CHALLENGES TO ACCESSIBILITY OF EMERGENCY MEDICAL SERVICES AMONG RURAL RESIDENTS IN THE OTSE CLUSTER, MAHALAPYE DISTRICT, BOTSWANA

By

Kesego Morake

A dissertation submitted to the University of Zambia in partial fulfilment of the requirements for the award of a degree of Master of Science in Emergency and Trauma Nursing

The University of Zambia

Lusaka

2025

DECLARATION NOTICE OF COPYRIGHT

DECLARATION

I, Kesego Morake declare that this dissertation hereby submitted for the award of the degree of Master of Science in Emergency and Trauma Nursing is my own work and has not been submitted either wholly or in part for another degree to this University or any other or to my institution of Higher learning.

Signed……. Date……

Kesego Morake (candidate)

ABSTRACT

Emergency Medical Services (EMS) are essential for timely medical intervention and improved patient outcomes, yet access to these services remains limited in rural settings. In Botswana's Otse Cluster, Mahalapye District, rising mortality rates and delayed emergency care highlight potential challenges in EMS accessibility. This study aimed to explore the challenges affecting accessibility to EMS among rural residents in the Otse Cluster to identify factors contributing to service delays and propose potential strategies to improve equitable emergency care delivery. A qualitative descriptive approach was employed, using purposive sampling to select participants with relevant knowledge of EMS challenges. Data were collected through ten focus group discussions (FGDs) involving 89 rural residents and five unstructured interviews with healthcare providers serving the Otse Cluster. The sample size was determined by data saturation, ensuring that the information gathered was rich and comprehensive. Data were coded using ATLAS.ti software and analysed thematically. The study findings revealed three main themes: infrastructure and resource constraints, community awareness and education, and strategies to improve EMS accessibility, supported by eight subthemes including staff and supply shortage, poor transport and communication networks and limited public knowledge of EMS. The findings expose systemic and multifaceted barriers to EMS access, suggesting that targeted policy reforms, infrastructure improvements, community engagement, and innovative low-cost EMS solutions are necessary to enhance emergency healthcare delivery and reduce preventable deaths in Botswana.

Keywords: Emergency Medical Services, rural healthcare, access to care, Otse Cluster, Mahalapye District, Botswana, community perceptions, challenges.

ACKNOWLEDGEMENT

I praise and thank God for the blessings, wisdom, grace, and strength that he has given me in pursuing my studies, especially during moments of weakness.

I extend my sincere appreciation to my dedicated supervisors, Dr. Ruth Wahila and Mrs. Natalia Mbewe Shitima for their invaluable guidance and support throughout my academic journey. Their expertise has been instrumental in shaping this study.

I am also grateful to the Ministry of Health Botswana for funding my studies and to the Head of the Mahalapye District Health Management Team for giving me permission to conduct the research study at Otse cluster.

A heartfelt thank you to the participants who took the time to contribute to this study. Their cooperation and input have been crucial in achieving meaningful results.

Finally, I am deeply thankful to my family for their unwavering support, patience, and encouragement. Their belief in me has been a source of strength throughout my studies.

DEDICATION

I dedicate this study to my beloved family, whose unwavering support, love, and encouragement have been my greatest source of strength. To my mother, for her sacrifices and endless belief in my abilities, and my siblings, for their constant motivation and companionship, and to my partner for your patience, love and prayers which kept me strong. Thank you for your prayers and words of encouragement. This achievement is a testament to their guidance and firm belief in me.

TABLE OF CONTENTS

Contents

Page No

LIST OF ABBRIVIATIONS

DALYs	Disability-Adjusted Life Years
DHMT	District Health Management Team
EMS	Emergency Medical Services
FGD	Focused Group Discussion
HRDC	Health Research Development Committee
KII	Key informant interview
LMIC	Lower-middle- income countries
MOH	Ministry of Health
NHRA	National Health Research Authority
OHCA	Out of hospital cardiac arrest
RTA	Road traffic accidents
UNZABREC	University of Zambia Biomedical Research Ethical Committee
WHO	world health Organisation

LIST OF TABLES

Tables page No.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.0 Introduction

Emergency medical services (EMS) are the foundation of health systems around the globe, offering vital medical attention to patients in situations where their lives are in danger (Mahama et al., 2018; Takele et al., 2021; Zou et al., 2023). As one of the sustainable development objectives established by the United Nations, access to EMS is an essential part of healthcare, particularly for those living in rural areas (Luo et al., 2022). The purpose of this study is to assess challenges to the accessibility of emergency medical services among rural residents in Botswana's Otse cluster, Mahalapye District.

According to Zou et al. (2023), prompt access to emergency care is necessary to prevent complications from accidents, injuries, or acute illnesses. Long travel times between patients and healthcare institutions can seriously affect rural residents' access to care. Long distances between patients and medical institutions can have a major impact on rural communities' ability to get healthcare. According to Alanazy et al. (2022), there are other obstacles as well, such as the accessibility of transportation and financial constraints. Since each rural setting is unique, it is necessary to evaluate the particularities of emergency medical accessibility in the Otse cluster of Mahalapye District in Botswana.

The current study will, therefore, investigate the challenges faced by the Otse cluster residents when requiring emergency medical services. The generated findings could help guide suggestions to important decision-makers regarding possible improvements to emergency response systems and accessibility. Improving access may eventually benefit the general welfare in some of the more remote regions of Botswana.

Chapter one of the current study begins with the introduction and background which outlines the existing literature, research gaps, and the importance of addressing the issue of emergency medical service accessibility in rural areas. This is followed by the statement of the problem which identifies the lack of adequate access to emergency medical services among rural residents. The study justification, study purpose, research questions and objectives are also presented to contribute to the clarity, justification, and rigour of the research being undertaken. Finally, the chapter ends with a conclusion.

1.1 Background

Worldwide, each government has an ethical duty to ensure that everyone has access to emergency care, as recognized by the World Health Organization (WHO) (Burkholder et al., 2019). WHO has acknowledged emergency care access as a basic human right that is necessary to guarantee the best possible level of health for every individual (Burkholder et al., 2019). This underscores the need for policies and interventions to strengthen EMS systems and reduce rural-urban disparities in accessibility in line with WHO's goal of promoting universal health coverage and reducing inequalities in healthcare access.

EMS are a vital part of the healthcare system and saves lives during medical emergencies, (Luo et al., 2022; Mahama et al., 2018; Takele et al., 2021). To handle public crises such as out-of-hospital cardiac arrest (OHCA), stroke, and road traffic accidents (RTA), every health system in the world should have an integrated EMS in place (Moafa et al., 2020). In rural areas where access to emergency medical treatment is necessary, EMS plays a critical role in responding quickly to critical circumstances. Research has indicated that prompt and efficient EMS have the potential to decrease unintentional injuries and fatalities by 80% for adults and 60% for children (Luo et al., 2022; Wong et al., 2019). Additionally, EMS can lower mortality by 45% in rural areas of low- to middle-income nations (Zou et al., 2023). By filling the gap in residents' access to emergency medical treatment in remote places, providing EMS to rural areas has a distinct advantage.

Accessibility to EMS in isolated locations reduces the likelihood of complications and fatalities by enabling prompt medical emergency response, interventions, and potentially life-saving care (Alanazy et al., 2022). It is also noted that locating EMS in rural areas ensures that all residents have access to emergency medical treatment (Alanazy et al., 2019; Zou et al., 2023). Access to EMS in rural areas relieves residents of the financial burden of seeking medical attention by allowing them to receive necessary medical treatment closer to home and avoiding the need to pay for additional transportation or travel long distances (Jung and Qin, 2024; Zou et al., 2023). In addition to lowering health disparities and improving health outcomes, EMS accessibility in rural areas also lessens the financial burden of seeking medical care and ensures that residents have prompt access to life-saving medical treatments.

Despite the benefits of accessibility to EMS, rural residents frequently encounter challenges to prompt treatment, even though access to emergency medical care is essential for excellent health outcomes (Luo et al., 2022; Takele et al., 2021). Studies show that when EMS respond

to emergencies in rural locations, it takes longer than in urban settings, and delays can have a serious influence on conditions like heart attacks, strokes, or severe trauma (Chari et al., 2023; Verma et al., 2023). Serious delays may come from long distances between patients and facilities (Coombs et al., 2022). Waiting times for ambulances are on average almost as twice as long in rural areas of the United States as they are in urban areas (Miller et al., 2020), and variation in median time to arrival ranges from 0.8 to 3.2 minutes (Alanazy et al., 2019). This has resulted in longer travel times, and possibly a delay in patient care. Burkholder et al., (2021) also observed that in areas with low healthcare resources, the absence of emergency care can result in avoidable deaths and impairments.

Alanazy et al. (2019) equally report that for residents living in rural locations, having access to EMS is essential, yet delivering pre-hospital services in these areas can be difficult. Longer travel lengths, challenging terrain, and expansive geographical landscapes are common in rural locations, which may affect emergency medical response times and the availability of prompt care for those in need (Alanazy et al., 2022, 2019; Alayande et al., 2022). Muchatuta et al. (2022) state that the development and implementation of integrated EMS systems in these nations continue to be impeded by the scarcity of resources, facilities, and EMS technicians, as well as infrastructure gaps. According to Sultan et al. (2019), the utilization of EMS in LMICs varies between 4% and 23%. The reason for this poor utilization can be attributed to various factors such as misconceptions, lack of awareness, and the absence of a well-organized and established EMS. Therefore, it is important to ensure that all challenges faced by the people are addressed to maximise the benefits of EMS.

The EMS was established in Botswana in 2012, however, it only serves a small number of the country's larger towns and villages. The majority of the country's smaller villages and settlements are rarely served by it. Therefore, nurses employed by rural healthcare facilities are in charge of offering ambulance services if EMS is not present (Mamalelala et al., 2023). Most of the research reviewed in the literature addresses healthcare professionals' perspectives on challenges to EMS accessibility. Very little research has been conducted on the unique problems that the rural population of Botswana faces. This research project explores the challenges that rural residents encounter in obtaining emergency medical care. The results of this study may contribute to the advancement of plans aimed at improving EMS accessibility in rural areas of Botswana.

1.2 Statement of the Problem

In LMICs, there is an increasing emphasis on strengthening emergency care systems as a critical component of healthcare delivery. Research indicates that EMS are vital in providing pre-hospital emergency care and medical transportation, improving survival rates and patient outcomes in emergencies (Reid, 2019). According to (Muchatuta et al., 2022), a strong emergency care system in LMICs has the potential to prevent up to 45% of deaths and 35% of disability-adjusted life years (DALYs). Despite significant efforts by the government of Botswana and other stakeholders to establish and improve EMS for rural populations, there remains limited information about the specific challenges that rural residents in the Otse Cluster of Mahalapye District face in accessing these services. This gap in knowledge presents a significant obstacle to designing and implementing effective interventions aimed at improving emergency care access and patient outcomes.

Table 1: Mortality Rates for Otse cluster 2021-2023 (Home Deaths)

Year	Total number of mortalities	Mortality rate per 1000 people
2021	20	2.8
2022	16	2.2
2023	27	3.7

Source: Otse cluster-home deaths, 2023

Recent mortality data from the Otse Cluster further underline the urgency of addressing EMS accessibility challenges. Between 2021 and 2023, home deaths in the Otse Cluster showed a concerning upward trend as illustrated in Table 1 above. In 2021, there were 20 recorded home deaths, corresponding to a mortality rate of 2.8 per 1,000 people. Although there was a slight decrease in 2022, with 16 deaths (2.2 per 1,000 people), the number sharply increased to 27 deaths in 2023, resulting in a mortality rate of 3.7 per 1,000 people (Otse Cluster-Home Deaths, 2023). Overall, the three-year average mortality rate is 2.9 per 1,000 people per year. These statistics suggest that despite a temporary decline in 2022, the overall trend reflects a rising burden of home deaths, which may point to underlying difficulties in timely access to emergency medical care. In the context of LMICs, where effective EMS systems can significantly reduce preventable mortality (Muchatuta et al., 2022), this increase in home deaths is particularly alarming and warrants further investigation.

The challenges associated with accessing EMS in rural settings have far-reaching consequences, not only for individual health outcomes but also for the broader healthcare system. As highlighted by (Pennel et al., 2016) and (Willie, 2023), delays in receiving emergency care are associated with increased morbidity and mortality among rural residents. Furthermore, individuals who rely on EMS for routine management of chronic diseases or disabilities may experience a diminished quality of life when emergency services are inadequate or inaccessible. Limited EMS access strains rural healthcare systems, as clinics and hospitals must absorb the impacts of delayed and substandard care (Fleet et al., 2020), thereby exacerbating systemic inefficiencies and negatively affecting healthcare providers.

Given the increasing mortality rates and the systemic vulnerabilities associated with EMS access challenges in the Otse Cluster, there is a clear and pressing need to investigate these issues comprehensively. The lack of localised data and research hinders efforts to identify gaps and implement targeted solutions. Therefore, this study aims to explore and assess the perceptions of rural residents in the Otse Cluster, Mahalapye District, regarding the challenges they face in accessing emergency medical services, to inform strategies that can enhance emergency care access and ultimately improve health outcomes.

1.3 Justification

Access to timely and effective Emergency Medical Services (EMS) is fundamental to reducing mortality, mitigating the severity of injuries and illnesses, and improving overall healthcare outcomes. However, rural communities, particularly in low- and middle-income countries (LMICs) such as Botswana, continue to face substantial barriers to accessing emergency care. Despite the government's efforts to strengthen EMS delivery across the country, recent evidence from the Otse Cluster in the Mahalapye District highlights rising home mortality rates, suggesting persistent gaps in emergency care accessibility. Given that a strong emergency care system can prevent a significant proportion of deaths and disability-adjusted life years (Muchatuta et al., 2022), understanding the specific challenges faced by rural residents is critical to informing effective policy and practice interventions.

Currently, there is limited localized research focusing on the accessibility of EMS in Botswana’s rural settings, particularly in the Otse Cluster. Without an evidence-based understanding of the challenges to EMS access, it becomes difficult to design targeted solutions that address the unique geographic, infrastructural, socioeconomic, and systemic challenges faced by rural populations. Furthermore, rural healthcare systems, already strained by resource

limitations, are disproportionately affected by inefficiencies in emergency service delivery, which in turn exacerbate healthcare disparities between rural and urban areas (Fleet et al., 2020; Pennel et al., 2016).

By investigating the perceptions of rural residents regarding the challenges to EMS accessibility, this study contributes valuable insights into an underexplored area of public health in Botswana. The findings have the potential to inform national healthcare strategies aimed at improving rural EMS coverage, optimizing resource distribution, enhancing health education, and strengthening the resilience of rural health systems. Additionally, this research can support advocacy efforts for increased investment in rural emergency care infrastructure and the development of community-based interventions, thereby promoting health equity and improving the quality of life for rural populations. Ultimately, this study is justified by the urgent need to address rising rural mortality rates and by the broader goal of ensuring that all citizens, regardless of their geographic location, have equitable access to lifesaving emergency medical services.

1.4 Purpose of the study

The study aims to explore the challenges to the accessibility of EMS among residents in the Otse cluster to provide a reference for improving the accessibility of EMS in rural areas.

1.5 Research objectives

1.5.1 General objective

To explore the challenges to the accessibility of EMS among rural residents in the Otse cluster, Mahalapye district, Botswana.

1.5.2 Specific objectives

1. To describe the EMS availability in the rural Otse cluster in Mahalapye district, Botswana.
2. To examine the key challenges to timely utilisation of EMS among the rural residents of the Otse cluster in Mahalapye district, Botswana.
3. To identify innovative strategies to improve EMS accessibility in rural Otse cluster, Mahalapye district, Botswana.

1.6 Research questions

What are the challenges to accessibility of EMS among rural residents in the Otse cluster, Mahalapye district, Botswana?

1.7 Definitions of Terms

Table 2: Conceptual and operational definition of terms

	Term	Conceptual definitions	Operational definitions
1	Emergency medical services	EMS are public services that often provide the first line of response to urgent health care needs within a community (McCarthy et al., 2020)	EMS refers to a system that provides emergency medical care outside of a healthcare facility in the Otse cluster.
2	Accessibility	Accessibility refers to the degree to which individuals can obtain and utilize services, facilities, or information without encountering barriers related to physical, cognitive, economic, or social factors (Ouma et al., 2021).	In the study accessibility encompasses the ease with which residents in the Otse cluster can access medical services, treatments, and information to meet their healthcare needs
3	Challenges	Challenges refer to obstacles, difficulties, or issues that impede the effective delivery of services, achievement of goals, or successful outcomes in a particular context.	In the study challenges refer to obstacles, difficulties, or issues that impede the effective delivery of services, achievement of goals, or successful outcomes in a particular context.

4	Rural residents	Rural residents are people living in rural areas as defined by national statistical offices (World Bank,2018)	Rural residents in the study are individuals who reside in sparsely populated areas located outside urban centres. These include people who resides in the Otse cluster.
5	Rural areas	Rural areas are defined as all settlements with a population of less than 2000 (Central Statistics Botswana, 2001) A rural area is an area of land outside the densely populated urban areas in a town or city (Jovanović Todorović and Puškarić, 2020).	In the study rural areas refers to a geographical area located outside towns and cities?

1.8 Conclusion

Emergency medical services (EMS) are crucial for global health systems, especially in rural areas. This study aims to assess the challenges faced by rural residents in Botswana's Otse cluster, Mahalapye District, regarding the accessibility of emergency medical services. Prompt access to EMS is essential to prevent complications from accidents, injuries, or acute illnesses (Zou et al., 2023). However, rural residents often encounter challenges to prompt treatment, such as longer travel times, challenging terrain and expansive geographical landscapes. The study intends to answer the following questions; What are the challenges to accessibility of EMS among rural residents in the Otse cluster, and the innovative strategies that should be implemented to improve? EMS accessibility in rural areas. The findings could guide decision-makers regarding possible improvements to emergency response systems and accessibility. Improving access may ultimately benefit the general welfare in some of the more remote regions of Botswana.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter provides a critical review of existing literature relevant to the challenges of accessing Emergency Medical Services (EMS) in rural communities, with a particular focus on the Otse Cluster in the Mahalapye District, Botswana. The review aims to establish a contextual understanding of EMS accessibility barriers by examining previous research conducted at the international, regional, and national levels. The chapter draws on quantitative and qualitative studies published between 2018 and 2024 with a few citations spanning up to 2015 used in multiple references, sourced from databases such as PubMed, Medline, Wiley Online Library, Google Scholar, and Research4Life. The search terms used included "rural health delivery," "medical emergency accessibility," and "healthcare inequities," with an emphasis on studies relevant to Botswana or similar low- and middle-income country (LMIC) contexts. While direct research on EMS accessibility in the Otse Cluster is limited, related studies offer valuable insights into the structural, demographic, and systemic factors influencing access. This review is structured around the study's research questions and focuses on the following thematic areas: the socio-demographic characteristics of EMS users, the availability of EMS in rural settings, accessibility challenges, and innovative strategies to improve rural EMS delivery.

2.1 Socio-demographic characteristics of rural residents accessing EMS

Socio-demographic characteristics such as age, gender, income, and education significantly influence EMS utilization in rural settings. Numerous studies have established that EMS users in rural areas are often older, have lower educational attainment, and occupy lower socioeconomic strata (Jesús-Azabal et al., 2020). These characteristics create vulnerabilities that directly affect their ability to access emergency care services in a timely and effective manner.

Age, in particular, is a major determinant of EMS use. Older adults, especially those aged 65 and above, have been found to utilize EMS more frequently than younger individuals, largely due to their increased risk of chronic illness, falls, and acute medical emergencies. In the Botswana context, (Terashima and Carter, 2018) reported that 35% of EMS transports for older

adults were for lower-urgency cases, underscoring both their heavy reliance on EMS and the need for age-appropriate EMS triage and intervention strategies. This aligns with international findings from the United States and Saudi Arabia, where older patients are more dependent on EMS services, while younger patients often rely on non-EMS methods (Rudnicka et al., 2020; Zuurmond et al., 2019). These trends point to the need for tailored EMS delivery models that account for the ageing rural population.

While gender differences in EMS use are generally minimal, nuanced findings suggest that women in some rural contexts may be more likely to access EMS services than men, particularly due to their roles as caregivers (Søvsø et al., 2020; Turner et al., 2016; Vallejo et al., 2023). In contrast, studies in other settings, such as Saudi Arabia, have shown higher EMS utilization among men (Moafa et al., 2020). Evidence from Malawi and South Africa supports the view that cultural and economic contexts influence health-seeking behaviour, with women often being more proactive in seeking emergency care (Hodkinson et al., 2020; Vallejo et al., 2023). These disparities indicate that EMS accessibility strategies must be sensitive to local gender dynamics and societal roles.

Income and financial insecurity are also critical determinants. Rural populations typically earn less than their urban counterparts, and this financial disparity has been shown to directly impact access to EMS. High transportation costs, combined with a lack of health insurance or savings, often prevent rural residents from seeking care until it is too late (Coombs et al., 2022; Solomon et al., 2021). Research across LMICs has demonstrated that individuals with limited financial resources are more likely to delay or avoid seeking emergency services altogether, leading to preventable morbidity and mortality (Sultan et al., 2019). Consequently, there is a need for government policies that subsidize EMS costs or expand financial protection for rural populations.

Educational attainment further compounds these accessibility challenges. Individuals with lower education levels generally have poorer health literacy and a limited understanding of when and how to seek emergency care (Søvsø et al., 2020). A study from China found that 23.3% of individuals with education below junior high school could not access EMS in time, compared to just 7.6% among those with doctoral-level education (Takele et al., 2021). In rural Botswana and other LMICs, similar trends have been observed, where low education levels correlate with limited knowledge about EMS and reduced willingness to engage with formal

healthcare systems (Ookeditse et al., 2022). These findings reinforce the importance of targeted community health education programs to improve awareness and timely EMS utilization.

2.2 Availability of EMS in rural communities

Availability of EMS services is another critical determinant of healthcare equity in rural areas. Although EMS systems are designed to deliver urgent care, their effectiveness is often undermined in rural settings by systemic resource limitations, inadequate infrastructure, and uneven service distribution. These limitations not only delay care but also compromise health outcomes, especially during life-threatening emergencies.

One of the most significant constraints is the shortage of EMS personnel and emergency vehicles. Studies have repeatedly shown that rural healthcare systems operate with fewer ambulances, lower numbers of trained paramedics and EMTs, and insufficient medical equipment (Alanazy et al., 2021; Hodkinson et al., 2020; Wolfe et al., 2020). The lack of adequately resourced EMS teams means that rural patients often face long wait times before help arrives, increasing the likelihood of complications or death. These gaps are exacerbated by high staff turnover and difficulty in attracting and retaining professionals in remote areas (Maganty et al., 2023; Nkomazana, 2022).

Geographical barriers further limit EMS availability. Rural regions are characterised by large land areas with low population density, often connected by poorly maintained roads. These logistical challenges make timely ambulance dispatch difficult and may render some areas effectively unreachable during adverse weather conditions (Kvirkvelia et al., 2023). As a result, EMS providers may face long travel times both to and from the scene, reducing overall system efficiency and patient survival rates.

In addition to structural and logistical barriers, social and cultural factors also hinder EMS utilisation. In many rural communities, limited awareness of EMS services, language barriers, and traditional beliefs contribute to delays in seeking emergency care. Some individuals may prefer to rely on local healers or home remedies, especially in areas where EMS is under-resourced or poorly understood (Pennel et al., 2016). These cultural norms, combined with low trust in the formal health system, result in significant underutilisation of available services.

Moreover, inadequate government funding and weak policy frameworks contribute to the persistence of these challenges. Many rural EMS systems are underfunded, lacking the resources required to upgrade equipment, expand coverage, or improve service quality. Policy

gaps, including the absence of standardised rural EMS protocols and insufficient integration with broader health systems, further weaken emergency response capabilities (Peden et al., 2016). Without deliberate investment and policy reform, rural EMS services will continue to lag behind their urban counterparts.

To address these disparities, scholars have emphasised the need for integrated solutions that combine infrastructure investment, workforce development, and policy innovation. Improving the availability of EMS in rural communities requires not only additional resources but also strategic planning to ensure those resources are equitably distributed and effectively utilised (Alanazy et al., 2021; Hodkinson et al., 2020). Interventions must be locally tailored, culturally sensitive, and responsive to the unique needs of rural populations.

2.3 Challenges of EMS accessibility in rural communities

Access to Emergency Medical Services (EMS) in rural settings is impeded by a complex interplay of factors ranging from geographical barriers and socio-economic limitations to weak healthcare infrastructure. These challenges compromise the quality and timeliness of care, especially in time-sensitive conditions such as trauma, stroke, and obstetric emergencies. A growing body of literature underscores that rural residents experience disproportionate barriers to EMS compared to their urban counterparts (Broccoli et al., 2015; Sultan et al., 2019). Despite growing awareness of the importance of timely emergency care, systemic limitations in rural EMS delivery remain prevalent and inadequately addressed.

Rural areas are often characterized by vast geographical coverage, low population density, and underdeveloped infrastructure, all of which extend EMS response times. The distance to the nearest medical facility can be significant, particularly in countries with limited road networks and uneven healthcare facility distribution (Coombs et al., 2022; Reid, 2019). Delayed emergency response times are particularly detrimental in life-threatening conditions such as myocardial infarction and stroke, where early intervention is essential to improving outcomes (Moafa et al., 2020). Furthermore, the lack of a structured prehospital care system, inadequate resources, and a shortage of trained EMS personnel contribute to delayed or inadequate care delivery (Chinyakata et al., 2021). This underlines the necessity for strengthening both the EMS infrastructure and its supporting policy frameworks to ensure equitable emergency care in rural regions.

2.3.1 Geographical challenges to accessibility of EMS

Geographic isolation is one of the most persistent and widely cited barriers to EMS accessibility in rural areas. Travel time, poor road conditions, long distances to health facilities, and limited transportation options are recurrent challenges documented across diverse settings (Alanazy et al., 2022; Alruwaili and Alanazy, 2022; Zou et al., 2023). Research in rural Saudi Arabia found average ambulance response times exceeding 40 minutes, far beyond the recommended 8 to 9 minutes, largely due to long distances and dispersed populations (Alanazy et al., 2021). Similarly, in Malawi, the average journey to a health centre takes one hour, while trips to central hospitals take over 2.5 hours, which can be fatal in emergency contexts (Varela et al., 2019).

Infrastructural inadequacies exacerbate these delays. According to WHO (1999), only 37% of rural roads in Africa are usable year-round, compared to 82% in urban areas. During rainy seasons, many rural routes become impassable, reducing access to EMS to zero in some instances. Up to 80% of patients in low-income countries who live more than 20 kilometres from a healthcare facility must walk or be carried to receive care (Muchatuta et al., 2022). Additionally, geographic features such as mountainous terrain and river crossings further limit ambulance access and response times in countries like China, Malawi, and Botswana (Zou et al., 2023; Varela et al., 2019; WHO, 2019).

Geographic isolation also contributes to the emergence of "ambulance deserts," where entire communities receive no consistent or timely EMS coverage (Alayande et al., 2022; Li et al., 2022). In such areas, patients often resort to traditional healers or delay care until conditions become critical, which increases the likelihood of poor outcomes (Hosaka et al., 2023; Mangundu et al., 2020). These findings indicate that EMS delivery must account for terrain, road conditions, and seasonal accessibility to effectively serve rural populations. Targeted investment in rural transport infrastructure and location-sensitive EMS deployment strategies are therefore essential.

2.3.2 Socio-economic factors

Socio-economic inequalities also play a central role in limiting access to EMS in rural communities. Lower income levels, poor health literacy, and educational disparities directly affect the ability of individuals to seek timely emergency care (Coombs et al., 2022; Reid, 2019). Financial barriers, including transport costs and treatment expenses, can deter care-

seeking behaviour, especially in contexts where EMS is perceived as expensive or inaccessible. Cultural norms and mistrust in formal medical services may further contribute to delayed utilization (Sultan et al., 2019).

In many LMICs, reliance on informal transportation methods such as Bajaj tricycles or taxis during emergencies is widespread due to the limited availability of ambulances. This phenomenon, observed in Ethiopia, Ghana, and Zimbabwe, highlights both a lack of public awareness about EMS and gaps in system coverage (Mangundu et al., 2020; Mould-Millman et al., 2015; Takele et al., 2021). In Botswana, a study by (Ookeditse et al., 2022) found that although knowledge of EMS was relatively high in urban settings like Gaborone, significant awareness gaps persisted among specific subgroups. The study also cautioned against generalizing urban findings to rural settings, where service availability and awareness are presumed to be lower.

Compounding these issues is the underfunding of public health systems in rural areas. For example, (Mangundu et al., 2020) note that the failure of the Zimbabwean government to allocate the required 15% of the national budget to health further limits rural EMS availability. In sum, without comprehensive public education campaigns and economic interventions, low EMS utilization in rural settings is likely to persist, exacerbating health inequities and avoidable morbidity.

2.3.3 Limited Healthcare Infrastructure

A lack of infrastructure and skilled personnel in rural health systems significantly constrains the delivery of emergency care. Most rural facilities suffer from chronic shortages of ambulances, essential medical supplies, and trained EMS responders (Chinyakata et al., 2021; Coombs et al., 2022). Delays in treatment are common, as rural clinics are often staffed by general nurses who may lack the expertise or resources to manage emergencies effectively. Studies from South Africa have reported that staff shortages contribute to service disruptions and reduced quality of care, especially in rural and underserved areas (Mamalelala et al., 2023; Willie, 2023).

Additionally, communication infrastructure is often unreliable in rural areas. Limited internet access and poor mobile network coverage impede the timely coordination of emergency responses and hinder public awareness about EMS availability (Alanazy et al., 2022; Coombs

et al., 2022). The inability to call for help or receive timely guidance during an emergency has serious implications, particularly for patients in remote or isolated communities.

The consequences of limited infrastructure extend beyond delayed treatment. They contribute to elevated morbidity and mortality, especially in emergencies where time to treatment is critical such as cardiac arrests, strokes, trauma, and obstetric complications (Jeon et al., 2020; Lee et al., 2018; Moafa et al., 2020). Moreover, communities aware of these limitations may avoid seeking EMS altogether, leading to late hospital presentations and more complicated, costly treatment pathways (Mahama et al., 2018). This further burden both patients and the healthcare system.

Limited EMS access also affects psychological well-being. The awareness that one may not receive emergency care when needed creates anxiety, distrust, and fear within rural communities (Houghton et al., 2023; Søvsø et al., 2020). Studies show that underserved rural populations who often experience higher burdens of chronic illness are more likely to suffer adverse outcomes due to delays in care and insufficient preventive services (Baljepally and Metheny, 2022; May et al., 2023). Jung and Qin (2024) emphasize that EMS delays correlate with increased morbidity and mortality, particularly in remote areas where alternative care is unavailable.

2.4 Strategies to improve EMS accessibility in rural areas

Addressing the persistent challenges in EMS accessibility within rural communities requires targeted, innovative, and context-specific strategies. Numerous studies emphasize that improving access to EMS is not only essential for enhancing health outcomes but also fundamental to promoting health equity across underserved populations. Rural settings characterized by dispersed populations, weak infrastructure, and limited human and material resources necessitate interventions that are both scalable and sustainable(Alanazy et al., 2021; WHO, 2021).

Technological integration is increasingly recognized as a key enabler of more responsive and efficient EMS systems. For instance, the application of GPS and real-time tracking technologies has been shown to significantly reduce response times by streamlining dispatch coordination and route optimization, even in difficult terrains (Ahmed, 2024; Luo et al., 2022). These tools not only enhance operational efficiency but also ensure that emergency responses are better aligned with actual demand patterns. Furthermore, telehealth services offer a cost-

effective solution for bridging service gaps, especially in remote areas where physical access to healthcare facilities is limited. As evidenced by Canadian studies, telemedicine reduces the need for physical transport while enabling timely triage and consultation, thereby improving continuity of care and reducing emergency-related mortality (Chen and Lai, 2022).

Spatial planning algorithms are also gaining traction as effective tools for optimizing EMS station placement. Multi-objective models, which consider both geographical coverage and road accessibility, have been used to identify strategic locations for EMS facilities, thereby maximizing service reach and minimizing delays (Ahmadi et al., 2024; Guarino et al., 2022). However, the successful implementation of such approaches requires concurrent investment in rural transport infrastructure, including road rehabilitation and expansion. Without this foundation, even the most advanced logistical models may fall short of delivering meaningful improvements in access.

Beyond technological advancements, alternative modes of transport have proven vital in overcoming rural mobility challenges. Studies from Sub-Saharan Africa and Southeast Asia demonstrate the effectiveness of bicycle and motorcycle ambulances in reducing EMS response times, especially in areas with narrow or unpaved roads (Apiratwarakul et al., 2021; Silva and Poggioli, 2015). These transport models have been particularly beneficial in managing maternal health emergencies and accessing mountainous or flood-prone regions where conventional ambulances are impractical. Although such solutions may not offer advanced life support, their speed and reliability can significantly improve early response and referral, which are critical for survival.

In addition to infrastructure and mobility solutions, improving EMS accessibility requires institutional reforms and performance benchmarks. As Horak and Sanborn (2022) suggest, the establishment of EMS performance standards tailored to rural contexts could guide system improvement and accountability. These standards may include minimum staffing levels, equipment requirements, and acceptable response times, adjusted for regional realities. Furthermore, community engagement must be at the heart of EMS reform. Incorporating local stakeholders in planning and monitoring not only builds trust but also ensures that interventions are culturally appropriate and demand-driven.

Overall, the enhancement of EMS in rural areas must combine immediate, low-cost solutions such as community first responder programs and alternative transport with long-term systemic investments in infrastructure, digital health, and workforce development. A comprehensive,

multisectoral approach is imperative for ensuring that rural residents receive timely, equitable, and high-quality emergency medical care.

2.5 Conclusion

The literature strongly affirms that access to Emergency Medical Services in rural settings is hindered by a complex matrix of socio-demographic, geographic, and systemic barriers. Age, income level, and educational attainment shape health-seeking behaviour and influence the likelihood of accessing EMS. At the same time, geographic isolation, including long distances to facilities and inadequate transportation networks, further compounds delay in care, particularly in time-sensitive emergencies. The structural deficiencies of rural healthcare systems ranging from shortages in trained personnel to limited communication infrastructure exacerbate these vulnerabilities, contributing to higher rates of morbidity and mortality among rural populations.

Efforts to overcome these challenges must be rooted in both innovative and evidence-based strategies. Technological tools such as telemedicine, GPS-enabled dispatch, and spatial optimization of EMS stations offer scalable solutions, while the deployment of alternative transport modes like bicycle and motorcycle ambulances provides practical, low-cost interventions for hard-to-reach areas. Policy reforms that establish rural EMS performance benchmarks and community involvement in healthcare planning are equally essential. Ultimately, bridging the EMS access gap between rural and urban communities will require sustained investments in infrastructure, capacity building, and policy alignment (Chinyakata et al., 2021). By addressing these challenges holistically, health systems can significantly enhance the responsiveness, equity, and effectiveness of emergency medical care, thereby safeguarding lives and promoting health justice for rural populations.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter provides a thorough explanation of the research strategies and designs that were employed in the study to meet its goal. The research design, study setting, target population, sample and sampling technique, data collection procedure, reliability, data analysis and presentation strategy, ethical considerations, and results and findings distribution plan make up the research techniques. The purpose of this study is to explore the perception of rural residents about the challenges to the accessibility of EMS.

3.1 Study design

The study employed a qualitative descriptive research design to explore the challenges of accessing EMS among rural residents in the Otse cluster, Mahalapye District, Botswana. This design was selected for its strength in providing clear, practical descriptions of phenomena, making it particularly suitable for health research where actionable insights are needed (Doyle et al., 2020). Given the limited prior research in this area, the design provided a strong foundation for generating relevant, evidence-based recommendations to improve EMS accessibility in similar rural settings.

3.2 Study setting

The study was conducted in the communities of Dibete, Poloka, Mokgenene, Otse and Kodibeleng, which make up the Otse cluster in Mahalapye district, Botswana. The Otse cluster represents remote villages spanning the Mahalapye district, with basic infrastructure and high rates of poverty (Population & Housing Census 2022, 2023). With a population predominantly engaged in subsistence farming and herding, these communities are often cut off from essential resources due to geographical isolation and limited infrastructure. The total population for the cluster is approximately 7254 people (Population & Housing Census 2022, 2023). Each village has a clinic to serve its community and surrounding settlements, and they are served by two ambulances, one stationed at Dibete and another stationed at Otse. In case of emergencies, ambulances that are well equipped are sourced from Mahalapye District Hospital, and all these villages refer their patients to Mahalapye District Hospital located in Mahalapye for further

management and continuity of care. These villages are located over 20-35 km apart, and the mode of transportation used by the residents is mostly by foot and donkey carts. Dibete village is located along A1 Road (the main big road in the country that connects the southern and northern parts of the country), approximately 83 kilometres from Mahalapye, with a total population of 1403. Poloka is another village in the cluster and is located 27 kilometres from Dibete and 77 kilometres from Mahalapye, with a total population of 902 (Population & Housing Census 2022, 2023). Mokgenene village has a total population of 1000 and is located 54 kilometres from Dibete and 27 kilometres west of Poloka. Otse is the largest village in the cluster, with a population of 2360. It is located approximately 100 kilometres west of Mahalapye and 87 kilometres from Dibete. Kodibeleng is also one of the villages in the cluster, comprising approximately 1589 total inhabitants and located 41 kilometres from Otse along Lephephe-Serowe road.

The distance and area coverage of these villages vary, with each contributing to the overall rural healthcare landscape. Most of these villages are connected by gravel road which is approximately 87 kilometres, from Dibete, through Poloka and Mokgenene to Otse village. Studies have shown that rural residents often experience disparities in EMS transport times and patient outcomes compared to urban areas. These rural areas face challenges in accessing EMS due to their remote location, limited infrastructure, high rate of poverty and potentially longer travel distance to healthcare facilities making it an ideal site to study challenges of EMS accessibility among rural residents.

3.3 Study population

The study population comprises the following:

a. All rural residents who accessed EMS services in Otse cluster in Mahalapye District Botswana.

b. All health workers involved in EMS delivery in the Otse cluster in Mahalapye District, Botswana were included as key informant (KI).

3.3.1 Target population

The target population were:

a. All rural residents who accessed EMS in the Otse cluster, Mahalapye district, Botswana

b. All health workers providing EMS in health facilities within Otse Cluster, Mahalapye District, Botswana.

3.3.2 Accessible population

The accessible population were:

a. All rural residents who accessed EMS and were reachable during data collection in the Otse Cluster, Mahalapye District, Botswana.

b. All health workers available during data collection in clinics within the study period

3.4 sampling technique

A purposive sampling technique was employed in this study to deliberately select participants who possessed specific characteristics relevant to the research objective namely, exploring challenges to Emergency Medical Services (EMS) accessibility in rural Botswana. Community participants were selected based on criteria such as being 18 years or older, residing permanently within the Otse cluster, and having previous experience with EMS either directly (as patients) or indirectly (as caregivers or bystanders). Key informants were chosen for their professional roles within rural health facilities, including clinic nurses, all of whom had practical insights into EMS operations and barriers. This approach ensured the inclusion of information rich cases capable of offering detailed, context-specific insights to enhance understanding of EMS access in underserved rural settings.

3.5 Sampling size determination

The adequacy of the sample size was determined by data saturation. Data saturation was reached after conducting 10 FGDs with community members and 5 KIIs with healthcare professionals. The FGDs comprised a total of 89 participants, with each group including between 6 and 10 individuals. The composition of each FGD was carefully structured to ensure heterogeneity and capture diverse perspectives across the five villages within the Otse cluster. Participants were purposively selected to include adult men and women aged 18 years and above, with variations in age, gender, and experiences with EMS. For the KIIs, participants were selected based on their professional expertise and direct involvement in the provision or coordination of EMS. The sample size was consistent with prior qualitative studies in similar contexts, which demonstrate that saturation is typically achieved with 4–6 FGDs in smaller

studies, and 10–15 in community-based research settings (Abiiro et al., 2014; Broccoli et al., 2015). This methodological decision enabled the collection of comprehensive, credible and contextually relevant data.

3.6 Inclusion and exclusion criteria

3.6.1 Inclusion criteria

Being 18 years of age or older, being a permanent resident of a village within Otse cluster and having had either direct or indirect interaction with EMS (such as calling for an ambulance, accompanying a patient, or being referred by local health facilities). This ensured that participants could meaningfully contribute to discussions about EMS accessibility challenges from a community perspective. Clinic nurses who were knowledgeable about logistics, resources and administrative operations of EMS in rural settings

3.6.2 Exclusion criteria

All residents in the cluster who were mentally challenged and those with severe health conditions. Nurse in charges who were not available during data collection due to sick leaves and having less than 6 months working in the community.

3.7 Data collection tools and techniques

3.7.1 Data collection tool

The FGD interview schedule was created by the researcher based on the research question. The FGD interview schedule was adjusted to conduct the semi-structured interview with health workers (key informants). The FGD schedule serves as a road map and memory aid for the facilitator (Cortini et al., 2019). The FGD schedule contained one core question about the challenges of EMS accessibility among rural residents in the Otse cluster. The core question was developed by the researcher, and its formulation was guided by the forces of the study. Depending on the participants response, the participants were asked different follow-up questions to probe, clarify, and provide a more detailed explanation of certain information. The follow-up questions were developed by the researcher during interview sessions based on individual explanations as well as research objectives to allow for the study objectives to be met. Some of the follow-up questions include:

a. What are the consequences of limited EMS access on health outcomes of rural residents?

b. What are the innovative strategies that should be implemented to improve EMS accessibility in rural areas?

All the questions were open-ended to get rich in-depth and contextually grounded data that can provide valuable insight into the phenomenon under investigation. This data collection tool encouraged participation, as participants felt more comfortable voicing their opinions after they have heard others speak freely. The interview schedule was translated into the local language,Setswana.

3.7.2 Data collection technique

Participants were recruited using purposive sampling, targeting residents in the villages of Dibete, Poloka, Mokgenene, Otse and Kodibeleng. Community leaders and local health workers helped with identify and recruit eligible participants. On the day of the data collection, participants were informed about the study's purpose, procedures and their rights. Those who agree to participate were scheduled for the FGD sessions and provided with an information sheet, and consent form. It was emphasized that the session is designed to gather insight and perception from participants and that their contribution is highly valued. The FGDs was conducted in the community centre of each village and comprised of 6-10 participants.

The discussion was facilitated by the researcher who was a trained moderator and an assistant moderator was present to take notes and assist with the process. The FGDs began with a warm welcome and introductions, the moderator start by greeting the participants and introducing the study. To make participants feel more comfortable, a friendly and inclusive atmosphere was established by engaging in casual conversation and introduction so that participants may be addressed by their names. Participant’s identity and responses were kept anonymous for confidentiality. Honest open dialogue was encouraged all the time by emphasizing that there are no right or wrong answers and that we are here to learn from their perspectives.

FGD using an unstructured interview schedule with one core question was to gather the qualitative data, as they are best for exploring beliefs, attitudes, and opinions (Hunter et al,2018). The moderator directed the discussion of the group by using the FGD schedule to ask a standard set of questions to the group. The FGD was in Setswana (local language) and the discussion ranged from 60-75 minutes. The data collection took 2 days in each village until

data saturation was reached. The moderator used the probing questions to elicit more detailed responses and encourage all participants to share their perspectives and experiences. Throughout the discussion, the assistant moderator was taking detailed notes, including observations of non-verbal cues and group dynamics.

All the discussions were audio recorded and backed up by field notes by a trained research assistant, with the consent of the participants, to ensure accurate capture of the discussion and facilitate subsequent data analysis (Creswell and Poth, 2018). The researcher also maintained a reflective journal to document their thoughts, observations and potential biases. This enhanced the transparency and credibility of the research by providing an audit trail and enabling the researcher to critically examine their role and influence on the research process (Creswell and Creswell, 2017). Field debriefing was held on the same day after the meetings to check for consistency and completeness of recordings, as well as any unique and emerging issues the research team encountered. At the end of the FGD/ interview, the facilitator thanked the participants for their time and valuable contributions. The participants were informed about the next steps of the study and how they can access the findings. The audio recordings and notes were securely stored in a computer which was accessible to the researcher by password and notes were kept in a cupboard under lock and key. Through this approach, the study gained in-depth insights into the challenges faced by rural residents in accessing EMS services in the Otse cluster, Mahalapye district.

Semi-structured interviews with key informants who have in-depth knowledge on EMS accessibility issues in the Otse cluster was also conducted using adjusted FGD interview schedule. All interviews with key informants were in English, conducted by the main researcher and last between 30-45 minutes. The interview was conducted in a village conference room, and recorded with consent from the participants to capture detailed responses. Notes were also be taken during the interview to document any nonverbal cues or contextual information that was relevant to the analysis. By using a combination of FGDs and semi-structured interviews, the researcher collected rich, contextual data to deeply explore the challenges to EMS accessibility from the perspectives of both community members and key-stakeholders (health workers).

To keep participants informed of the progress and outcomes of the research, participants were briefed about the study's timeline, purpose, objectives, procedure, and potential risks during the initial consent process. Regular updates were provided through messages and phone calls.

A summary of preliminary findings was shared once data analysis begun, and participants were encouraged to questions or provide feedback. The participants were also briefed that upon the study's completion, a comprehensive report of the outcomes will be distributed to all participants in easily understandable language, in person. This ensures transparency and maintain participants engaged throughout the research process (Hunn, 2020).

3.8 Trustworthiness

Trustworthiness is the level of confidence that qualitative researchers have in their data, using the strategies of credibility, dependability, confirmability, and transferability (Ahmed, 2024; Forero et al., 2018)

To ensure credibility, the study employed triangulation by using data sources from the interview and FGDs. Triangulation allowed cross verification of data, providing a more comprehensive understanding of the perception and experiences of rural communities on EMS access challenges. Additionally, prolonged engagement with Otse cluster community over extended period helped build rapport with participants and gain deeper understanding of their experiences, further enhancing credibility (Stahl and King, 2020).

Transferability was ensured through a thick description of the Otse cluster context to enable readers to assess the relevance and application of the findings to similar context (Stahl and King, 2020). Participant's demographics, backgrounds and contexts extensively allowed readers to judge the similarity between own contexts and that of the study.

Dependability pertains to the consistency of the findings when applied to similar context, settings, and participants groups, yielding comparable results (Ahmed, 2024). To ensure dependability, the researcher meticulously documented the entire research process, encompassing the study design, data collection technique and tools, and data analysis methods. This detailed documentation was reviewed and validated by the supervisor and co-supervisor, with necessary adjustments made. This thorough verification ensured that the research methodology is robust and acceptable.

To ensure confirmability, the researcher engaged in reflexive practices, such as keeping a reflexive journal to critically reflect on personal biases, assumptions, and their potential influence on the research process. The detailed documentation of the research process and decisions made during the study provides an audit trail that can be reviewed by others to

confirm the findings. These practices help ensure that the study's results are based on the data rather than the researcher's preconceptions (Forero et al., 2018).

3.9 Data management, processing and storage

The interviews with participants were recorded using an audio tape, which facilitated the collection of proper data to maintain the authenticity of participants responses. The FGD and interview audio records were transcribed verbatim by the researcher, and the transcripts were checked to ensure that they are complete and accurate. The transcriptions were conducted manually five to eight hours after each interview to capture all details accurately before importing into ATLAS.ti for analysis. The ATLAS.ti software was used to facilitate the coding process which allowed the researcher to effectively organise and manage substantial volume of quantitative data. The software's robust coding and querying capabilities which enable the researcher to systematically identify patterns, explore connections between codes and themes, and maintain a thorough audit trail of the analytical process (Friese, 2012). The researcher ensured the safekeeping of all the research material on the computer, which was accessed by a password known only to the researcher, and transcripts were locked in a cabinet. The researcher was the only person with access to the data. This storage approach was chosen to protect the confidentiality of participants and comply with ethical standard, ensuring that only authorized personnel have access to the sensitive data.

3.10 Ethical considerations

The study adhered to ethical research standards by seeking permission to conduct the research, obtaining informed consent from all participants, ensuring confidentiality and anonymity. These measures were in place to ensure that the study is conducted ethically and responsibly, respecting the rights and welfare of all participants. Permission to conduct the research was obtained from the National Health Research Authority in Zambia (NHRA) with registration number NHRAAR-R-1477/06/04/2024, Ethical clearance was sought from the University of Zambia Biomedical Research Ethical Committee (UNZABREC) (Reference No:5680-2024), the Botswana Ministry of Health (MoH) Human Research and Development Committee (HRDC) (reference No: HPRD 6/14/1) and Mahalapye DHMT Research and Ethics Committee (Reference No: MH/DHMT/1/7/7(90)) before data collection begun.

Informed consent facilitates shared decision-making between the participants and the researcher. Therefore, participants were informed about the study's purpose, that an audio

recorder will document the interview and FGDs sessions, and that field notes will be taken. Additionally, each study participant received a study information letter. To ensure that participants understood the study's goal, they were given ample time to read the information letter. The researcher then obtained informed consent from participants before conducting any interviews and making fields notes.

Confidentiality was maintained through several measures. All participants identified were protected by assigning unique codes to their data, ensuring that their names and other identifying information are not linked to the study findings. Audio recordings and written notes were securely stored in locked cabinets and password protected digital files, accessible only to the researcher. During data analysis and reporting, any potentially identified details were removed or anonymized. Additionally, participants were reminded of their right to withdraw from the study at any time without consequences, further ensuring their comfort and privacy.

Beneficence was ensured by prioritizing the well-being and interests of the participants throughout the study. This involved conducting the research in a manner that minimizes any potential risks or discomfort such as conducting the interviews and FGDs in a quiet isolated room. The researcher created a supportive and no judgmental environment during data collection by establishing rapport, actively listening, and ensuring confidentiality to encourage honest and open communication. Participants were informed about the purpose and benefits of the study, emphasizing how their contributions can help improve EMS access in rural areas. The overall goal is to ensure that the study's outcomes provide valuable insight that can lead to positive changes in healthcare practices and policies.

3.11 Conclusion

This chapter provides the research methodology and research design adopted for the study. The study employed a qualitative phenomenological interpretive research design to explore the challenges to accessibility of EMS among rural residents in Mahalapye health district, Botswana. Ethical considerations adhered to during the research process are also described, as well as the research setting, data collection process, and data analysis.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.0 Introduction

This chapter presents the analysis and findings of the study that explored the challenges to the accessibility of Emergency Medical Services (EMS) among rural residents in the Otse Cluster, located in the Mahalapye District of Botswana. Data were gathered through ten focus group discussions (FGDs) with community members and five key informant interviews (KIIs) with healthcare professionals. The qualitative data were analysed thematically, resulting in the identification of three main themes: Infrastructure and Resource Constraints, Community Knowledge and Perceptions of EMS and innovative solutions to improve EMS accessibility in rural areas. These themes are supported by sub-themes and substantiated by verbatim quotations from participants to illustrate the key findings.

4.1 Data analysis

The qualitative data collected were examined using Braun and Clarke's (2006) six-phase thematic analysis approach. This analytical method involves a systematic, iterative process that ensures rigorous and credible interpretation of qualitative data. The steps undertaken were as follows:

1. **Familiarisation with the Data:** All audio-recorded interviews and discussions were transcribed verbatim. The researcher then read and re-read the transcripts multiple times to become immersed in the data and develop a holistic understanding of the content.
2. **Generating Initial Codes:** The researcher systematically identified and highlighted significant features of the data across the entire dataset. ATLAS. ti was used to facilitate the coding process.
3. **Searching for Themes:** Codes were reviewed and grouped based on conceptual similarities, forming broader themes that encapsulate important aspects of the data relevant to the research questions.
4. **Reviewing Themes:** Themes were reviewed and refined to ensure they accurately represented the data. This involved checking that themes were internally coherent and

distinct from each other and verifying their alignment with the coded extracts and the full dataset.

5. **Defining and Naming Themes:** Each theme was clearly defined and named to reflect its central idea. Detailed descriptions were developed to articulate the essence of each theme and how it related to the overall research objectives.

6. **Producing the Report:** A comprehensive narrative was developed, presenting the themes supported by direct quotations from participants. The themes were contextualised within the broader literature and research questions.

4.2 Socio-demographic characteristics of participants

This study involved a total of 94 participants, comprising 89 individuals who took part in 10 focus group discussions (FGDs) and 5 key informants (KIs) interviewed individually. The socio-demographic profiles of the participants were diverse and provided rich contextual insights into the challenges of accessing EMS in the Otse Cluster. The FGD participants included adult residents from the five villages within the Otse Cluster, Otse, Poloka, Kodibeleng, Dibete, and Mokgenene. The groups were composed of both males and females aged between 19 and 68 years, representing a cross-section of community members such as farmers, informal traders, pensioners, and unemployed individuals. The majority of participants were not working, they relied on the drought relief program (Ipelegeng) as a source of income.

The key informants were healthcare workers (nurses), stationed at health facilities within the Otse Cluster. The KII comprises o three female and two male nurses with more than five years of professional experience and held relevant roles in the coordination or delivery of emergency care services in the rural setting. All of them hold a diploma in general nursing and two had post-basic qualification in midwifery. Neither of them had post-basic qualifications in emergency care.

4.3 Presentation of findings

After analysis of the dataset, three main themes and 8 subthemes emerged for this study. Table 3 below presents a summary of the identified themes, subthemes, and associated codes and shows a structured overview of the rich descriptive qualitative data that emerged from the study.

Table 3: Themes, subthemes and codes

Theme	Sub-themes	Codes	
		KII	FGDs
Infrastructure and resource constraint	Shortage of staff	Lack of sufficient nursing staff One nurse coverage every day No pharmacists	Lack of sufficient nursing staff One nurse coverage every day No midwife Doctor visits once a month
	Shortage of medication and supplies	Shortage of oxygen, bandages, and syringes Insufficient medication	Shortage of oxygen, bandages, and syringes Insufficient medication
	Poor road and transport conditions	Limited number of ambulances Ambulances not well-equipped Long travel distances to health facilities Poor road condition	Long wait due to few ambulances Long travel distance to health facilities Lack of accessible public transport Shared ambulance between multiple clinics
	Poor communication and mobile network	Poor network coverage	Poor network coverage

Community awareness and education	Limited knowledge of available emergency services	Lack of knowledge of emergency conditions Lack of campaigns	Unaware of emergency number
	Health education and community engagement	Community outreach programmes Health campaigns	Health education on emergencies Community first responders
Innovative solutions to improve EMS accessibility	Creation of community-based EMS service to increase coverage and response time	Train community members and volunteers Nurse training in emergency care Regular in-service training to empower healthcare workers	Create community health groups Trained in first aid Conduct community health outreaches
	Upgrading of health facilities	To improve supply of medication, and supplies	Increase staffing. Each facility is to have its own ambulance Clinic to operate 24 hours

Theme 1: Infrastructure and resources constraints

The accessibility and functionality of EMS in the Otse Cluster are significantly undermined by widespread infrastructural and resource-related challenges. Rural health facilities often operate with minimal personnel, frequently depending on a single nurse to manage all patient care needs. This shortage is further exacerbated by the absence of specialized staff such as midwives and pharmacists, severely limiting emergency response capacity. In addition to human resource constraints, essential medical supplies are frequently unavailable, forcing patients to seek treatment elsewhere at a personal cost. The situation is compounded by inadequate transport options, poor road conditions, and weak mobile network coverage, which collectively contribute to delayed care and increased mortality risk.

Sub-theme 1: Shortage of staff

Many clinics within the Otse Cluster face chronic understaffing, with healthcare workers often managing emergency cases alone.

One key informant stated:

> *"We do not have enough nurses to cover all shifts. In some cases, only one nurse is on duty for an entire day." (KII, Mokgenene)*

Highlighting the severity of personnel shortage. Similarly, a participant noted;

> *"In our clinic, there is no midwife, and the doctor only visits once a month. This makes it very difficult for pregnant women to receive timely care."(FGD-1, Poloka)*

> *In our clinic, there is no midwife, so if you have a relative in labour you have to seek help from Shoshong, which is also costly as we have to hire transport." (FGD-5, Kodibeleng)*

Another key informant expressed frustration:

> *"There are no pharmacists, so nurses must handle medication distribution, which affects overall patient care." (KII. Dibete)*

> *“As you can see, um alone in the clinic, so it happened that yesterday in the afternoon I referred a patient to the hospital for further management, I came late at around 0340, and at 0730 I am expected to be productive on duty. This shortage of nurses is killing us” (KII-Kodibeleng)*

These observations demonstrate how limited staffing impairs timely EMS delivery, especially for vulnerable populations such as pregnant women and the elderly.

Sub-theme 2: Shortage of medication and supplies

Inadequate access to essential medical supplies was consistently reported as a critical limitation.

A healthcare worker explained:

> *"Sometimes, patients need oxygen, but we don't have any available at the clinic." (KII, Poloka)*

Revealing the direct impact of shortages on emergency care. Another informant from Otse echoed this concern, stating;

> *"We experience a shortage of equipment like nebulisers, glucometer, bandages and drugs which help during emergencies so we have to improvise a lot." (KII, Otse)*

The lack of life-saving resources compromises the ability of healthcare providers to stabilise patients in urgent situations.

> *"There have been cases where we run out of bandages, and nurses have to improvise." (FGD-3, Mokgenene)*

> *"There is no electricity in our clinic, we are using solar panels, so during rainy days when there is no enough sunshine, the clinic becomes dark, and the nurse will not be able to help you, especially at night." (FGD-1, Poloka)*

Another healthcare worker added:

> *"Without proper supplies, even basic emergency care becomes impossible. We do what we can, but the system is failing us." (KII-Dibete*

Sub-theme 3: Poor Road and Transportation

Limited transport options and poor road conditions significantly hinder access to EMS. Many villages share a single ambulance, leading to long wait times for emergency response. Participants also reported that poor road infrastructure made it difficult for ambulances to reach patients promptly. Poor roads and long travel distances in emergency medical response often

lead to worsening health outcomes, particularly during critical health emergencies such as obstetric complications or trauma. One healthcare worker explained:

> *"The ambulance we have is not well-equipped; it does not even have oxygen or proper stretchers for emergency cases." (KII, Otse)*

Highlighting not only delays but compromised care during transit. An FGD participant shared their experiences:

> *"When my neighbour had a medical emergency, we had to wait for the ambulance that was shared between several clinics. It took too long, and by the time it arrived, it was almost too late." (FGD-4 Mokgenene)*

These delays due to shared ambulances and impassable roads during rainy season present serious risk for patients requiring immediate care.

> *"Our roads are in a bad state; when it rains, ambulances struggle to reach our village, and we have to find alternative transport." (FGD-3, Mokgenene)*

> *“For some villages, the nearest ambulance station is over 40 kilometres away which makes it difficult to provide timely care.” (KI, Otse)*

Another participant shared:

> *"The long travel distance to health facilities, combined with poor transport options, makes it very difficult for people to seek timely medical help."(KII, Otse)*

Sub-theme 4: Poor communication and mobile network

Limited mobile network coverage emerged as a significant barrier to accessing EMS. Both healthcare workers and community members reported challenges in making emergency calls due to poor signal strength.

As a participant from Poloka described,

"Network coverage is poor, so even calling an ambulance is a challenge. You sometimes have to walk far just to get a signal." (FGD-2, Poloka, KII,)

This communication gap adds a critical delay in the EMS response chain, especially in remote villages.

Theme 2: Community knowledge and awareness

Community awareness and perceptions play a pivotal role in shaping how and when emergency services are utilized. In the Otse Cluster, the findings reveal a general lack of knowledge regarding emergency medical conditions and appropriate response procedures. This knowledge gap often results in delayed help-seeking behaviour and suboptimal use of available EMS resources. The following sub-themes illustrate specific dimensions of these community-level barriers.

Sub-theme 1: Lack of Knowledge of Emergency Conditions

Both key informants and focus group participants emphasized that many rural residents lack a clear understanding of what constitutes a medical emergency. As one of the key informants noted,

> *"Many people in the community do not understand what constitutes a medical emergency. They wait too long before seeking help, which often leads to severe complications or even fatalities." (KII-Dibete)*

Similarly, FGD participants expressed concerns that the lack of information led to delays in seeking emergency care. One participant remarked:

> *"We sometimes don't know if a situation is an emergency or not. We try home remedies first, and by the time we go to the hospital, it's too late." (FGD-10, Dibete)*

Additionally, the lack of knowledge regarding emergency contact numbers further limits timely EMS access. A participant from an FGD stated:

> *"I have never seen or been told about emergency numbers. If something happens, I just call a neighbour or try to find transport to the hospital."(FGD-6, Kodibeleng)*

Key informants emphasized the need for better dissemination of emergency contact information. One healthcare worker noted:

> *"Most people do not know the national emergency number. In many cases, they rely on personal contacts instead of calling emergency services." (KII, Poloka, Otse)*

Sub-theme 2: Health Education and Community Engagement

The study participants consistently expressed the need for regular community outreach and emergency education initiatives. One FGD participant stated.

> *"If at least every 3 months you conduct a community campaign through 'Botsogo Pitso' with us on emergencies we will gain information on emergency care." (FGD-7, Otse)*

One participant mentioned:

> *"I think it will be better if some of the community members are trained on first aid so that they can be able to help us in case of emergency." (FGD-2, Poloka)*

Supporting this view, a key informant stressed the importance of community-based training, noting,

> *"Training volunteers as first responders is essential. They can provide immediate assistance before professional help arrives, potentially saving lives." (KII, Poloka, Kodibeleng)*

These findings underscore the importance of strengthening health education to bridge gaps in emergency preparedness and improve outcomes.

Theme 3: Innovative solutions to improve EMS accessibility in rural communities

The theme 'Innovative solutions to improve EMS accessibility in rural communities' describes potential strategies to enhance EMS accessibility and response time in rural communities.

Sub-theme 1: Creation of community-based EMS services

Healthcare workers highlighted the importance of training community members and volunteers to serve as emergency responders. One key informant shared:

> *"Training local volunteers and nurses in emergency care can significantly improve response times in rural areas." (KII, Poloka)*

FGD participants suggested forming community health groups to support emergency responses.

> *"If we have a health group in each village, they can act fast before ambulances arrive." (FGD-2, Poloka)*

Sub-theme 2: Upgrading of Health Facilities

Both key informants and FGD participants emphasized the need to upgrade rural health facilities by increasing staffing and ensuring that each facility has its ambulance. A participant noted:

> *"Clinics should operate 24 hours with enough staff to handle emergencies anytime." (FGD, Otse-2, Kodibeng-1)*

Another suggested:

> *"Every facility needs an ambulance because waiting for one from a distant hospital causes delays." (FGD, Mokgenene1&2)*

> *Most key informants suggest that each facility should have at least 3 nurses allocated per clinic." (KII, Poloka, Kodibeleng, Mokgenene)*

4.2 Conclusion

This chapter has presented the analysis and findings of the study exploring the challenges to the accessibility of Emergency Medical Services (EMS) among rural residents in the Otse Cluster of the Mahalapye District, Botswana. Through thematic analysis of data collected from focus group discussions and key informant interviews, three overarching themes were identified: Infrastructure and Resource Constraints, Community Knowledge and Perceptions of EMS, and Innovative Solutions to Improve EMS Accessibility. The findings underscore significant systemic and structural barriers such as staff shortages, inadequate medical supplies, poor transportation infrastructure, and limited communication networks, all of which hinder timely and effective EMS delivery. Moreover, the study revealed low levels of community awareness regarding emergency conditions and the proper use of EMS, contributing to delays in care seeking. Despite these challenges, participants proposed practical and locally relevant solutions, including community-based EMS initiatives, first aid training for volunteers, and upgrading rural health facilities. These findings provide a foundation for informed policy recommendations and interventions aimed at enhancing EMS accessibility and ultimately improving health outcomes in rural Botswana.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter provides a comprehensive discussion of the key findings from the study, linking them with existing literature on healthcare access, resource limitations and community health education in rural and underserved areas. The finding reveals several critical challenges to effective healthcare delivery, including transport and staff shortages, inadequate infrastructure, and gaps in health knowledge. In this discussion, each theme will be discussed in detail, compared to other literature, and contextualised within the unique challenges. Additionally, this chapter will address the limitations, and assumptions of the study to ensure a comprehensive understanding of the findings.

5.1 Socio-demographic characteristics of participants

The socio-demographic profiles of participants in this study reveal important patterns influencing EMS accessibility in rural areas. The findings correspond with global evidence that rural EMS users typically have lower incomes, lower levels of education, and higher dependence on informal employment initiatives such as Botswana's 'Ipelegeng' program (Jesús-Azabal et al., 2020). Participants' reliance on 'Ipelegeng' suggests significant financial vulnerability, which has been shown to hinder timely access to emergency healthcare due to the inability to afford private transportation or medical services.

Age related patterns identified in the study align with research from the United States and Saudi Arabia, where older adults, due to their susceptibility to chronic illnesses and acute medical conditions, are more reliant on EMS than younger populations (Rudnicka et al., 2020; Zuurmond et al., 2019). This reinforces the need for age-sensitive EMS strategies targeting elderly populations in rural contexts.

Gender trends observed in the Otse Cluster mirror findings from studies in Denmark, Malawi, and South Africa, which report that women, often serving as primary caregivers, are more likely to seek emergency care (Hodkinson et al., 2020; Søvsø et al., 2020; Vallejo et al., 2023). Conversely, findings from Saudi Arabia showing greater male EMS usage (Moafa et al., 2020) highlight the cultural specificity of gendered healthcare-seeking behaviours.

Educational attainment emerged as a critical factor, with most participants having completed only secondary education. This finding is consistent with studies in China and Africa, which demonstrate that lower education levels are associated with delayed EMS utilization due to limited health literacy (Ookeditse et al., 2022; Takele et al., 2021). Collectively, these socio-demographic characteristics underscore the necessity of context-sensitive interventions that address the economic, educational, and cultural factors influencing rural EMS access

5.2 Infrastructure and resource constraints

Infrastructure and resource limitations were identified as primary barriers to EMS accessibility, consistent with findings from other rural and low-resource contexts (Alanazy et al., 2021; Burkholder et al., 2019). The study revealed severe understaffing at healthcare facilities, with many clinics operating with minimal personnel. This aligns with broader African and South African research, where single-staffed rural clinics are common and lead to service disruptions and poor emergency care delivery (Chinyakata et al., 2021; Willie, 2023).

The absence of doctors, midwives, and pharmacists in the Otse Cluster mirrors regional and international challenges associated with healthcare professional shortages in remote areas (Alanazy et al., 2021; Coombs et al., 2022). These shortages force nurses to assume multiple roles, reducing their capacity to respond effectively to emergencies and increasing the risk of burnout. Resource limitations were further compounded by frequent shortages of essential medical supplies, such as oxygen, syringes, and critical medications. Similar issues have been documented in rural healthcare systems globally, where stockouts significantly compromise the quality of emergency services (Burkholder et al., 2019).

Transportation challenges including ambulance shortages, shared ambulance services between villages, and poor road conditions exacerbated by seasonal weather were found to severely delay emergency responses. These barriers echo findings from rural Malawi, Saudi Arabia, and across Sub-Saharan Africa, where infrastructural weaknesses prolong response times and worsen patient outcomes (Alanazy et al., 2021; Varela et al., 2019; World Health Organization, 2019). Poor communication networks, a key finding of this study, further delay EMS activation, supporting previous studies that link inadequate telecommunications infrastructure to reduced emergency response efficiency (Coombs et al., 2022).

5.3 Community awareness and education

The study demonstrated that limited community awareness significantly impedes the timely utilization of EMS. A lack of knowledge about medical emergencies and symptoms such as strokes, heart attacks, and severe allergic reactions led to delayed help-seeking behaviour. This is consistent with existing research that links low health literacy in rural populations to delayed EMS utilization (Singhal et al., 2024; Søvsø et al., 2020). Inadequate awareness of emergency contact numbers further complicates response times. Studies by Fleet et al. (2020) and Shayo et al. (2025) similarly found that ignorance of EMS protocols leads to reliance on informal transportation methods, thereby increasing pre-hospital delays. Compared to urban populations where emergency system awareness is higher, rural residents demonstrate significant information gaps (Ookeditse et al., 2022).

Participants' recommendations for community-based health education programs align with international best practices. For instance, structured community health campaigns and basic first-aid training have been shown to increase emergency responsiveness and decrease mortality rates in rural Ethiopia and Ghana (Sultan et al., 2019; Takele et al., 2021). The findings thus affirm the need for localized, culturally appropriate health education interventions that not only raise awareness but also empower rural residents to act effectively during emergencies.

5.4 Innovative solutions to improve EMS accessibility in rural communities

Participants proposed several innovative solutions to enhance EMS accessibility, emphasizing community-based emergency services and infrastructural improvements. Training local volunteers and nurses as first responders was seen as a critical intervention, a strategy strongly supported by literature on community-based EMS models in Canada, India, and Ethiopia (Alanazy et al., 2021; Luo et al., 2022). The integration of mobile health technologies, such as GPS-enabled emergency alerts and mHealth applications, was identified as a promising approach to bridge service gaps. Studies have shown that technology can significantly improve EMS coordination and response times in remote settings (Chen and Lai, 2022; Guarino et al., 2022).

Infrastructure upgrades—including ensuring 24-hour clinic operations, adequate ambulance distribution, and the availability of critical medical supplies—were also emphasized. These findings align with research advocating for sustained investment in rural healthcare

infrastructure to reduce mortality and enhance emergency care outcomes (Apiratwarakul et al., 2021; Horak and Sanborn, 2022). Moreover, the recommendation to introduce motorcycle and bicycle ambulances for hard-to-reach areas is consistent with successful implementations in other Sub-Saharan African countries, demonstrating their effectiveness in reducing response times where traditional ambulances are impractical (Apiratwarakul et al., 2021; Luisa Silva and Poggioli, 2015).

5.6 Conclusion

This chapter critically discussed the challenges affecting the accessibility of Emergency Medical Services (EMS) among rural residents in the Otse Cluster, highlighting how infrastructural deficiencies, resource limitations, socio-demographic factors, and limited community awareness collectively impede timely emergency care. By situating the study's findings within the broader literature, it became evident that these barriers are consistent with those faced by rural communities globally, emphasizing systemic neglect of rural healthcare needs. Innovative community-based approaches, technological integration, and infrastructural improvements were identified as essential solutions to bridge service gaps. Overall, addressing the multifaceted challenges to EMS accessibility requires a coordinated effort involving policy reform, investment in healthcare resources, and community engagement to ensure equitable access to emergency medical care for rural populations.

5.7 Implication of this study to Emergency and Trauma Nursing

The findings of this study have several significant implications for emergency and trauma nursing practice, education, administration and research.

5.7.1 Nursing practice

The study highlights critical challenges faced by rural communities in accessing Emergency Medical Services (EMS), which nurses must understand to provide empathetic and effective care. By recognizing limitations in infrastructure and resources, nurses can advocate for changes in emergency protocols that prioritize swift responses and efficient resource allocation. Additionally, nurses can engage in community education initiatives to enhance health literacy about emergency conditions and available services, thereby improving patient outcomes and empowering residents to seek timely care

5.7.2. Nursing Education

The findings highlight the importance of integrating specialized training in emergency and trauma care within nursing education. Programs should include simulation-based training, rural health challenges, and interdisciplinary collaboration to prepare nurses for real-world scenarios. Community first-aid education programs can empower locals to act as first responders, bridging gaps in emergency services in underserved areas.

5.7.3. Nursing Administration

The implications for nursing administration are significant, particularly regarding staffing and resource allocation in emergency settings. Administrators should advocate for policies that ensure adequate personnel and supplies are consistently available in clinics to enhance service delivery. Additionally, implementing support systems to address emotional burnout and stress among nursing staff is crucial for maintaining quality care and staff retention. Nursing leaders can also engage with policymakers to address systemic challenges affecting rural healthcare, advocating for improved funding and infrastructure to support nursing practice.

5.7.4. Nursing research

This study paves the way for further research in emergency nursing, particularly focusing on the unique challenges faced in rural areas. Future investigations can explore specific interventions designed to improve EMS access and evaluate their impact on patient outcomes. Community-based research that involves local participation can help identify health needs and tailor intervention strategies effectively. Moreover, assessing the effectiveness of educational programs aimed at improving health literacy and emergency preparedness in rural communities can provide insights for enhancing nursing curricula and practices.

5.8 Recommendations

Based on the study findings, the following recommendations are proposed to improve Emergency Medical Services (EMS) in rural communities, enhance emergency and trauma nursing, and address key barriers identified in the study:

5.8.1 Improving staffing and capacity of healthcare facilities

Increase the number of healthcare workers, including nurses and pharmacists, at clinics, and provide ongoing training to improve emergency care skills. Flexible staffing arrangements should be introduced to prevent burnout and ensure better coverage.

5.8.1 Upgrade infrastructure and resources

Ensure clinics and ambulances are adequately equipped with emergency supplies and medical equipment while improving road networks and communication systems to facilitate faster emergency responses, particularly in remote areas.

5.8.3 Implementing community-based services

Establish community health groups or train volunteers as first responders to address emergencies locally while creating EMS hubs or stations closer to remote villages to reduce response times.

5.8.4 Policy interventions

Advocate for policies that prioritize rural healthcare funding and enforce guidelines for EMS services, with systems in place to monitor and improve performance over time.

5.9 Plan for dissemination and utilisation of findings

The findings of this study were disseminated to various stakeholders to facilitate the implementation of evidence-based recommendations aimed at improving Emergency Medical Services (EMS) accessibility in rural areas of the Otse Cluster, Mahalapye District. A hard copy of the full report was submitted to the University of Zambia (UNZA) School of Nursing Sciences and the Main Library to enrich academic resources and contribute to the learning experiences of nursing students and future researchers.

To support policy formulation and strategic planning, another copy was submitted to the Ministry of Health (MOH) in Botswana. The Ministry can utilise the findings to guide the development and refinement of emergency care policies, with a focus on bridging EMS accessibility gaps in rural settings.

In addition, summary reports of the study were distributed to the clinics in each of the five villages that participated in the research. These reports provide healthcare providers with

evidence-based insights that can inform local interventions and improve the quality and timeliness of EMS delivery in underserved communities.

The research findings were also prepared for publication in peer-reviewed journals. Efforts have been made to submit manuscripts to reputable platforms such as the *International Journal of Nursing* and the *Journal of Clinical Nursing*. Publishing in these journals ensures the scientific validity of the study is evaluated by subject matter experts, while also allowing the findings to reach a global audience and contribute to the growing body of knowledge on emergency care in rural and resource-limited settings.

Furthermore, the study was presented at local, regional, and international conferences focused on emergency care, including the African Conference on Emergency Medicine. These presentations facilitated professional networking, feedback exchange, and knowledge-sharing, offering valuable opportunities to engage with researchers, clinicians, and policymakers. Discussions during these conferences also enabled context-specific interpretations of the findings and informed collaborative strategies to improve EMS access in rural regions.

Through these dissemination efforts, the study has not only raised awareness of the barriers facing rural EMS accessibility but has also laid a foundation for collaborative action and informed decision-making among key health stakeholders in Botswana and beyond.

5.10 Strengths and limitations of the study

5.10.1 Strengths of the study

The study provides valuable insights into the challenges of emergency medical services (EMS) in rural areas, highlighting gaps in infrastructure, human resources, and community awareness. These findings contribute to the growing body of knowledge on rural healthcare disparities and inform policy and intervention strategies.

The study utilized both Key Informant Interviews (KII) and Focus Group Discussions (FGDs), ensuring diverse perspectives from healthcare providers and community members. This methodological triangulation enhances the credibility and depth of the findings.

The recommendations provided in the study are actionable and can be used by policymakers, healthcare providers, and EMS administrators to improve emergency response systems in rural communities.

By addressing knowledge gaps regarding emergency conditions and the use of EMS, the study highlights the critical role of health education in improving emergency response behaviours. This focus on community engagement can lead to practical and sustainable solutions.

The study highlights structural and systemic barriers affecting EMS delivery in rural areas, emphasizing the need for policy reforms and increased investment in emergency healthcare infrastructure.

5.10.2 Limitations of the study

The findings are based on a specific geographical area and may not be fully applicable to other rural settings with different healthcare systems, socioeconomic conditions, or cultural factors. Thematic similarities with other rural areas can make the findings useful to broader rural healthcare planning. Broader studies across multiple regions would be needed for more generalisable conclusions. Qualitative research relies on participants narratives and the researcher's interpretation, which may introduce bias in data collection and analysis. To minimise bias, the study employed triangulation, where data from focus group discussions, key informant interviews and literature review were compared to ensure consistency. Additionally, peer debriefing and member checking helped maintain objectivity. Also, participants provided socially desirable responses and struggled to recall past experiences accurately, so to minimise recall bias, the study included probe questions to help participants reconstruct their experiences more accurately. By addressing these limitations, the study enhances its credibility, reliability and overall contribution to understanding EMS accessibility challenges in the Otse cluster.

REFERENCES

Abiiro, G.A., Mbera, G.B., De Allegri, M., 2014. Gaps in universal health coverage in Malawi: A qualitative study in rural communities. BMC Health Serv Res 14, 234. https://doi.org/10.1186/1472-6963-14-234

Ahmadi, H., Jelokhani-Niaraki, M., Argany, M., Ghanbari, A., 2024. Optimizing locations of emergency medical stations for rural areas: A case study in Iran. International Journal of Disaster Risk Reduction 103, 104336. https://doi.org/10.1016/j.ijdrr.2024.104336

Ahmed, S.K., 2024. The pillars of trustworthiness in qualitative research. Journal of Medicine, Surgery, and Public Health 2, 100051. https://doi.org/10.1016/j.glmedi.2024.100051

Alanazy, A.R.M., Fraser, J., Wark, S., 2022. Emergency medical services in rural and urban Saudi Arabia: A qualitative study of Red Crescent emergency personnel' perceptions of workforce and patient factors impacting effective delivery. Health Social Care Comm 30. https://doi.org/10.1111/hsc.13859

Alanazy, A.R.M., Fraser, J., Wark, S., 2021. Organisational factors affecting emergency medical services' performance in rural and urban areas of Saudi Arabia. BMC Health Serv Res 21, 562. https://doi.org/10.1186/s12913-021-06565-3

Alanazy, A.R.M., Wark, S., Fraser, J., Nagle, A., 2019. Factors Impacting Patient Outcomes Associated with Use of Emergency Medical Services Operating in Urban Versus Rural Areas: A Systematic Review. IJERPH 16, 1728. https://doi.org/10.3390/ijerph16101728

Alase, A., 2017. The Interpretative Phenomenological Analysis (IPA): A Guide to a Good Qualitative Research Approach. IJELS 5, 9. https://doi.org/10.7575/aiac.ijels.v.5n.2p.9

Alayande, B., Chu, K.M., Jumbam, D.T., Kimto, O.E., Musa Danladi, G., Niyukuri, A., Anderson, G.A., El-Gabri, D., Miranda, E., Taye, M., Tertong, N., Yempabe, T., Ntirenganya, F., Byiringiro, J.C., Sule, A.Z., Kobusingye, O.C., Bekele, A., Riviello, R.R., 2022. Disparities in Access to Trauma Care in Sub-Saharan Africa: a Narrative Review. Curr Trauma Rep 8, 66–94. https://doi.org/10.1007/s40719-022-00229-1

Alruwaili, A., Alanazy, A.R.M., 2022. Prehospital Time Interval for Urban and Rural Emergency Medical Services: A Systematic Literature Review. Healthcare (Basel) 10, 2391. https://doi.org/10.3390/healthcare10122391

Apiratwarakul, K., Suzuki, T., Çelebi, İ., Tiamkao, S., Bhudhisawasdi, V., Pearkao, C., Ienghong, K., 2021. “Motorcycle Ambulance” the Policy to Promote Health and Sustainable Development in Large Cities. https://doi.org/10.20944/preprints202107.0455.v1

Baljepally, V.S., Metheny, W., 2022. Rural-urban disparities in baseline health factors and procedure outcomes. Journal of the National Medical Association 114, 227–231. https://doi.org/10.1016/j.jnma.2022.01.001

Bardhan, R., Byrd, T., 2023. Psychosocial Work Stress and Occupational Stressors in Emergency Medical Services. Healthcare 11, 976. https://doi.org/10.3390/healthcare11070976

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qualitative Research in Psychology 3, 77–101. https://doi.org/10.1191/1478088706qp063oa

Broccoli, M.C., Calvello, E.J.B., Skog, A.P., Wachira, B., Wallis, L.A., 2015. Perceptions of emergency care in Kenyan communities lacking access to formalised emergency medical systems: a qualitative study: Table 1. BMJ Open 5, e009208. https://doi.org/10.1136/bmjopen-2015-009208

Burkholder, T.W., Hill, K., Calvello Hynes, E.J., 2019. Developing emergency care systems: a human rights-based approach. Bull. World Health Organ. 97, 612–619. https://doi.org/10.2471/BLT.18.226605

Chari, S.V., Cui, E.R., Fehl, H.E., Fernandez, A.R., Brice, J.H., Patel, M.D., 2023. Community socioeconomic and urban-rural differences in emergency medical services times for suspected stroke in North Carolina. The American Journal of Emergency Medicine 63, 120–126. https://doi.org/10.1016/j.ajem.2022.10.039

Chen, Y., Lai, Z., 2022. A Multi-Objective Optimization Approach for Emergency Medical Service Facilities Location-Allocation in Rural Areas. RMHP Volume 15, 473–490. https://doi.org/10.2147/RMHP.S332215

Chinyakata, R., Roman, N.V., Msiza, F.B., 2021. Stakeholders’ Perspectives on the Barriers to Accessing Health Care Services in Rural Settings: A Human Capabilities Approach. TOPHJ 14, 336–344. https://doi.org/10.2174/1874944502114010336

Coombs, N.C., Campbell, D.G., Caringi, J., 2022. A qualitative study of rural healthcare providers’ views of social, cultural, and programmatic barriers to healthcare access. BMC Health Serv Res 22, 438. https://doi.org/10.1186/s12913-022-07829-2

Cortini, M., Galanti, T., Fantinelli, S., 2019. Focus Group Discussion: how many Participants in a Group? Encyclopaideia Vol 23, 29-43 Pages. https://doi.org/10.6092/ISSN.1825-8670/9603

Creswell, J.W., Creswell, J.D., 2017. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.

Creswell, J.W., Poth, C.N., 2018. Qualitative inquiry & research design: choosing among five approaches, Fourth edition. ed. SAGE, Los Angeles.

Doyle, L., McCabe, C., Keogh, B., Brady, A., McCann, M., 2020. An overview of the qualitative descriptive design within nursing research. Journal of Research in Nursing 25, 443–455. https://doi.org/10.1177/1744987119880234

Fleet, R., Turgeon-Pelchat, C., Smithman, M.A., Alami, H., Fortin, J.-P., Poitras, J., Ouellet, J., Gravel, J., Renaud, M.-P., Dupuis, G., Légaré, F., 2020. Improving delivery of care in rural emergency departments: a qualitative pilot study mobilizing health professionals, decision-makers and citizens in Baie-Saint-Paul and the Magdalen Islands, Québec, Canada. BMC Health Serv Res 20, 62. https://doi.org/10.1186/s12913-020-4916-1

Forero, R., Nahidi, S., De Costa, J., Mohsin, M., Fitzgerald, G., Gibson, N., McCarthy, S., Aboagye-Sarfo, P., 2018. Application of four-dimension criteria to assess rigour of qualitative research in emergency medicine. BMC Health Serv Res 18, 120. https://doi.org/10.1186/s12913-018-2915-2

Friese, S., 2012. Qualitative Data Analysis with ATLAS.ti. SAGE Publications Ltd, 1 Oliver's Yard, 55 City Road London EC1Y 1SP. https://doi.org/10.4135/9781529799590

Guarino, G., Bernabucci, I., Bibbo, D., Caviglia, M., Ambai, A.J., Putoto, G., Ragazzoni, L., Tognon, F., Vandy, M.J., Barone-Adesi, F., Schmid, M., 2022. A Data-Based System for the Optimization of Emergency Medical Services Allocation in Rural Countries, in: 2022 IEEE Symposium on Computers and Communications (ISCC). Presented at the 2022 IEEE Symposium on Computers and Communications (ISCC), IEEE, Rhodes, Greece, pp. 1–4. https://doi.org/10.1109/ISCC55528.2022.9912928

Hodkinson, P.W., Pigoga, J.L., Wallis, L., 2020. Emergency healthcare needs in the Lavender Hill suburb of Cape Town, South Africa: a cross-sectional, community-based household survey. BMJ Open 10, e033643. https://doi.org/10.1136/bmjopen-2019-033643

Horak, T.S., Sanborn, A.N., 2022. The Need for Reliable Robust Maternal Transport Program to Improve Maternal Outcomes in Rural America. Clinical Obstetrics & Gynecology 65, 839–847. https://doi.org/10.1097/GRF.0000000000000722

Hosaka, L., Tupetz, A., Sakita, F.M., Shayo, F., Staton, C., Mmbaga, B.T., Joiner, A.P., 2023. A qualitative assessment of stakeholder perspectives on barriers and facilitators to emergency care delays in Northern Tanzania through the Three Delays. African Journal of Emergency Medicine 13, 191–198. https://doi.org/10.1016/j.afjem.2023.06.007

Houghton, Bascolo, Cohen, Cruz Vilcarromero, Rodriguez Gonzalez, Albrecht, Koller, Fitzgerald, 2023. Identifying access barriers faced by rural and dispersed communities to better address their needs: implications and lessons learned for rural proofing for health in the Americas and beyond. RRH. https://doi.org/10.22605/RRH7822

Hunn, A.J., 2020. Guidance for communicating research findings to participants. BMJ m1. https://doi.org/10.1136/bmj.m1

Jeon, J., Kim, S., Kang, G.H., Suh, K., 2020. Analysis of Emergency Medical Vulnerability and Survival Rates Following Real-Time Traffic Information. Applied Sciences 10, 6492. https://doi.org/10.3390/app10186492

Jesús-Azabal, M., Berrocal, J., García-Alonso, J., Soares, V.N.G.J., Galán-Jiménez, J., 2020. An Opportunistic Routing Solution to Monitor Isolated Elderly People in Rural Areas, in: García-Alonso, J., Fonseca, C. (Eds.), Gerontechnology, Communications in Computer and Information Science. Springer International Publishing, Cham, pp. 195–203. https://doi.org/10.1007/978-3-030-41494-8_19

Jovanović Todorović, M., Puškarić, A., 2020. Importance of Plant Production in Development of Rural Areas: A Case Study City of Smederevo, Serbia, in: Jean Vasile, A., Subic, J., Grubor, A., Privitera, D. (Eds.), Advances in Environmental Engineering and Green Technologies. IGI Global, pp. 241–252. https://doi.org/10.4018/978-1-5225-9837-4.ch012

Jung, S., Qin, X., 2024. Promoting Emergency Medical Service Infrastructure Equality to Reduce Road Crash Fatalities. Sustainability 16, 1000. https://doi.org/10.3390/su16031000

Khazaei, A., Torabi, M., Shayganihonar, M., Bayat, A.R., 2024. Exploring the challenges of emergency medical service providers in the initial phase of the COVID-19 pandemic: a

qualitative content analysis. BMC Emerg Med 24, 159. https://doi.org/10.1186/s12873-024-01079-7

Kvirkvelia, B., Elizbarashvili, S., Kimeridze, M., Khuntselia, T., Chikhradze, N., 2023. Evaluation of the Geographical Accessibility to Medical Services, Taking into Account the Environmental and Infrastructural Factors. https://doi.org/10.5194/egusphere-egu23-4238

Lee, S.Y., Song, K.J., Shin, S.D., Ro, Y.S., Hong, K.J., Kim, Y.T., Hong, S.O., Park, J.H., Lee, S.C., 2018. A disparity in outcomes of out-of-hospital cardiac arrest by community socioeconomic status: A ten-year observational study. Resuscitation 126, 130–136. https://doi.org/10.1016/j.resuscitation.2018.02.025

Li, S., Dong, X., Li, D., Zhang, H., Zhou, S., Maimaitiming, M., Ma, J., Li, N., Zhou, Q., Jin, Y., Zheng, Z.-J., 2022. Inequities in ambulance allocation associated with transfer delay and mortality in acute coronary syndrome patients: evidence from 89 emergency medical stations in China. International Journal for Equity in Health 21, 178. https://doi.org/10.1186/s12939-022-01777-3

Luisa Silva, A., Poggioli, S., 2015. A81 Emergency Transport experiences from Sub-Saharan Africa: public involvement in transport innovations to improve access to healthcare. Journal of Transport & Health 2, S47. https://doi.org/10.1016/j.jth.2015.04.569

Luo, W., Yao, J., Mitchell, R., Zhang, X., Li, W., 2022. Locating emergency medical services to reduce urban-rural inequalities. Socio-Economic Planning Sciences 84, 101416. https://doi.org/10.1016/j.seps.2022.101416

Maganty, Byrnes, Hamm, Wasilko, Sabik, Davies, Jacobs, 2023. Barriers to rural health care from the provider perspective. RRH. https://doi.org/10.22605/rrh7769

Mahama, M.-N., Kenu, E., Bandoh, D.A., Zakariah, A.N., 2018. Emergency response time and pre-hospital trauma survival rate of the national ambulance service, Greater Accra (January - December 2014). BMC Emerg Med 18, 33. https://doi.org/10.1186/s12873-018-0184-3

Mamalelala, T.T., Dithole, K.S., Maripe-Perera, D.B., 2023. Nurses and emergency nursing care in Botswana. African Journal of Emergency Medicine 13, 68–71. https://doi.org/10.1016/j.afjem.2023.03.002

Mangundu, M., Roets, L., Van Rensberg, E.J., 2020. Accessibility of healthcare in rural Zimbabwe: The perspective of nurses and healthcare users. African Journal of Primary Health Care & Family Medicine 12. https://doi.org/10.4102/phcfm.v12i1.2245

May, T.L., Stoddard, H., Daley, A., Sholl, M., Oko, J., Ryzhov, S.V., deKay, J.T., Gagnon, D., Riker, R.R., Seder, D.B., 2023. Abstract 426: The Rural Experience of Cardiac Arrest in Maine: Geography, EMS Access, and Social Determinants of Health. Circulation 148. https://doi.org/10.1161/circ.148.suppl_1.426

McCarthy, J., Patel, A.P., Spain, A.E., 2020. Pre-hospital Care: Emergency Medical Services, in: Paige, J.T., Sonesh, S.C., Garbee, D.D., Bonanno, L.S. (Eds.), Comprehensive Healthcare Simulation: InterProfessional Team Training and Simulation, Comprehensive Healthcare Simulation. Springer International Publishing, Cham, pp. 285–303. https://doi.org/10.1007/978-3-030-28845-7_19

Miller, K.E.M., James, H.J., Holmes, G.M., Van Houtven, C.H., 2020. The effect of rural hospital closures on emergency medical service response and transport times. Health Services Research 55, 288–300. https://doi.org/10.1111/1475-6773.13254

Moafa, H.N., Van Kuijk, S.M.J., Alqahtani, D.M., Moukhyer, M.E., Haak, H.R., 2020. Disparities between Rural and Urban Areas of the Central Region of Saudi Arabia in the Utilization and Time-Centeredness of Emergency Medical Services. IJERPH 17, 7944. https://doi.org/10.3390/ijerph17217944

Mould-Millman, N.-K., Rominski, S.D., Bogus, J., Ginde, A.A., Zakariah, A.N., Boatemaah, C.A., Yancey, A.H., Akoriyea, S.K., Campbell, T.B., 2015. Barriers to Accessing Emergency Medical Services in Accra, Ghana: Development of a Survey Instrument and Initial Application in Ghana. Glob Health Sci Pract 3, 577–590. https://doi.org/10.9745/GHSP-D-15-00170

Muchatuta, M., Mudariki, S., Matheson, L., Rice, B., Chidzonga, M., Walker, R., Strehlow, M., Newberry, J., 2022. Emergency Medical Services (EMS) Utilization in Zimbabwe: Retrospective Review of Harare Ambulance System Reports. Annals of Global Health 88, 70. https://doi.org/10.5334/aogh.3649

Nkomazana, O., 2022. A Healthcare Case Study from Botswana, Africa, in: Lakshmanan, V.I., Chockalingam, A., Murty, V.K., Kalyanasundaram, S. (Eds.), Smart Villages. Springer International Publishing, Cham, pp. 309–319. https://doi.org/10.1007/978-3-030-68458-7_23

Ookeditse, O., Ookeditse, K.K., Motswakadikgwa, T.R., Masilo, G., Bogatsu, Y., Lekobe, B.C., Mosepele, M., Schirmer, H., Johnsen, S.H., 2022. Public and outpatients' awareness of calling emergency medical services immediately by acute stroke in an upper middle-income country: a cross-sectional questionnaire study in greater Gaborone, Botswana. BMC Neurol 22, 347. https://doi.org/10.1186/s12883-022-02859-z

Ouma, P., Macharia, P.M., Okiro, E., Alegana, V., 2021. Methods of Measuring Spatial Accessibility to Health Care in Uganda, in: Makanga, P.T. (Ed.), Practicing Health Geography, Global Perspectives on Health Geography. Springer International Publishing, Cham, pp. 77–90. https://doi.org/10.1007/978-3-030-63471-1_6

Pennel, C.L., Tamayo, L., Wells, R., Sunbury, T., 2016. Emergency Medical Service-based Care Coordination for Three Rural Communities. Journal of Health Care for the Poor and Underserved 27, 159–180. https://doi.org/10.1353/hpu.2016.0178

Population & housing census 2022: population of cities, towns, villages & associated localities, 2023. . Statistics Botswana, Gaborone.

Reid, S., 2019. The rural determinants of health: using critical realism as a theoretical framework. Rural Remote Health. https://doi.org/10.22605/RRH5184

Rudnicka, E., Napierała, P., Podfigurna, A., Męczekalski, B., Smolarczyk, R., Grymowicz, M., 2020. The World Health Organization (WHO) approach to healthy ageing. Maturitas 139, 6–11. https://doi.org/10.1016/j.maturitas.2020.05.018

Shayo, F., Zaccheus, G.G., Sakita, F., Hernandes, T.R., Vissoci, J.R.N., Gordee, A., Kuchibhatla, M., Kiremeji, M., Minja, L., Mmbaga, B.T., Staton, C.A., Keating, E.M., Joiner, A.P., 2025. Emergency care knowledge, utilization, and barriers in Northern Tanzania: A community-based survey. PLOS Glob Public Health 5, e0004032. https://doi.org/10.1371/journal.pgph.0004032

Singhal, A., Sharma, G., Shah, D., Dubey, S., Kalra, M., Khan, S., 2024. Lack of Public Awareness and Prehospital Care in Severe Trauma Patients: The Weakest Link in the Indian Healthcare System. Cureus 16, e61208. https://doi.org/10.7759/cureus.61208

Solomon, M., Furuya-Kanamori, L., Wangdi, K., 2021. Spatial Analysis of HIV Infection and Associated Risk Factors in Botswana. IJERPH 18, 3424. https://doi.org/10.3390/ijerph18073424

Søvsø, M.B., Bech, B.H., Christensen, H.C., Huibers, L., Christensen, E.F., Christensen, M.B., 2020. Sociodemographic Characteristics Associated with Contacts to Emergency Medical Services and Out-of-Hours Primary Care: An Observational Study of 2.3 Million Citizens. CLEP Volume 12, 393–401. https://doi.org/10.2147/CLEP.S243531

Stahl, N., King, J., 2020. Expanding Approaches for Research: Understanding and Using Trustworthiness in Qualitative Research 44, 26–28.

Sultan, M., Abebe, Y., Tsadik, A.W., Ababa, A., Yesus, A.G., Mould-Millman, N.-K., 2019. Trends and barriers of emergency medical service use in Addis Ababa; Ethiopia. BMC Emerg Med 19, 28. https://doi.org/10.1186/s12873-019-0242-5

Takele, G.M., Ballo, T.H., Gebrekidan, K.B., Gebregiorgis, B.G., 2021. Utilization, Barriers and Determinants of Emergency Medical Services in Mekelle City, Tigray, Ethiopia: A Community-Based Cross-Sectional Study. OAEM Volume 13, 325–334. https://doi.org/10.2147/OAEM.S315459

Terashima, M., Carter, A.J.E., 2018. Correlation of age and rurality with low-urgency use of emergency medical services (LUEMS): A geographic analysis. CJEM 20, 874–881. https://doi.org/10.1017/cem.2017.364

Turner, N., Chen, H., Morosanu, L., 2016. Characteristics of Rural Users of Emergency Medical Services in Georgia: A Population-Based Study. JGPHA 5. https://doi.org/10.21633/jgpha.5.408

Vallejo, M.C., Shapiro, R.E., Lilly, C.L., Elmo, R.M., Altobello, R.A., Nield, L.S., Ferrari, N.D., 2023. Rural healthcare and gender-related differences. J Public Health (Berl.) 31, 869–875. https://doi.org/10.1007/s10389-021-01623-w

Varela, C., Young, S., Mkandawire, N., Groen, R.S., Banza, L., Viste, A., 2019. Transportation Barriers To Access Health Care For Surgical Conditions In Malawi a cross sectional nationwide household survey. BMC Public Health 19, 264. https://doi.org/10.1186/s12889-019-6577-8

Verma, S., Wilson, F., Wang, H., Smith, L., Tak, H.J., 2023. Impact of Community Socioeconomic Characteristics on Emergency Medical Service Delays in Responding to Fatal Vehicle Crashes. AJPM Focus 2, 100129. https://doi.org/10.1016/j.focus.2023.100129

Willie, M., 2023. Enhancing Access to Medical Emergency Services in Rural Communities: Challenges and Proposed Solutions -Commentary. https://doi.org/10.58489/2836-2179/ENM

Wolfe, M.K., McDonald, N.C., Holmes, G.M., 2020. Transportation Barriers to Health Care in the United States: Findings From the National Health Interview Survey, 1997–2017. Am J Public Health 110, 815–822. https://doi.org/10.2105/AJPH.2020.305579

Wong, H.T., Lin, T.-K., Lin, J.-J., 2019. Identifying rural–urban differences in the predictors of emergency ambulance service demand and misuse. Journal of the Formosan Medical Association 118, 324–331. https://doi.org/10.1016/j.jfma.2018.05.013

World Health Organization, 2021. World Health Sstatistics 2021: monitoring health for the sdgs, sustainable development goals. World Health Organization, S.l.

World Health Organization, 2019. World health statistics 2019: monitoring health for the SDGs, sustainable development goals. World Health Organization, Geneva.

Zou, Y., Jia, L., Chen, S., Deng, X., Chen, Z., He, Y., Wang, Q., Xing, D., Zhang, Y., 2023. Spatial accessibility of emergency medical services in Chongqing, Southwest China. Front. Public Health 10, 959314. https://doi.org/10.3389/fpubh.2022.959314

Zuurmond, M., Mactaggart, I., Kannuri, N., Murthy, G., Oye, J.E., Polack, S., 2019. Barriers and Facilitators to Accessing Health Services: A Qualitative Study Amongst People with Disabilities in Cameroon and India. IJERPH 16, 1126. https://doi.org/10.3390/ijerph16071126

APPENDICES

Appendix A: Participant information sheet

Title: Challenges to Accessibility of Emergency Medical Services among Rural Residents in Otse Cluster

Investigator: Ms Kesego Morake Contact: +269771811471 or +260960122428

Email: morakesego@gmail.com

Introduction

My name is Kesego Morake. I am a student at the University of Zambia in the School of Nursing Sciences pursuing a Master of Science Degree in Emergency and Trauma Nursing. You are requested to participate in a study exploring the challenges to accessibility of emergency medical services among the rural residents in the Otse cluster in Mahalapye district, Botswana. I will read you a consent form explaining the research study you are being asked to participate in. Please feel free to ask any questions before you agree to participate. You may also ask questions during the study.

Background and rationale for the study

Emergency medical services are an essential part of the health system and save lives during medical emergencies. However, developing countries face challenges in providing timely, quality care, particularly in rural areas, despite efforts to achieve universal access. Prompt and efficient EMS have the potential to reduce unintended injuries and fatalities by 80% in adults and 60% in children. Additionally, it can reduce the mortality rate in LMIC rural areas. The findings will help administrators make informed decisions about resource acquisition and allocation.

Purpose

The purpose of the study is to explore the challenges in accessing EMS in rural setting in order to develop actionable insights and recommendations for improving EMS delivery.

Procedures

You will be asked to participate in an in-depth interview or focus group discussion after you consent to the study. The FGD and interview will take place in a private, confidential setting and should last approximately 90 minutes for the FGD and 30 to 45 minutes for the interviews,

which will be audio recorded with your permission. Throughout the interview, you will have the chance to openly express your thoughts, feelings, and experiences.

Who will participate in the study?

Nurses who oversee the cluster's medical facilities and cluster residents who have lived there for at least six months.

Risk/ discomfort

The study carries no major risks or discomfort except the time and energy needed to answer the questions. The study does not involve any experimentation.

Benefits

The study has no direct benefits to you as a participant. However, the information you provide will be important in contributing to a better understanding of challenges faced by rural residents when accessing EMS, potentially leading to improved service delivery to rural areas.

Alternatives

The decision to participate in this study is completely voluntary. You have the right to decline or withdraw from participation at any point without any penalties, and this may not affect you.

Cost

The participation will not incur any cost during the conduct of the study.

Compensation for the participation in the study

There is no compensation for participating in the study. However, participants injured during the course of the study will be assisted; it will be the responsibility of the researchers to ensure that the participant receives medical assistance and optimal care. Participants who may suffer permanent damage will be ensured that the participant receives necessary medical attention and covers all medical expenses related to injury.

Reimbursement

The study will take place among the community of the Otse cluster, and no cost will be incurred by participants.

Statement of voluntariness

Participation in this study is completely voluntary. You have the right to join at your own will and decline participation or withdraw from the study at any time without any penalties.

Confidentiality

The results of this study will be kept strictly confidential and used only for research purposes. My identity will be concealed as far as the law allows. The name will not appear anywhere on the coded forms with the information, and participants will remain anonymous in the published results of this study. Paper and computer records will be kept under lock and key with password protection, respectively.

Questions about participants rights

Participants who have questions about their rights as research participants can have their queries addressed to the contacts provided below.

Ethical approval

If you need clarification on ethical approval, please contact the University of Zambia Biomedical Research Ethics Committee.

Telephone: +260977925304

Ridgeway Campus

Telegrams: UNZA, LUSAKA

Telex: UNZALU ZA 44370

P.O. Box 50110 Lusaka, Zambia

Fax: + 260-1-250753

E-mail: unzarec@unza.zm

Federal Assurance No. FWA00000338, IRB00001131 of IORG0000774, and NHRAR-REC No 2021-05-0002.

Persons to contact for queries

If you have any questions about your participation in this study process you should contact;

1. Kesego Morake, researcher. School of Nursing. Contact: +269771811471 or +260960122428

Email: morakesego@gmail.com

2. Dr Ruth Wahila, supervisor. School of Nursing. Contact: +260975971620.

Email: ruth.wahila@unza.zm

3. Natalia Shitima (Co-Supervisor): School of Nursing Sciences. Contact: +260 979670096

Email: natalia.mbewe@unza.zm

Tlaleletso A: Tokomane ya tshedimosetso ya motsayakarolo

Setlhogo: Dikgwetlho tsa go fitlhelela ditirelo tsa kalafi ya tshoganyetso gareng ga banni ba magae mo setlhopheng sa Otse

Motlhotlhomisi: Mme Kesego Morake

Mogala: +269771811471 kgotsa +260960122428

Email: morakesego@gmail.com

Matseno

Ke nna Kesego Morake. Ke moithuti kwa Yunibesithing ya Zambia mo Sekolong sa Saense ya Booki yo o ithutileng go nna Mookamedi wa Saense mo go Tsa Booki jwa Matlhotlhapelo le Matshwenyego. O kopiwa go nna le seabe mo patlisisong e e sekasekang dikgwetlho tsa go fitlhelela ditirelo tsa kalafi ya tshoganyetso mo baaging ba kwa magaeng mo setlhopheng sa Otse mo kgaolong ya Mahalapye, Botswana. Ke tla go balela foromo ya tumalano e e tlhalosang patlisiso e o kopilweng go nna le seabe mo go yone. Tsweetswee ikutlwe o gololesegile go botsa dipotso dipe fela pele ga o dumela go nna le seabe. Gape o ka nna wa botsa dipotso ka nako ya thuto.

Tshimologo le mabaka a a dirileng gore go dirwe thuto eno

Ditirelo tsa kalafi ya tshoganyetso ke karolo ya botlhokwa ya thulaganyo ya tsa boitekanelo e bile di boloka matshelo fa go na le maemo a tshoganyetso a kalafi. Le fa go ntse jalo, dinaga tse di tlhabologang di lebane le dikgwetlho tsa go tlamela ka tlhokomelo ya boleng jo bo kwa godimo ka nako e e tshwanetseng, segolobogolo kwa mafelong a metseselegae, le fa go dirwa maiteko a go fitlhelela batho botlhe. EMS e e bonako le e e nang le matswela e ka fokotsa dikgobalo tse di sa ikaelelwang le dintsho ka diperesente di le 80 mo bagolong le diperesente di le 60 mo baneng. Mo godimo ga moo, e ka fokotsa selekanyo sa dintsho mo mafelong a selegae a LMIC. Se ba se fitlheletseng se tla thusa batsamaisi go dira ditshwetso tse di siameng malebana le go reka le go abela batho didirisiwa.

Boikaelelo

Maikaelelo a thuto e ke go batlisisa dikgwetlho tsa go fitlhelela EMS kwa mafelong a magae gore go nne le dikakanyo tse di ka dirisiwang le dikatlanegiso tsa go tokafatsa go tlamelwa ka EMS.

Dithulaganyo

O tla kopiwa go nna le seabe mo potsolotsong e e tseneletseng kgotsa mo puisanong ya setlhopha se se tsepameng morago ga gore o dumele mo thutopatlisisong. FGD le puisano di tla nna mo sephiring mme di tshwanetse go tsaya metsotso e ka nna 90 mo FGD le metsotso e le 30 go ya go 45 mo dipuisanong, tse di tla rekotiwang ka tetla ya gago. Fa lo ntse lo botsolodiwa, o tla nna le tshono ya go tlhalosa ka tshosologo se o se akanyang, maikutlo a gago le maitemogelo a gago.

Ke bomang ba ba tla nnang le seabe mo patlisisong eno?

Baoki ba ba okametseng mafelo a kalafi a setlhopha seno le baagi ba setlhopha seno ba ba nnileng koo bobotlana dikgwedi di le thataro.

Kotsi/go sa phuthologe

Thuto eno ga e na dikotsi dipe tse dikgolo kana ga e na mathata ape fa e se fela nako le maatla a a tlhokegang go araba dipotso. Patlisiso eno ga e akaretse go lekeletsa sepe.

Dithuso

Thutopatlisiso ga e na mosola ope o o tlhamaletseng mo go wena jaaka motsayakarolo. Le fa go ntse jalo, tshedimosetso e o tla e re nayang e tla nna botlhokwa mo go thuseng go tlhaloganya botoka dikgwetlho tse banni ba kwa magaeng ba lebanang le tsone fa ba dirisa EMS, e leng se se ka dirang gore go nne le tirelo e e botoka kwa mafelong a magae.

Ditsela tse dingwe

Tshwetso ya go nna le seabe mo thutopatlisisong eno ke ya boithaopo. O na le tshwanelo ya go gana kgotsa go tlogela go nna le seabe nako nngwe le nngwe ntle le go otlhaiwa, mme seno se ka nna sa se ka sa go ama.

Ditshenyegelo

Go nna le seabe ga go kitla go nna le ditshenyegelo dipe ka nako ya fa go dirwa thutopatlisiso

Tuelo ya go nna le seabe mo thutopatlisisong

Ga o duelelwe go nna le seabe mo thutopatlisisong eno. Le fa go ntse jalo, batsayakarolo ba ba gobetseng mo thutopatlisisong eno ba tla thusiwa; e tla bo e le maikarabelo a babatlisisi go tlhomamisa gore motsayakarolo o amogela thuso ya kalafi le tlhokomelo e e siameng. Batsayakarolo ba ba ka nnang ba gobala go ya go ile ba tla netefalediwa gore batsayakarolo ba

bona tlhokomelo ya kalafi e e tlhokegang le go duelela ditshenyegelo tsotlhe tsa kalafi tse di amanang le kgobalo.

Go busediwa madi

Patlisiso eno e tla dirwa mo gare ga batho ba ba nnang mo setlhopheng sa Otse, mme batlakopanong ga ba kitla ba duelelwa sepe.

Kitsiso ya boithaopo

Go nna le seabe mo thutopatlisisong eno ke ga boithaopo fela. O na le tshwanelo ya go ikwadisetsa thutopatlisiso ka bowena le go gana go nna le seabe kgotsa go tlogela thutopatlisiso ka nako nngwe le nngwe o sa otlhaiwe.

Go boloka tshedimosetso e le sephiri

Diphelelo tsa patlisiso eno di tla bolokwa e le sephiri mme di tla dirisiwa fela mo dipatlisisong. Ke tla nna ke sa itsiwe go ya kafa molao o letlang ka teng. Leina la motho yoo ga le kitla le tlhaga gope mo diforomong tse di nang le tshedimosetso e e kwadilweng ka khomputara, mme batho ba ba tsayang karolo mo thutopatlisisong eno ba tla nna ba sa itsiwe mo dipegong tse di gatisitsweng tsa patlisiso eno. Direkoto tsa pampiri le tsa khomputara di tla nna di lotletswe ka senotlolo le go sirelediwa ka go dirisa password.

Dipotso ka ga ditshwanelo tsa batsayakarolo

Batsayakarolo ba ba nang le dipotso ka ditshwanelo tsa bone jaaka batsayakarolo ba patlisiso ba ka nna ba romela dipotso tsa bone kwa bagolwaneng ba ba neilweng fa tlase fano.

Kamogelo ya maitsholo

Fa o tlhoka go tlhalosediwa ka ga tumelelo ya maitsholo, tsweetswee ikgolaganye le Komiti ya Boitsholo ya Patlisiso ya Kalafi ya Yunibesiti ya Zambia.

Mogala: +260977925304

Khampase ya Ridgeway

Dithelekerama: UNZA, LUSAKA Telex:

UNZALU ZA 44370

P.O. Lebokoso la 50110

Lusaka, Zambia

Fax: + 260-1-250753

E-mail: unzarec@unza.zm

Tshedimosetso ya Federal Assurance No. FWA00000338, IRB00001131 ya IORG0000774, le NHRAR-REC No 2021-05-0002.

Batho ba ba ka ikgolaganyang le bone fa ba na le dipotso Fa o na le dipotso dingwe ka ga go nna le seabe ga gago mo thutopatlisisong e, o tshwanetse go ikgolaganya le:

1. Kesego Morake (mmatlisisi): Yunibesiti ya Zambia, Sekolo sa Saense ya Booki. Mogala: +267 7111471/ +260 960291224, imeili: morkesego@gmail.com

2. Dr. Ruth Wahila (Molaodi-Mogolo): Yunibesithi ya Zambia, Sekolo sa Saense ya Booki, P.O. Lebokoso la 50110, Lusaka, Zambia. Mogala: +260 975971620 di-imeile: ruth.wahila@unza.zm

3. Natalia Shitima (Co-Supervisor): University of Zambia, School of Nursing Sciences, P.O. Lebokoso la 50110, Lusaka Zambia. Mogala +260 979670096, imeili: natalia.mbewe@unza.zm

Appendix B: Informed Consent form for participation in the study

Should you choose to participate in the research, you will be required to sign the consent form attached:

Title: Challenges to Accessibility of Emergency Medical Services among Rural Residents in the Otse Cluster, Mahalapye District, Botswana.

Statement of consent/ assent

..……. has explained the contents of the participation information sheet to me, which I fully understand. I have been allowed to ask questions, which have been answered satisfactorily. I fully understand that my decision to participate in this study will not affect my job. I have been assured that my anonymity and confidentiality will be maintained. I am aware that I may withdraw at any time without penalty. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the research study in which I voluntarily consent to participate.

Name of Participant …….

Signature of Participant ……

Date: DD/MM/YYYY

Name of Witness: …….

Signature of Witness: ……

Date: DD/MM/YYYY

Name of interviewer: ……...

Signature of Interviewer: …….

Phone number: …….

Date: DD/MM/YYYY

For more information/ inquiries, please contact:

1. Kesego Morake (researcher): the University of Zambia, School of Nursing Sciences. Cell: +267 7111471/ +260 960291224, email: morkesego@gmail.com
2. Dr Ruth Wahila (Principal Supervisor): University of Zambia, School of Nursing Sciences, P.O Box 50110, Lusaka Zambia. Cell: +260 975971620 emails: ruth.wahila@unza.zm
3. Natalia Shitima (Co-Supervisor): University of Zambia, School of Nursing Sciences, P.O Box 50110, Lusaka Zambia. Cell +260 979670096, email: natalia.mbewe@unza.zm

Mametlelelo B: Foromo ya Tumalano e e Theilweng mo Tshedimosetsong ya go Tsaya Karolo mo Thutong

Fa o ka tlhopha go nna le seabe mo patlisisong eno, o tla kopiwa go saena foromo e e tsentsweng fano ya tumelelo:

Setlhogo: Dikgwetlho tsa go fitlhelela ditirelo tsa kalafi ya tshoganyetso mo baaging ba kwa magaeng kwa Otse Cluster, Kgaolo ya Mahalapye, Botswana.

Tlhaloso ya tumalano/kamano

..... o ntlhaloseditse diteng tsa pampitshana ya tshedimosetso ya go nna le seabe, e ke e tlhaloganyang sentle. Ke ne ka letlelelwa go botsa dipotso tse di neng tsa arabiwa ka tsela e e kgotsofatsang. Ke tlhaloganya sentle gore tshwetso ya me ya go nna le seabe mo thutopatlisisong eno ga e kitla e ama tiro ya me. Ke tlhomamiseditswe gore ke tla nna ke sa itsiwe le gore ke tla nna ke sa bolelelwe sepe. Ke a itse gore nka nna ka tlogela tiro eno nako nngwe le nngwe ke sa otlhaiwe. Ke tlhaloganya gore ka go saena foromo eno, ga ke tlogele ditshwanelo tsa me tsa semolao mme ke supa fela gore ke itsisitswe ka patlisiso e ke dumalanang go nna le seabe mo go yone.

Leina la Motsayakarolo .....

Letshwao la motsayakarolo .....

Letlha: DD/MM/YYYY

Leina la Mosupi: .....

Tshwaelo ya Mosupi: .....

Letlha: DD/MM/YYYY

Leina la motho yo o botsolotsang: .....

Letshwao la motho yo o botsolotsang: .....

Nomoro ya mogala: .....

Letlha: DD/MM/YYYY

Go bona tshedimosetso e e oketsegileng, tsweetswee ikgolaganye le:

1. Kesego Morake (mmatlisisi): Yunibesiti ya Zambia, Sekolo sa Saense ya Booki. Mogala: +267 7111471/ +260 960291224, imeili: morkesego@gmail.com

2. Dr. Ruth Wahila (Molaodi-Mogolo): Yunibesithi ya Zambia, Sekolo sa Saense ya Booki, P.O. Lebokoso la 50110, Lusaka, Zambia. Mogala: +260 975971620 di-imeile: ruth.wahila@unza.zm

3. Natalia Shitima (Co-Supervisor): University of Zambia, School of Nursing Sciences, P.O. Lebokoso la 50110, Lusaka Zambia. Mogala +260 979670096, imeili: natalia.mbewe@unza.zm

Appendix C: Data collection tool (Unstructured Interview/ FGD schedule)

Socio-demographic data

Study title: Challenges to Accessibility of EMS Among Rural Residents in the Otse Cluster Mahalapye, District, Botswana

Focus group No: …….

Date of interview: …….

Place of interview: …….

Name of researcher: …….

Section A: Socio-demographic characteristics

Please place an X at the correct answer or fill in the correct answer where required in the questions below.

What is your gender?

Male	
Female	

What is your age

Age category	Under 20 years	20-29 years	30-39 years	40-49 years	50-59 years	60 years and above

What is your level of education?

Primary	
Secondary	
Tertiary (specify qualification attained)	

How long have you been living in this village?

……

How long have you been working in this clinic?

……

Section B: Challenges to accessibility of EMS among rural residents in the Otse cluster, Mahalapye district, Botswana

What are the challenges that hinder the timely utilization of EMS among rural residents in the Otse cluster?

Probes for FGD

1. What challenges do you face when trying to access EMS?
2. Have you or someone in your household ever experienced a delay in receiving emergency medical assistance? What happened?
3. Are there transportation barriers that make it difficult to reach EMS services?
4. Do financial constraints affect your ability to call an ambulance or visit an emergency facility?
5. Are there cultural or traditional beliefs that influence your decision to seek emergency medical care?
6. Do language barriers or lack of health information affect your access to EMS?

Probes for KII

1. From your experience, what are the most common reasons for delays in EMS response times?
2. How does road infrastructure impact EMS response in the Otse cluster?
3. Are there enough trained professionals to meet EMS demands in rural areas?
4. How do socio-cultural factors impact the use of EMS in this region?
5. What efforts have been made to improve timely access to EMS in the Otse cluster?

Section C: Availability of EMS in rural communities

What is the availability of EMS in the rural Otse cluster?

Probes for FGDs

1. Can you describe how you usually access emergency medical services in your community?
2. How far is the nearest healthcare facility that provides emergency services?
3. Have you or someone you know ever needed an ambulance? If so, what was the experience like?
4. Are there enough ambulances or healthcare facilities to meet the community's needs?
5. Do you feel that EMS is available when needed? Why or why not?

Probes for KII

1. How many EMS vehicles and personnel are currently serving the in your facility?
2. What are the biggest logistical challenges in ensuring EMS availability in rural areas?
3. What is the average response time for an ambulance call in this region?
4. Are there enough trained EMS staff to handle emergencies effectively?

Section D: Strategies to improve EMS access in rural Otse cluster, Mahalapye district, Botswana.

what innovative strategies can be implemented to improve EMS accessibility?

Probes for FGDs

1. What changes would you like to see in the way EMS is provided in your community?
2. Are there local initiatives or community-based solutions that have improved access to emergency care?
3. Would you be open to community-based first responder training programs?

Probes for KII

1. What strategies have been successful in improving EMS access in other rural areas?
2. Could community health workers or volunteer responders play a bigger role in emergency care?

3. What role can technology (e.g., telemedicine, mobile alerts) play in addressing EMS challenges?
4. What policy changes or funding adjustments could enhance EMS services in rural Botswana?

Mametlelelo C: Sedirisiwa sa go kokoanya tshedimosetso (Puisano e e sa rulaganngwang/ Thulaganyo ya FGD)

Tshedimosetso ya loago le ya batho

Setlhogo sa patlisiso: Dikgwetlho tsa go fitlhelela EMS gareng ga baagi ba kwa magaeng kwa Otse Cluster, Kgaolo ya Mahalapye, Botswana

Setlhopha sa go tlhoma mogopolo No: .....

Letlha la go botsolodiwa: .....

Lefelo la go botsolotsa: .....

Leina la mmatlisisi: .....

Karolo A: Dikarolo tsa loago le tsa batho

Tsweetswee tshwaya karabo e e siameng ka X kgotsa tlatsa karabo e e siameng fa go tlhokega mo dipotsong tse di fa tlase.

Bong jwa gago ke bofe?

Monna	
Mosadi	

O na le dingwaga di le kae?

Age category	Under 20 years	20-29 years	30-39 years	40-49 years	50-59 years	60 years and above

O rutegile go le kana kang?

Primary	
Secondary	
Tertiary (specify qualification attained)	

O na le lobaka lo lo kana kang o nna mo motseng ono?

.....

O na le lobaka lo lo kana kang o ntse o dira mo tliliniking eno?

.....

Karolo ya B: Dikgwetlho tsa go fitlhelela EMS mo baaging ba kwa magaeng kwa Otse cluster, Mahalapye district, Botswana.

Ke dikgwetlho dife tse di kgoreletsang go dirisiwa ga EMS ka nako mo baaging ba kwa magaeng mo setlhopheng sa Otse?

Diphuthelwana tsa FGD

1. Ke dikgwetlho dife tse o lebanang le tsone fa o leka go dirisa EMS?

2. A wena kgotsa mongwe mo lelapeng la gago o kile a diega go bona thuso ya kalafi ya potlako? Go diragetseng?

3. A go na le dikgoreletsi tsa dipalangwa tse di dirang gore go nne thata go fitlhelela ditirelo tsa EMS?

4. A mathata a madi a dira gore o se ka wa kgona go bitsa ambulense kgotsa go ya kwa lefelong la thuso ya potlako?

5. A go na le ditumelo tsa setso kgotsa tsa setso tse di tlhotlheletsang tshwetso ya gago ya go batla kalafi ya potlako?

6. A mathata a puo kgotsa go tlhoka tshedimosetso ya tsa boitekanelo go ama tsela e o dirisang EMS ka yone?

Ditlhatlhobo tsa KII

1. Go ya ka boitemogelo jwa gago, ke mabaka afe a a tlwaelegileng a go diega ga nako ya go tsiboga ga EMS?

2. Mafaratlhatlha a ditsela a ama jang tsela e EMS e tsibogang ka yone mo setlhopheng sa Otse?

3. A go na le badiri ba ba lekaneng ba ba katisitsweng sentle go ka fitlhelela ditlhokego tsa EMS mo mafelong a magae?

4. Dintlha tsa loago le tsa setso di ama jang go dirisiwa ga EMS mo kgaolong eno?

5. Ke maiteko afe a a dirilweng go tokafatsa go fitlhelela EMS ka nako kwa setlhopheng sa Otse?

Karolo ya C: Go nna teng ga EMS mo ditšhabeng tsa magae

Go na le EMS e e kana kang kwa kgaolong ya Otse?

Diphuthelwana tsa FGD

1. A o ka tlhalosa gore gantsi o bona jang ditirelo tsa kalafi ya potlako mo lefelong la lona? 2. Lefelo la tlhokomelo ya boitekanelo le le gaufi le wena le le nayang ditirelo tsa tshoganyetso le kgakala go le kana kang?

3. A wena kgotsa mongwe yo o mo itseng o kile a tlhoka ambulense? Fa e le gore go ntse jalo, maitemogelo ao a ne a ntse jang?

4. A go na le diambulense tse di lekaneng kgotsa ditheo tsa tlhokomelo ya boitekanelo tse di ka kgonang go tlamela setšhaba ka dilo tse se di tlhokang?

5. A o akanya gore EMS e teng fa go tlhokega? Ke ka ntlha yang fa go ntse jalo?

Ditlhatlhobo tsa KII

1. Ke dikoloi le badiri ba le kae ba EMS ba ba direlang mo lefelong la lona gone jaanong? 2. Ke dikgwetlho dife tse dikgolo tse di leng teng tsa go dira gore EMS e nne teng mo mafelong a metseselegae?

3. Nako e e tlwaelegileng ya go araba fa go lelediwa ambulense mo kgaolong eno ke e e kana kang?

4. A go na le badiri ba ba lekaneng ba ba thapisitsweng ba EMS go kgona go lebana le maemo a tshoganyetso ka tsela e e nang le matswela?

Karolo D: Maano a go tokafatsa phitlhelelo ya EMS mo setlhopheng sa Otse sa kwa magaeng, kgaolo ya Mahalapye, Botswana.

Ke ditsela dife tse disha tse di ka dirisiwang go tokafatsa tsela e EMS e fitlhelelwang ka yone?

Diphuthelwana tsa FGD

1. Ke diphetogo dife tse o ka ratang go di bona mo tseleng e EMS e dirisiwang ka yone mo lefelong la lona?

2. A go na le maiteko a mo lefelong la lona kgotsa a a dirwang ke batho mo lefelong la lona a a tokafaditseng tsela ya go bona thuso ya potlako?

3. A o ka rata go nna le seabe mo dithulaganyong tsa go thapisa batho ba ba tsereng kgato pele go thusa ba bangwe?

Ditlhatlhobo tsa KII

1. Ke maano afe a a atlegileng mo go tokafatseng phitlhelelo ya EMS mo mafelong a mangwe a magae?

2. A badiredi ba tsa boitekanelo ba mo lefelong la lona kgotsa baithaopi ba ka nna le seabe se segolo mo ditirelong tsa potlako?

3. Thekenoloji e ka nna le seabe sefe (sekao, telemedicine, ditlhagiso tsa mogala) mo go rarabololeng dikgwetlho tsa EMS?

4. Ke diphetogo dife tsa pholisi kgotsa go baakanya madi go go ka tokafatsang ditirelo tsa EMS kwa metseselegaeng ya Botswana?

Appendix D: Letters

Request letter for Permission to conduct the study

Kesego Morake

P. O. Box 387

Oodi, Botswana

16 July 2024

The Chairperson

Biomedical Research Ethics Committee

University of Zambia

P.O. Box 50110

Lusaka

U.f.s: The Dean, School of Nursing Sciences

Assistant Dean Post-graduates, School of Nursing Sciences

Dear Sir/Madam

RE: Application for ethics clearance of a research proposal.

This communiqué provides information on the subject topic mentioned above. As a student pursuing a Master of Science in Emergency and Trauma Nursing, I am required to conduct a research study to meet programme criteria. In light of this, I am submitting the following study proposal: Challenges to Accessibility of EMS among Rural Residents in The Otse Cluster, Mahalapye district, Botswana, for your review and approval to move on to the following phase.

I hope that my application will be taken into consideration.

Yours faithfully

Kesego Morake

Cell: +267 71811471/+260 960281224

Email: morakesego@gmail.com

Request letter to conduct research

Kesego Morake

P.O. Box 387

Oodi, Botswana

03 October 2024

The Chairperson

Research and Development Division

Ministry of Health

Private Bag 0038

Gaborone, Botswana

U.f.s: The Dean, University of Zambia School of Nursing Sciences

Dear Sir/Madam

RE: Request to conduct a study in the Otse Cluster

This communiqué provides information on the subject topic mentioned above. As a student pursuing a Master of Science in Emergency and Trauma Nursing, I am required to conduct a research study to meet programme criteria. Considering this, I am submitting the study proposal titled Challenges to Accessibility of EMS Among Rural Residents in the Otse Cluster, Mahalapye District, Botswana, for your evaluation and consent to proceed to the next stage. I hope that my application will be considered.

Yours faithfully

Kesego Morake

Cell: +267 71811471/+260 960281224

Email: morakeso@gmail.com

Request letter to conduct the research

The University of Zambia

School of Nursing Sciences

P.O. Box 50110

Lusaka, Zambia

27 November 2024

Head of Research Board

Mahalapye DHMT

P.O. Box 43

Mahalapye, Botswana

U.f.s: The Dean, University of Zambia, School of Nursing Sciences

Dear Sir/Madam

RE: Request to conduct a research study at Otse Cluster, Mahalapye DHMT.

This communiqué provides information on the subject topic mentioned above. As a student pursuing a Master of Science in Emergency and Trauma Nursing, I am required to conduct a research study to meet programme criteria. Considering this, I am presenting the research proposal titled Challenges to the Accessibility of EMS among Rural Residents in the Otse cluster, Mahalapye District, Botswana, for your evaluation and consent to proceed to the next stage. I hope that my application will be considered.

Yours faithfully

Kesego Morake

Cell: +267 71811471/+260 960281224

Email: morakesego@gmail.com

Approval letter from UNZABREC

UNIVERSITYOFZAMBIA

BIOMEDICALRESEARCHETHICSCOMMITTEE

Telephone: +260 977925304 Ridgeway Campus Telegrams: UNZA, LUSAKA P.O. Box 50110 Telex: UNZALU ZA 44370 Lusaka, Zambia

Fax: + 260-1-250753 E-mail: unzarec@unza.zm

Federal Assurance No. FWA00000338 IRB00001131 of IORG0000774 NHRAR-REC No 2021-05-0002

25th September 2024

Your REF. No. 5680-2024.

Kesego Morake,

University of Zambia,

School of Nursing Sciences, P.O Box 50110, Lusaka.

Dear Sir/Madam,

RE: CHALLENGES TO ACCESSIBILITY OF EMERGENCY MEDICAL SERVICES AMONG RURAL RESIDENTS IN THE OTSE CLUSTER, MAHALAPYE DISTRICT, BOTSWANA (REF. NO. 5680-2024)

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 24th September, 2023. The proposal is **approved.** The approval is based on the following documents that were submitted for review:

a) **Study proposal**

b) **Questionnaires**

c) Participant Consent Form

APPROVAL NUMBER : REF. No. 5680-2024.

This number should be used on all correspondence, consent forms and documents as appropriate.

i. **APPROVAL DATE : 25th September 2024**

ii. **TYPE OF APPROVAL : Standard**

iii. **EXPIRATION DATE OF APPROVAL : 24th September 2025**

iv. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the UNZABREC Offices should be submitted one month before the expiration date for continuing review.

v. **SERIOUS ADVERSE EVENT REPORTING:** All SAEs and any other serious challenges/problems having to do with participant welfare, participant safety and study integrity must be reported to UNZABREC within 3 working days using standard forms obtainable from UNZABREC.

vi. **MODIFICATIONS:** Prior UNZABREC approval using standard forms

obtainable from the UNZABREC Offices is required before implementing any changes in the Protocol (including changes in the consent documents).

vii. **TERMINATION OF STUDY:** On termination of a study, a report has to be submitted to the UNZABREC using standard forms obtainable from the UNZABREC Offices.

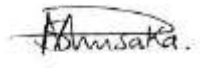
viii. **NHRA:** You are advised to obtain final study clearance and approval to conduct research in Zambia from the National Health Research Authority (NHRA) before commencing the research project.

ix. **QUESTIONS:** Please contact the UNZABREC on Telephone No. +260977925304 or by e-mail on unzarec@unza.zm.

x. **OTHER:** Please be reminded to send in copies of your research findings/results for our records. You are also required to submit electronic copies of

your publications in peer-reviewed journals that may emanate from this study. Use the online portal: unza.rhinno.net for further submissions.

Yours sincerely,



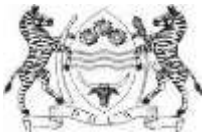
Prof. Sody Mweetwa Munsaka, BSc., MSc., PhD

CHAIRPERSON

Tel: +260977925304

E-mail: s.munsaka@unza.zm

Approval from MDHMT

MAHALAPYYE  DHMTTELEPHONE: 4718000

P.O. BOX 49 MAHALAPYEFAX: 4711179

FAX: 4711325TELEGRAMS: RABONGAKA TELEPHONE: (+267) 4718000 Republic of Botswana TELEX:

16 December 2024

REFERENCE: MH/DHMT/1/7/7 (90)

Notification of MDHMT IRB Review: **New Application**

To: Kesego Morake

P O Box 387

Oodi

Protocol Title: CHALLENGES TO ACCESSIBILITY OF EMERGENCY MEDICAL SERVICES AMONG RURAL RESIDENTS IN THE OTSE CLUSTER, MAHALAPYE DISTRICT, BOTSWANA

Review Type:	Expedited
Review Date:	1 3/12/2024
Approval Status:	Approved
Effective Date:	1 611212024
Expiry Date:	1 611212025

Risk Determination: Minimal Risk

The Mahalapye District Health Management Team (MDHMT) thank you for submitting the application documents for the above-mentioned protocol for evaluation. Based on the approval by the MDHMT Institutional Review Board ORB) on 13/12/24, the MDHMT-IRB hereby

approves your study. This implies that the MDHMT-IRB grants permission for the study to be initiated.

The study's approval is provided for a year, effective 16 December 2024, after which the continuation of the study is dependent on the issuing of a letter of continuation.

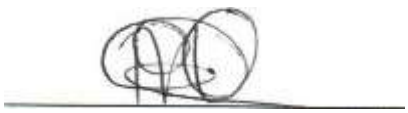
The approval applies strictly to the proposal as stipulated in the application. Should any amendments to the proposal be deemed necessary during the course of the study, the principal investigator must apply for approval of these amendments at the MDHMT-IRB, before implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.

Moreover, you are requested to submit an electronic copy of the report to MDHMT- IRB within 3 months of completion of the study.

If you have any questions or need further clarifications, please contact Dr S. Tshitenge (tshitenge@ub.ac.bw, Tel: 71550036), or M. Ralethaka (antonioralethaka@gmail.com, Tel: +267 71922235).

Thank you for your commitment to protecting the rights of human subjects in your research at the MDHMT.

Yours Faithfully,



M. Ralethaka/For Agt: MDHMT Coordinator

Mahalapye DHMT IRB Chair

Approval from MOH

TELEPHONE: 363 2500
FAX: 391 0647
TELEGRAMS: RABONGAKA
TELEX: 2818 CARE BD

MINISTRY OF HEALTH
PRIVATE BAG 0038
GABORONE

REFERENCE NO: HPRD 6/14/1 **04th November 2024**

Health Research Development Division

Notification of IRB Review: New Application

Kesego Morake
P O BOX 387
OODI

Dear Kesego Morake

PROTOCOL TITLE: CHALLENGES TO ACCESSIBILITY OF EMERGENCY MEDICAL SERVICES AMONG RURAL RESIDENTS IN THE OTSE CLUSTER, MAHALAPYE DISTRICT, BOTSWANA.

Review Type:	Expedited
Review Date:	24th October 2024
Approval Date:	04th November 2024
Effective Date:	04th November 2024
Expiration Date:	09th November 2025
Risk Determination:	Minimal Risk

Thank you for submitting new application for the above-referenced protocol. Permission is granted to conduct the study.

This permit does not however give you authority to collect data from the selected sites without prior approval from the management. Consent from the identified individuals should be obtained where applicable.

The research should be conducted as outlined in the approved proposal. Any changes to the approved proposal must be submitted to the Health Research and Development Division in the Ministry of Health for consideration and approval. Furthermore, you are requested to submit at least one hardcopy and an electronic copy of the report to the Health Research, Ministry of Health within 3 months of completion of the study. Copies should also be submitted to all other relevant authorities.

Continuing Review
In order to continue work on this study (including data analysis) beyond the expiry date, submit a Continuing Review Form for Approval at least three (3) months prior

to the protocol's expiration date. The Continuing Review Form can be obtained from the Health Research Division Office (HRDD), Office No. 7A.7 or Ministry of Health website: www.moh.gov.bw or can be requested via e-mail from HRDD office, e-mail address: hhealthresearch@gov.bw or hhealthresearch@govbots.onmicrosoft.com. As a courtesy, the HRDD will send you a reminder email about eight (8) weeks before the lapse date, but failure to receive it does not affect your responsibility to submit a timely Continuing Report form.

Amendments

During the approval period, if you propose any change to the protocol such as its funding source, recruiting materials, or consent documents, you must seek HRDC approval before implementing it. Please summarize the proposed change and the rationale for it in the amendment form available from the Health Research Division Office (HRDD), Office No. 7A 7 or Ministry of Health website: www.moh.gov.bw or can be requested via e-mail from HRDD Office, e-mail address: hhealthresearch@govbots.onmicrosoft.com

In addition, submit a copy of an updated version of your original protocol application showing all proposed changes in bold or "track changes".

Reporting

Other events which must be reported promptly in writing to the HRDC include:

- Suspension or termination of the protocol by you or the grantor
- Unexpected problems involving risk to subjects or others
- Adverse events, including unanticipated or anticipated but severe physical harm to human participants.

If you have any questions please do not hesitate to contact Mr Abia Sebaka at, asebaka@gov.bw, Tel +267-3632754 and Mr Kgomotso Motlhanka at, kgmmotlhanka@gov.bw, Tel +267-3632751.

Thank you for your cooperation and your commitment to the protection of human participants in research.

Yours Sincerely

Mr Abia Sebaka
for /PERMANENT SECRETARY

MINISTRY OF HEALTH
RESEARCH DIVISION
0 4 NOV 2024
P/BAG 0038, GABORONE
HEALTH POLICY RESEARCH & DEVELOPMENT