harm will be inflicted during the process if we become too sensitive in our interviews feel free to let us know. You have the right to withdraw from the interview whenever you think it's necessary without any prejudice to your relations with health personnel. If you agree to participate in the study you can indicate in writing below:

Name of the participant……. Date……..

Signature ……Thumb print……..

If you have any related questions patterning the study you are free to conduct Africa University Research Ethics Committee (AUREC) on the following phone number (020) 60075.

Name of the Researcher ……Date……

APPENDIX 5: Shona Consent (Chibvumirano kupinda Muongororo (Mutasa District)

Zita rangu ndinonzwi Fonte Cephas mudzidzi wepachikoro chikuru cheAfrica University ndiri kudzidza gwaro reMaster of Public Health. Ndiri kuita ongororo pamusoro pekusangana kwakaita COVID 19 nechirwere chemalaria mudunhu remuMutasa District. Ndiri kukumbira kuti mupinde muongororo iyi kuburikidza nekupindura mibvunzo ichatevera.

Kana masarudza kupinda muongororo iyi muchabvunzwa mibvunzo uye zvezvinotora nguva inoita makumi matatu emaminitsi. Mukuita izvi hapana zvakaipa zvinotarisirwa kuti mungangosangana nazvo. Mukupinda kwenyu muchirongwa hapana muripo kana mari yamunopihwa asi kungobatsira ongororo chete. Uyezve munekodzero yekumisa mibvunzo pamunenge maona zvakakodzera.

Zvese zvatichabvumirana hazvimbo budiswa kune vamwe vanhu pasina mvumo yenyu uye zita renyu haribude pazvinyorwa zvinechekuita neongororo iyi. Mhinduro dzenyu dzichachengetedzwa pasingasvikwe nevanhu.

Kana paine zvamunoda kunyatsonzwa makasununguka kubvunza musatimanyora chibvumirano chekupinda muchirongwa. Kana masarudza kupinda muongororo iyi, ndinokumbira kuti muise runyoro rwenyu semucherechedzo wekuti maverenga mukanzwisisa zviri mugwaro rino uyezve mabvuma kupinda muongororo iyi.

Zita……..Runyoro……Thumb signature……
Zuva……..

Kana muine imwe mibvunzo maererano neongororo iyi zvamusina kunzwisisa kubva kumuongorori, dakarirai henyu kuchaya runhare kuneveAfrica University Research Ethics Committee panharedzinoti (020) 60075.

Runyororwemuongorori …….....Zuva ……

APPENDIX 6: English Assent Form (0-16 years)

My name is Fonte Cephas a student from Africa University studying towards the Masters of Public Health degree. I am conducting a study on the Effects of COVID 19 on malaria prevention and curative services in Mutasa District for the period (2019-2021). I am kindly asking you to participate in the study. If you are comfortable with participating in the study, I will interview you for approximately 15 minutes. Results of this interview will be kept under a high degree of privacy and confidentiality. Your names will only be used for the study only and will not be used for any other purposes and will not appear anywhere else in the research related documents.

Only minimal harm will be inflicted during the process if we become too sensitive in our interviews feel free to let us know. You have the right to withdraw from the interview whenever you think it's necessary without any prejudice to your relations with health personnel. If you agree to participate in the study you can indicate in writing below:

Name of the participant…….. Date……Signature……

Name of Guardian……..…Date…….Signature…….

If you have any related questions patterning the study you are free to conduct Africa University Research Ethics Committee (AUREC) on the following phone number (020) 60075.

Name of the Researcher ……Date……

APPENDIX 7: Chibvumirano Kupinda Muongororo Remwana (0-16 Years) (Mutasa District, 2021)

Zita rangu ndinonzi Fonte Cephas ndiri mwana wechikoro paAfrica University arikuita chidzidzo cheMasters of Public Health degree.

Ndiri kuita ongororo pamusoro pekusangana kwakaita COVID 19 nechirwere chemalaria mudunhu remuMutasa District. Ndiri kukumbirawo kuti mupinde Muongororo iyi kuburikidza nekupindura mibvunzo ichatevera. Ndichakubvunza mibvunzo kwemaminitsi anogona kuita gumi nemashanu. Zvichabuda mutsvakirudzo zvichachengetedzwa uye hazvitaurirwi kumunhu vosevose. Zita harichashandiswi kune zvimwe kunze kweongororoi noyi. Kana masarudza kupinda muongororo iyi, ndinokumbira kuti muise runyoro rwenyu semucherechedzo wekuti maverenga mukanzwisisa zviri mugwaro rino uye zvemabvuma kupinda muongororo iyi.

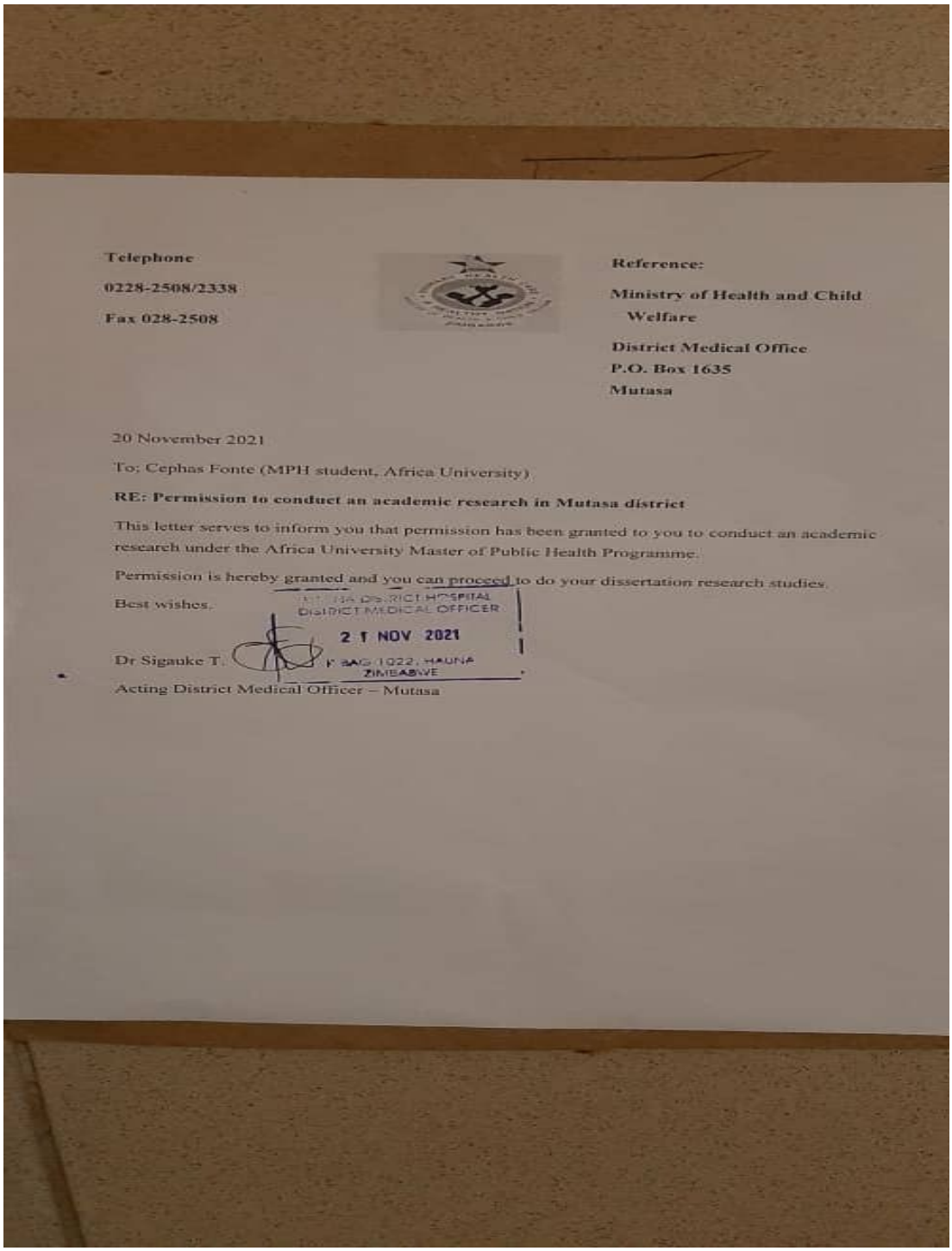
Zita (mwana) …… Zuva …… Runyoro……..

Zita (remubereki) ……....Zuva ……. Runyoro…….

Kana muine imwe mibvunzo maererano neongororo iyi zvamusina kunzwisisa kubva kumuongorori, dakarirai henyu kuchaya runhare kuneveAfrica University Research Ethics Committee panhare dzinoti (020) 60075.

Runyororwemuongorori …… Zuva ……

APPENDIX 8: Letter of Study Approval to Carry Out Study



Telephone
0228-2508/2338
Fax 028-2508

Reference:
Ministry of Health and Child Welfare
District Medical Office
P.O. Box 1635
Mutasa

20 November 2021

To: Cephas Fonte (MPH student, Africa University)

RE: Permission to conduct an academic research in Mutasa district

This letter serves to inform you that permission has been granted to you to conduct an academic research under the Africa University Master of Public Health Programme.

Permission is hereby granted and you can proceed to do your dissertation research studies.

Best wishes.

DISTRICT HOSPITAL
DISTRICT MEDICAL OFFICER
21 NOV 2021
P BAG 1022, HAUNA
ZIMBABWE

Dr Sigauke T.
Acting District Medical Officer – Mutasa

APPENDIX 9: Proof of Payment to AUREC

{1:F01SCBLZWHXAXXX0000000000}{2:I103SBICZWHXXXXXN}{3:{103:ZET}{108:IR07802112020446}{121:b0397d54-3720-44f1-b66a-ac0eac917ff3}}{4:

:20:IR07802112020446

:23B:CRED

:32A:211202ZWL2550,00

:33B:ZWL2550,00

:50K:/0150509272700

CEPHAS FONTE

7468 KUWADZANA T/SHIP,HARARE

/ZIMBABWE

:52A:SCBLZWHXXXX

:53A:REBZZWHXXXX

:54A:REBZZWHXXXX

:57A:SBICZWHXXXX

:59:/9140000847290

Africa University

Mutare, Zimbabwe

ZIMBABWE

/ZIMBABWE

:70:PYMT DTL 1 AUREC fees

:71A:SHA

:72://RTM02DLPCTP

/RRF/ST RTGS