FACTORS LIMITING LUSAKA CITY COUNCIL FROM EFFECTIVELY DELIVERING FIRE AND RESCUE SERVICES: A CASE OF LUSAKA FIRE BRIGADE UNIT.

BY

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LUSAKA
2024

DECLARATION

I, STEWARD **HAMULANGU** hereby declare that the work presented in this dissertation is the result of my research work and that it has not previously been submitted for a degree, diploma or other qualification at this or another University.

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APPROVAL

This dissertation of **Steward Hamulangu** has been approved as partial fulfilment of the requirement for the award of the Degree of Master of Public Administration by the University of Zambia.

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ABSTRACT

The Provision of Fire and Rescue Services in Zambia is offered by the Fire Authorities under the Ministry of Local Government. Firefighting is the act of attempting to prevent the spread of fire and extinguish significant unwanted fires in buildings, vehicles, woodlands, among others. The Constitution of Zambia establishes firefighting as a function of local government and in this the Lusaka City Council. This research sought to study the management of fire and rescue services in Lusaka: A case of Lusaka Fire Brigade Unit.

In the recent past years Zambia has witnessed an unprecedented rise in fire incidences where properties worth millions of Kwachas have been destroyed. The study objectives included examining the extent to which human resource capacity of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services; investigate the extent to which financial capacity of the Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services and establish how equipment of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City. The methodology was mainly qualitative approach though some quantitative approaches were applied. A descriptive survey design was used where the researcher administered interview guides to four key informants as a mode of collecting data, and questionnaires to 152 firefighters.

The findings revealed that human resource at Lusaka Fire Brigade Unit was not enough despite being in tandem with the staff establishment that is 184 out of 190 and six on separation. The fire brigade unity is poorly funded; budgets were never met. Equipment, PPP is not modern and enough, fire trucks were few and unreliable, there were few fires hydrating points and no fire detecting system, among other hindrances.

Recommendations include; make Lusaka Fire Brigade Unit a Department from being a section. Establish several satellite fire stations and increase human resource to enhance fire and rescue services delivery. The government to increase the budgetary allocation to the Ministry of Local Government for the procurement of various equipment for the fire brigade unit. Resolve the defective 993 toll free fire emergency line.

Keywords: *fire brigade unit, fire and rescue services, local authority, effectiveness, human resource capacity, financial capacity, equipment.*

DEDICATION

To my late Mother, Julia Mukamulambo-Hamulangu, whose unwavering love breathed life into my education. I take pleasure in the support she gave me from the genesis until she departed.

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LIST OF ABBREVIATIONS

CSO - Central Statistical Office

CTIF - Centre of Fire Statistics of International Association of Fire and Rescue Services

DMMU - Disaster Management and Mitigation Unit

LA - Local Authorities

LCC - Lusaka City Council

MLGH - Ministry of Local Government and Housing, cited in

NFPA - The National Fire Protection Agency

RTA - Road Traffic Accidents.

ZAF - Zambia Air Force

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

The chapter will start by giving an introduction, followed by the background, then statement of the problem, general research objective and specific research objectives, general research question and specific research questions, significance of the research, conceptual frame work, definition of key concepts, conceptual frame work guiding the research, and lastly the structure of the dissertation.

1.2 Background to the Study

Fire has widely been accepted and seen as one of the greatest threats to buildings, occupants, fabrics, and contents (Agyekum, Ayarkwa and Amoah, 2016). Fire normally takes place without any warning. According to Spadaccini (1998), when fire is not effectively controlled or managed people may suffer injuries and at times death. There is also destruction of properties, temporary or permanent closure of buildings, among other things. According to Wanjiru (2007), world history is prevalent with events and stories of destruction attributed to great fires. From the great fire that destroyed Rome in 64 BC to the fires that raged through the Australian landscape in 2002, firefighting remains one of society's most difficult battles.

World over, fire hazards are a major concern due to their rapid and destructive consequences if not brought under immediate control (Spadaccini,1998). The prevalence of fires in both developed and developing countries underscores the need for proper and efficient management measures. In the United States of America (USA), concerns to address fire problems countrywide created the need to have a full-fledged body within the Federal Emergency Management Agency (Berneisten, 2000). The National Fire Protection Agency (NFPA) of the USA, in its 2001 report estimated property losses due to fire disasters at about 44 billion US Dollars (Kanyuithia, 2003).

Centre of Fire Statistics of International Association of Fire and Rescue Services (CTIF) (2019) shows that between 1993-2017 total fire statistics from 27-57 countries, collectively represented 0.9-3.8 billion inhabitants of the Earth, depending on the year of reporting. In these countries 2.5-4.5 million fires and 17-62 thousand fire deaths were reported to fire

services, depending on the year. In 34 countries, representing 1.1 billion, 15% of the World's population, 49 million calls, 3.1 million fires, 16.8 thousand civilian fire deaths and 47.9 thousand civilian fire injuries were reported by fire services in 2017. Above statistics shows the magnitude of fire outbreaks and need for effective fire brigade service delivery.

Pelling and Wisner (2009) argue that fires are among man's oldest concern since prehistory and myth period but are hardly scrutinized critically to develop efficient fire service delivery strategies. This has led to significant increase in fire damages in the last one and half decades. However, Wanyande and Odhiambo-Mbai (2013) postulates that many governments all over the world are now putting in place fire safety management measures to control any fire outbreak. Wanyande and Odhiambo-Mbai (2013) further asserts that in an increasingly competitive world, sound fire service delivery is essential in managing fire outbreaks.

In Zambia, the responsibility of providing fire services is constitutionally a mandate of Local Authorities (LAs). The Constitution of Zambia establishes firefighting as a local government function. The Local Government Act of 2019 and its subsidiary legislation, the Local Administration (Fire Services) Regulations – Statutory Instrument (SI) No. 121 of 1991 and the Local Government (Fire Inspectors and Fire Officers) Order of 2012, are the core statutes governing fire management in Zambia, further the Local Government Act of 2019 provides for the establishment of fire authorities and mandates Government to make financial grants to relevant local councils for fire services. In addition, the Act directs District Councils to establish and maintain firefighting and prevention services and to take measures that protect life, property, and natural resources from damage by fire (GRZ, n.d).

GRZ (n.d) reveals that household and related fires were the most common emergencies or incidents that fire brigades responded to in the period 2014-2016, followed by road traffic accidents (RTAs). This is according to countrywide Fire Brigade Administrative records from 2012 to 2016. Therefore, Local Authorities in Zambia have been expected to establish and equip appropriate institutions to effectively manage fire risks and rescue needs (Luskatimes.com). The above activities require the presence of effective institutions, coordination, enforcement, and monitoring and evaluation mechanisms.

Currently, fire management in Zambia is government centred. This is evident in that most fire and rescue service provision in the country is done by District Councils for their areas of jurisdiction as mandated by the Local Government Act No.2 of 2019. This means that all

District Councils must provide fire and rescue services regardless of when they were established or their financial capacity. Notably, in some instances, fire services can be provided by the private sector and volunteer agencies or the government can subcontract. However, in Zambia, there is limited participation of the private sector. Community and volunteer involvement in fire management is also limited at all levels. Fire services are mainly provided by local authorities. This has led to a situation where some areas do not have fire brigades while those that have are providing fire and rescue services exhibiting wide variations in the level of service, which is predominantly low (GRZ, n.d; Zambia Daily, 2017).

According to Disaster Management and Mitigation Unit (DMMU) (2008) the frequency of natural and human induced fires in Zambia has been on the increase and the Fire and Rescue Services Organizations' abilities to save property and lives in locations where fires have occurred has been reportedly inadequate. This suggests that Zambia is faced with inadequacy in responding to fire disasters of high magnitude (Phiri, 2014; Mwiinga, 2009; Zambia Daily, 2017). From this perspective, it becomes imperative to establish the management of fire brigade services in Lusaka City

1.3 Statement of the Problem

Despite the government investing money towards fire management in recent past years, delivery of fire brigade services has been reportedly poor (Zambia Daily Mail, 2017). In the recent past years Zambia has witnessed an unprecedented rise in fire incidences where properties worth millions of Kwachas have been destroyed. This is evidenced by recent gutting of the Lusaka City Market, and Kapalala Market in Ndola where thousands of traders were robbed of their source of livelihoods (Zambia Daily Mail, 2017). According to DMMU (2017), in relation to Lusaka City Market, about 1,908 stands were gutted and looted with an estimation total cost of the items that were burnt and looted being ZMK63, 482,916.00. Other markets that have been burnt before include; Luburma Market in Lusaka where 120 stalls were destroyed, Kapalala Market an extension of Ndola's main Masala market and Nakambala market in Mazabuka District destroying property worth ZMK284, 680. Owing to increased population, infrastructure development and mushrooming shanty compounds, the situation has been worse in Lusaka District. Concerns from the public about fire machines arriving too late and often without enough water to contain the fire have been reported (GRZ, n.d).

The country has also experienced fire incidences in some big buildings such as Building Society in 1997, Cabinet Office in 1997, and Indeni Oil Refinery in 2000 among many others. Fire incidences in residential buildings have also been reported with efforts to manage fire outbreaks in the country reportedly unsatisfactory in most cases (DMMU, 2008). In most cases, the fire men and women have watched hopelessly as buildings, markets, houses, and properties are burnt to ashes (DMMU, 2008). This raises questions regarding the capacity of local authorities to manage fire outbreaks. To this end, it therefore becomes imperative to establish factors that may account for ineffective delivery of fire brigade services in Lusaka District.

1.4 Research Objectives

1.4.1 General Objective

To establish the factors that accounts for the Lusaka City Council's limitations in effectively delivering fire and rescue services in the City.

1.4.2 Specific Objectives

(i) To examine the extent to which the human resource capacity of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City.
(ii) To investigate the extent to which the financial capacity of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City.
(iii) To establish the extent to which equipment at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City.

1.5 General Question

What factors accounts for the Lusaka Fire Brigade Unit's limitations from effectively delivering fire and rescue services in the City?

1.5.1 Specific Questions

Within the specific objectives outlined above, the study seeks to answer the following questions:

(i) To what extent does the human resource capacity of Lusaka Fire Brigade Unit account for limitations to effectively deliver fire and rescue services in the City?

(ii) To what extent does the financial capacity of Lusaka Fire Brigade Unit account for limitations to effectively deliver fire and rescue services in the City?

(iii) To what extent does equipment at Lusaka Fire Brigade Unit account for limitations to effectively deliver fire and rescue services in the City?

1.6 Significance of the Research

The significance of this research is that it has provided academic information on the Management of fire and rescue services. Fire and rescue services delivery has been chosen for this research because Local Authorities across the country have been reportedly facing challenges in delivering fire and rescue services (Banda, 2018; GRZ, n.d). The information that has been provided by this research is useful to the government, local authorities, policy makers and other stakeholders. Firstly, it is of benefit to the policy makers who may in future, be able to come up with policies that can improve fire and rescue service delivery. Secondly it may benefit local authorities who are likely to gain knowledge on how to effectively deliver fire and rescue services. Thirdly it might be of benefit to the citizens and institutions, as they are likely to gain knowledge of how they can contribute or play their part in management of fire outbreaks and traffic accidents. To sum it up, this study is important as it provides information to practitioner which can contribute to the achievement of efficiency and effectiveness in the delivery of fire and rescue services.

1.7 Conceptual Framework

The study uses a conceptual framework to examine the effectiveness of fire and rescue services in Lusaka district. The conceptual framework is divided into two parts. The first part provides definitions of key concepts. The second part provides a conceptual framework by focusing on the following variables: (a) Human Resource Capacity, (b) Financial Capacity (c) Equipment and (e) Fire and Rescue Services. These variables were chosen because they are key and necessary in evaluating the effectiveness of fire and rescue services by the local authority.

1.7.1 Definitions of Key Concepts

The key concepts in this research are:

(i) **Fire Brigade Unit:** An organised body of people trained and employed to extinguish fires and respond to rescue incidents.

(ii) **Fire and Rescue Services:** This refers to the process of planning, preventing, and fighting fires to protect people, property, and forest resources.

(iii) **Local Authority**: -Refers to an organization that comprises elected and appointed officials responsible for the provision of all public services and facilities in a particular area. These public services include provision of school, hospitals, feeder roads, street lights, fire, and rescue services etc.

(iv) **Effectiveness**: This refers to the degree to which the Fire Brigade Unit can deliver fire and rescue services.

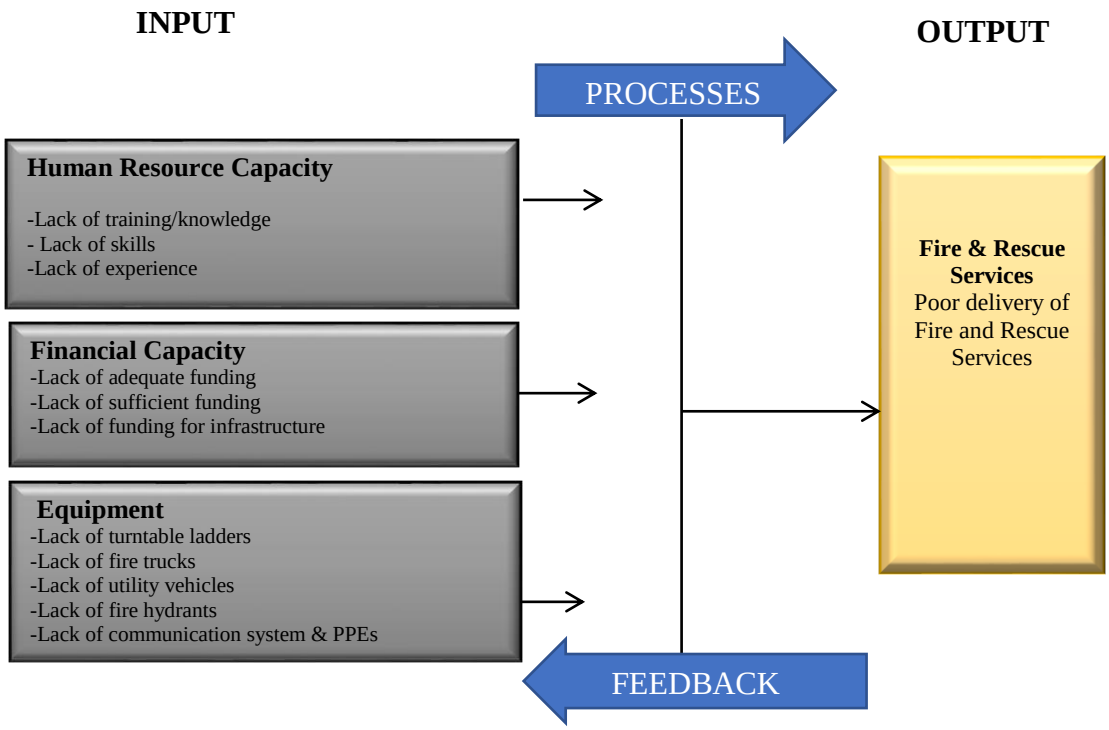
(v) **Human Resource Capacity**: This refers to the availability of suitably qualified staff able to understand fire prevention, management and deliver fire and rescue services.

(vi) **Financial Capacity**: This refers to the availability of finances that are necessary to effectively deliver fire and rescue services by the Fire Brigade Unit.

(vii) **Equipment**: This refers to the availability of capital equipment such as fire trucks, and other fire prevention and management equipment that is necessary for fire management by the Fire Brigade Unit.

1.7.2 Conceptual framework guiding the Research

As earlier indicated to, the conceptual framework is guided by the following variables: (a) Human Resource Capacity (b) Financial Capacity (c) Equipment (d) Fire and Rescue Services



Source: Author, 2023

Figure 1.1: Conceptual Framework

The conceptual framework of this study is based on the assumptions and concepts derived from the systems theory. Bertalanffy (1972) in his systems theory hypothesis that everything is part of a larger, independent arrangement and it is centered on clarifying the whole, its parts, and the relations between them. The systems theory shows that a system is composed of various sub systems that work together to achieve specific set goals. In this dissertation, the components comprise of factors related to human resource capacity, financial capacity, and equipment that are required to effectively deliver fire and rescue services. The interaction of these components contributes towards effective delivery of fire and rescue services. The inputs that are fed into the system are acquired from the environment which is influenced by social, economic, legal, political factors. These factors can sometimes, affect the inputs that are available in the environment. In this dissertation the inputs under human resource include training, skills, and knowledge, under financial capacity includes finances and infrastructure

funding, and under equipment include turntable ladders, fire trucks, drone, cameras, fire hydrants, ambulances, utility vehicles, communication system, personal protective clothing, and firefighting foam.

Sterman (2000) argues that once acquired, inputs are processed and converted to produce desired end. In this regard, this involves processes related to management of fire brigade station, finance, equipment, and personnel to ensure effective delivery of fire and rescue services thereby leading to effective management of fire outbreaks. The extent to which services are delivered depends on the availability of inputs herein classified under human resource capacity, financial capacity, and equipment. In this dissertation, fire and rescue service delivery encompasses many parts which constitute human resource capacity, financial capacity, and equipment aspects of the fire brigade unit. To derive at arguments of the systems theory is to argue that effective fire and rescue service delivery requires response time that is at par, with available equipment, financial resources, personnel with skills and knowledge, support of the top management and the competition from outside quotas within the fire station.

According to Weinberg (2001), these systems are open not only in relation to their environment but also in relation to themselves; the interactions between components affect the system as a whole and influences and/or affect effective fire and rescue service delivery. Arguably, effective delivery of fire and rescue services requires availability of adequate equipment (such as fire trucks, uniforms, utility vehicles etc.) well trained, skillful and, well financed fire station, and effective fire detection system or devices put in place among other factors. Effective interactions of these components are expected to lead towards effective delivery of fire and rescue services and vice-versa.

Put simply, the aforementioned factors classified under human resource capacity, financial capacity and equipment are expected to affect the output of the system herein regarded as fire and rescue service delivery. Debatably, lack of adequate firefighting equipment (such as fire engines, vehicles, protective clothing), well trained, skillful, and motivated fire fighters, well financed fire station, and effective fire detection system or devices put in place among other factors is expected to affect effective management of fire outbreak. The feedback stage in the system is composed of acquisition of information from the environment regarding the systems performance.

Therefore, in this study fire and rescue services refers to the provision of fire and rescue services by local councils to local communities. The understanding in this framework is that effective provision of fire and rescue services largely depends on the human resource capacity, financial capacity, and equipment of the local authority. The extent to which the fire station will respond and manage fire outbreak will depend on the aforementioned factors. For instance, according to United Nations Development Programme (2011), the fire department need well maintained vehicles, machinery, technology, and equipment to effectively deliver fire and rescue services. For this study, lack of adequate and proper equipment is expected to negatively affect effective delivery of fire and rescue services by local authorities. The assumption is that if a local authority lacks adequate equipment, technology, and machinery; then delivery of fire and rescue services will be poor. The extent, to which the fire brigade unit will manage, be prepared, and effectively respond to fire outbreaks largely will depend on the availability of human resource, finance, and equipment.

According to Meadows (2008), availability of competent and skillful human resource is seen vital towards effective delivery of fire and rescue services. Here, competent, and skillful human resource entails fire fighters who have undergone adequate training and possess adequate knowledge on fire fighting. To this end, lack of adequate and suitably qualified human resources is expected to inhibit effective and efficient provision of fire and rescue services. Well trained and knowledgeable human resource is expected to have a positive influence on the delivery of fire and rescue services. A council with adequate human resource capacity is expected to deliver fire and rescue services efficiently. Ansell and Gash (2008) argue that fire stations staff with technical skills training are more at ease in participating in technological advancement to improve fire and rescue service delivery. Therefore, lack of technical skills on fire and rescue service operations among fire station staff and lack of knowledge on fire and rescue service delivery is expected to limit effective and efficient fire and rescue service delivery.

To conclude, fire and rescue service delivery in this study is the dependent variable being influenced by availability of human and financial and equipment related factors. Changes in the three independent variables are likely to affect the effectiveness of fire and rescue service delivery. The indicators of effective delivery of fire and rescue services will be measured in terms of the equipment, financial and human resource capacity of the local authority to

respond and manage fire outbreaks. By having adequate human resource, finances, and equipment, the local authority is expected to effectively deliver fire and rescue services.

1.8 Structure of the Dissertation

This dissertation has been divided into seven chapters. Chapter one provides the introduction and background of the study. The second chapter presents the statement of the problem, objectives of the study, research questions, and significance of the research, conceptual framework. Chapter one ends with a presentation of the structure of the dissertation. Chapter two presents literature review relevant to the research. It reviews relevant and related literature on management of fire and rescue services. Chapter three presents the methodology used in this research. Specifically, the chapter presents the type of research, the location of the research, the research approach, research design, sources of data, sample size, sampling methods, data collection methods, reliability of data, validity of data, truthfulness, data analysis methods, ethics applied when conducting the research and the limitations of the research. Chapter Four examines the extent to which human resource capacity of Lusaka City Council may account for limitations to effectively deliver fire and rescue services. It focuses on skills, knowledge, and training of human resource to deliver fire and rescue services. Chapter Five investigates the extent to which financial capacities of Lusaka City Council may account for limitations to effectively deliver fire and rescue services. The chapter focuses on adequacy of funding, for the fire brigade. Chapter Six establishes the availability of equipment at Lusaka Fire Brigade Unit. The chapter focuses on the availability of equipment to effectively deliver fire and rescue services. Chapter Seven gives the conclusions and recommendations of the study. The chapter provides overall conclusions and recommendations in terms of policy and areas for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviews literature on the management of fire and rescue services. Due to scantiness of literature on the management of fire and rescue services in Zambia, the literature review takes a general approach. However, it was anticipated that even in this case, important lessons were to be drawn to inform the present research. To achieve its purpose, the chapter begins by reviewing related literature on human resource capacity of fire brigades, financial capacity of fire brigades, equipment of fire brigades, literature on Management of Fire and Rescue Services in Zambia, Management of Fire and Rescue Services in Africa, and Management of Fire and Rescue Services outside Africa**.** The researcher attempted to identify gaps and lessons that provided a basis for this research. Consequently, a conclusion was presented.

2.2 Literature on Human Resource Capacity

This section reviews literature on human resource capacity. Due to lack of literature on human resource capacity on fire and rescue services in Zambia, the literature review takes a general approach.

The greatest assets of any organization are its human resources that ensures the achievement of the company's goal and objective. It is unfortunate that most companies and organizations have neglected the development and management of their chief asset which is human resource. According to Wikipedia, Human resource is a set of individuals who make up the force of an organization. Human resource management encompasses activities designed to provide for and co-ordinates, all human elements within the organization. This will ensure its stable continuity and achievement. The human personnel elements represent one of the company's largest investments. Susan (2012), argues that consequently organizations should prioritize the development of the human element to maximize talents, skills and ability which will automatically reflect on the company's profit.

Luedtke (2009) conducted a study in fulfillment of the requirement for Master of Science Degree *at* University of Wisconsin in Risk Control on "*Identification of the Best Methods of*

Firefighter Training at the Menomonie Fire Department and Rice Lake Fire Departments". The purpose of this study was to evaluate the methods of training currently in use by the Menomonie and Rice Lake fire departments. To achieve the purpose of this study four goals were established: 1. Analyzing training of full-time firefighters and Paid On Call firefighters at the Menomonie Fire Department and Rice Lake Fire Department , 2. Determine the most effective methods of training by means of a survey of Menomonie Fire Department and Rice Lake Fire Department firefighters and analysis of the results, 3. Make recommendations to the Menomonie Fire Department and Rice Lake Fire Department to make its training more effective and efficient while meeting applicable codes and 4. Survey firefighters to determine what they feel was the most practical and effective in terms of training.

To maximize the effectiveness of firefighter training the author developed the following conclusions:

1. Whenever possible, hands-on training should be utilized.
2. Classroom training should be kept to a minimum.
3. Implementing closely monitored mentoring programs over the next five to ten years.

Review of Luedtke's (2009) study is important to this research to the fact that it brings out useful information on identification of the best methods of firefighter training. However, the omission in Luedtke's (2009) study is that it did not reveal how the best methods of firefighter training accounts for limitations to effectively deliver fire and rescue services by local authorities.

Smith (2019) conducted a study in partial fulfillment of the requirements for the degree of Doctor of Education at Appalachian State University on "*A Case Study of a Community College's Basic Firefighter Program and Its Capacity to Meet Regional Firefighting Requirements"*. The purpose of this study was to gain a better understanding of the firefighter training programs offered at a local community college and the capacity of these programs for meeting the needs of local stakeholders. The stakeholders that were considered included current students, graduates, local firefighting officials, and citizens who were currently served by this county's emergency services. A review of the current firefighter program components at this North Carolina community college was used to determine whether changes should be made to better prepare firefighting candidates for professional departments within the local county. The study applied a case study research design using data derived from surveys,

interviews, an analysis of the current curriculum, and regional emergency response data. Overall, this study illustrated an industry shift and a need to modify the current training program. Recommendations were made for these modifications consistent with study's results.

1. Eliminate course titled "Emergency Medical Care" from NC Fire Fighter I and II certification. This curriculum change eliminates fifteen-hours.
2. Combine NC Fire Fighter I and II course titled "Rescue" and EMT-B module title "Vehicle Extrication." This curriculum change would eliminate eight-hours.
3. Both credentials have victim management components that should be shared. Victim management curriculum teaches methods for dealing with injured patients.

This curriculum change eliminated eight-hours but still teaching the student needed skills. These highlighted changes would eliminate thirty-one hours from the program which makes combining the program a good option for stakeholders.

Review of Smith's (2019) study is important to this research for it brings out useful information on community college's basic firefighter program and its capacity to meet regional firefighting requirements. However, the gap in Smith's (2019) study is that it did not review how firefighters accounts for limitations to effectively deliver fire and rescue services by local authority.

Nikolic and Petkovic (2015) conducted a conference in Belgrade on "*Human Resource Challenges in Fire Services as an Issue of Public Safety"*. Fire departments and fire-rescue units play a vital role in the public safety of every country. However, there is an evident lack of research in the field of human resource management in fire services, even though the job of a firefighter-rescuer is one of the riskiest and the most challenging professions worldwide. There is a huge gap between the challenges faced by fire services and the current level of their performance. The significance of functions of human resource management for the performance of any organization opens up a number of issues of human resource management in fire services. Based on the analysis of relevant literature and legal and normative sources, the authors of this paper identified key challenges of human resource management in fire departments and pointed out some of the directions towards their solution. Undeniably, the list of challenges is neither final nor exhaustive; it is rather a call for action to undertake novel research opportunities in this field.

Review of Nikolic and Petkovic's (2015) study is of great significance to this research to the fact that it reveals human resource challenges in fire services as an issue of public safety. However, the shortfall in Nikolic and Petkovic's (2015) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Yang, Han, and Cui (2023) conducted a study in Beijing on "*Analysis of Factors Influencing the Training Effectiveness of Chinese Firefighters"*. The important concepts of training effectiveness have been widely addressed by fire departments worldwide. Therefore, this paper examined and studied firefighter training effectiveness influencing factors to reveal firefighter training effectiveness influencing factors in emergency rescue training scenarios and test firefighter training effectiveness influencing factors hypotheses.

Through the analysis and research of training effectiveness by scholars worldwide and field surveys, hypotheses on the influencing factors of firefighter training effectiveness were made, and the entire training effectiveness was categorized into four potential variables and 21 observed variables. Using an empirical research method, 542 valid questionnaires were collected from firefighters in the Daxing District of Beijing to obtain practical information on physiological and psychological aspects of training; the questionnaire data were analyzed using Statistical Package for the Social Sciences software, and the hypothesized relationships between variables were tested by structural equation modeling, and the established model was validated by testing the goodness of fit and using the factor loadings and weights of each potential variable in the model to characterize the effects of each factor on training effectiveness. The model was validated by testing the goodness of fit and using the factor loadings and weights of each potential variable to characterize each factor's effects on training effectiveness.

The results showed that the possible variables affecting firefighter training effectiveness in descending order of factor loadings and weights were mental state 0.71, training intensity 0.65, physiological state 0.59, and rescue behavior 0.47, with mental state, physiological state, and training intensity having a direct effect on firefighter training effectiveness.

Review of Yang, Han, and Cui's (2023) study is important to this research to the fact that it brings out important lessons on factors influencing the training effectiveness of fire fighters. However, the short fall in Yang, Han, and Cui's (2023) study is that it does not show how

firefighters accounts for limitations to effectively deliver fire and rescue services by local authorities.

Kamuk (2020) conducted a study in fulfillment of the requirement for Master of Science degree at Hitit University, Corum in Turkey on "*Effects of training on firefighters' physical readiness, fitness, and Body Mass Index levels"*. Firefighting is arduous work and it requires a high level of physical fitness and readiness. The purpose of this study was to assess the physical fitness and readiness levels of the Turkish firefighters and investigate the effects of 12-week exercise on firefighters' fitness levels.

The study was an experimental study in which 41 firefighters participated voluntarily. Ethics committee approval and written consents were obtained prior to the study. The experiment group attended to a 12-week planned exercise sessions for two times per week for 90 min. The control group did not participate into a planned exercise during that period. Any caloric restrictions were not recommended nor were calorie intakes controlled in either group. As the Shapiro-Wilk and Q-Q plot tests revealed that the data were normally distributed, independent samples t- test, paired-samples t-test, and Pearson's r to analyse data.

The results indicated that body mass index levels of the firefighters in both groups were over the critical level suggested by the World Health Organization and their VO2 max levels did not meet the minimum requirements. It was also found that Body Mass Index had disruptive effects on physical performance. The experimental group had significant improvement after attendance to 12-week training but the control group's performances were worsened. It was concluded that the firefighters' physical performances were low and they were highly prone to be obese. Instant measures, including promoting exercise and regularly testing the physical performance levels of the personnel, should be taken to reverse the current undesirable situation.

Review of Kamuk's (2020) study is important to this research to the fact that in brings out relevant information on effects of training on firefighters' physical readiness, fitness, and Body Mass Index levels. The short fall in Kamuk's (2020) study is that it did not focus on how fire fighters accounts for limitations to effectively deliver fire and rescue services by local authorities.

Templeman (2021) conducted a study in fulfillment of the requirement for Master of Professional Studies at University of Queensland in Australia on "*An Exploration of Recruit Firefighter Training and Adult Learning Principles"*. Firefighters are required to respond to unpredictable situations that necessitate physicality and time-critical actions. Recruit training is the initial training that is designed to prepare civilians for the rigors of their profession as firefighters. Traditionally, recruit firefighter training has been delivered utilising a paramilitary instructional approach. This training approach, which at its extreme applications has shown negative effects on self-esteem, learning capacity and psychological growth, is incongruent with modern adult learning theories. While the role and skill set of firefighters have undergone significant transformation over recent decades, the training approach for recruit firefighters has remained largely unchanged.

This study conducted semi-structured interviews with 16 recently graduated firefighters from the Queensland Fire and Emergency Service. It examined whether the current recruit firefighter training program was aligned with adult learning principles. It also explored the impact of the current training approach on the trainee and whether adult learning principles could be successfully applied to recruit firefighter training.

This study found out that while the training approach varied across recruit courses, instructors and individual experiences, the current recruit firefighter training program was heavily seated within a paramilitary instructional approach. The impact of this approach on the learner varied based on respondents' perception of whether paramilitary training was necessary or unnecessary for the development of professional competence. Furthermore, it found out that respondents believed adult learning principles could be successfully applied to recruit firefighter training, however, that it should be applied in a manner that maintains the rigour of training and is contextually appropriate to the role of firefighters. This study proposes a reformed recruit firefighter training program. It recommended a blended training approach that draws on the strengths of adult learning and paramilitary training in a complementary framework.

Review of Templeman's (2021) study is important to this research to the fact that it brings out useful information on exploration of recruit firefighter training and adult learning principles. However, the gap in Templeman's (2021) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Vidal-Gomel, Delgoulet, and Gabbai, (2012) conducted a study on "*Specialisation and training for fire-fighters driving heavy rescue vehicles: Consequences for the development of operators"*. This work was undertaken in France at the request of a local fire and rescue school in order to conduct an analysis of driving two types of heavy rescue vehicle with a view to improving training. This study took place in a context of specialisation: the drivers of these vehicles henceforth performed this type of task only. Consequently, specific training had been designed in advance. This study was concerned with the improvement of this training, taking account of the particularities of driving these vehicles in emergency situations typical to the profession of fire-fighters. The results first stressed that driving of rescue vehicles in emergency situations was a multidimensional collective activity. Driving strategies identified shared certain common objectives: "optimising trajectories", warn other road users, anticipate their behaviour and leave room for maneuver to counter and react to any unexpected behaviour. They included risks management for the potential victims of the incident and the risk of accidents during the journey. These initial results helped to identify certain recommendations for the training courses dealing with driving vehicles in emergency situations. They also provided a warning concerning the possible consequences of driver specialisation.

Review of Vidal-Gomel, Delgoulet, and Gabbai's (2012) study is worth noting to the fact that it brings out useful lessons on specialisation and training for firefighters driving heavy rescue vehicles and consequences for the development of operators. However, the gap in Vidal-Gomel, Delgoulet, and Gabbai's (2012) study is that it did not illustrate how specialised training for firefighters driving heavy rescue vehicles accounts for limitations to effectively deliver fire and rescue services by local authorities.

Nwaodike and Dem (2019) conducted a study on "*Human Resource Management Activities and Performance of Fire Services in Abia and Anambra States, Nigeria"*. Organizations are rated high based on their performance and it is the responsibility of the human resources management to coordinate the personnel to attain the stipulated objectives. Thus, human resources managers are meant to attract, develop, motivate, and retain human resources in order to increase organizational performance. This is expected in the fire services of Abia and Anambra States. Paradoxically, their performance is hardly felt in the area of their principal mandate of protecting lives and properties from unwanted fire. Consequently, the two largest markets in the south east, Abia and Onitsha, suffer from frequent fire outbreaks.

This study examined the influence of human resources management activities on the performance of the fire services in the identified states. The study adopted a survey research design. Census was adopted as the population which is the 96 personnel of Abia and Anambra states fire services. Questionnaire and interview guide were used as instruments for data collection. The response rate was 100 percent. Face-to-face interviews were purposively conducted on the fire service director, human resource manager, fire service commander, serving fire service personnel, retired fire service personnel, three market leaders and the public, in the two States. Quantitative data was analyzed using descriptive statistics while qualitative data was thematically analyzed.

Findings revealed that Human Resource Management was a significant predictor of performance. The nature of recruitment with a p-value = 0.000 was significant at 0.05 percent. Also, Human Resource Management activities with a p-value = 0.007 was significant at 0.05 level of significance. However, the influence of motivation on performance with a p-value = 0.677 was not significant at 0.05 percent. Motivation is only significant in combination with recruitment and management activities yielding a p-value = 0.000 which was significant at 0.05 percent. The study concluded that human resource management has positive influence on the performance of the fire services in Abia and Anambra States; thus, it should be given more attention. Hence, the study recommended enhanced nature of recruitment; avoiding favoritism; improving salaries and welfare packages of workers; upgrading infrastructures in the areas of road networks and building more fire service stations.

Review of Nwaodike and Dem's (2019) study is important to this research to the fact that it brings out important information on human resource management activities and performance of fire services. The flaw in Nwaodike and Dem's (2019) study is that it did not show how human resource capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

Uchechukwu and Uche (2015) conducted a study at University of Agriculture, Umudike, Abia State, Nigeria, Department of Business Administration on "*Analysis of Human Resources Development as a Critical Factor on Organization Productivity"*. The study aimed to determine the extent at which effective human resources development can enhance productivity in order to reduce poor performance in organization, to determine the efficiency of human resources training and development in organization growth, to ascertain if human resource development have many significant impact on organizational profitability, to

determine and identify the factors affecting human resource development and organizational productivity and to ascertain the attitude of the senior management and other employees on the need for proper utilization of available human resources which have tremendous effect on the firms productivity.

The five research questions and three hypotheses were formulated in line with the objectives of the study. To achieve the aims of the study, data was collected from both primary and secondary sources. Data collected were analyzed by use of means, variance, and standard deviation and three hypotheses formulated were tested using z-test statistical tool.

Based on the analysis, the study found out that human resource development is very vital to any organization ranging from small to large scale enterprises since it is well known that no business can exist entirely without a human being, also that one of the major functions of human resource development is the engagement of people to work in order to achieve sales growth and profitability, another finding is that the method of training and development as gathered from interviews conducted by the researcher were just by reason of the problems the company had due to lack of funds. Based on the finding of the study, the researcher recommended that organizations should inculcate the habit of attending seminars and conferences, the company should make sure that the effort of employees is appraised from time to time to find out how they contribute to the achievement of organizational goals and educational qualification must be pre-requisite for the recruitment, selection, promotion, and placement of workers.

Review of Uchechukwu and Uche's (2015) analysis is important to this study to the fact that it brings out useful information on how human resource development is a critical factor on organization productivity. However, the gap in Uchechukwu and Uche's (2015) study is that it did not focus on how human resource capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

Taber, Plump and Jelerome (2008) conducted a study in Canada on "*Grey Areas and Organized Chaos in Emergency Response",* The purpose of this research was to explore the interaction between organizational policies and daily work practices of paramedics and firefighters within two emergency response organizations.

Design, methodology, approach, and Data were collected in a case study consisting of interviews, focus groups, and observations. The theoretical grounding for this research was framed by learning in practice through legitimate peripheral participation.

Findings analysis of the data found out that paramedics and firefighters value learning in their daily work above initial qualification training. They learn in practice through increasing collaboration with others, and in the broader context of legitimate peripheral participation. Organizational policies can help in guiding their decision-making processes, but learning in practice and relying on experience is most helpful in their daily work.

Research limitations, the notion of situated learning was insufficient to explain the dramatic performance of emergent, creative, and autonomous actions often required of individual emergency personnel in crisis situations. Originality and value, this study adds to the current literature on communities of practice and legitimate peripheral participation. It applies learning theory to emergency response organizations to demonstrate the need to focus on practice and understandings in workplaces. The research also offers a greater understanding of the unique job of emergency response personnel who must often make instantaneous decisions in critical situations and must therefore understand their practice to ensure positive outcomes.

Review of Taber, Plump and Jerome's (2008) study is important to this research to the fact that it brings out important information on the crucial use of simulations based on real life for preparing people to deal with stressful and challenging situations in their work. However, the gap in Taber, Plumb and Jerome's (2008) study is that the study does not show how human resource capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

Victoria (2003) conducted a study on "*Community Based Approaches to Disaster Mitigation in Philippines"*. Community participation was recognized as the additional element in disaster management necessary to reverse the worldwide trend of increasing frequency and loss from disasters, building a culture of safety and disaster resilient communities, and ensure sustainable development for all. This paper highlighted the features, processes, components, and gains of community-based disaster management as showcased by good practices in community-based preparedness and mitigation of key organizations involved in the Philippine Disaster Management Forum. The study argues that skills and responses capacity of

firefighting personnel is critical to the success of fire suppression and overall disaster management. Therefore, since it was established that firefighting is more practical oriented than academic, there is need for more personnel to undergo training and examination for the various fire promotion examination.

Review of Victoria's (2003) study is important to this research to the fact that it brings out useful lessons that skills and responses capacity of firefighting personnel is critical to the success of fire suppression and overall disaster management. Training of fire officers gives an opportunity to acquire skills that can be useful to effectively deliver fire and rescue services such as; awareness, communication, response and use of new technology and tools. However, the omission in Victoria's (2003) study is that the study does not show how human resource capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

Landry (2010) conducted study in Maryland at the Department of Sociology on "*Firefighting in The New Economy: Changes in Skill and the Impact of Technology"*. The study was meant to better understand the shift in workers' skills in the New Economy, a case study of professional firefighters (n=42) was conducted using semi-structured interviews to empirically examine skill change and the impact of technology. A conceptual model was designed by both introducing new ideas and integrating traditional and contemporary social theory. The first component of this model categorized firefighters' skills according to the job-context in which they occurred, including: fire related emergencies, non-fire related emergencies, the fire station, and non-fire non-emergencies. The second component of this model drew from Braverman's (1998/1974) skill dimension concept and was used to identify both the complexity and autonomy/control-related aspects of skill in each job context. Finally, Autor and colleagues' (2002) hypothesis was adapted to determine if routinized components of skill were either supplemented or complemented by new technologies.

The findings indicated that skill change among firefighters was clearly present, but not uniform across job contexts. A substantial increase in both the complexity and autonomy/control related skill dimensions was present in the non-fire emergency context (particularly due to increased EMS-related skills). In fire emergencies, some skills diminished across both dimensions (e.g., operating the engine's pump), yet others had a slight increase due to the introduction of new technologies. In contrast to these two contexts, the fire station and non-fire non- emergency job-contexts had less skill change. Technology played a major

role in the skill change experienced by firefighters. Surprisingly, aside from the introduction of computerized engine pumpers, the technology introduced did not diminish skill by replacing routinized tasks Landry' (2002), and did not create an overall decrease in firefighters' skill as would be suggested by Braverman's (1998/1974). Instead, new technologies tended to create new skills for firefighters, especially in the fire and non-fire emergency contexts. Like the consistent level of skill used in the fire station and non-fire non-emergency contexts, with only few exceptions (e.g., computers) technology's impact on firefighters' skill was found to be rather limited in these two dimensions. Using the tenets detailed in the conceptual model, a more elaborate understanding of skill change and technology's impact was able to be realized.

Review of Landry's (2010) study is significant to this study to the fact that it reveals how technology can enhance firefighters' skills. However, the gap in Landry's (2010) study is that it did not show how firefighters skills accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.3 Literature on Financial Capacity

This section reviews literature on financial capacity. Due to lack of literature on financial capacity on fire and rescue services in Zambia, the literature review takes a general approach.

Muntasya, F.I. (2022) conducted a study in fulfillment of the requirement for a Master of Science degree in Environmental and Energy Management at Leeuwarden on "*Budget Analysis of Forest and Land Fire Control in Riau Provincial Government, Indonesia"*. There is widespread air pollution surrounding Southeast Asia, mainly in Indonesia, Singapore, and Malaysia, resulting from Riau Province, where forest and land fires have occurred heavily. Budget analysis is needed to ascertain whether forest and land fire control activities are within Riau Provincial Government's budget structure.

This research aimed to identify gaps in the provincial government's budget in implementing fire control measures. The perspective of this research used the conceptual framework model in the Punctuated Equilibrium Theory to analyze the relationship between the dependent variable, namely the budget, and its changes, and the independent variables were positive and negative feedback, especially forest and land fires as triggering events or shocks. With

Punctuated Equilibrium Theory, the researcher analyzed how forest and land fires as a shock could change the budget allocation.

This research used a mixed method: a quantitative method for analyzing government budgets and qualitative methods for analyzing interviews and other desk research data. The results showed that the transboundary haze makes forest and land fires a national issue; thus, the central government intervenes in control of forest and land fires. Nevertheless, a particular budget was affected by significant fires, namely the firefighting budget. This proved Riau Provincial Government expanded its attention in the event of extensive forest and land fires. In addition, this research describes how Riau Provincial Government responded to forest and land fires as shocks by facilitating all input from stakeholders in the status quo by the government with still accommodating the shock or triggering events that could change budget allocations.

This research suggested policy monopoly on Punctuated Equilibrium Theory became neutral feedback that did not have to be negative; it depended on other variables or condition. Recommendations for Riau Provincial Government are early detection, monitoring, and evaluation of industrial compliance and law enforcement.

Review of Muntasya (2022) is important to this research to the fact that it brings out useful information on budget analysis of forest and land fire control. However, the shortfall in Muntasya's (2022) study is that it did not clearly show how financial capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

International Federation of Red Cross (IFRC) (2012) report recommended that achieving goals in firefighting requires set goals in future by selecting best alternatives. In firefighting preparedness, the most important thing is making decisions in advance about the management of financial resources, coordination, and communications procedures, and being aware of a range of technical and logistical responses. Contingency finances are a management tool which can help ensure timely and effective provision of aid to victims of fire disasters and that it involves all sectors. These funds have to do with existing procedures and improving where there are gaps to perfect response operations practically when fire disasters strike.

The recommendation by International Federation of Red Cross (IFRC) (2012) report is important to this study because it brings out important information on making of decisions in

advance about the management of financial resources, coordination, and communications procedures, and being aware of a range of technical and logistical responses in firefighting. However, the gap in International Federation of Red Cross (IFRC) (2012) report is that the report does not look at how financial capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

According to United Nations Development Programme (UNDP) (2009) report, one of the key priorities in disaster management is the allocation of a budget. It is also noted that a strategy for mobilization of resources should also be integrated in the budget to facilitate funding for disaster management. Phaup and Kirschner (2010) note that disasters are difficult to predict; putting a speculative number in the budget may reduce the budget's credibility and usefulness. Projecting the government's expected cost need not be an exercise in illusion. Over the past decade, most countries have spent significant sums on recovery from various "unexpected" loss events. This experience provides a convenient database for extrapolating expected costs from such events. Ex ante budgetary policies can increase net benefits by providing fiscal incentives and legislative opportunities to increase national savings, reduce exposure to risk, and promote mitigation, before a disaster. Effective ex ante budgeting for disasters requires trade-offs of current consumption for saving and mitigation, and procedural safeguards against opportunistic efforts to divert disaster savings to other uses. This also implies that ex post budgetary policies can have the perverse effect of increasing welfare losses from disasters (UNDP, 2009).

Review of the United Nations Development Programme (UNDP) report of 2009 is important to this study for it brings out important lessons on the allocation of a budget for disaster management as a key priority. The omission in this United Nations Development Programme of 2009 report is that it did not show how financial capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

Cote (2003) in his report on "*Organizing for Fire and Rescue Services, Massachusetts"*, argues that Councils are supposed to budget properly because inadequately prepared budgets can lead to serious monetary shortfalls which can hinder smooth preparedness in operations. Cote added that the funds meant for fire disaster prevention, response and recovery must be estimated realistically and expenditures monitored on regular basis. Therefore, the budget should develop a long-range plan that projects capital replacement funding for vehicles, fire equipment, fire station maintenance and other related tools.

Review of Cote's (2003) report is important to this study to the fact that it brings out useful information on how councils should budget properly to avoid shortfalls that may hinder smooth preparedness in operations. However, the gap in Cote's (2003) report is that the report did not look at how financial capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

United Nations Development Programme (UNDP) and Government of Nepal report of 2011 on Nepal's capacity for fire disaster preparedness recommended that local governments carry out functional coordination for resource sharing. It was advised that local governments should coordinate with national government offices, which allocate resources for fire disaster management, as well as with other relevant offices to help generate funds.

Review of the United Nations Development Programme (UNDP) report of 2011 and Government of Nepal is important to this study because it reveals important information on functional resource coordination and sharing. The shortfall in United Nations Development Programme (UNDP) and Government of Nepal report of 2011 is that it did not show how financial capacity accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.4 Literature on Equipment

This section reviews literature on equipment. Due to lack of literature on equipment on fire and rescue services in Zambia, the literature review takes a general approach.

Park, Park, and Lin (2021) conducted a study on "*Assessment of Firefighters' needs for personal protective equipment".* This study performed focus group interviews with 54 firefighters in four states in the United States to assess the needs for design of firefighters' personal protective equipment. Firefighters' responses indicated three major issues to be considered for improved mobility, comfort, and safety: 1. Consideration of human factors, 2. Sizing and fit, and 3. Integrity of protection in the interface between protective equipment and turnout ensemble.

Ergonomic design issues were identified through firefighters' responses about their limited mobility of the head and arms while wearing helmet and self-contained breathing apparatus, restricted access to coat pockets, back pain and soreness while wearing self-contained breathing apparatus. Sizing and fit issues such as the excessive length and bulkiness of glove

fingers were identified as a major concern regarding fire gloves resulting in limited mobility and dexterity, negatively affecting firefighters' work efficiency and safety. The integrity of protection in the interface between turnout ensemble, gloves and boots were reported as an important consideration for firefighter comfort, mobility, and protection against heat hazards. Possible design solutions were also discussed.

Review of Park, Park, and Lin's (2021) study is important to this research to the fact that it brings out useful information on firefighters' needs for personal protective equipment. However, the shortfall in Park, Park, and Lin's (2021) study is that it only focused on personal protective equipment leaving out other equipment that may account for limitations to effectively deliver fire and rescue services by local authorities.

Tok (2008) conducted a study in fulfillment of the requirement for the Master of Science degree in Engineering at the Graduate School of Engineering and Sciences of Izmir Institute of Technology on "*Design and Manufacturing of a Fireproof Fire Rescue Robot"*. The aim of this thesis was to design and manufacture fireproof fire rescue robot for extinguishing fire. The robot was designed and manufactured to go in the middle of fire, extinguish it and send images from incident area by using a camera to increase knowledge about fire behavior. This robot made it possible to extinguish fire without spreading in the shortest time. This will reduce the risk of injury and number of casualties for firefighters as well as for the possible victims. The robot can also decrease the monetary losses which increase considerably as fire duration increases.

For designing the fireproof fire rescue robot three-dimensional solid modeling computer program were used. The semi-autonomous robot was powered by two DC electric actuators. It went on the ground with tracking system which was manufactured by using sprockets and chains. To prevent possible damages that may be incurred by heat, the robot was covered with a ceramic fiber paper that has very low thermal conductivity. In addition to mechanical design of the fireproof fire rescue robot, two electronic circuits were mounted in order to control actuators and solenoid valve of the extinguisher. Furthermore, in order to control actions of the robot remotely by the operator, two remote controls were used at different frequencies.

Review of Tok's (2008) study is important to this research to the fact that it bring out useful lessons on design and manufacturing of a fireproof fire rescue robot. As a result of this thesis; a fireproof fire rescue robot was designed and manufactured to be used in fire incidents. Also,

some ideas were expressed to improve the fireproof fire rescue robot by gained experience throughout the thesis. However, the gap in Tok's (2008) study is that it did not show how the robot accounts for limitations to effectively deliver fire and rescue services by local authorities.

Ro and Indrayani (2023) conducted a study in Indonesia on "*Management of Personal Protective Equipment (PPE) Fire Extinguisher in Fire Fighting Officials in Jember Regency"*. In their work, firefighters have a great risk of danger and require Personal Protective Equipment. However, the reality in the field of Personal Protective Equipment management is still not well implemented. This happens because the facilities provided by the local government of Kabupaten Jember are not maximal and the availability of Personal Protective Equipment is not in accordance with the standard. The purpose of this study was to assess the management of personal protective equipment for fire fighters at the Fire Department UPT Jember. This research was descriptive and used a qualitative approach. This research was conducted at the UPT Pemadam Kebakaran Jember Regency with the informants who were the head of potential development of Satpol PP, members of the fire team, and the head of the firefighting team. The results showed that Personal Protective Equipment management is still not running optimally. The Personal Protective Equipment identification process is carried out only when a fire incident occurs; some of the Personal Protective Equipment they have was still not up to standard; Personal Protective Equipment training has never been conducted by the Minister of Home Affairs; Personal Protective Equipment storage was still not suitable; did not carry out the Personal Protective Equipment disposal and destruction process; Personal Protective Equipment guidance was only carried out orally; the implementation of Personal Protective Equipment inspections by the Satpol PP was held regularly and suddenly; as well as in the evaluation process carried out informally. A suggestion that could be recommended was that it was necessary to carry out a comprehensive Personal Protective Equipment management processing in accordance with the aspects inside.

Review of Ro and Indrayani's (2023) study is important to this research to the fact that it brings out useful information on management of Personal Protective Equipment. However, the gap in Ro and Indrayani's (2023) study is that it did not show how Personal Protective Equipment accounts for limitations to effectively deliver fire and rescue services by local authorities.

Bino and Kielisek (2018) conducted a study in Warsaw, Poland on "*Analysis of the use for Fire Protection Water Supply Systems in public utility buildings and residential buildings"*. Regulation of the Minister of Interior and Administration of 7th June 2010 on the fire protection of buildings, other construction objects and areas, presented a number of requirements that must be met by public buildings and residential buildings requirements, among others, for fire- fighting water supply installations. The article presents an analysis of current requirements for water supply installations in public buildings and residential buildings included in Polish legal acts. In addition, statistical data on the size of the fire was presented and real water consumption in the activities of fire protection units during events. This data was obtained from the SWD PSP program, which is the basic tool for supporting the actions of rescue and fire-fighting units. It turned out that for the objects in question statistically the largest number of fires are small fires, where relatively little water was used. On the basis of the comparison of the actual water consumption needed to extinguish the fire by the fire department with the requirements in force in relation to the analyzed buildings, too restrictive requirements for these facilities were noticed. Appropriate efficiency of the external hydrant network ensured the possibility of carrying out extinguishing activities. In connection with the above, one should consider the legitimacy of applying high requirements for the efficiency of fire protection installations in facilities.

Review of Bino and Kielisek's (2018) study is important to this research to the fact that it brings out useful information on analysis of the use for fire protection water supply systems in public utility buildings and residential buildings. However, the omission in Bino and Kielisek's (2018) study is that it did not show how fire protection water supply systems accounts for limitations to effectively deliver fire and rescue services by local authorities.

Hao (2013) conducted a study in Hebei Province, China on "*Heavy Compressed Air Foam Truck Applied to High-Rise Building Fires"*. With the development of the social economy, more and more high-rise buildings are built in the City. The firefighting of the high-rise buildings has become one of the most difficult problems in the fire service. The high-rise buildings fire relies mainly on the indoor fire protection facility. Outbreak of fire, the indoor fire facility cannot satisfy the needs for different reasons. At this time, we must have the firefighter put out the fire indoors. By investigation and study, the heavy compressed air foam truck has advantages in the high-rise building's firefighting, and fire services department has devoted major efforts to increase the numbers of this fire truck. It is sure that with upgrading

of the firefighting equipment throughout the country, heavy-duty compressed air fire foam truck could shoulder the responsibility of high-rise building's firefighting. Therefore, based on the analysis of the adaptability and applicability of the heavy compressed air foam truck, this thesis tried to contribute to the laying down of combat formation and achieving a perfection combination of personnel and equipment so as to provide certain scientific basis for decision/making in the smooth operation of fire-fighting, fire-rescuing and disposal work. Besides, it could contribute to the improvement of the ability to put out fire in high-rise building.

Review of Hao's (2013) study is important to this research to the fact that it brings out useful information on heavy compressed air foam truck applied to high-rise building fires. However, the flaw in Hao's (2013) study is that it did not show how heavy compressed air foam trucks accounts for limitations to effectively deliver fire and rescue services by local authorities.

Oh, and Kong (2020) conducted a study in Jeon Buk, Korea on "*The Strategies to Supply Efficient Fire Fighting Force in High-rise Building by NFPA 550 Guide to the Fire Safety Concepts Tree: Focusing on Automatic Fire Suppression"*. In this study NFPA 550 Guide was applied to the Fire Safety Concepts Tree' to analyze the efficient supply of fire fighting force strategies which were proposed and applied to fire fighting force to high story of high-rise buildings and focused on automatic fire suppression. The supply time of fire fighting force was secured by rapid fire detection: installation of infrared thermal image cameras as temperature sensor; installation of video image-based fire detectors and CCTV to see protection zone; transmission of fire information rapidly and diversification of fire alarm, such as indication of smartphones; securing resource waiting for stations by installing easy-to-destruct glass and lifts; and application to gliding and rescue techniques. The supply of firefighting water was secured: using helicopters and rescue techniques; looping main pipes; installation of high-pressure pumps and water supply towers; and dual configuration of emergency generator and wiring.

Review of Oh and Kong's (2020) study is important to this research to the fact that it brings out useful information on the strategies to supply efficient fire fighting force in high-rise building by NFPA 550 guide to the fire safety concepts tree. However, the gap in Oh and Kong's (2020) study is that it did not look on how infrared thermal image cameras, video

image-based fire detectors, CCTV, fire alarm and helicopters may account for limitations to effectively deliver fire and rescue services by local authorities.

According to United Nations Development Programme (UNDP) and Government of Nepal report of 2011 on international standards, it stated that there should be one fire-fighter in every 2,000 people and one engine for a population of 28,000 As far as equipment is concerned. It also noted that a fire department in a large city may operate one engine company per 15,000 to 20,000 populations. However, Fire stations or department rather should be in strategically appropriate areas because it is crucial to the efficiency of fire response work. Therefore, with the rapid rate of urbanization in most Cities it is recommended that fire brigades be decentralized and thus be established at the outer space of the Central Business District to avoid heavy traffic and facilitate quick response.

Review of the United Nations Development Programme (UNDP) and Government of Nepal's report of 2011 is important to this study to the fact that it brings out important information on how human resource, equipment and fire stations can be divided according to population for effective provision of fire and rescue services. The gap in the United Nations Development Programme and Government of Nepal's 2011 report is that it did not show how equipment accounts for limitations to effectively deliver fire and rescue services by local authorities.

Radu (2019) conducted research on "*Use of Drones for Firefighting Operations: Group RISK 4-11 at Aalborg University"*, in Esbjerg, Denmark. After many years of being tools used by military, drones have become very popular among commercial uses and public safety. One of the areas of application where drones could have a big impact is firefighting. The report studied how drones could become an asset for Falck Fire Services by studying different aspects that influence the implementation of this technology.

The research was built with the help of qualitative semi-structured interviews that were conducted either face-to-face or via email with several decision makers within Falck Fire Services. In this way it highlighted experts' opinion within firefighting sector on the current stage of implementation of drones, benefits, possible usage, limitations, and future prospects. In addition, it was found necessary to analyze the current stage of legislative developments within several countries within the European Union and to identify if there are any drones that can meet the requirements for firefighting purposes.

The report ended with a schematic analysis of the potential usage of drones in different stages of the emergency management cycle, followed by a Bow-Tie model that identifies causes, consequences, and barriers for the risk of the drone crashing. This report offers insights in drone technology, legislation on drones, firefighting activities, and risks. It encourages future research within the scope of safely introducing drones into firefighting activities or other area of application.

Review of Radu's (2019) study is important to this research to the fact that it brings out important information on insights in drone technology, legislation on drones, firefighting activities, and risks. However, the shortfall in Radu's (2019) study is that it only focused on drones leaving other equipment used to effectively deliver fire and rescue services by local authorities.

United Nations Development Programme (UNDP) and Government of Nepal (2011) report recommended that the fire department need well maintained vehicles, machinery, and equipment. In this regard, the parameters to be considered include their status, the physical condition of fire engines, the availability of spare parts, the servicing of fire engines and fuel management as well as the availability of search and rescue tools. In addition to the above, to be properly prepared for fire hazards, each fire brigade should keep engines at international standards operations by establishing repair and maintenance workshops within the municipalities themselves. Fire stations are also required to safely store fuel to run engines for use in emergencies. It further recommended that after every fire response, engines should be refueled fully. It is also important to stock other forms of fire suppression materials such as hydrogen gas, liquid fuel, and platinum chemical foams.

Review of the United Nations Development Programme (UNDP) and Government of Nepal's report of 2011 is important to this research in the fact that it brings out useful information on the need to service and maintain well vehicles, machinery, and equipment for firefighting. However, the omission in United Nations Development Programme (UNDP) and Government of Nepal's (2011) report is that it did not show how equipment accounts for limitations to effectively deliver fire and rescue services by local authorities.

International Fire Service Training Association (2008) report recommended that fire stations require fire engines with extension ladders and elevators especially for suppression of fires in

high-rise buildings and since the use of fire engines is seasonal and unpredictable, it is important to make provision for their periodic servicing.

Review of this report by International Fire Service Training Association is important to this study to the fact that it brings out important information on the requirement of fire engines with extension ladders and elevators (Turntable ladder). However, the flaw in International Fire Service Training Association's (2008) recommendation are that it does not show how engines with extension ladders and elevators (Turntable ladders) may account for limitations to effectively deliver fire and rescue services by local authorities.

United States Fire Administration and Federal Emergency Management Agency (USFA & FEMA) (1995) argues that communications systems are critical to safe and effective fire ground performance. The basic elements of a communications system include transmitters, antennas, receivers, and their power supplies and other ancillary equipment. It is important for local governments to establish a communications centre or the dispatch centre as others call it. This is the hub centre of fire department operations and usually the first point of contact to the public. The dispatch centre must manage and allocate the fire and rescue resources of the fire department in a way that ensures that the proper resources are dispatched in a quick, efficient, and professional manner to emergency incidents. In addition, it recommended that fire departments should aim at embracing new technology to enhance their efficiency and effectiveness. It should also provide support to field operations personnel and units in carrying out many routine tasks and responses to non-emergency incidents. Therefore, it is critical that the communications centre be managed in a way that gains the confidence of the public and the department served.

Review of United States Fire Administration (USFA) and Federal Emergency Management Agency (FEMA) report of 1995 report is important to this study to the fact that it brings out useful information on communication systems and technology as critical to effective fire ground performance. However, the limitation in the United States Fire Administration and Federal Emergency Management Agency (USFA & FEMA) report of 1995 is that it did not look at how communication systems accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.5 Management of Fire and Rescue Services in Zambia

Although existing literature on local authorities is found on service delivery, not much has been done that deal with fire management either in Lusaka or else were in Zambia.

Mweetwa (2018) in his study titled, "*Fire Incidence Preparedness by Mazabuka Municipal Council: A Case Study of Urban Markets"*. The study investigated fire incidence preparedness by Mazabuka municipal council in urban markets. Fire incidents have been on the rise in the country with urban markets experiencing devastating property loss and business disturbances. However, the public has been putting the blame on the local authority as it is the one mandated to prevent and respond to fire outbreaks.

This report presented a study conducted in Mazabuka at the municipal council and urban markets from February to May 2018. The aim of the study was to investigate fire incidence preparedness by Mazabuka municipal council in urban markets. This was done by establishing human capacity and equipment, determining major preparedness projects undertaken in Mazabuka urban markets and challenges faced by the fire department.

The research design used was a descriptive and the major approach was qualitative. The sampling techniques used included; purposive sampling, convenience sampling and simple random sampling. Fire officers at the department and the market committee members from urban markets were interviewed through focus group discussions to examine current information on fire incidence preparedness whereas the chief fire officer and the market master were administered with questionnaires and interviews were done.

The findings indicated that the majority of the personnel at Mazabuka municipal council fire department were still mere fire officers whereas four officers had other ranks and they had only 14 officers at the department. The council also had a water tender with modern equipment, a good conditioned ambulance and utility van. To propel preparedness the following projects were being implemented and these were; fire drills in markets, trainings in markets and private institutions, public awareness, fire inspections and stakeholder collaboration. However, the following challenges were being faced; lack of adequate man power, erratic water supply, and lack of effective communication system and unavailability of a substation for quick response in areas far from the station in urban district. The general situation indicated that Mazabuka municipal council fire department was not well prepared to manage fire outbreaks meaning that plans to rectify the situation are cardinal.

Review of Mweetwa's (2018) study is significant to this study to the fact that it reveals important lessons in fire incidence preparedness. The shortfall in Mweetwa's (2018) study is that it mainly focused on the preparedness of the local authority to manage fire outbreaks and did not explicitly explain factors that accounts for limitations to effectively deliver fire and rescue services by local authorities. The study also relied on qualitative approach and therefore results cannot be generalised. The other limitation is that the study focused on a municipal council.

Zulu and Shi' (2023) conducted a study in Lusaka on "*Fire Risk Analysis and Resilience Improvement in Lusaka City"*. This paper was about the fire risk analysis and resilience improvement in Lusaka City. The data was from the fire brigade in Lusaka City and the field which was used to analyze the trends of fire and other disaster risk in years and its impact to the City.

The study found out that fire risk has become one of the most recurring and frequent disaster in the world. Fire disaster risk has put more burdens on the economic loss and social development to the people of Lusaka City in Zambia. Lusaka City has continuously suffered by fire cases which has claimed millions of kwacha loss and life. It has been discovered that the incidence of fire is increasing very rapidly. The cause can be charcoal braziers, cigarette ends, lighted candles, illegal wiring and electrical faulty etc., but devastation is increasing both in terms of lives and economies. Due to the increase of cases the disaster management mitigation unity in Zambia has organized structure programmes and policies, but the administration and resilience implementation of these programmes demand more efficiency. In the recent years, fire disaster risk has more damages of life and the economy than other disasters in Zambia.

Review of Zulu and Shi's (2023) study is important to this research to the fact that it brings out useful information on fire risk analysis and resilience improvement. The gap in Zulu and Shi's (2023) study is that it did not focus on the factors that accounts for limitations to effectively deliver fire and rescue service by local authorities.

Mwila (2018) conducted a study in fulfillment of the requirement for a Master's degree at Mulungushi University on "*Disaster Risk Preparedness Strategies against Fire in Urban Makrkets in Zamabia. A Case Study of Chisokene Market in Kitwe"*. This study investigated disaster risk preparedness strategies against fire at Chisokone market in Kitwe, Zambia.

The aim of the study was to analyse disaster risk preparedness strategies against fire at Chisokone market in Kitwe to ensure safety at the trading place. The objectives were to identify fire risks at Chisokone market in Kitwe. To establish disaster risk preparedness strategies against fire at Chisokone market in Kitwe. To determine the challenges being faced in implementing disaster risk preparedness strategies against fire at Chisokone market in Kitwe.

To analyse efforts being made by the local authority and market committees to reduce fire disasters at the market, qualitative research design was used with a sample size of 120 respondents in which 108 respondents were stratified and randomly selected from marketeers and customers. On the other hand, 12 respondents were purposively selected from Kitwe City Council, Market Associations and Disaster Management and Mitigation Unit respectively. Primary data for the study were collected using administered questionnaires, observations, and interviews while Secondary data were obtained from already published journals and other published materials. Data collected were subjected to appropriate statistical analysis tools such as Microsoft Excel 2007.

Results obtained revealed that out of the five preparedness strategies identified, formation of the neighborhood watch was the most important strategy followed by conducting market inspections. Others were encouraging insurance amongst marketeers, conducting awareness meetings, and enhancing communication with the fire brigade department.

Based on the above findings the study recommended that the government speeds up the implementation of re-designing and modernizing the Chisokone market. The shop owners and market managers should invite fire experts to give talks of fire safety and the need for having firefighting equipment in their shops. Zambia Electricity Supply Corporation should install pre-paid meters at the market to avoid illegal connection of electricity. Further research needs to be carried out to determine the compliance level on preparedness and mitigation measures adopted by market authorities.

Review of Mwila's (2018) study is important to this study as it brings out some of the strategies that can be used to manage fire outbreaks in urban markets in Zamabia. However, the omission in Mwila's (2018) study is that it only focused on Chisokone Market. The other gap in this study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Hollingsworth, Johnson, and Siame (2015) conducted a study on "*Fire Management Assessment of Eastern Province, Zambia"*. The mission that produced this assessment was prompted by requests from Forestry Department personnel in Zambia to the United States Agency for International Development for formal fire management training. United States Agency for International Development contacted the United States Forest Service's International Programs with the training request. Together, United States Forest Service, United States Agency for International Development, and Zambian partners determined that this mission should contribute to understanding how, when, where, and why fire is used in Eastern Province of Zambia. The team would conduct an assessment and then produce this report, which describes the current status of fire management and fire use in Eastern Province, documents the role of fire in dominant vegetation types based on personal observations and available literature, and provides recommendations for formal fire management training and equipment needs.

Two individuals on the assessment team worked for the United States Forest Service; Darren Johnson was seated with the Zambia Environmental Management Agency in Lusaka as a Climate Change Advisor, and LaWen Hollingsworth worked for the Rocky Mountain Research Station in Missoula, Montana as a Fire Behavior Specialist. The third team member, Sylvester Siame, worked as the acting Principal Extension Officer for the Zambia Forestry Department in Eastern Province, and joined the team to share his vast knowledge of vegetation and personal contacts within the province. The final team member was Gift Sikaundi who worked for Zambia Environmental Management Agency and manages the spatial fire detection data for Zambia. The travel itinerary for Eastern Province developed based on the need to consult with as many community leaders and members within Eastern Province as possible, as well as personnel from the Zambia Forestry Department, Zambia Wildlife Authority, and other critical agencies active in Eastern Province, such as Community Markets for Conservation and the Center for International Forestry Research. The team travelled 2,500 km from Lusaka, through Eastern Province, and then returned to Lusaka. In Lusaka, the team met with officials from pertinent ministries as well as additional stakeholders to understand the nature of fire management from the governmental and political perspective, and to learn about relevant fire management policies and projects in other provinces within Zambia.

Review of Hollingsworth, Johnson, and Siame's (2015) study is significant to this research to the fact that it brings out important information on the use and management of fire in eastern

province. However, the shortfall in Hollingsworth, Johnson, and Siame's (2015) study is that it was not conducted in Lusaka, secondly it did not focus on factors that accounts for limitation to effectively deliver fire and rescue services by local authorities.

Mubita, Milupi and Kalimaposo (2023), conducted a study on "*Fire Safety Management Strategies in Selected Markets of Lusaka City"*. This study investigated the effectiveness of fire safety management strategies in selected markets of Lusaka City.

The study employed a descriptive research design, which involved qualitative data collection and analysis. The study used purposive sampling to select markets and participants for the study. A total of 2 markets were sampled. From each market, 10 marketeers were sampled conveniently. 2 market managers were also sampled purposefully. The study collected data using two main methods: Focus Group Discussions and in-depth interviews. The marketeers were interviewed individually and Focus Group Discussions guide was further administered to get more insights. This was meant to collect opinion and insights that could not be collected during interviews. The in-depth interviews were conducted with a subset of the participants to obtain more detailed and nuanced information. The data collected from the in-depth interviews and Focus Group Discussions were analyzed using thematic analysis to identify patterns and themes in the data.

The findings of the study indicated that effective fire safety management in markets required a combination of proactive measures and emergency preparedness. Proactive measures included regular risk assessments, proper storage of flammable materials, regular maintenance of electrical systems, and the installation of fire safety equipment such as alarms and sprinklers. Emergency preparedness strategies included the creation of emergency evacuation plans, the establishment of communication protocols, and the training of market staff on fire safety procedures. The study also found out that collaboration between market management, vendors, and local fire department is crucial to effective fire safety management in markets.

The study highlighted the need for ongoing education and training for vendors and market staff to maintain awareness of fire safety hazards and emergency response procedures. It also underscores the importance of regular reviews and updates of fire safety management plans to ensure they remain effective and relevant. Overall, the study provides valuable insights into effective fire safety management strategies in markets, and emphasizes the need for continued

attention and investment in fire safety management to protect people, property, and businesses from the devastating effects of fires.

Review of Mubita, Milupi and Kalimaposo's (2023) study is important to this research to the fact that it brings out important information on fire safety management strategies in selected markets. However, the short fall in Mubita, Milupi and Kalimaposo's (2023) study is that it did not focus on factors that accounts for limitation to effectively deliver fire and rescue services by local authorities.

Phiri (2014) in his study on "*Effective Management of Markets and Service Provision by Local Authorities: A Case Study of Lusaka City Council (1991-2013)"*. The study investigated effective management of markets and service provision by Lusaka City Council. The overall objective of this study was; to determine the extent of effective management of markets and service provision by Lusaka City Council. The specific objectives were: To establish the extent of effective management of garbage from markets run by Lusaka City Council. To examine the extent of effective provision of toilet facilities and water supply to markets managed by Lusaka City Council. To determine the extent to which Lusaka City Council has been able to effectively manage fire outbreaks in markets. To determine constraints faced by Lusaka City Council in ensuring effective management of garbage, drainage systems, toilet facilities, supply of water, and fire outbreaks in markets under its jurisdiction.

The total sample size for this study was 264, 18 key informants were purposively selected from Lusaka City Council. Furthermore, 30 support staffs were also purposively selected from Lusaka City Council. Simple random sampling was used to select 216 marketeers. Both primary and secondary data was used for this research. Qualitative and quantitative data was also used in this study. Qualitative data was analysed by transcribing it into the major themes which emerged. Quantitative data was analysed using Statistical Packages for Social Sciences.

The study found out that Lusaka City Council lacked capacity to manage market garbage, drainages, and fire outbreaks. The Council did not adequately provide toilet facilities to markets. Some markets run by the Council do not even have toilet facilities. The study also found out that the Lusaka City Council has not done enough to ensure that markets are supplied with sufficient quantities of water. The study recommends the following; Procurement of garbage collection tools such as wheelie bins, skip bins as well as tipper trucks; sensitisation of market users on the importance of maintaining high levels of hygiene

in markets; construction of more toilets in markets; and construction of boreholes in markets to act as reservoirs in the event that Lusaka Water and Sewerage Company ration the commodity. The study further recommends that earth excavated drainages must be stone patched.

Review of Phiri's (2014) is important as it shows the extent to which Lusaka City Council can effectively deliver fire services to markets. However, the gap in Phiri's (2014) study is that the study takes a general outlook of services delivered by Lusaka City Council to markets. Put simply, the study does not explicitly reveal factors that accounts for limitations to effectively deliver fire and rescue service by local authorities.

Lolojih's (2008) study titled, "*Local Government Administration and Service Delivery in the Third Republic: A Case Study of Lusaka City Council, Choma Municipal Council and Luwingu District Council"* is worth noting. The thesis examined the performance of local Councils, with regard to administration and service delivery, during the Third Republic (1991-2001). The study was based on a Case Study of Lusaka City Council, Choma Municipal Council and Luwingu District Council. The focus of the study was not so much as on comparing the three Councils with regard to their ability to deliver services. The selected Councils simply represent their respective categories in the hierarchy of local government structure namely City, Municipal and District.

The study utilised structured and semi-structured research instruments to collect primary data from respondents which were randomly and purposively selected. Secondary data was collected through desk research. Quantitative data was analysed using computer software, the Statistical Package of the Social Sciences. The narrative approach was adopted for the analysis and discussion of qualitative data. The Central argument of the thesis is that, "a central government predisposed to centralising tendencies cannot create an enabling environment for efficient and effective service delivery by local Councils". The study design aimed at capturing as many thematic areas as possible with a view to providing a 'broad' understanding of how the local authorities have performed during the period under review.

The thesis showed that the performance of the local authorities with regard to the delivery of public services, during the period under review, has been poor and raised a lot of concern among residents. Constraints characterising the operations of the Councils include inadequate financing, poor policies and pronouncements, the lack of adequate equipment and qualified

staff, bloated workforce, lack of initiative and poor work habits among staff, inadequate supervision of subordinates, mismanagement of the scarce resources, ineffective community representation by Councilors, and the lack of public scrutiny. The study has noted that despite some capacity among the business community (Choma and Lusaka) the local authorities have not utilised contracting-out as an alternative method of service delivery. Although non-governmental organisations have demonstrated some capacity to deliver services, these institutions have not been co-opted into the work of the local authorities. Similarly, the role of traditional authorities in public service delivery has largely been that of mobilisation of communities to undertake developmental activities on voluntary basis and/or ensure the desired community response to externally funded projects.

Overall, the study found that although there are other factors that have contributed to the poor performance of the local authorities, government's tendency to centralise decision-making on critical matters of local authority operations, is the major constraining factor. This centralising tendency has created local authorities whose operations are highly dependent on the centre at the expense of local initiative. In effect, therefore, inadequacies of the centre have translated into the poor performance of the dependent local authorities.

Review of Lolojih's (2008) study brings out important issues to this research that surround the causes of poor service delivery by local authorities. Although Lolojih's study mainly provides a broad understanding of local authorities and factors affecting their performance, he does not really bring out the particulars or major factors and/or issues that accounts for limitations to effectively delivery fire and rescue services by local authorities.

Momba (2002) study on "*Problems of Effectiveness in Service Delivery, Accountability, And Transparency of Local Authorities in Zambia"* is also worth noting. For this study, a total of 450 respondents drawn from Lusaka and Chongwe districts were interviewed. The study revealed that lack of adequate and reliable sources of revenue was noted as major financial obstacle to efficient and effective service delivery. The study also reveals serious concerns regarding the lack of transparency and accountability in the activities of the councils. Momba's (2002) study provides valuable information with regards to understanding some of the factors negatively affecting delivery of services by local authorities in Zambia. Momba (2002) also provides an insight to factors likely to affect fire and rescue service delivery by local authorities. However, just like Lolojih, Momba does not specifically look at fire and

rescue services provided by local authorities to understand issues pertaining to management and challenges faced.

Mokwena (1999) conducted a study on "*Building the Institutional Capacity of Local Authorities in Zambia in The Third Republic: An Assessment. African Administrative Studies"*. The study found out that the ability of local authorities to deliver services to their communities has been declining, amongst others as a result of inadequate funding and serious staffing problems, as well as unclear objectives and inappropriate systems structures. Effective institutional capacity building measure should tackle the various factors accounting for institutional weakness. Under the Third Republic, government act of 1991 which provides amongst others for administrative rationalization and the launching of the public sector reform program in 1993. However, the implementation of this program was considerably delayed and while donor agencies notably the British Overseas Development Administration had assumed an important role in institutional capacity building through the local government support project the main responsibility lied with the ministry of local government and housing whose functioning had been hampered by lack of political will and inadequate resources.

Review of Mokwena's (1999) study provides useful information to this research on the declining service delivery, inadequate funding, and serious staffing problems, as well as unclear objectives and inappropriate systems structures by local authorities in Zambia. However, the omission in Mokwena's (1999) study is that the study did not focus on the factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.6 Management of Fire and Rescue Services in Africa

This section is aimed at reviewing literature on Management of Fire and Rescue Services in Africa from which lessons can be drawn.

Boye, and Abubakar (2019) conducted a study on "*Application of Geographic Information System in Emergency Service Delivery – A Case of Ghana National Fire Service"*. The Ghana National Fire Service since its inception has been faced with several challenges in executing its firefighting duties. Some of the challenges include: lack of appropriate logistics to fight fires, inaccessibility to fire sites, inadequate training facilities and inability of Ghana National Fire Service to carry out fire risk assessment prior to operations. This has contributed to the

Ghana National Fire Service having low emergency response time of 12½ minutes as against the international standard time of 4 minutes. This project therefore adopted Geographic Information Systems techniques that enable significant reduction in time for emergency service response and delivery by the Ghana National Fire Service. Data used for the project included georeferenced high-resolution satellite image, topographic map of the study area and fire outbreak statistics of Tarkwa. A suitability analysis was performed to select appropriate sites in the unplanned communities for mounting fire hydrants in open spaces. These selected open spaces together with the community centre feature were fed into a model builder in Arc Geographic Information Systems.

Through the processes of buffering, reclassification of the input features and weighted overlay operations, the final outcome was obtained. The results showed the fastest route to be used for emergency service delivery from the Tarkwa fire station. The study created scenarios to show the extent of service areas for different travel times of one, two, three and four minutes using travel speed of 50 km/h, 80 km/h and 100 km/h respectively. The results revealed that with a travel speed of 80 km/h, the entire study area could be reached to meet the international standard of 4 minutes response time. The project proposed an emergency service delivery plan for the Geographic Information Systems. It recommended that this project be adopted by Geographic Information Systems to minimize delays in the delivery of emergency services in the country. Geographic Information Systems techniques would also aid decision making, improve efficiency and response time of emergency delivery agencies.

Review of Boye, and Abubakar's (2019) study is important to this research to the fact that it brings out relevant information on application of geographic information system in emergency service delivery. However, the flaw in Boye, and Abubakar's (2019) study is that it did not focus on factors that account for limitations to effectively deliver fire and rescue services by local authorities.

Addai, Tulashie and Annan (2016) conducted a study on "*Trend of Fire Outbreaks in Ghana and Ways to Prevent These Incidents"*. In Ghana, fire incidents have become a regular occurrence, with thousands of lives and millions of dollars lost every year. Hardly a day passes without news of a fire outbreak in some part of Ghana, causing fear and panic among the people. This generates much discussion centering on rumors relating to politics, sabotage,

misfortune, religious differences, etc. This article discussed the trend of fire incidents occurring in Ghana from 2000 to 2013 and the different ways to prevent these incidents.

The pattern of fire incidence in Ghana as a whole, as well as in each region was discussed. The study took into consideration the causes, mechanisms, as well as preventive measures against the fire menace. Data was obtained from the head office of Ghana's national fire service. It was noticed that in general the rate of fire incidence increased each year. This increase was attributed to several factors: rate of population growth and industrialization, unstable electricity, urbanization, negligence, illegal electrical connection, etc. The cause of fire was categorized into domestic, industrial, vehicular, institutional, electrical, commercial, bush, and others. Among these causes, domestic fire accounted for 41 percent of the total number of fire incidents in the country.

Finally, this study presented several recommendations to help prevent and mitigate fire incidents in Ghana. Public education on fire safety, Enforcement of fire safety regulations, Redevelopment and regularizing of informal settlements, Formation of community fire volunteers, Need for international assistance codes and provision of fire hydrants at various strategic locations in the country.

Review of Addai, Tulashie and Annan's (2016) study is important to this research to the fact that it brings out useful information on trends of fire outbreaks and ways to prevent these incidents. However, the shortfall in Addai, Tulashie and Annan's (2016) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Kaseem,Yatim and Mahmood (2021) conducted a study on "*Fire Safety Management Strategy in Nigeria Public Buildings"*. Ineffective fire safety management is one of the severe issues in public buildings, especially in Nigeria. There has been a significant increase in fire disaster cases in Nigeria in the last 25 years, the incidence of fire disasters becomes the most significant and ultimate threat to building occupants, building and its contents, as well as the economic growth of the nation. Therefore, in order to ensure the safety of building occupants, building contents, the essential features depend on the fire safety protection system, which should be under the fire safety regulation requirements. Nonetheless, practical fire safety management could remedy the damages or rates of injury in fire events.

This study attempted to determine the factors affecting improper fire safety management and determine the level of effective implementation of fire safety management components. This study presented the findings on the investigation of the effectiveness of fire safety management strategy in Nigeria public buildings. From the study, safety training and adequate fire safety compliance are the factors that affect improper fire safety management the most. The level of effective implementation of fire safety management strategy was low, which translated to inadequate fire safety management. The most effective approach identified to improve the fire safety management and achievement of fire safety objectives was through effective fire safety management strategy and improvement in fire safety training arrangement and absolute compliance with the fire safety regulations.

Review of Kaseem, Yatim and Mahmood's (2021) study is important to this study to the fact that it brings out relevant information on fire safety management strategy in public buildings. However, the omission in Kaseem, Yatim and Mahmood's (2021) study is that it did not bring out information on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Nwaichi, Wijayanuddin and Aule (2023) conducted a study on "*Framework for Fire Safety Management of Hotels in Nigeria: A Structural Equation Modeling Approach"*. Recent findings indicate Nigeria is among the top countries with devastating consequences of fire incidences. The volatile position of Port Harcourt as an oil producing capital city was seen as one of the reasons why fire disasters occur in hotels, among other high-rises institutional building structures.

This study, therefore, explored the factors responsible for the high incidences of fires in Port Harcourt, Nigeria. As phenomenological research involving humans, a 5-point Likert scale cross-sectional questionnaire survey instruments were developed using online Google forms to evaluate people's awareness, identifying the material factors that promoted fire incidents, and assessed the present policy and standards to control fire incidents. The ordinal scaled data collected from 108 respondents were tested to be reliable with a Cronbach alpha of 0.958 using the Statistical Package for the Social Sciences software and further analyzed using the Structural Equation Modelling approach.

Results show that hotel workers in Port Harcourt are aware of fire safety management issues, though periodic retraining was required as new technologies evolve. Safety standards were

also relatively maintained in the placement of equipment power points, extinguishers, and emergency controls. However, the significant causes of the fire were attributed to electrical and mechanical devices installed and utilized on the hotel premises. While the study calls for the installation of high-quality equipment in hotels, more inquiry is needed to check the reliability of individual equipment. A framework was finally conceptualized for further research and replicating the study in other contexts. This study's findings are essential to hotel entrepreneurs and managers, fire experts, building designers, and researchers.

Review of Nwaichi, Wijayanuddin and Aule's (2023) study is significant to this research to the fact that it brings out important information on the framework for fire safety management of hotels. However, the gap in Nwaichi, Wijayanuddin and Aule's (2023) study is that it did not show the factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Nieman, Van, and Leslie (2021) conducted a review on "*Fire Management Practices in African Savanna-Protected Areas".* The level of understanding of the ecological effects of fires has improved over the past century, but comprehensive information on the practical application of fire remains restricted to a few well-studied areas, and management information is scattered. This article reviews the goals of fire management practices in African savanna-protected areas, and the approaches that have been adopted to achieve them.

The study identified 15 distinct fire management practices described in 107 papers from 19 African countries. Fire management has evolved in response to changing ecological understanding, as well as the shifting goals of protected areas. Currently, fire management practices can be divided into those that use fire to achieve specific ecological outcomes, those where fire is applied to promote diverse fire patterns across the landscape without necessarily having a specific ecological outcome in mind, and those that use fire to achieve specific, non-ecological or social goals. In larger, heterogeneous protected areas, fire management practices may vary at different sites in order to achieve a range of goals. The study compared the effectiveness of each practice in terms of achieving 10 broad goals. These included ecological goals, for example, reversing woody and social goals (e.g., maintaining community relationships).

Conservation implications: Fire management remains an important ecosystem process that can be manipulated to achieve particular goals in protected areas. The choice of a particular

approach, or approaches, depended on the circumstances pertaining to a particular protected area, and the study provided examples of situations where each practice could be most appropriate.

Review of Nieman, Van, and Leslie's (2021) study is important to this research to the fact that it brings out important information on fire management practices in African Savana Protected Areas. The flaw in Nieman, Van, and Leslie's (2021) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Chigwanda and Mupindu (2022) conducted a study in Zimbabwe on *"Disaster Plans, Preparedness and Response: A Case Study of Mutare City Council Fire Brigade"*. The major objective of this research was to assess how prepared the City of Mutare Fire Brigade was, to respond to emergencies and disasters.

This research used the mixed methods approach. The descriptive research design was used. The study was based on the positivism philosophy. The target population were all the 26 Fire Brigade staff working at the Mutare City Council Fire Brigade at the time of study and three ambulance drivers. However, data were collected from 19 firefighters and two ambulance drivers. Data was collected using questionnaires, key informant interviews and participant observation. The data were collected from January to March 2020. The quantitative data was analyzed using the Statistical Package for Social Sciences.

The study found out that a disaster plan, which had a list of potential hazards, risks, or threats, was available. The most common disasters in the opinion of respondents were road traffic accidents 100 percent, fire 95 percent, mine collapse 79 percent and disease epidemics 53 percent. The Fire Brigade had one functional ambulance stationed at a clinic instead of at least five ambulances, and no ambulance was stationed at the Fire Station. The respondents had inconsistent answers on whether the Fire Brigade had a pre-hospital disaster scene plan or incident scene guide, which guides their operations at the incident scene such as a road traffic accident. More than half 53 percent indicated that they had a pre-hospital disaster plan, whilst 37 percent indicated that they did not have it and 10 percent indicated that they did not know whether they had it or not. Most respondent's 95 percent were of the view that, poor organisation at the road traffic accident scene can cause more disasters. A significant proportion 74 percent agreed that there could be deaths and injuries of responders on duty at poorly organised accident scenes. The majority 84 percent agreed that the arrangement of

emergency vehicles and traffic control devices at the scene of a road traffic accident with the aid of a pre-hospital disaster plan could create safer working environment for responders. There was no specific budget for disasters and disaster preparedness trainings, workshops, and drills, in the Mutare City Council budget. Slightly above half 53 percent of the respondents had attended disaster preparedness training/workshops. Close to half 47 percent of the respondents had not done mass casualty disaster preparedness drills involving clinics and hospitals. Close to half of the respondent's 47 percent were of the view that the Fire Brigade equipment was not in good condition, 68 percent indicated that the vehicles they were using were too old and 63 percent indicated that the Fire Brigade did not have all the equipment needed to effectively respond to emergencies or disasters. The personal attitude of respondents towards disaster preparedness at a personal and family level was weak.

The study concluded that absence and insufficiency of disaster preparedness trainings, workshops, and mass casualty disaster preparedness drills as well as insufficient equipment could have been responsible for the City of Mutare Fire Brigade's poor state of disaster preparedness. It was recommended that Mutare City Council specifically budget for disaster preparedness trainings, workshops, mass casualty disaster preparedness drills, upgrade the Fire Brigade vehicles and equipment and update the disaster profile and disaster plans.

Review of Chigwanda and Mupindu's (2022) study is important to this research to the fact that it brings out important lessons on disaster plans, preparedness, and response. However, the shortfall in Chigwanda and Mupindu's (2022) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Davies, Pollard and Mwenda (2010) conducted a study on "*Perceptions of land-degradation, forest restoration and fire management: A case study from Malawi"*. Understanding local perceptions of degradation and attitudes to fire management are critical for gaining support for restoration work and improving livelihoods. Deforestation and annual burning are causing significant land degradation problems in the area around Bandawe, northern Malawi. The study mapped evidence of soil erosion and remaining areas of woodland. Gully erosion was common and primarily associated with heavily utilised footpaths. Areas between gullies showed signs of significant soil movement. Remnant patches of native woodland existed but were small, degraded, and isolated. Local households were interviewed to understand local awareness and impacts of land-degradation, its perceived cause, and preferred methods for restoration. All households were aware of the presence of gullies and reported associated

problems of flood damage. Most households believed erosion was a result of deforestation. Burning practices were seen to have exacerbated erosion problems. Changing fire management practice was not seen as realistic as it risked reducing the productivity of grasses and fires were perceived to be too difficult to control. Tree planting was the community's preferred approach to tackling erosion. Their focus was on planting exotic fruit and timber trees around houses and they often requested that such work be done by volunteers. Such attitudes may have been influenced by recent extension work and a desire to secure ownership of utilisable resource. Ecologists in the Miombo zone should focus on improving fire management practices and involving communities in creating diverse secondary woodlands that provide a range of goods and services.

Review of Davies, Pollard, and Mwenda's (2010) study is important to this reserch to the fact that it brings out useful information on perceptions of land degradation, forest restoration and fire management. The omission in Davies, Pollard, and Mwenda's (2010) study is that it did not look at factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Modise (2021) conducted a study at University of Johannesburg in fulfillment of the requirement for a Master of Arts degree on "*Factors influencing the implementation of fire brigade services in the Ekurhuleni Metropolitan Municipality"*. This study focused on factors that influenced the implementation of Fire Brigade Services Act 99 of 1987 in South Africa, with specific reference to the City of Ekurhuleni. The national government is responsible for providing resources in terms of funding programmes or policy implementation. Notwithstanding, the enormous investment in terms of resources (funding and capacity building programs), municipalities are also responsible for their own financial preparation and planning of their budgetary processes.

The study discussed factors that influenced failure to implement the Fire Brigade Services Act efficiently and effectively with success in the City of Ekurhuleni. The study found out that the use of outdated legislation and policies, lack of authority and follow up, inadequate resources and financial constraints, lack of effective monitoring and evaluation and communication, coupled with lack of enough media coverages and research on fire brigade in South Africa's local municipalities and universities to be the leading factors that influence the failures of Fire Brigade Services Act. In addition to the above factors, corruption, lack of adequate training programmes for firefighters in the City of Ekurhuleni, failure to understand

the effects of fire on social order, security and stability and economic growth seem to be hindering the implementation of the Fire Brigade Services Act in South Africa.

In an effort to address the above factors and enable the successful implementation of the Fire Brigade Services Act, the study recommended that there should be strong cooperation between the three spheres of government in South Africa in addressing those factors as to allow the prevention of fires in local municipalities to destroy properties and kill people. The study also recommended that there should be more training programmes and schools established in every municipality that offer fire brigade trainings to firefighters. There should also be civic education that gives awareness to the public and educates them about the effects of fire on their livelihoods, social order, and security. The study also recommended that there should be an amendment of Fire Brigade Services Act, and the establishment of effective authority structures that assist in following-up process.

Above all the study recommended that there should be strong systematic monitoring and evaluation processes in the City of Ekurhuleni, and this would depend on the allocation of adequate resources to the fire department in the City of Ekurhuleni. The study further recommended that there should be additional studies on the effects of fire incidents on economic growth and sustainable development. To achieve the above assertions and findings, a qualitative research design with exploratory and explanatory approaches were adopted. The study relied on policy documents, literature review of secondary data that included a review of key documents (specific reports on local government performance regarding fire services), and primary data that was collected from the interviews with the participants.

Review of Modise's (2021) study is important to this research to the fact that it brings out important information on factors influencing the implementation of fire brigade services. However, the shortfall in Modise's (2021) study is that it did not look at the factors that accounts for limitation to effectively deliver fire and rescue service by local authorities.

Menya (2010), conducted a study in Kenya on "*Fire Disaster Mitigation and Preparedness in Nairobi: A Capacity Assessment of the City's Fire Brigade"*. This study was an assessment of the capacity for fire disaster mitigation and preparedness of the county government. It aimed at assessing the existing capacity, identifying the deficiencies, and recommending areas of improvement to enhance fire disaster mitigation and preparedness. Based on parameters of

assessment identified in fire disaster management literature, a conceptual framework for fire disaster preparedness was developed.

The study adopted an evaluative approach to achieve its objectives. Several indicators of management technical and infrastructure, financial, and institutional and legislative capacities were assessed. The study used stratified random sampling to create a sample frame which comprised 243 respondents, out of which 198 respondents were service users and 45 respondents were fire department personnel. Service users were derived from three different parts of the City where recent fire disasters had occurred in Gikomba market, Industrial area and Gatwikira village, Kibera. Data collection was done using questionnaires, interview schedules, observation, and photography. Data analysis was done using Statistical Package for the Social Sciences and Ms Excel, and the results presented using tables, graphs, and pie charts.

The study revealed that the county government has inadequate capacity for fire disaster mitigation and preparedness by identifying inadequacies such as lack of fire disaster management plans and inadequate machinery and equipment among others. The study provides recommendations on improvements and policy measures on fire disaster mitigation and preparedness key among them being development of fire disaster management and contingency plans, adequate budgetary allocation, community awareness creation and capacity development.

Review of Menya's (2010) study is important to this research to the fact that it brings out important information on assessing the existing capacity, identifying the deficiencies, and recommending areas of improvement to enhance fire disaster mitigation and preparedness. However, the omission in Coley's (2010) study is that it does not explain factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Agyekum, Ayarkwa and Amoah (2016) in their study, "*Challenges to Fire Safety Management in Multi-story Students",* at Kwame Nkrumah University of Science and Technology campus in Ghana. Fire safety management plays an important role in enhancing the safety of buildings against fire outbreaks. The persistent increase in fire related issues amongst students' hostel accommodations calls to mind the role hostel management and occupants play in order to ensure complete safety of lives and properties. Controlling fire outbreaks is associated with a lot of challenges.

This study presented the results of a questionnaire survey which sought to assess the perceptions of students on challenges to fire safety management in multi-story students' hostels around the Kwame Nkrumah University of Science and Technology campus in Ghana.

The findings from the study revealed that, problems with electrical wiring and installations, inadequate water distribution systems, inadequacies in the fire departments, passive attitudes of owners/management towards housekeeping and maintenance, and passive attitudes towards personal fire protection are the five critical challenges to effective fire safety management in the hostels. The results further showed that, fire insurance policies, fire evacuation plans, and regular maintenance and housekeeping, are all measures which when put in place can mitigate the outbreak of fire. Identifying the challenges to effective fire safety management and implementing measures to control such challenges should assist in the control of fire outbreaks in students' hostels and other buildings.

Review of Agyekum, Ayarkwa and Amoah's (2016) is important to this research for it provides important information on the critical challenges to fire safety management and measures that can be put in place to effectively manage the challenges. However, the flaw in Agyekum, Ayarkwa and Amoah's (2016) study is that it did not indicate the role fire and rescue services play in fire safety management. Also, the study does not highlight factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

A study by Lango (2014) titled, "*Factors Influencing Fire Service Delivery: A Case of Fire Stations in Kiambu County in Kenya",* is worth noting. Factors influencing fire service delivery are essential to reform the emergency sector and meet the safety needs of the present while improving on its future advances. By improving on services that are provided for free like fire service, the fire stations can enhance effectiveness and efficiency thereby increasing its responder's productivity and satisfaction while at the same time streamline to a minimum the response time and administrative systems that are key in meeting the expectations of the members of the public who are the consumers of fire service delivery.

The purpose of this study was to investigate the factors influencing fire service delivery at the county fire stations. The objectives of this study were; to examine the influence of fire stations staff skills in delivery of fire services in Kiambu County; to evaluate how time taken to respond to reported emergencies issues affect fire service delivery in Kiambu County; to establish the influence of top management support in the fire service delivery in Kiambu

County and finally, to establish the influence of conditional external pressure in fire service in Kiambu County. Based on theories from fire service delivery literature, a conceptual framework for the fire service delivery was developed.

This study used mixed method research approach and applied the concurrent design. The total population size was 152 with the sampling size being 108 selected from the various strata which were the fire station commanders, heads of department, ambulance attendants, first aiders and the fire marshals. Data was collected using self-administered questionnaire, interview guide and observation method. The collected data was analyzed using Statistical Package for Social Scientist Software. The results of the study were analyzed using descriptive and inferential statistics and the results were presented using tables.

The findings of the study revealed that factors that influence fire service delivery are the fire staff skills, top management influence, the work environment, and the conditional external pressure. The study further provided recommendation on improvements and policy measures on fire service delivery at the county level.

Review of Lango's (2014) study is relevant to this research to the fact that it provides valuable information on the factors influencing fire service delivery. However, just like Wanjiru, Lango does not provide relevant information on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Mbiggo and Ssemwogerere (2018) conducted a study in Uganda on *"Investigation into Fire Safety Measures in Kampala Slums: A Case of Katanga-Wandegeya"*. Globally, UN-Habitat estimates that nearly one billion people live in slums in the cities/towns of developing countries and the annual growth rate in sub-Saharan Africa is almost 5 percent, twice as high as in Latin America and Asia representing a total of 187 million people. Slums have a very significant contribution towards providing cheap shelter for the urban poor in Uganda's capital Kampala. Statistics from Uganda Bureau of Statistics indicated that Uganda had a population of 38 million in 2014 with Over 60 percent of Kampala's population living in slums. In the last decade, however the problem of fire hazards in Kampala slums has become quite overwhelming for the City authorities.

This research therefore sought to investigate the existing fire safety measures used in slums with the objective of finding ways in which fire safety can be enhanced in slum dwellings. This research revealed that the one roomed house type was most dominant which is inhabited

by 3-5 people. 94 percent of the respondents used charcoal for cooking inside or on the verandahs of such houses. In addition to that, most causes of fires in the slums were due to electric faults due to illegal connections, with exposed wiring.

This work recommended that considering the spread of fire, structures should be designed and given minimum space allowance of about 1m so as to limit spread of fire from the original source to the neighborhood structures. Fire brigade should involve the use of motorized bikes such as back pack bikes installed with all firefighting equipment which can access the remote areas in slums where fire engines may not reach.

Review of Mbiggo and Ssemwogerere's (2018) study is important to this research to the fact that it brings out useful information on fire safety in slums. However, the gap in Mbiggo and Ssemwogerere's (2018), study is that it did not show factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Wambugu, Mburu, and Gatebe (2016) conducted a study at Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya on "*Fire Safety Preparedness at Jomo Kenyatta International Airport"*. Recently, Kenyans have witnessed an increase in incidents of fire where fire has been gutting down homes, buildings, and factories, with loss of lives and property. Lack of disaster preparedness has remained one of Kenya's enduring development challenges for decades. There is lack of recognition of the interrelationship between disaster preparedness, unsustainable production, and consumption patterns. Most of the fire disaster response initiatives in Kenya tend to be ad hoc, uncoordinated, and short-term measures, mainly in the form of emergency relief services to the worst affected areas. Fire outbreaks are not only a health risk, but they also adversely affect the social, economic, and environmental conditions of an organization.

The purpose of this study was to assess fire safety preparedness measures in place at Jomo Kenyatta International Airport based on International Civil Aviation Organization standards. The study employed descriptive research design targeting 340 respondents using proportional random sampling technique. A questionnaire was used in collecting data.

Based on the results of the study, Jomo Kenyatta International Airport had inadequate preventive and preparedness measures in place to minimize the potential effects of any fire disaster occurrence. It lacked mechanism to integrate the safety standards and practices of the different stakeholders in and around the airport. The study recommended an integrated fire

disaster management system involving all organizations operating at the airport and a provision for more and bigger emergency exits and a public address system that can be relied upon in case of a fire disaster.

Review of Wambugu, Mburu, and Gatebe's (2016) study is important to this research to the fact that it brings out important information on fire safety preparedness. However, the shortfall in Wambugu, Mburu, and Gatebe's (2016) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Madoffe, Midtgaard, and Mbeyale (2014), conducted research on "*The role and performance of existing governance structures in prevention and management of wildfires in Miombo woodland, Tanzania"*. Although wildfire remains a persistent threat to the forest resources and human livelihood, very limited information exists about the role and performance of existing local governance structures in the prevention and management of wildfires in Miombo woodlands. This study was conducted in nine villages of Handeni, Kilosa and Kilwa Districts, eastern Tanzania to examine how existing local governance structures were actively involved in prevention of wildfires in forests under differing management regimes. All the surveyed villages had both formal and informal governance structures responsible for prevention and management of wildfires with over 50 percent of respondents aware of their existence. Available formal structures included village councils, Village Environmental Committees /Village Natural Resource Committee, ward development committees and primary courts. These structures were charged with ensuring security in the respective villages including protecting forests against deforestation and degradation. Despite their existence in every village, most suffered poor coordination, severe under funding and poor support from the villagers who see torching of forests as their sole right to getting access to their livelihoods.

The study established that existing local fire management structures are unlikely to guarantee effective prevention of this environmental threat unless the existing impediments are effectively addressed. Management of forest fires should therefore be handled through a well-coordinated framework that accommodates all key stakeholders in the country and should empower existing local fire prevention machinery at the village level.

Review of Madoffe, Midtgaard, and Mbeyale's (2014) study is important to this research to the fact that it brings out useful information on the role and performance of existing local governance structures in the prevention and management of wildfires. The omission in

Madoffe, Midtgaard,and Mbeyale's (2014) study is that it did not focus on factors that accounts for limitation to effectively deliver fire and rescue services by local authorities.

Wanjiru (2007) conducted a study in Nairobi, Kenya on, "*The Challenges in Preventing and Fighting Structural Fires in Nairobi's Informal Settlements*". The study was designed to investigate the challenges in preventing and fighting structural fires in Nairobi's informal settlements.

For this study, data was collected by use of both quantitative and qualitative methods with the interview as the main technique of gathering data. Descriptive statistics were used to analyse the data.

The study revealed that the respondents cited stove explosions, improper installation of electricity, use of tin lamps, use of highly flammable construction materials and use of charcoal burners as some of the contributing factors to the rising cases of fire outbreaks in the informal settlements. The study further established that despite the high cases of fire incidents in the informal settlements, the residents of the informal settlements did not have any fire preventive or response equipment installed in their houses and this was due to their low-income levels. The study also revealed challenges faced when it came to preventing structural fires in Nairobi's informal settlements. These included the lack of a fire policy and a fire act that would give guidelines to the fire personnel on how to go about responding and fighting structural fires in the informal settlements.

Review of Wanjiru's (2007) study is important to this research to the fact that it reveals some of the challenges faced in preventing and fighting structural fires. However, the gap in Wanjiru's (2007) study is that it only focused on informal settlements and left out formal settlements like fire brigade stations which are important in fire prevention. Secondly Wanjiru (2007) does not explain factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.7 Management of Fire and Rescue Services outside Africa

This section is aimed at reviewing literature on Management of Fire and Rescue Services outside Africa from which lessons can be drawn.

Mushi (2016) conducted a study at University of Central Lancashire in fulfillment of the requirement for a Master of Science degree on "*A comparative assessment of Community Fire Safety Initiatives between United Kingdom and Tanzania"*. The focus of this study was to compare the community fire safety practices between United Kingdom and Tanzania, with the aim of examining the community fire safety practices that have been used by the United Kingdom Fire and Rescue Services and see whether they can be adopted to improve the community fire safety in Tanzania.

Though the capacity of governments in managing and organizing community fire safety differs significantly across countries, depending on their economic wellbeing and resource constraints, it is argued that any initiative for community safety enhancement to be successful, it must be formulated in collaboration with the targeted communities due to the fact that they are the one who well understand their local environment, culture and tradition and their social status.

In this study, different literature was consulted as the main data source in which various community fire safety documents, articles and books were critically reviewed and followed with content analysis. The area of study is United Kingdom and Tanzania with the main focus on fire and rescue activities.

This study found out that among the initiatives which could be adopted by Tanzania from the United Kingdom practices included home fire safety checks, promotion of smoke alarm detectors, manual fire extinguishers, strict fire safety laws, regulations and enforcement, community engagement practice, partnership promotion of community fire safety for all community safety stakeholders, restructuring of national security and safety committee, improvement of Tanzania Fire and Rescue Force. Human resources, formulation of standard operation procedures and establishment of public information centres including the improvement of the Tanzania Fire and Rescue Force's website and the use of various media like radios, television, and newspapers to reach more people in the community.

Finally, the study found out that community fire safety is the function of interrelated factors which involve different stakeholders and the community. These stakeholders, fire and rescue services, ambulance, police department, local government authorities and the central government, must work in partnership in order to achieve the goal of improving the community fire safety.

Review of Mushi's (2016) study is important to this research to the fact that it reveals useful information on comparative assessment of Community Fire Safety Initiatives between United Kingdom and Tanzania. However, the omission in Mushi's (2016) study is that it did not reveal the factors that account for limitation to effectively deliver fire and rescue services by local authorities.

Khalil (2019) conducted a study at university of Gothenburg in Sweden in fulfillment of the requirement for Bachelor of Arts in Business Economics on "*Innovation in Firefighting Equipment Diffusion a Qualitative Study About New Technology Adoption in Swedish Fire Brigades"*. The continuous innovation and diffusion of firefighting technologies has always been improving the speed and efficiency of firefighting. The users of these technologies are qualified and passionate men and women who are dedicated to the wellbeing of others. As for all technologies, their diffusion process is not smooth, and the new products cannot easily find their way into its user's hands, there are always problems preventing the adoption of these technologies. Sweden suffered from one of the worst cases of forest fires in 2018 and the need for innovation to better fight these fires was imminent. In addition, it was noticed that the diffusion time of firefighting innovations is taking long periods of time for complete adoption by brigades and the adoption decision making process was not smooth or similar between all the fire brigades in Sweden.

This study did a qualitative analysis of the diffusion process in Swedish fire brigades by interviewing product vendors and fire fighters in different positions and expertise. The collected data was analyzed while maintaining a theoretical guideline of diffusion theories by Everett M. Rogers and Geoffrey A. Moore. The study concluded that the process of innovation diffusion was subjective to most of the fire brigade since most fire brigades in Sweden operate and take innovation adoption decisions independently unless they were not involved in larger organization. The issue of communication between brigades was the most prominent when it came to spreading the word about successful innovation and their compatibility to existing training and procedures. Others issues such as funding new equipment and decision makers preferences were emphasized as hinders for innovation adoption.

Review of Khalil's (2019) study is worth noting to the fact that it reveals useful information on innovation in firefighting equipment diffusion and new technology adoption. However, the

omission in Khalil's (2019) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

El and Avasar's (2022) conducted a study on "*The Evaluation of The Readiness of Fire Departments for Disasters and Emergencies: The Case of Niksar Fire Department in Tokat, Turkey".* This study aimed to evaluate the readiness of fire departments in Turkey for disasters and emergencies, with a particular emphasis on the Fire Department of Niksar Municipality. In the study, survey method was used, and fire department was evaluated in terms of its staff, vehicles, equipment, and compliance with legal regulations. In terms of the number of vehicles, Niksar Fire Department complied with the relevant regulation. A large part of its staff members knew with which institutions they were supposed to collaborate in the case of a disaster or an emergency. Among results obtained was the finding that the presence of certain provisions likely to lead to subjective interpretations of relevant regulations creates differences between fire departments.

Review of El and Avasar's (2022) study is important to this research to the fact that it brings out useful information on evaluation of the readiness of fire departments for disasters and emergencies. However, the flaw in El and Avasar's (2022) study is that it did not reveal factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Pantya (2018) conducted research on "*Fire, Rescue, and Disaster Management: Experiences from Different Countries".* On international level we can find various methods in the field of fire and disaster management interventions. Individual nations are trying to manage the activities related to firefighting, technical rescue, and, in some cases, healthcare on the basis of international trends but individually and at the highest quality possible. In this article, the author intended to present some syntheses of information that had already been published about the differences and some good practices of rescue organizations applying common, basically similar tools by taking an international outlook and studying various countries-including Hungary. The target countries are in Europe: Poland, Germany, the United Kingdom, and Italy.

When examining international fire protection operations, and at the same time a bit of traditional ambulance services, the use of technical equipment and procedures, slight differences and variations can be observed. 15 In this paper fire protection operations in five countries were examined, Hungary, Poland, the United Kingdom, Germany, and Italy. Good

practices and solutions can be found in each country, whose adaptation seems reasonable to other countries, as they are likely to have a favorable impact.

The study made recommendations on considering the following elements, listed by countries. From *Poland:* there are a lot of good practices in the area of training fire officers, decision makers by the Main School of Fire Service in Warsaw. It is also interesting to mention the freely modifiable training scenes with real fires and smokes near Zamczysko and the absolutely freely buildable and usable computer simulation room in the centre of the university.

From the *United Kingdom:* Fire engines performing firefighting and primary intervention activities are equipped with mobile terminals and simple, easy-to-use printers, thus facilitating flexibility, orientation on the site and management of the response. Developments have already begun in Hungary in this field (developments of the National Directorate General for Disaster Management for on-board PCs). Instant access to data that can be easily updated, with firm background support and the possibility for quick, simple, and cheap printing on the spot can all be of significant help for the firefighters and the commanders in certain cases. It may be worth considering the achievements of British firefighters with outstanding international experience. At the same time, auxiliary hand tools, equipment mentioned in the paper also increase safety and effectiveness of the intervention. These are for example the so-called hooligan tools, self-adhesive protection films and battery-powered equipment allowing greater mobility and flexibility. Telemetry commonly used in respiratory protection in the UK is also a good example, although expenses are much higher than those of simple designs.

From *Germany:* A very strong voluntary presence in the fire service is clearly one of the major strengths of the German fire protection system. Their deep involvement in fire protection operations and disaster management result in an increased effectiveness and at the same time, lower costs. Their training and further training system is very varied and thorough, there are good opportunities for trainings in individual areas, close-to-reality situations, and sometimes even in mobilised versions.

From *Italy:* Hybrid fire trucks that can be used in a complex way, both on water and on land can be of good help in firefighting, technical rescue, and disaster responses. Preliminary assessment prior to the procurement may be justified, it is worth paying attention to issues of purchasing, maintenance, and applicability. The general use of alpine technology equipment

and training and the use of straps for self-rescue (similarly to the United Kingdom) increases effectiveness and safety of the firefighters. Integrating swimming training into the basic training and further practice to maintain these skills can also be a good example for fire stations where water interventions are likely and can be expected.

Review of Pantya's (2018) study is of great use to this research to the fact it brings out important information on fire, rescue, and disaster management and experiences from different countries. However, the gap in Pantya's (2018) study is that is that it does not bring out important information on factors that accounts for limitations to effectively deliver fire and rescue services by local authourites.

Kodur and Kumar (2019) conducted research *in* United States on "*Fire Hazard in Buildings: Review, Assessment, and Strategies for Improving Fire Safety",.* The purpose of the study was that the current fire protection measures in buildings do not account for all contemporary fire hazard issues, which has made fire safety a growing concern. Therefore, this paper aimed to present a critical review of current fire protection measures and their applicability to address current challenges relating to fire hazards in buildings.

Design, methodology, approach to overcome fire hazards in buildings, and impact of fire hazards was also reviewed to set the context for fire protection measures. Based on the review, an integrated framework for mitigation of fire hazards was proposed. The proposed framework involves enhancement of fire safety in four key areas: fire protection features in buildings, regulation and enforcement, consumer awareness and technology and resources advancement. Detailed strategies on improving fire safety in buildings in these four key areas were presented, and future research and training needs were identified.

Findings revealed that current fire protection measures lead to an unquantified level of fire safety in buildings, provide minimal strategies to mitigate fire hazard and do not account for contemporary fire hazard issues. Implementing key measures that include reliable fire protection systems, proper regulation and enforcement of building code provisions, enhancement of public awareness and proper use of technology and resources is key to mitigating fire hazard in buildings. Major research and training required to improve fire safety in buildings include developing cost effective fire suppression systems and rational fire design approaches, characterizing new materials and developing performance based codes.

Practical implications of the proposed framework encompassed both prevention and management of fire hazard. To demonstrate the applicability of this framework in improving fire safety in buildings, major limitations of current fire protection measures were identified, and detailed strategies were provided to address these limitations using proposed fire safety framework.

Social implications of fire represented a severe hazard in both developing and developed countries and posed significant threat to life, structure, property, and environment. The proposed framework had social implications as it addressed some of the current challenges relating to fire hazard in buildings and was enhanced overall fire safety.

Originality and value of the novelty of proposed framework lied in encompassing both prevention and management of fire hazard. This was unlike current fire safety improvement strategies, which focused only on improving fire protection features in buildings (i.e., managing impact of fire hazard) using performance-based codes. To demonstrate the applicability of this framework in improving fire safety in buildings, major limitations of current fire protection measures were identified and detailed strategies were provided to address these limitations using proposed fire safety framework. Special emphasis was given to cost-effectiveness of proposed strategies, and research and training needs for further enhancing building fire safety were identified.

Review of Kodur and Kumar's (2019) study is important to this research to the fact that it brings out useful information on fire hazard in buildings, review, assessment, and strategies for improving fire safety. However, the gap in Kodur and Kumar's (2019) is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Shuka (2017) conducted a study in United Kingdom at University of History and Philology Tirana Department of Geography in fulfillment of the requirement for PhD on "*Fire Prevention and Management*". Fire prevention and management is one of the key aspects of disaster management. Prevention of fire outbreaks is important, as it reduces the risk of loss of life and property. Underdeveloped countries such as the Balkans and Albania face disproportionate events and consequences when it comes to fire. Human activities such as pastoralism, burning of weeds in farms in preparation for planting, and informal settlements increase the risk of fire outbreaks in underdeveloped countries, compared to developed

countries. Disaster preparedness requires substantial investment in terms of equipment and training of personnel on disaster management. Educating people about fire safety is one of the highly recommended strategies against fires. Innovation enabled the creation of creative programs meant to facilitate fire protection and management. In addition, such countries lacked the necessary equipment and know-how on fire protection and management. Collaborating with the developed countries can help the underdeveloped countries learn and acquire sustainable techniques in fire protection and management.

Review of Shuka's (2017) study is important to this research for it brings out useful information on fire prevention and management. However, the shortfall in Shuka's (2017) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Correa, and Ivo (2021) conducted research in Brazil on *"The Contribution of Rescue and Fire-Fighting Services to Sustainable Development: An Overview from Pernambuco under the View of The Municipal Managers"*. This research aimed to evaluate the implementation or maintenance of firefighting and rescue services in Pernambuco municipalities, as a possible factor for sustainable development.

The work began by contextualizing the objective of this research, the State of Pernambuco in Brazil, based on statistical data and works that deal with the history of the State, from its first settlers to the present day. The services studied in the State were brought in a descriptive overview. Therefore, a compilation of the history of rescue and firefighting services in Pernambuco territory (Cavalcanti, 2008), reaching the current composition, specificity, and geographic distribution. The concept of Sustainable Local Development was considered as one of the theoretical foundations of this text. Its applicability, as a promotion of the development of local potentials, promoted the improvement of human conditions, despite the sustainable administration of resources and energy, under the aegis of a planetary balance.

This presentation was based on the Brundtland Report, produced over three years (1985 to 1987) and edited in 1987 (CMMAD, 1991). It also explored the thoughts of distinguished authors on the subject. (Capra, 2004; Morin, 2002; Sachs, 1991; Silva, 2006) Within the discussion of Sustainable Development, the theme of measurement was addressed, that is, what system of indexes and indicators could be used to diagnose a promotion of the economy and human conditions, with the guarantee that the resource bases and energy will be

satisfactory for future generations. In this tone, the study was based on the work of sustainability indicators developed, mainly, by Bellen (2006). The study of fire rescue and firefighting services is incorporated into the research, both in conceptual focus and in history and evolution. Such knowledge created an understanding of the economic, human, and environmental fragility of regions without institutional apparatus for prompt response to claims.

The analysis also observed official statistical data from the United Nations, the Brazilian Institute of Geography and Statistics, and the Brazilian Military Fire Brigade, with an emphasis on Pernambuco, official surveys of municipalities involved in the analysis, as well as others that were considered relevant. The research was carried out between 2009 and 2011, being synthesized in a dissertation presented and approved by the University de Pernambuco.

Based on the answers obtained and believing that the questionnaire brings together a set of questions that refer to important aspects of sustainability, we also concluded that municipal managers consider that the Fire Rescue and Fighting service promote Sustainable Development in their municipalities.

The analysis of responses by questioning inspired that, for most of the respondent municipal managers, the improvement in the management of fisheries resources was not encouraged (when services existed) or were not promoted (when the same Rescue and Fire Fighters services did not exist). The question of mining activities also resulted in a similar response; however, in both, the “no” answers were almost as numerous as the “yes”, respectively 23/19 and 22/20. The hypothesis raised during the analysis of the results, that a greater number of “no” answers would derive from the inexistence or incipience of the activity (fishing and mining) in the municipalities, were to be considered.

For the other eighteen questions, the “yes” answers were frankly more numerous. At the extreme of these questions (where the “yes” was more numerous) were the questions about the improvement of care for accident victims and the preservation of public and private assets, with more than 95 percent of positive answers.

For the first two groups of analysis, Municipalities with and without rescue and firefighting services, there was a visible difference. It is clear when comparing the two answer patterns of these groups, that, although there was a predominance in both affirmative answers, they

presented a very similar profile when considering the percentages for questioning; however, in the responses of the managers of the municipalities that had the service under study, the percentages were slightly higher for "yes" responses to most questions.

Therefore, these binomial Rescue and Combat Services (Rescue and Fire Fighters) to Fire versus Sustainable Local Development was good, by those who already had the services in their municipality, as well as a positive perspective, as for the promotion of Sustainable Local Development with the activation of the services by managers who had not yet tried it in their locality, but at a slightly lower level, compared to the first one.

After this analysis, in the view of the municipal managers of the environment, civil defense, and economic development, of twenty-six municipalities in Pernambuco, as in six municipalities, there was no completed questionnaire, of the twelve development regions, the services of Rescue and Fire Fighters encourage, in cases where the services already existed or would encourage, where they do not exist, the issues listed as aspects of sustainable local development.

It is also true that this same picture is very favorable when analyzing numerous other issues, such as the improvement of forest management, water resources, and soil, which was assessed as being promoted by the services. The presence of institutions providing these services in the municipalities was also visibly assessed in the development of activities and attitudes that benefit: the installation and maintenance of production chains (industrial and services), the confrontation and prevention of floods, floods, landslides barriers, aquifer, and soil contamination, among other accidents.

Review of Correa, and Ivo's (2021) study is important to this research to the fact that it brings out useful information on the contribution of rescue and fire-fighting services to sustainable development. The flaw in Correa, and Ivo's (2021) study is that it did not look at factors that accounts for limitation to effectively deliver fire and rescue service by local authorities.

Huzayifa (2019) conducted a study at University of Teknologi, Malaysia in fulfillment of the requirement for Master of Science degree (Safety, Health & Environment) on "*An Investigation of Fire Emergency Preparedness in The Faculty of Engineering in Johor Bahru"*. Fire in learning institutions is a public concern because of the increased incidences, injuries, and deaths of innocent immediate school stakeholders not to mention the destruction

caused by the fire to the institution buildings such as the halls of residence and lecture rooms. Preparedness to fire disaster will help to minimize loss of lives, property and learning time.

The purpose of this study was to investigate fire disaster preparedness in the University of Teknologi, Engineering faculty in Johor Bahru, Malaysia. The study was guided by the following objectives; to establish the adequacy of firefighting facilities in University Teknologi Malaysia engineering faculty in Johor Bahru, to determine the extent to which University Teknologi Malaysia engineering faculty buildings are constructed in relation to policy provisions pertaining to fire disaster preparedness, to establish how University Teknologi Malaysia engineering faculty has put in place fire safety plans as a measure of fire disaster preparedness, to determine whether University Teknologi Malaysia engineering faculty in Johor Bahru trains workers and students on appropriate responses in case of fire outbreak and to make recommendations from the study.

The research adopted a descriptive survey design. The target population was the academic staff, supporting staff and students in all the six schools in University Teknologi Malaysia engineering faculty in Johor Bahru. Simple random sampling was used to give every subject an equal chance to be selected. Data were collected by means of questionnaires which were administered to the respondents through drop and pick method, and the site observation checklist. Data collected from respondents were analyzed through descriptive statistics.

The results were presented using frequency tables. Basing on the study findings, majority of the respondents reported that a few specific firefighting facilities in schools were adequate and annually inspected contributing to a low level of fire disaster preparedness. In relation to faculty buildings and fire safety, in majority of the schools, lecture rooms are not congested, laboratories have two doors and all laboratory chemicals are properly stored, assembly points and all exit routes are well labeled. This indicated a high level of fire disaster preparedness. On safety plans, most schools have evacuation plans, but they have never used them. The fact that most schools have never experienced the use of the evacuation plans in the schools, shows that in case of fire disaster, the stakeholders may not benefit from them. Most schools do not remind the stakeholders of these plans and this means that the plans may not help them in case of a fire disaster. Most schools lack evacuation plans for vulnerable persons. All these are signs of fire disaster unpreparedness. On training in fire safety, most workers and students

have not been trained on appropriate responses in case of fire outbreak and most of them may not know what to do in case of fire disaster leading to fire disaster unpreparedness.

Basing on the study findings, the faculty management should consider adding more firefighting facilities like sprinkler system, reliable water supply, fire boots, suits, helmets, hoods, gloves, sacks of sands in buildings, fire blankets, fire fighters' outfits, fire protective clothing, fire hydrants, fire escape ladder and self-contained breathing apparatus so that they become proportional to the number of buildings and people in the schools. It is also recommended that windows should not be grilled, and doors should open outwards. In addition, University Teknologi Malaysia engineering faculty stakeholders should be made aware of evacuation plans. Finally, all University Teknologi Malaysia engineering faculty stakeholders should be trained on fire safety. The researcher suggested that a similar study be carried out in other University Teknologi Malaysia faculties in Johor Bahru to check on fire disaster preparedness in the schools as cases of fire disasters are on the rise.

Review of Huzayifa's (2019) study is relevant to this research to the fact that it brings out important information on fire emergency preparedness. However, the shortfall in Huzayifa's (2019) study is that it did not bring out factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Allaway (2010) conducted a study at the university of Edinburgh for fulfillment of the requirement for a post graduate degree on "*An Exploration of Culture and Change in the Scottish Fire Service: The Effect of Masculine Identifications"*. This study examined the organisational culture of the Scottish Fire Service, and the political pressures for change emanating from the modernisation agenda of both the United Kingdom and Scottish Governments. Having completed a preliminary analysis of the Fire Service's culture, by examining the cultural history of the Scottish Fire Service and the process through which individuals are socialised into the Service, the study analysed the contemporary culture of the Service through research in three Scottish Fire Brigades. This research concluded that there was a clearly defined Fire Service culture, which is predicated on the operational task of fighting fire, based on strong teams, and infused with masculinity at all levels. In these circumstances, the service's cultural realities attempted to exclude women and were derisive in their regard for other more marginalised males. Following an analysis of Government driven imperatives for change, being applied to the Fire Service, it was further concluded that

the resistance to change, evident within the cultural realities of the service, can be defined as an attempt to defend one of the last bastions of male identification in the workplace.

Review of Allaway's (2010) study is important to this study to the fact that it reveals useful information on Culture and Change in the Scottish Fire Service. The shortfall in Allaway's (2010) study is that it did not show factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Penney (2016) conducted a study at Edith Cowan University in Australia for fulfillment of the requirement for Master of Para-Medical Science on "*Dynamic Risk Management in Fire and Rescue Emergency Operations"*. Firefighting is an inherently dangerous occupation involving numerous risk sources, unique contexts, multiple personnel, and rapidly changing environments. Firefighting operations are dynamic in nature yet require calculated risk taking and structured command to prevent the realisation of potentially catastrophic outcomes to both casualties and rescuers. The notion of "dynamic risk management" is a term that has gained popularity throughout fire services worldwide, yet the process of dynamic risk management is typically poorly articulated.

This study demonstrated 'dynamic risk management' is a misnomer, with risk management being defined as a process applied within the context of dynamic emergency response. Failure to recognise this and respond accordingly may leave fire services exposed to adverse findings should adverse consequences be realised. Further, this study tested the perceptions of risk held by incident controllers in the Department of Fire and Emergency Services in Western Australia against AS31000, through a combination of qualitative surveys and subsequent Bayesian analysis of reported adverse outcomes resulting from all hazards emergency response. This study found significant variance in risk tolerance between incident controllers and to a lesser degree, variance in the understanding of risk as defined by AS31000. Bayesian statistical analysis identified reportable adverse outcomes were almost certain to occur across the majority of firefighting activities, whilst potential worst-case outcomes were rarely historically realised.

The results of this study demonstrated that it is critical for firefighting organisations to have documented risk thresholds and to provide greater education of risk management in dynamic situations to incident controllers of all ranks.

Review of Penney's (2016) study is relevant to this research to the fact that it brings out important information on dynamic risk management in fire and rescue emergency operations. However, the omission in Penney's (2016) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Akhter (2014) conducted a study in Pakistan on "*Firefighters' view on Improving Fire Emergency Response: A Case Study of Rawalpindi"*. Firefighting is a professional task to perform since it involves specialized skills; however, the response of firefighters and their departments is accused for inefficiency and mismanagement especially in case of high-rise buildings. The purpose of the study was to highlight firefighters view on improving fire emergency response reasons in high rise buildings in Rawalpindi. It investigated hurdles faced by firefighters to respond to fire emergencies in high rise buildings.

This study was based on qualitative approach with purposeful sampling technique. Five rescue stations were visited for interview from 25 firefighters and two focus group discussions from 10 firefighters on set agenda related research study. The surveys were based on semi structured interviews from firefighters. It highlighted obstacles in firefighting response in high rise building constructed without safety standards as per building bylaws and how firefighters' response depends on resources, skills, implementation of building bylaws and coordination among response organizations.

The study found out that safety standards as per building bylaws were not being implemented fully in Rawalpindi and lack of public awareness about firefighting profession affected fire emergency response. Furthermore, lack of coordination at all levels especially with Police, Traffic and Pakistan Water and Power Development Authority departments and unavailability of Incident Command System also affected fire emergency response despite of having good skills and resources. The study also found that media was playing positive role at the site as representatives of the media never disturb firefighters for interviews rather, they contact their seniors for gathering details of the incident.

Review of Akhter's (2014) study is significant to this research to the fact that it brings out important information on firefighters' view on improving fire emergency response. However, the short fall in Akhter's (2014) study is that it did not focus on factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Omar, Mahmoud, and Aziz (2023), conducted a study at University of Technology, Razak Faculty of Technology, and Informatics in Malaysia on "*Critical Factors Affecting Fire Safety in High Rise Buildings in the Emirate of Sharjah, United Arab Emirates"*. The purpose of this paper was to identify the critical factors affecting fire accidents in high-rise residential buildings in the Emirate of Sharjah in order to find solutions that contribute to reducing injuries and deaths from fire accidents. A large urban expansion of the Emirate of Sharjah has taken place in the form of high-rise buildings, and the Emirate is now third in the UAE in terms of the number of high-rise buildings and is home to 19 percent of the population. Consequently, an increase in the rate of fire accidents was also observed. As such, there was need to conduct research on enhancing fire safety in high-rise buildings by conducting a literature review, in which nineteen factors affecting fire globally were identified. Because the fire characteristic was unique in every country, to identify the nature of fire in the Emirate of Sharjah, sixteen subject matter experts were consulted in the field of fire in the Emirate of Sharjah to identify the factors applicable to the Emirate. Failure mode, effect, and criticality analysis methodology was used to accomplish this goal.

The outcome of the consultations resulted in the three main factor categories, which are management factors, human factors, and technical factors, and the critical factors affecting the high-rise buildings in the Emirate of Sharjah were identified, which are: fire regulations, fire enforcement regulations, accident investigation, rescue speed, human behavior, lack of proper maintenance, fire training, building design, fire knowledge, combustible materials, fire culture of society, and urbanization. Using the Analytical Hierarchy Process tools implemented to measure the effect level of the sub-critical fire factors, 45 effects were identified, and the most common effects were: the building is fully covered by cladding, the effect of stopping activities in high-rise buildings that are non-compliant with fire regulations, the residents practiced activities related to fire knowledge, fire regulations efficiency, the training of new employees by their employers, and the residents had fire-related knowledge.

Review of Mahmoud and Aziz's (2023) study is useful to this research to the fact that it provides important information on how to prevent fire in high rise-buildings, reducing injuries and deaths from fire accidents. The gap in Omar, Mahmoud, and Aziz's (2023) study is that it did not show factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

Al-Sharabi (2013) conducted a study at University of Bradford in England for fulfillment of the requirement for Master of Science degree on "*Identification, Examination and Management of Risk Factors behind Dwelling Fires in the Kingdom of Saudi Arabia: A Managerial and Policy Perspective"*. Fire incidents are a central issue in Saudi civil defense. Despite detailed regulation concerning firefighting equipment dealing with dwelling fires, fires occur frequently.

Globally, research on dwelling fire safety is relatively new. Most studies focus on human factors, incidence, and causal issues. Few studies examine management or policy-making perspectives towards managing these individual agents. Thus, a detailed study on understanding the management of these factors for dwelling fires is long overdue.

The study used an inductive approach to investigate key management issues in reducing dwelling fires in Saudi Arabia. This qualitative study consisted of twelve in- depth semi-structured interviews and four focus groups with senior managers of the Civil Defense Division dealing with fire safety.

A sustainability-based framework was developed to map the critical issues in generating a long-term planning solution to policy and management of fire hazard and risk in Saudi Arabia. Critical drivers of this sustainability approach are good management, regulation, governance practices: especially accountability and transparency; reduction of tribalism, bureaucracy, and burns unit efficiency. However, given the modern environment of communications, information technology and communications, and in particular public education, are viewed as important mediators between drivers and sustainability. The critical role of knowledge generation is also positioned as a mediator.

The framework proposed was a paradigm shift from merely managing fire incidents on a case by case basis to a proactive risk reduction strategy. This represents an original solution to managing fire hazards at a national level and an important contribution to the fire management literature.

Al-Sharabi's (2013) study is significant to this research to the fact that it brings out useful information on identification, examination, and management of risk factors behind dwelling fires. However, the flaw in Al-Sharabi's (2013) study is that it did not focus on factors that account for limitations to effectively deliver fire and rescue services by local authorities.

Mladjan, Subosic and Jakovljevic (2012) conducted a study on "*Fire and Rescue Service in the World: Status and New Challenges"*. Analysis of statistical data in the work supported the fact that the fire and rescue services developed and equipped, particularly following the development of cities, population increase and the general progress of science and technology. Constant self-examination, together with the recognition of acceptable industry standards allow fire and rescue services to set targets, measure the extent of their achievements and, if necessary, to achieve the goals of the institution program in phases. The next generation of leaders in fire and rescue services will need to use more scientific methods of forecasting operational planning engagement during emergencies and disasters because they will face with new challenges, which are caused by phenomena about which they do not have enough experience (for example, use of weapons of mass destruction, etc.).

Review of Mladjan, Subosic and Jakovljevic's (2012) study is important to this research to the fact that it brings out useful information on fire and rescue service in the world, status, and new challenges. However, the ommission in Mladjan, Subosic and Jakovljevic's (2012) study is that it did not look at factors that accounts for limitations to effectively deliver fire and rescue services by local authorities.

2.8 Summary

In summary the reviewed literature provides useful information on management of fire and rescue services to effectively deliver fire and rescue services. Lessons have been learned in Zambia, Africa, and the rest of the world on fire and rescue services. Literature has revealed valuable information on the critical challenges to fire and rescue services management and measures that can be put in place to effectively manage the challenges. Reviewed literature has revealed that management of fire outbreaks requires coordination of various state departments and agencies in this case human resource capacity, financial capacity, and availability of equipment. The reviewed literature has not highlighted how human resource capacity, financial capacity, and equipment accounts for limitations to effectively deliver fire and rescue services by local authorities. This is the gap which this research is going to cover. In Zambia, literature suggests that most local authorities face capacity constraints to effectively deliver services. However, it has been observed that most of the studies done focus on capacities of local authorities in general to deliver services, no studies have been done to focus on local authorities and delivery of fire and rescue services. Thus, it is necessary to carry out a study in Lusaka District to evaluate factors that account for limitations to effectively

deliver fire and rescue services by Lusaka Fire Brigade Unit. This study will, therefore, fill up the identified gap. It will provide information on factors that accounts for limitations to effectively deliver fire and rescue services in Lusaka City by the local authority.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used in this research. The chapter looks at the type of research, scope of the research, research approach, research design, and sources of data, sample size, sampling methods, and data collection methods, reliability of data, validity of data, trustworthiness of data, dependability of data, credibility of data, transferability of data, data analysis techniques and the ethics to be applied when conducting the research. The chapter ends by presenting the limitations of the research.

3.2 Type of Research

The research type was based on three angles. The first angle is based on the purpose of the research. In this regard the study employed a descriptive research design. Mugenda and Mugenda (2003) argue that a descriptive research design is one that allows one to present data collected from multiple methods such as surveys and documents review to provide the complete story. This method can help to discover out what, where, and how of an occurrence. This method was used as it gave the researcher an opportunity of collecting information about the correct status of fire and rescue services delivered in Lusaka District.

The second angle was based on the number of cases to be investigated. In this regard, the research used a case study of Lusaka Fire Brigade Unit. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context. In addition, a case study allows a lot of detail to be collected that would not normally be obtained by other research designs. Additionally, a case study narrows down a very broad field of research into one easily reachable topic and is considered useful when not much is known about a particular phenomenon. Finally, a case study is less costly in terms of time and finances (Yin, 1984; Shuttleworth, 2008).

The third angle is based on the time-frame within which the research was conducted. In this regard, it was one-time research. This type of research involves the examination of a phenomenon at one point in time. This means that the observation is not made over an extended period (Barbie, 2007). One-time research is ideal in this case because, firstly, it is

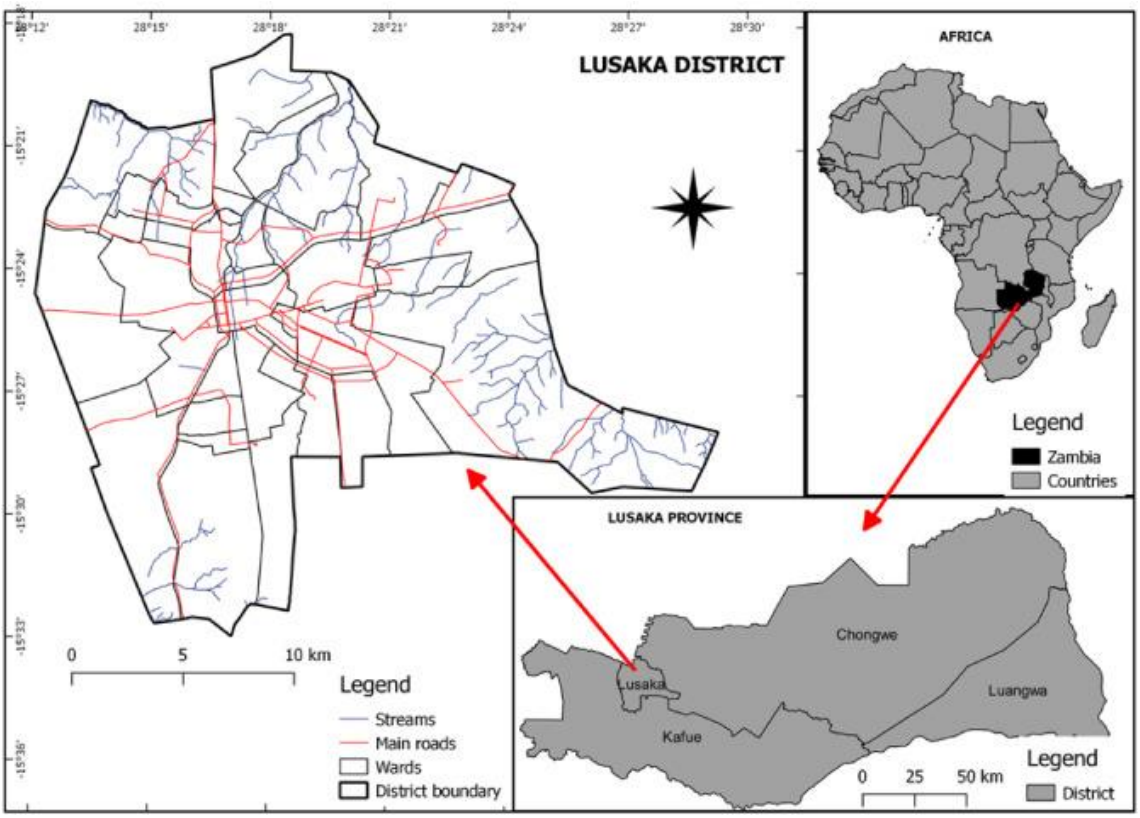
less costly. Secondly, it conforms to the time-frame within which this research is expected to be completed for the purposes of obtaining a master's degree in public administration at the University of Zambia. The point in time that this research was conducted is between March and April 2023.

3.3 Scope of the Research

This research was confined to Lusaka District. Lusaka has been chosen because it is the capital City of Zambia and one of the fastest growing cities in Southern Africa. It is situated in Lusaka Province and houses the headquarters of all government ministries and all diplomatic missions accredited to Zambia. This coupled with its central position has made Lusaka to be one of the most important economic hubs of Zambia. Lusaka City shares district boundaries with Chongwe, Mumbwa, Chibombo and Kafue Districts. Lusaka also has the fastest growing infrastructure which puts a strain on the need for fire and rescue services. Politically, Lusaka is divided into seven (7) Constituencies which include Kanyama, Chawama, Lusaka Central, Munali, Mandevu and Kabwata and these are further subdivided into 33 wards (Lusaka City Council, 2022).

The economic importance of Lusaka is very significant as it provides market for the agriculture produce from all provinces (CSO, 2022). Lusaka City is the second largest economic centre of Zambia (after Kitwe City) and is notable for its substantial diversification in the production of goods and services. According to the 2022 Census of Population and Housing Preliminary report, the population of Lusaka District is 3,181,000 persons, which is about one eighth of the 19,610,769 Zambians. Lusaka is one of the most urbanized and most populated districts in the country (CSO, 2022). Based on evidence and other observed variations in the level of economic activities across regions in Zambia, fire hazards or outbreaks in the urban setting are more likely to occur in Lusaka which is also the most urbanised and affluent (GRZ, n.d). Therefore, Lusaka District provided an ideal case for this study. Fire and rescue service delivery was chosen because Lusaka has in the recent past years witnessed unprecedented fire incidences (Lusaka times, 2018). The frequency of natural and human induced fire incidences has been on the increase. However, the Fire and Rescue Services Organizations' abilities to save both properties and lives in locations where these fires have occurred have been dismal. Further, Lusaka district was selected because no comprehensive study had been done in the district to establish the management of fire and rescue services by Lusaka City Council.

Figure 3.1: Map of Lusaka District



Source: Google Maps (2023)

According to Kumar (2005) a target population refers to all members of a real or hypothetical set of people, events, or objects to which the researcher seeks to generalise research results. For this study, the target population consisted of Lusaka City Council officials, fire station official and firefighters from Lusaka Fire Brigade Unit at Lusaka Central Fire Station.

3.4 Research Approach

The research utilised mixed method approach which combined with descriptive research design. Mixed method research approach is a design that mixes both qualitative and quantitative research designs in collecting and analysing data in order to comprehend a particular research problem (Creswell and Clark, 2011). The reason for adopting such a research method was to try and facilitate for the benefits of both qualitative and quantitative research design. The quantitative methods helped to quantify the occurrence/patterns of results and answer 'what' numbers or percentages of the population were affected while the qualitative helped to find reasons or 'why' this is the case. Thus, the application of both methods complemented each other thereby sealing the gaps that could have been created if

just one method was used (Creswell and Clark, 2011). Mugenda and Mugenda (2003) argue that a descriptive research design is one that allows one to present data collected from multiple methods such as surveys and document review to provide the complete story. This method can help to discover out what, where, and how of an occurrence. This method was used as it gave the researcher an opportunity of collecting information about the correct status of fire and rescue services delivered in Lusaka District.

3.5 Research Design

This research adopted a non-experimental design. The use of this design meant that the researcher had little control over the conditions under which the research was conducted. The researcher interacted with the research participants in their natural settings. This implied that the researcher had no control over the variables under investigation (Creswell, 2014).

3.6 Sources of Data

This research used both Primary and Secondary sources of data. Primary data are data which are undocumented and are collected for the first time by the researcher (Surbhi, 2016). In this research, primary data included both quantitative and qualitative data. Primary data was collected from the key informants, who are officials at Lusaka City Council that is from Lusaka Fire Brigade Unit, Human Resource Department, Finance Department, and Engineering Department. Primary data was collected from fire fighters who oversee delivery of fire and rescue services in Lusaka City. Primary data was used so that the researcher would get first-hand information and for the specific purposes of the study. In essence, the questions the researchers asked were tailored to elicit the data that would help him with the study.

Secondary data, on the other hand, is data that has already been collected by someone else and which has already been processed (Kothari, 2004). This data was collected through desk research from documents that relate to the research topic. The secondary sources of data included published and unpublished documents such as books, research reports, journal articles, periodicals, newspapers, dissertations, theses, and national documents, among others. These documents were accessed from libraries, individuals, organizations, and the internet. Secondary data was used because the data collection process is often guided by expertise and professionalism that may not be available to individual researchers or small research projects.

3.7 Sample Size

Sample size can be taken to mean "the number of items to be selected from the universe to constitute a sample" (Kothari, 2004: 10). It is often necessary to sample more than 10 percent of the population provided that the resulting sample is not less than 30 from the total sample. For this study, primary data was collected from a total sample of 156 respondents. The sample comprised 01 management official from Lusaka Fire Brigade Unit, 01 Engineering official from LCC, 01 Finance official from LCC, 01 Human resource official from LCC, 152 fire fighters from Lusaka main fire station. Table below shows the sample size for this study.

Table 3.1: Category of Respondents

No	**Category of Respondents**	**Sample size**
1	Official from Lusaka Central Fire Station	01
2	Officials from Human Resource Dpt., Engineering Dpt., and Finance Dpt. at LCC	03
3	Fire Fighters from Lusaka Central Fire Station	152
TOTAL		**156**

Source: Author (2023)

3.8 Sampling Methods

Sampling is a process of selecting a few individuals from a bigger group to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation, or outcome regarding a bigger group (Kabir, 2016). The research used purposive sampling method which is a non-probability sampling method to select key informants/officials and firefighters from Lusaka City Council and Lusaka Fire Brigade Unit. The research employed a purposive sampling that is based on the researcher's judgement about characteristics of a representative sample. This type of sampling is based on what the researcher thinks is typically the population under investigation (Bless and Achola, 1988). Purposive sampling was adopted in this research as it enabled the selection of respondents who were able to give in-depth information about the research topic.

3.9 Data Collection Methods

In order to provide responses to the objectives, the study utilized interview guides to key informants, and questionnaires to the fire fighters. Qualitative data was collected using semi structured interviews which were conducted with key informants. Four different interview guides were prepared, one for an official at Lusaka Fire Brigade Unit, the other was for an official from Human Resource (LCC), Finance (LCC) and the last one was for an official from Engineering (LCC). A semi-structured interview is a data collection tool in which the researcher asks informants a series of predetermined but open-ended questions (Given, 2008). Semi-structured interviews were preferred as they enabled the researcher to get detailed information while having control over the topics of the interview than in unstructured interviews. Semi structured interviews were also preferred because they made it possible for the interviewer and interviewee to include aspects of the interview which are necessary to the topic and could have initially been overlooked in the research instruments (Creswell,2003). A mixture of closed and open-ended questions was used in questionnaires that were self-administered to respondents. Quantitative data was collected using questionnaires. Closed and open-ended questions in the questionnaire gave respondents a choice to choose from a list of pre-set questions and create their own responses (Given, 2008).

Secondary data was collected through desk research from published and unpublished documents. This was done by reading and analysing documents on fire brigades' management. This method was adopted for this research because it provided insights about what had been written on fire brigades' management. This method was chosen because published and non-published documents tend to provide background information about the society or the organization being investigated, hence making it more beneficial or helpful in contextualizing one's research within the field of study.

3.10 Reliability of Data

Reliability means the quality of being trustworthy or performing consistency well. It refers to the same thing occurring under the identical or very similar conditions (Cohen, Manion and Morrison, 2000). The opposite of reliability is an erratic, unstable, or inconsistent result that happens because of the measurement itself. This research used internal consistency to measure the reliability of data (Kothari, 2004). Internal consistency is a measure of reliability that is used to evaluate the degree to which different test items that probe the same construct produce

similar results (Lawrence, 2014). To ensure internal consistency, this research asked logically related questions and the answers were checked for their logical relationship to the corresponding questions. This is the data that is presented in this research. The responses that were contradictory to the corresponding questions were taken to be unreliable, hence discarded from this research. Only responses that were found to be logically related to the corresponding questions were taken to be reliable.

3.11 Validity of Data

Validity suggests truthfulness. It refers to the extent to which the scores from a measurement represent the variable they are intended to (Prince, Jhangiani and Chiang, 2009). The absence of validity means that the fit between the ideas we use to analyze the social world and what occurs in the lived social world is poor. In simple terms, validity addresses the question of how well we measure social reality, using our constructs about it (Haradhan, 2017). Content validity was used to ensure validity of the data in this research. This involved the use of a research instrument which represented the full content of the subject under investigation (Prince, Jhangiani and Chiang, 2009). The research instruments were structured in a way that covered all aspects of the phenomena under investigation.

3.12 Trustworthiness

To ensure trustworthiness, this study was done by giving a clear and distinctive description of the research context, selection and characteristics of respondents, data collection as well as the procedure for data analysis. Trustworthiness also included, dependability, credibility, and transferability (Richardson, 2008).

3.12.1 Dependability

This refers to the quality of being trustworthy and reliablibility of the research finding and the degree to which research procedures are documented (Chowdhury, 2015). The researcher ensured dependability by tracking the methods, data collection, analysis and providing adequate contextual information about each piece. This was ensured by the able supervisor.

3.12.2 Credibility

Credibility is the level that the research results are believable from the participant's perspective (Nachmias and Nachmias, 2008). In this study, member checking occurred.

Member checking is an opportunity for members (respondents) to check and consent to aspects of the interpretation of the data they provided. Though not all members did check but a significant number of participants did. In a nutshell this was done by asking the participants to check whether the information provided was correct.

3.12.3 Transferability

Transferability is the degree that research can be transferred to other contexts or settings (Chowdhury, 2015). In this study; transferability was insured by a large description of the participant's responses. Furthermore, this study is transferrable in that other fire brigades outside of Lusaka district can still be studied and conclusions drawn. The researcher made sure that the study was representative and transferrable by methods, theory and by context.

3.13 Methods of Data Analysis

Data analysis is defined as a way of processing data so that what has been learnt can be disseminated to others. Generally, it involves the search for meaning (Richardson, 2008). The data from questionnaires was processed and analysed manually. Excel was used to create tables and graphs for quantitative data that was generated form respondents. On the other hand, qualitative data from key informants was analysed using thematic analysis. The themes that were used to analyse the data were categorised as human resources capacity, financial capacity, and firefighting and rescue equipment.

3.14 Research Ethics

Ethics define what is or is not legitimate to do. Ethics can also be defined as moral principles which researchers have to adhere to when conducting the research (Richardson, 2008). Ethical issues were considered when carrying out this research. Firstly, permission to collect data was sought from Lusaka city council and Lusaka Fire Brigade Unit. Secondly, informed consent was employed where participants had to agree to participate in the study, meaning that participation was voluntary. Besides, the participants were told about the research and allowed to ask questions about the research where they needed clarity. Confidentiality was employed and participants' identity was kept anonymous. Furthermore, participants were assured of their rights to decline to answer questions which they felt uncomfortable with in the process of data collection.

3.15 Limitations of the Research

Limitations are those elements over which the researcher has no control (Kalangwa 2022). In most instances, any assumption you make there are limitation. They are the shortcomings, conditions or influences that cannot be controlled by the researcher that place restrictions on your methodology and conclusions. The study limitations are:

i. Poor responses as some respondents may not know factors limiting Lusaka Fire Brigade Unit from delivering effective fire and rescue services.
ii. Some respondents may fail to answer a questionnaire, which may result in poor data collection.
iii. Lack of knowledge on Lusaka Fire Brigade Unit may limit the researcher's access to reliable information by employees.
iv. Limited interview time by management and respondents.
v. Absence of managers and supervisors in their offices.

In the process of conducting this research, several challenges were encountered. These are as follows:

1. Lusaka City Council delayed authorizing the researcher to conduct the research. However, the researcher wrote a letter to the Town Clerk requesting for permission to collect data and made constant follow ups until he was given permission and managed to hold interviews with all the key informants and collected the necessary data.

2. At first attempt to collect data, the country was hit by a Covid 19 pandemic the researcher contracted Covid 19 and the Zambian government was encouraging government officials to be working from home. This made it difficult for the researcher to hold interviews with the respondents. Nevertheless, the researcher recovered and decided to proceed with the research.
3. It was difficult to hold face to face interviews with all the key informants, as most of them were busy with work during the time of data collection. This made it difficult for the researcher to collect data at the stipulated time. However, the researcher was patient enough and managed to have a face-to-face interview with all the key informants. Therefore, the findings of this research are still reliable.

3.16 Conclusion

The chapter presented the methodology that was used in this research. The chapter looked at the type of research, scope of the research, research approach, research design, sources of data, sample size, sampling methods, data collection methods, reliability of data, validity of data, trustworthiness, methods of data analysis and the ethics to be applied when conducting the research. The chapter ended by presenting the limitations of the research.

CHAPTER FOUR

HUMAN RESOURCE CAPACITY OF LUSAKA FIRE BRIGADE UNIT AS A LIMMITING FACTOR TO EFFECTIVEELY DELIVER FIRE AND RESCUE SERVICES IN LUSAKA CITY

4.1 Introduction

The purpose of this chapter is to present and discuss research findings relating to the first specific objective which reads: To examine the extent to which human resource capacity of Lusaka City Council may account for limitations to effectively deliver fire and rescue services. To achieve this objective, the chapter discusses the availability of human resource at Lusaka Fire Brigade Unit to effectively deliver fire and rescue services. The chapter will be divided into seven sections. The first section is the introduction. The second section deals with available number of firefighters against the establishment for the whole City. The third section deals with the available number of firefighters in departments at Lusaka Fire Brigade Unit against the required number of firefighters; their roles, categories and how they apply their skills in the work of firefighting. The fourth section discusses the education qualifications, training, and skills of fire fighters. This section shows whether fire fighters have undergone specialised training in firefighting and possess adequate skills and knowledge to provide fire and rescue services or not. The section will also show the kind of specialised training (if any) the fire fighters have undergone in order to effectively deliver fire and rescue services. The fifth section shows the experience of the fire fighters according to the number of years they have served in firefighting. Finally, a conclusion will be drawn.

4.2 Human resource availability in the city and effective delivery of fire and rescue services

As earlier indicated, this section discusses whether the Lusaka Fire Brigade Unit has adequate human resource to deliver fire and rescue services. Towards this end, a question was asked on the normal establishment for Lusaka Fire Brigade Unit to deliver fire and rescue services and manage fire outbreaks in Lusaka City.

The study found out that the section was within the required establishment but the human resource was not enough to effectively deliver fire and rescue services in Lusaka City. An informant from Human Resource Department at Lusaka City Council explained that there were only 184 fire firefighters out of the 190 total establishment at the time of the interview. The six vacancies were caused by separation. The fire section was working below its capacity and there by affecting the delivery of fire and rescue services in the district. However, according to the National Fire and Rescue Services Policy for Zambia Implementation Plan of 2017, there must be an established minimum number of firefighters to population ratio and firefighter to regional GDP ratio across regions (GRZ, 2017). The National Fire and Rescue Services Policy for Zambia Implementation Plan of 2017 state that there should be 167 firefighters per 100,000 population (GRZ, 2017). Lusaka's population is approximately 3,181,000, meaning that according to this recommendation, Lusaka Fire Brigade Unit is supposed to have 5,312 fire fighters in order to effectively deliver fire and rescue services in Lusaka District.

The table below shows a distribution of the ranked and non-ranked officers at Lusaka Fire Brigade Unit in a descending order.

Table 4.1: Distribution of fire-fighters at Lusaka Fire Brigade Unit and Establishment

RANKED AND NON-RANKED OFFICERS	**CURRENT HUMAN RESOURCE**	**ESTABLISHMENT**
Chief fire officer	01	1
Deputy Chief Fire Officer	01	1
Division fire officers	05	6
Assistant Division Fire Officers	04	6
Station Fire Officers	03	6
Sub Fire Officers	27	27
Leading Fire Officers	24	24
Shift Drivers	18	18
Fire-Fighters	101	101
Total	**184**	**190**
Females	59	60

Males	125	130

Source: Human Resource Records Lusaka City Council (2023)

Table 4.1 shows the total number of fire officers as 184, consisting one Chief Fire Officer, one Deputy Chief Fire Officer, five Division Fire Officers, four Assistant Division Fire Officers, three Station Fire Officers, 27 Sub Fire Officers, 24 Leading Fire Officers, 18 Shift Drivers, 101 Fire-Fighters, a total of 59 women, and 125 men.

There are six departments which make up the Lusaka Fire Brigade Unit. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that the departments were six as follows; Administration Wing, which oversees the administration of the fire brigade unit and management of fire and rescue services in Lusaka District, Operations Wing, which oversees the fighting of fire out breaks, marine and road traffic accidents, Fire Prevention Wing, which oversees the sensitization of fire and rescue services in communities, Fire Investigation Wing, which oversees the investigation of fires around the city , Marine Wing, which is specialized in rescue operations, and Research and Development Wing which oversees all research and training activities that generate new firefighting and fire prevention knowledge required by the fire brigade in order to provide effective fire and rescue services in the City. It was revealed that under Administration Wing, there were 14 fire fighters, Operations Wing, there were 120 fire fighters, Fire Prevention Wing there were 35 fire fighters, Fire Investigation Wing there were four fire fighters, Marine and Rescue Wing there were six fire fighters, and Research and Development Wing there were five fire fighters, making a total of 184 fire fighters. The findings revealed that even in these mentioned departments there were still shortages of man power in order to effectively deliver fire and rescue services in the City.

Lusaka Fire Brigade Unit has three working watches (shifts) which are supervised by a group of one Division Fire Officer, one Assistant Division Fire Officer and one Station Officer per watch (shift), making it three supervisors per watch (shift) this is in accordance with the National Fire and Rescue Services Policy of 2018, which state that in order to effectively deliver fire and rescue services a fire station shall run an eight hours, 3 shift in a day and maintain a good number of manpower for reinforcement. However, in these 3 watches (shifts) the research found out that there were shortages of man power. Instead of Lusaka Fire Brigade Unit having six Division Fire Officers, six Assistant Division Fire Officers and six Station

Fire Officers, there were only five Division Fire Officers, four Assistant Division Fire Officers and three Station Fire Officers. These findings revealed that there was a shortfall of one Division fire officer, two Assistant Division Fire Officers and three Station Fire Officers as a result this made it difficult for the supervisors to have enough rest days in the watches (shifts) they were supervising. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station, explained that each shift (Watch) was supposed to have six supervisors so that when three Supervisors are on duty the other three supervisors are supposed to be on standby that is one Division Fire Officer, one Assistant Division Fire Officer, and one Station Fire Officer respectively. Since there are three watches (shifts) the 27 Sub Fire Officers and 24 Leading Fire Officers are divided into groups of five each and distributed in the three watches (shifts) according to the five fire engines and the remaining man power is for relief. The table below shows the available human resource at Lusaka Fire Brigade Unit and the required number in the respected departments.

Table 4.2: Distribution of required number of fire fighters per department at Lusaka Fire Brigade Unit against the required number

DEPARTMENTS	**AVAILABLE HUMAN RESOURCE**	**REQUIRED HUMAN RESOURCE**
Administration Wing	14	28
Operation Wing	128	256
Fire Prevention Wing	35	60
Fire Investigations Wing	4	60
Marine Wing	6	40
Research And Development	5	40
Total	**184**	**484**

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.2 shows the available human resource against the required human resource by Lusaka Fire Brigade Unit in order to effectively deliver fire and rescue services in Lusaka City. The required number of human resources was arrived at from a proposal made by the fire section to the Engineering Department. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that through the surveys that have been done on the ground,

Administration Wing should have 28 fire fighters, Operation Wing 256 fire fighters, Fire Prevention Wing 60 fire fighters, Fire Investigation Wing 60 fire fighters, Marine Wing 40 fire fighters, Research and Development Wing 40 fire fighters and still more looking at the figures given by the informant per each department with the growing population the human resource would not be enough to effectively deliver fire and rescue services in Lusaka City. An informant from Human Resource Department at Lusaka City Council further explained that under the fire prevention wing currently there were four fire firefighters and they had a target of issuing 26,000 fire certificates and do the inspection of these same 26,000 fire certificates in 2023 and looking at the department's human resource, this was practically impossible.

An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station, explained that Lusaka Central Fire Station was a head fire station in Lusaka province, for it also provided fire and rescue services to its neighboring districts. It was difficult to identify the boundaries with its neighboring districts in certain circumstances. Now with the growth in population, residential areas, commercial and industrial areas, the fire station was not adequate to effectively deliver fire and rescue services in the district. He stated that:

> *And we do not only cover Lusaka District, we are sometimes called upon for emergencies in Chongwe, Rufunsa, and Chilanga and Shibuyunji districts. So, some fire problems overwhelm our fire station. Nowadays its difficulty to separate Lusaka from its neighbouring districts due to conurbation.*

An informant from Human Resource Department at Lusaka City Council explained that Lusaka City Council could not employ more fire fighters because 190 firefighters is the approved establishment. Lusaka Central Fire Station was built in 1959 and it has maintained the same human resource establishment and building since that time despite the growing population in the district. He stated that:

> *Lusaka Central Fire Station currently is the only active firefighting station in the district and it was constructed before independence when the population and catchment areas of Lusaka were relatively small. Now with the growth in population, residential areas, commercial and industrial*

areas, this fire station has become inadequate to effectively deliver fire and rescue services in the district.

Apart from the main Lusaka Fire Brigade Station, there is one operational substation, Matero substation. There are also three incomplete fire stations, Chelstone, Chilenje and Makeni Barastone. An informant from Lusaka Fire Brigade Unit explained that despite Matero being a substation, it had no establishment of its own, and the fire fighters at Matero substation were deployed from Lusaka Central Fire Station. However, according to the Notational Fire and Rescue Services Policy for Zambia Implementation Plan of 2017, Matero substation was supposed to have an establishment of 40-60 fire fighters and be headed by a Division Fire Officer but due to lack of human resource it was headed by an Assistant Division Fire Officer (GRZ, 2017). The National Fire and Rescue Service Policy of 2019 state that the Ministry of Local Government shall establish fire sub-stations to reduce travel distance in responding to incidents and every fire authority shall establish and maintain a fire brigade unit with the approval of the Minister. In accordance with the requirements set out, it is imperative that every fire brigade station in each district should have a minimum of ten (10) sub stations and five (5) substations for big and small districts respectively, that should provide services required within the obligatory boundaries of 10 kilometers (10km) covering a population of 5,000 on average. This will help respond to any emergencies within the stipulated timeframe of seven (7) minutes by National Fire Safety and Rescue Services (GRZ, 2019). However, these policy stipulations are not met on the ground, the narrative on the ground is the opposite of is supposed to be. Figure 4.1 shows Lusaka Central Fire Station.

Figure 4.1: Lusaka Central Fire Station

Source: Author's fieldwork (2023)

This section has shown that human resource at Lusaka Fire Brigade Unit is not enough to effectively deliver fire and rescue services because Lusaka Central Fire Station is the only active fire stations in Lusaka City and this problem of lack of human resource does not only affect Lusaka Fire Brigade Unit but all fire station in the country. The researcher notes that the human resource at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The findings above support Mushi's (2016) findings which revealed that Tanzania Fire and Rescue Force was lacking enough staff and fire fighters to execute its functions in fire-fighting and rescue operations. The official records from the Tanzania Fire and Rescue Force indicated that up to the end of 2015, the force had 2,390 staff. However, the manning level distribution

indicated that the force needed 29,465 staff for smooth operation of its functions and responsibilities. Unfortunately, the Tanzania Fire and Rescue Force, which is responsible for all issues of firefighting and rescue operations (URT 2007), was understaffed, underfunded, underequipped and its stations were located only in the major cities and towns with only 36 fire stations in the whole country, with 49 million people sparsely distributed in the 945203 km^2 (Agwanda, Amani 2014).

4.3 Education Qualifications, Training, and Skills of Fire Fighters

As earlier indicted, in order to effectively deliver fire and rescue services in Lusaka City, the fire brigade requires well trained and qualified fire fighters. The following section discusses the professional qualifications of fire fighters at Lusaka Fire Brigade Unit and the required minimum qualifications according to position or rank.

4.3.1 Education Qualification, Basic Training, and in-Service Training

This section discusses professional qualifications of firefighters at Lusaka Central Fire Station compared to what is required from the current Chief Fire Officer to the position of ordinary firefighter.

The table below shows the education qualifications, basic training, and in-service training of the Chief Fire Officer at Lusaka Fire Brigade Unit.

Table 4.3: Education qualification, basic training, and in-service training of the Chief Fire Officer

CHIEF FIRE OFFICER	QUALIFICATIONS
Degree	1
Diploma	1
Grade 12 Certificate	1
Basic Training	1
Deputy Chief Fire Officer Certificate	1
In-Service Training Certificates	7

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.3 shows that at the time the study was carried out the Chief Fire Officer at Lusaka Central Fire Station had the following professional qualifications, degree in Fire Engineering, diploma in Fire Engineering and a grade 12 certificate. He also had seven compulsory in-service training certificates from Basic Firemanship Certificate to Chief Fire Officer Certificate. These qualifications are basically the professional qualification of anybody to become a Chief Fire Officer. The minimum professional qualifications required are Degree in fire engineering or any related field and in-service training certificates from basic firemanship to Chief Fire Officer.

This section has shown that the Chief Fire Officer at Lusaka Fire Brigade Unit has the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Chief Fire Officer do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service training of the Deputy Chief Fire Officer at Lusaka Fire Brigade Unit.

Table 4.4: Education qualification, basic training, and in-service training of the Deputy Chief Fire Officer

DEPUTY CHIEF FIRE OFFICER	QUALIFICATIONS
Degree	1
Diploma	1
Grade 12 Certificate	1
Basic Training	1
Deputy Chief Fire Officer Certificate	1
In-Service Training	6

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.4 shows that at the time of the study the Deputy Chief Fire Officer had a degree in Fire Engineering, diploma in Fire Engineering, a grade 12 certificate, and Basic Training Certificate. He also had six compulsory in-service training certificates from basic firemanship certificate to Deputy Chief Fire Officer Certificate. The required minimum qualifications for the position of Deputy Chief Fire Officer are degree in Fire Engineering

or any related field and in-service training certificates from Basic Firemanship to Deputy Chief Fire Officer.

This section has shown that the Deputy Chief Fire Officer at Lusaka Fire Brigade Unit has the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Deputy Chief Fire Officer do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service training of the five Division Fire Officers at Lusaka Fire Brigade Unit.

Table 4.5: Education qualification, basic training, and in-service training of the Division Fire Officer

QUALIFICATIONS	**NUMBER OF DIVISION FIRE OFFICERS**
Degree	2
Diploma	5
Grade 12 Certificate	5
Basic Training	5
Division Fire Officer Certificate	5
In-Service Training	5

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.5 shows that at the time of the study, among the five Division Fire Officers at Lusaka Fire Brigade Unit, two of them, each had a degree in Fire Engineering, that is in addition to the qualifications that the other three Division Fire Officers had, which are diploma in Fire Engineering, grade 12 certificate and in-service training certificates from Basic Firemanship to Division Fire Officer. The required minimum qualifications for the position of Division Fire Officer are diploma in Fire Engineering or any related field and compulsory in-service training certificates from Basic Firemanship to Division Fire Officer. Having a degree is an added advantage.

This section has shown that the Division Fire Officer at Lusaka Fire Brigade Unit has the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Division Fire Officer do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service training of the four Assistant Division Fire Officers at Lusaka Fire Brigade Unit.

Table 4. 6: Education qualification, basic training, and in-service training Assistant Division Fire Officer

QUALIFICATIONS	**ASSISTANT DIVISION FIRE OFFICERS**
Degree	
Diploma	4
Grade 12 Certificate	4
Basic Training	4
Assistant Division Fire Officer Certificate	4
In-Service Training Certificate	4

Source: Human Resource Records, Lusaka City Council (2023)

Tables 4.6 shows that at the time when the study was carried out four Assistant Division Fire Officers at Lusaka Fire Brigade Unit each one had a diploma in Fire Engineering, grade 12 certificate, Basic Firemanship and in-service training certificates. The minimum required qualifications for the position of Assistant Division Fire Officer are diploma in fire engineering or any related field and compulsory in-service training certificates from Basic Firemanship to Assistant Division Fire Officer. Having a degree is an added advantage.

This section has shown that the Assistant Division Fire Officer at Lusaka Fire Brigade Unit has the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Assistant Division Fire Officer do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service Training of the three Station Fire Officers at Lusaka Fire Brigade Unit.

Table 4.7: Education qualification, basic training, and in-service training of the Station Fire Officers

QULIFICATIONS	NUMBER OF FIRE STATION OFFICERS
Degree	
Diploma	3
Grade 12 Certificate	3
Basic Training	3
Station Fire Officer Certificate	3
In-Service Training	3

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.7 shows that at the time the study was carried out the three Fire Station Officers had the following qualifications, diploma in Fire Engineering which is compulsory in order to hold the position, grade 12 certificate, Basic Firemanship and in-service training certificate. A diploma is compulsory because in the past a Station Fire Officer used to be the head of Lusaka Fire Brigade Unit and a diploma was the required qualification. The minimum required qualifications for the position of Station Fire Officer are diploma in Fire Engineering or any related field plus three compulsory in-service training certificates from Basic Firemanship to the rank of Station Fire Officer. Having a degree is an added advantage.

This section has shown that the Station Fire Officer at Lusaka Fire Brigade Unit has the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Station Fire Officer do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service training of the 27 Sub Fire Officer at Lusaka Fire Brigade Unit.

Table 4. 8: Education qualification, basic training, and in-service training of the Sub Fire Officers

QULIFICATIONS	NUMBER OF SUB-FIRE OFFICERS
Degree	2
Diploma	2
Grade 12 Certificate	27
Basic Training	27
Sub Fire Officer Certificate	27
In-Service Training	27

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.8 shows that at the time when the study was carried out the 27 Sub Fire Officers two of them each had a degree and a diploma in fire engineering, that is in addition to the qualifications that the other 25 Sub Fire Officers had, which were certificate in Sub Fire Officer, certificate in Leading Fire Officer, Certificate in Basic Firemanship, in-service training certificates and grade 12 certificate. The minimum required qualifications for the position of Sub Fire Officer are grade 12 certificate, and in-service training certificates from initial Basic Firemanship to the position of Sub Fire Officer. Having a degree is an added advantage.

This section has shown that the Sub Fire Officers at Lusaka Fire Brigade Unit have the required professional qualifications to effectively deliver fire and rescue services. The researcher notes that the professional qualifications of the Sub Fire Officers do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service Training of the 24 Leading Fire Officers at Lusaka Fire Brigade Unit.

Table 4.9: Education Qualification, Basic Training, and in-Service Training of the Leading Fire Officers

QUALIFICATION	NUMBER OF LEADING FIRE OFFICERS
Degree	
Diploma	
Grade 12 Certificate	24
Basic Training	24
Leading Fire Officer Certificate	24
In-Service Training	24

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.9 shows that at the time when the study was carried out the 24 Leading Fire Officers, each one of them had the following qualifications, Leading Fire Officer certificate, Basic Firemanship certificate, in-service training certificates, and grade 12 certificates. The minimum required qualifications for the position of Leading Fire Officer are grade 12 certificate, Basic Firemanship certificate and in-service training certificates up to the position of Leading Fire Officer.

This section has shown that the Leading Fire Officers at Lusaka Fire Brigade Unit has under gone Basic Firemanship and Leading Fire Officer training to effectively deliver fire and rescue services. The researcher notes that the Leading Fire Officers have the required professional qualifications and do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualification, basic training, and in-service training of the 18 shift drivers at Lusaka Fire Brigade Unit.

Table 4. 10: Education qualification, basic training, and in-service training of Shift Drivers

QUALIFICATIONS	NUMBER OF SHIFT DRIVERS
Degree	
Diploma	
Grade 12 Certificate	18
Basic Training	18
Fire Truck Operating License	18
Fire Truck Operating License	18

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.10 shows that at the time of the study 18 Shift Drivers, each one of them had the following qualifications, grade 12 certificate, Basic Firemanship certificate, fire truck operating license and in-service training certificate. The minimum required qualification for the position of shift driver (operator) are grade 12 certificate, basic firemanship, fire truck operating license and in-service training certificates.

This section has shown that all the Shift Drivers at Lusaka Fire Brigade Unit have undergone Basic Firemanship training and Fire Truck Operation Training. The researcher notes that the Shift Drivers have the required professional qualifications and do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the education qualifications, basic training, and in-service training of the 101 Fire Fighters at Lusaka Fire Brigade Unit.

Table 4.11: Education qualification, basic training, and in-service training of the Fire Fighters

QUALIFICATIONS	NUMBER OF FIREFIGHTERS
Degree	
Diploma	
Grade 12 Certificate	101
Basic Training	101
Firefighter Certificate	101
In-Service Training	101

Source: Human Resource Records, Lusaka City Council (2023)

Table 4.11 shows that at the time when the study was carried out 101 Fire fighters, each one had a grade 12 certificate, Basic Firemanship certificate and in-service training certificate. The minimum required qualification to become a fire fighter is a grade 12 certificate with 5 credits, including chemistry and physics.

An informant from Human Resource Department at Lusaka City Council, explained that the standard is that anyone who had attained the position of Station Fire Officer with a degree in Fire Engineering or any related field was eligible to be Chief Fire Officer. He also explained that the fire fighters do their Basic Firemanship and other in-service training courses in Kabwe at Zambia National Fire Service Training School which was opened in 1968 just after independence. He stated that:

> *I would also like to stress that we have a training school in Kabwe where our firemen and women do their training in various courses including basic firemanship, breathing apparatus course, hazardous chemical course among others and we do send our marine department to Mbala ZAF, Samora Machel Base for marine training.*

An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that the entry qualification for Basic Firemanship is a full grade 12 certificate with Chemistry and Physics and before one is employed as a fire fighter, one is required to do aptitude tests that include physical fitness and when they are selected, they go under induction course to acquire skills in Basic Firemanship. The informant explained that

fire fighters are expected to undergo basic training in firemanship where they are trained in Basic Firefighting, Breathing Apparatus, Road Traffic Accidents, Fire Prevention, Fire Investigation, Occupational Health and Safety, Disaster Preparedness, Crew Commander, Pump Operator, Hazardous Materials and Fire Service Instruction. Thereafter, they go for further in-service training again in Kabwe where they are expected to specialise in one of the named courses above and learn fire engineering and electrical engineering. He stated that:

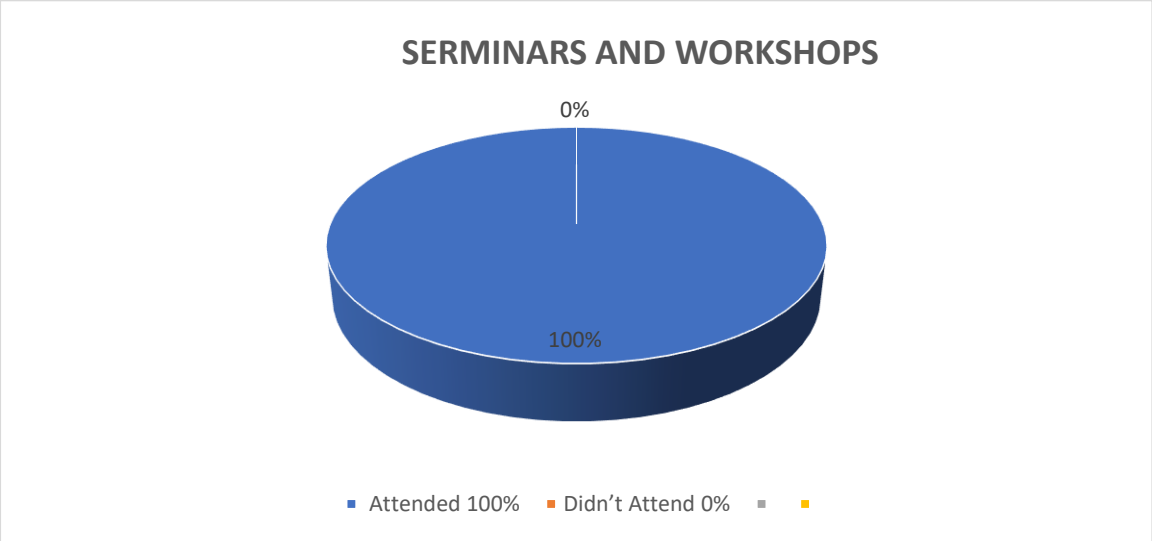
> *Apart from the Zambia National Fire Service Training School in Kabwe, there are also other schools providing a diploma and a degree in Firefighting Engineering in Zambia and these are Zambia Air Service Training Institute (ZASTI), NIPA and Eden University and are all members of the Institution of Fire Engineers (IFE).*

This section has shown that all the fire fighters at Lusaka Fire Brigade Unit have undergone Basic Firemanship training and in-service-training to effectively deliver fire and rescue services. The researcher notes that the firefighters have the required professional qualifications to effectively deliver fire and rescue services and, in this case, they do not account for limitations to effectively deliver fire and rescue services in Lusaka City.

4.3.2 Additional Training for the Fire Fighters

In addition to the formal qualification, basic training and in-service training undertaken by fire fighters at Lusaka Central Fire Station, fire fighters usually attend workshops and seminars and none of the fire fighters had undergone training outside the country apart from the Chief Fire Officer, Deputy Chief Fire Officer and one Division Fire Officer. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that the seminars and workshops attended by fire fighters were according to ranks and were mandatory. These seminars and workshops were held on quarterly basis in a year. The figure bellow shows the number of fire fighters that attended seminars and workshops.

Figure 4.2: Fire fighters that attended seminars and workshops



Source: field data (2023)

The figure 4.2 shows firefighters at Lusaka Central Fire Station that attended seminars and workshops on firefighting. The study found out that a total of 184 fire fighters representing 100 percent of the firefighters at Lusaka Central Fire Station attended workshops and seminars on firefighting and rescues services. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that on daily basis fire fighters at Lusaka Central Fire Station have continued to acquire knowledge and skills on how to be effective in the provision of fire and rescue services making them proactive when attending to fires and road traffic accidents through seminars and workshops.

An informant from Human Resource Department at Lusaka City Council explained that, fire fighters in seminars and workshops were taught Fire Legislation and Regulations, Chemistry of Fire and how fire spreads, Fire Detection, Fire Prevention, Fire Evacuation Process, Fire Extinguishers, Firefighting Tools, and Techniques. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that seminars and workshops were helpful and firefighters benefited from them, they improved their firefighting skills and broadened their knowledge base in providing fire and rescue services effectively. He stated that:

> *Seminars and workshops are so helpful in such that they cover the knowledge gap that firefighters are not taught during basic firemanship training and in-service training.*

An informant from Human Resource Department at Lusaka City Council, further explained that seminars and workshops were helpful to firefighters because they acted as refresher courses to their job whilst enhancing their knowledge capacity in fire and rescue services.

The section has shown that the human resource at Lusaka Fire Brigade Unit has undergone extra training to effectively deliver fire and rescue services. The researcher notes that the extra training for the firefighters at Lusaka Fire Brigade Unit does not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The above findings support Uchechukwu and Uche's (2015) study which recommended that organization should inculcate the habit of attending seminars and conferences, the company should make sure that the effort of employees is appraised from time to time to find out how they contribute to the achievement of organizational goals and educational qualification must be pre-requisite for the recruitment, selection, promotion, and placement of workers.

4.4 Experience of fire fighters

This section sought to establish the experience of fire fighters at Lusaka Central Fire Station. The study found out that the human resource from Lusaka Fire Brigade at Lusaka Central Fire Station has the required experience to effectively deliver fire and rescue services in Lusaka City. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that, in order to provide effective fire and rescue services in the City, the firefighters should have good working experience. He stated that:

> *"It's a great deal to have experienced firefighters. Those who have experience often are the first to realize that something is not quite right. They have seen normal so many times and when something abnormal happens it stands out to them. This allows them to benefit from naturalistic decision making. In other words, their quick decisions are based on a memory bank of similar past situations making it easy to handle situations".*

This section has shown that the human resource at Lusaka Fire Brigade Unit has the experience to effectively deliver fire and rescue services. The researcher notes that the experience for the firefighters at Lusaka Fire Brigade Unit does not account for limitations to effectively deliver fire and rescue services in Lusaka City.

The table below shows the required experience for someone to hold each position and the number of years served in firefighting at Lusaka Central Fire Station.

Table 4.12: Number of years required to have been saved before promotion to the position and served by the current firefighters

Rank	**Number of years required to be served**	**Actual number of years served by the current personnel in service.**
Chief Fire Officer	5	22
Deputy Chief Fire Officer	5	32
Division Fire Officer	5	20-25
Assistant Division Fire Officer	5	15-20
Station Fire Officer	5	10-15
Sub fire officer	2	5-10
Leading Fire Fighter	2	5-10
Fire Fighter	-	0-5

Source: Human Resource Records Lusaka City Council (2023)

Table 4.12 shows that at the time of the study the Chief Fire Officer at Lusaka Central Fire Station had served for 22 years in service, the Deputy Chief Fire Officer had served for 32 years in service, the five Division Fire Officers had also served between 20-25 years, the four Assistant Division Fire Officers had served between 15-20, the three Station Officers had served between 10-15 years, the 27 Sub Fire Officers had served between 5-10 years. The table also shows that from Station Fire Officer to the rank of Chief Fire Officer the required number of years to have been served in firefighting for someone to be eligible to hold these positions was five years and must have lived in the same district for not less than five years and from ordinary firefighter to sub fire officer to be eligible for these positions someone is required to have served for two years and lived in the same area for not less than two years. The table further shows that 24 Leading Fire firefighters had served between 5-10, and the 101 ordinary Fire Fighters had served between one month-5years.

This section has shown that the human resource at Lusaka Central Fire Station has the required experience to effectively deliver fire and rescue services in Lusaka City. The researcher notes that the experience of firefighters at Lusaka Fire Brigade Station does not account for limitation to effectively deliver fire and rescue services. This is because most of the firefighters have served for more than five years in the profession under Lusaka Fire Brigade Unit.

4.5 Conclusion

The chapter endeavored to answer the following question with a view to contributing to solutions that could lead to improved service delivery by the fire brigade in Lusaka District: *To examine how the human resource capacity of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City.* The findings have shown that human resource at Lusaka Fire Brigade Unit is not enough since Lusaka Central Fire Station is the only fire station in the City. The human resource has the education qualifications and is well trained and skilled in basic fireman ship and other in-service fire and rescue training courses. The human resource has the required experience in order to effectively deliver fire and rescue services. Therefore, the researcher concludes that the human resource capacity accounts for limitations to effectively deliver fire and rescue services in Lusaka City because the problem of lack of enough human resource outweighs their professional qualifications and working experience.

CHAPTER FIVE

FINANCIAL CAPACITY OF LUSAKA FIRE BRIGADE UNIT AS A LIMMITING FACTOR TO EFFECTIVELY DELIVER FIRE AND RESCUE SERVICES IN LUSAKA CITY

5.1 Introduction

Effective provision of fire and rescue services largely depend on the financial capacity of the local authority. The extent to which the fire station responds and manages fire outbreaks depends on the availability of adequate finances. Financial capacity refers to the availability of financial resources that are necessary for effective delivery of fire and rescue services by the local authority. Financial capacity entails paying salaries, wages, allowance and buying and repairing firefighting equipment needed to effectively deliver fire and rescue services in the City. The first section in this chapter is the introduction. The next section discusses funding of Lusaka Fire Brigade Unit. The third section discuses funding from Lusaka City Council to Lusaka Fire Brigade Unit, the fourth section discuses Government funding through Fire Safety and Rescue Services Unit to Lusaka Fire Brigade Unit, the fifth section discuses funding from Equalization Fund to Lusaka Fire Brigade Unit, the sixth section discuses funding from Fire Certificates, Inspection and training programs provided by Lusaka Fire Brigade Unit, the seventh section discuses infrastructure and development and lastly a conclusion.

5.2 Funding of Lusaka Fire Brigade Unit

The study found out that Lusaka Fire Brigade Unit is not well funded hence making it difficult to run its fire and rescue service operations effectively in the district. An informant from Finance Department at Lusaka City Council explained that the fire brigade had four sources of funding, that is firstly, funding from Lusaka City Council as the main source of funding, secondly funding from government through Fire Safety and Rescue Services, thirdly Equalization Fund from the Ministry of Local Government through Lusaka City Council and fourth funds raised from issuance of fire certificates inspection of buildings and short courses training programs provided by the fire prevention wing of Lusaka Fire Brigade Unit and fifth funding for infrastructure development from central government. The following section discusses these five sources of funding one by one in details and shows the specific figures from each source to Lusaka Fire Brigade Unit.

5.3 Funding from the Lusaka City Council to Lusaka Fire Brigade Unit

As earlier indicated in chapter four under human resource capacity, Lusaka Fire Brigade Unit is just a section under Engineering Department at Lusaka City Council and most of the financial decisions are made at the departmental level denying the section financial independence to fund its own budget.

An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that, Lusaka Fire Brigade Unit was just a section under engineering department and funding was mainly determined by the same department. It decided what amount was to be disbursed to the brigade while the section's role was simply to write wishful budgets and not dictating what should be given to it, since it is actively on the ground facing the financial challenges. Effective delivery of fire and rescue services requires a response time that is at par with available financial resources of the organization that delivers fire and rescue services.

The study found out that the operations of Lusaka Fire Brigade Unit are mainly financed by Lusaka City Council's (LCC) revenue collections. An informant from Finance Department at Lusaka City Council explained that Lusaka Fire Brigade Unit writes its wishful budget and it is from this wishful budget that the Lusaka City Council prioritizes what to do and not to do. Without doubt, timely provision of adequate finances is an important factor in the delivery of all local government services. Without sound financial provision and management, the local authority cannot effectively provide fire and rescue services. He also explained that the section suffers inadequacy in funding, which was the major challenge to the establishment of the fire station. There was no availability of funding to facilitate procurement of equipment and infrastructure development. Although allocations had been made in the Ministry's budget, the funds were not adequate to meet the demand for equipment and infrastructure. Ministry of Local Government continues engaging the Treasury for improved funding to expedite the establishment of fire stations, but there was little response. Other disparities were budgetary allocation and amount awarded. The budget allocation was never enough. It was based on the daily City Council collection and so in case there is under collection the fire brigade department faces stiff financial shortages in their day-to-day operations. These shortages force them to charge on services which are supposed to be free of charge, regular inspection of buildings and building plans.

The table below shows the Lusaka Fire Brigade Unit's budgets for the past ten years against what was given to it from Lusaka City Council.

Table 5.1: Fire Brigade Unit's budget against what is given to it by Lusaka City Council

YEAR	BUDGET	ALLOCATION	PERCENTAGE
2014	K4,634,712.00	K2,300,000.00	49
2015	K13,762,079.00	K9,000,000.00	65
2016	K16,913,862.00	K9,900,000.00	58
2017	K6,915,650.00	K10,700,000.00	154
2018	K3,503,753.00	K4,200,000.00	119
2019	K4,308,289.00	K20,600,000.00	478
2020	K4,674,460.00	K2,800,000.00	59
2021	K16,996,571.00	K9,000,000.00	52
2022	K20,265,885.00	K10,000,000.00	49
2023	K24,673,926.00	K15,700,000.00	63
TOTAL	**K112,340,898.00**	**K94,200,000.00**	

Source: Financial Records from Lusaka City Council 2023

Table 5.1 shows the Lusaka Fire Brigade Unit's budget and how much it received from Lusaka City Council in the past 10 years. Lusaka City Council faces challenges to meet the budget needs of the Lusaka Fire Brigade Unit. In 2017, 2018 and 2019 more allocation were given to the fire brigade unit and this was because Lusaka District in these years faced floods and there was need to relocate flood victims, additional money was given to the fire brigade unit to mitigate the floods, still more the addition allocations were not enough. The initial allocation for 2017 was K3, 000,000.00 and the fire brigades received an additional allocation of K7, 700,000.00 to carter for the natural disaster bringing the total budget to K10, 700,000.00. In 2018 the initial allocation was K2, 000,000.00 and an additional of K2, 200,000.00 was given to mitigate the floods bringing the total budget to K4, 200,000.00. In 2019 the same thing happened, an initial allocation was K2, 000,000.00 and an additional of K16,291,711.00 was released to the fire brigade to mitigate the floods bring the total budget to K20,600,000.00. An informant from Finance department at Lusaka City Council explained that an additional allocation is also expected to happen this year because of the floods that affected most parts of

Lusaka due to too much rainfall this year. The additional allocation can be explained in that, the fire brigade section is an emergency section meaning that additional allocation can be given at any time depending on what kind of disaster is met. When writing the budget there is no exact financial plan made for emergencies and the budget runs open the whole year to carter for emergencies despite that the funding is always very poor.

This section has shown that Lusaka Fire Brigade Unit is poorly funded by Lusaka City Council. The researcher notes that funding from Lusaka City Council to Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

5.4 Government funding through Fire Safety and Rescue Services Unit

The Fire Safety and Rescue Services Unit under the Ministry of Local Government`s department of Housing and Infrastructure is funded by the central Government. A total of K265, 814,643.00 was appropriated by Parliament between 2015 and 2019 to support the Provision of Fire and Rescue Services activities in Zambia as can be seen in the table below. The released money was shared among local authorities in Zambia to promote equal development in fire brigade units.

Table 5.2: Showing amounts Budgeted and funds released and to be shared among local authorities in the country

Year	Required	Budgeted	Released	Percentage
2015	24,500,600.00	12,250,386.00	5,755,734.00	46.9
2016	242,100,800.00	121,074,815.00	120,756,643.00	99.7
2017	206,400,700.00	106,298,679.00	103,964,855.00	97..8
2018	330,768,800.00	15,768,400.00	13,984,058.00	88.6
2019	350,000,000.00	10,422,360.00	6,190,448.00	59.3
Total	**1,153,771,000.00**	**265,815,090.00**	**250,651,738.00**	

Source: Estimates of Revenue and Expenditure, Finance Department (LCC), 2015-2019

Table 5.2 shows that 96 percent of the budgeted amounts were released by treasury, the funds were not adequate as the budgeted figures were based on ceilings given by the Ministry of Finance, which was way below what was required. As can be seen in the table, fire and rescue services have not been prioritised as the funding had reduced from K103, 964,855.00 in 2017

to K13, 984,058.00 in 2018 representing a reduction of 87 percent in funding with a further reduction in 2019 to K6, 190,448.00 representing 56 percent from 2018 figures. This means that with this reduction in the released amounts, the Fire and Rescue Services Unit of the Ministry was unable to undertake fire and rescue programs such as monitoring, evaluation, and surveys to enable them assess what was happening on the ground.

The study found out that the government perceives the funding to the fire brigade section enough given that most of the basic equipment needed to deliver fire and rescue services are there and service provision is ongoing and in addition the country does not have enough resources to disburse according to Lusaka Fire Brigade Unit's wishful budgets. According to the then Permanent Secretary of the Ministry of Local Government and Housing, cited in MLGH of 2011, the money given to LCC by central government is not adequate because we as a nation are poor. He stated that:

> *We do not have enough money to spend compared to rich countries such as Britain, United States of America, and Japan. We go by our standards. Consequently, the inadequacy in funding our local authorities stem from this premise.*

This section has shown that local authorities are poorly funded by government through Fire Safety and Rescue Services Unit. The researcher notes that government funding from Fire Safety and Rescue Services Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

5.5 Equalization Fund

The study found out that Lusaka City Council receives money from the central government through Equalization Fund and the money is not enough to effectively deliver fire and rescue services in Lusaka. An informant from Finance Department at Lusaka City Council explained that each year parliament allocates the Equalization Funds to local authorities with the aim of promoting equal development in the country. The informant from Finance Department at Lusaka City Council further argued that the Equalization Fund was operationalized in 2015, following the enactment of the Local Government (amendment) Act, No.12 of 2014. This Act has since been repealed and replaced by the Local Government Act, No. 2 of 2019. The local government Act of 2019 state that a local authority shall use at least twenty (20) percent of the funds received by a local authority from the Equalization Fund, in any financial year, to finance capital expenditure and eighty (80) percent for its recurrent expenditure. Fire

Authorities themselves do not generate sufficient revenues to meet their budgetary needs and must rely on the support of central government through the Equalization Fund, Lusaka Fire Brigade Unit is a beneficiary of this fund and only about 20 percent is earmarked for capital expenditure and 80 percent goes to recurrent expenditure in administration. However, an informant from Finance Department at Lusaka City Council further explained that this policy was not being followed on the ground. The 80 percent, including the 20 percent went to salaries and wages leaving nothing for procurement of capital equipment for the fire brigade. He further explained that the Equalization Fund received was four-million-kwacha every month from the central government and it is from this K4 million that Lusaka City Council pays salaries for fire fighters and other council workers leaving out capital equipment for Lusaka Fire Brigade Unit.

This section has shown that funding from Equalization Fund to Lusaka Fire Brigade Unit is poor. The researcher notes that Equalization Fund accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

5.6 Fire Certificates, Inspection and Training programs by the Fire Brigade

The research found out that most of the buildings in Lusaka do not have fire certificates because Lusaka Fire Brigade Unit has no staff to conduct building inspections and issue fire certificates which resulted in most of the business premises operating without fire certificates within the district. Another source of funding for Lusaka Fire Brigade Unit is through issuance of fire certificates, inspection of buildings and provision of training programs to the public and private companies on fire safety. The study revealed that non-issuance of fire certificates and inspection of buildings affected the generation of revenue. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that, the fire station could have generated some revenues from the fire certificates and inspection of buildings especially that the grants received from the government through the district council were erratic. However, according to Local Administration (Fire Services) Regulations, SI No. 121 of 1991, state that it will govern the issuance of fire certificates at a fee annually, prohibiting the occupation of “designated premises” (such as hospitals, schools, hotels, lodges, offices, and shops) without a fire certificate, this is to be done by councils. Premises that do not have fire certificates are supposed to be closed (GZR, 1991).

An informant from Finance Department at Lusaka City Council, explained that, money that was being raised from issuance of fire certificates and inspection of buildings had a separate account where it was kept and 50 percent of the money collected from issuance of fire certificates and inspection of buildings was supposed to be given back, direct to Lusaka Fire Brigade Unit. However, this rarely happened because it was the same money that the Lusaka City Council used to run the activities of Lusaka Fire Brigade Unit on daily basis. The findings also revealed that there was no consolidated list of payments to show financial records on how much money was being collected per year by Lusaka City Council from issuance of certificates, inspection of buildings and training programs of the public and private companies since some clients opted to pay direct to Lusaka City Council using online payment system which was faster and some paid physically to Lusaka Central Fire Station. It was further established that money from the issuance of fire certificates and inspection of buildings was not reliable as it was seasonal since clients opted to renew their fire certificates in the last quarter of the year, December so that they have new fire certificates in the coming new year.

This section has shown that funding from issuance of fire certificates, inspection and training programs by Lusaka Fire Brigade Unit is poor. The researcher notes that funding from Fire certificates, inspection of buildings and training programs to the Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

5.7 Infrastructure Development

The study found out that funding for infrastructure development for fire and rescue services is poor. An informant from Finance Department at Lusaka City Council, explained that central government releases some money to carter for capital expenditure such as construction of fire station and this year the Lusaka City Council received six-million-kwacha part payment from the 12 million kwacha which was allocated in 2022 by Local Government and Rural Development Permanent Secretary for technical services Nicholas Phiri for the completion of the three fire stations that had stalled at 70 percent completion level in the district. These fire stations are Chelstone, Chilenje and Makeni Bonaventure. However, these funds from the government are rarely given to fire brigades, as can been seen the K12 million allocation which was made in 2022, only K6 million was released this year 2023. The funding is erratic, it depends on what the central government decided in that particular year for capital projects necessary. This funding does not contribute much to Lusaka Fire Brigade Unit. It is the least source of money from central government for it was not reliable.

The research found out that the building housing Lusaka Fire Brigade Unit was small and very old and since inception it has never been refurbished. However, the Local Government Act of 2019, state that, the Minister shall establish a Fire Authority and maintain a state -of-the-art fire brigade for any area. In addition, the Ministry would establish fire sub-stations to reduce travel distance in responding to incidents (GRZ, 2019). These policy stipulations are not applying on the ground making it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services.

Further, the National Fire and Rescue Service Policy of 2019 state that Fire brigades should have appropriate and adequate fire station buildings with the necessary state-of-the-art technology for firefighting and rescue operations. Also, the buildings must offer sufficient protection to equipment and portray a good image to inspire public confidence in fire brigade. Fire station building must have fire station facilities such as restrooms and ablution for both female and male fire fighters (GRZ, 2019). However, these policy stipulations are not met on the ground making it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services.

This section has shown that funding for Infrastructure Development for fire and rescue services to Lusaka City Council is poor. The researcher notes that funding for infrastructure development accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The findings in this chapter support Mushi's (2016) findings that revealed that funding the fire and rescue services is the challenge that is facing both the UK and Tanzania Fire and Rescue Force. The Tanzania Fire and Rescue Force has no any other sources of fund except from the central government which is responsible to fund all public services provided under the central government scheme (Local Government Association 2013). But however, currently the Tanzania Fire and Rescue Force witnessed the budget cut off by more than 50% in the past three years. This makes it hard for the Tanzania Fire and Rescue Force to perform its statutory functions and responsibilities.

5.8 Conclusion

The chapter endeavored to answer the following question with a view to contributing to solutions that could lead to improved service delivery by the fire brigade in Lusaka District: *To investigate how the financial capacity of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City?* This chapter has revealed that Lusaka Fire Brigade Unit receives funding from five sources, namely Lusaka City Council, Government funding through Fire Safety and Rescue Services Unit, Equalization Fund, funds from fire certificates, inspection, training programs provided by the fire prevention wing of the Lusaka Fire Brigade Unit. Despite having these five sources of funding the financial capacity of Lusaka Fire Brigade Unit is poor. This study has revealed that LCC does not adequately fund the fire section accordingly. With the growth of the City of Lusaka, financing had not increased and is not enough. The chapter has revealed that apart from the traditional sources of revenue such as rates, rents, and personal levy and so on, Lusaka City Council receives money from the government through the Fire Safety and Rescue Services under the ministry of local government (MLG) for management of fire. This money is not reliable because it is erratic, the government chooses when to give hence it could not be budgeted for. From the K4 million Equalization fund, 80 percent is supposed to be used as operating expenditure and only 20 percent is supposed to go for capital expenditure and this was not done because the 20 percent for capital expenditure together with the 80 percent for recurrent expenditure goes to salaries and for fire fighters and other council workers. Money collected from issuance of fire certificates and inspection of buildings is not enough. Infrastructure development is poor because of lack of funding.

Therefore, the researcher concludes that the financial capacity of Lusaka Fire Brigade Unit is poor. This accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

CHAPTER SIX

EQUIPMENT OF LUSAKA FIRE BRIGADE UNIT AS A LIMMITING FACTOR TO EFFECTIVELY DELIVER FIRE AND RESCUE SERVICES IN LUSAKA CITY

6.1 Introduction

As earlier indicated in the conceptual framework, effective delivery of fire and rescue services largely depend on the availability of modern equipment of which without good equipment fire fighters may risk their lives trying to rescue people from fire and other accidents in the absence of the required equipment. The chapter starts by giving an introduction, the second section looks at availability of turntable ladders, the third section looks at ordinary fire trucks, fourth section looks at fire hydrants, the fifth section looks at Fire detection system, Imaging and Data Drones, and Thermal Imaging Cameras, the sixth section looks at Ambulances, the seventh section looks at Utility Vehicles, the eighth section looks at the emergency communication system, the ninth section looks at personal protective equipment, tenth section looks at firefighting foam and lastly a conclusion will be drawn.

6.2 Availability of turntable ladders (aerial fire trucks)

The study found out that equipment was not enough at Lusaka Fire Brigade Unit. The findings revealed that Lusaka Fire Brigade Unit did not have all the equipment needed to effectively provide fire and rescue services. An informant from the Engineering Department at Lusaka City Council explained that availability of equipment at Lusaka Fire Brigade Unit was poor, he stated that:

> *Availability of fire and rescue equipment entails capital equipment such as turntable ladders, fire trucks, fire hydrants, fire detection system, imaging and data drones, and thermal imaging cameras, ambulances, utility vehicles, personal protective equipment, communication system, firefighting foam and other fire prevention and management equipment that is necessary for fire management by the fire brigade.*

The research found out that Lusaka Fire brigade Unit has no turntable ladders which are used to fight fire in high-rise buildings. This means that should a fire break out in high-rise building; Lusaka Fire Brigade Unit would not be able to provide effective fire and rescue services and

this would lead to loss of life and property. An informant from Engineering Department at Lusaka City Council explained that a turntable ladder is a fire truck that has an aerial platform that is fitted with firefighting equipment such as first aid kit, hydraulic cutters, oxygen cutters, rotary saws, fire extinguishers, fire blankets, fire sprinklers, hose reels, hammers and many other tools used to suppress fire and break through obstacles such as buildings and fire. However, the National Fire and Rescue Services Policy of 2019 state that, fire brigades in major Cities with high rise buildings should be equipped with additional state of the art technologies such as imaging and data drones, thermal imaging cameras, turntable ladders, fire helmets, firefighting foam, C-thru Smoke Helmet, and fire shields (GRZ,2019). Figure 6.1 bellow shows Turntable ladders.

Figure 6.1: Turntable Ladders

Source: Google (2023)

An informant from Engineering Department at Lusaka City Council, explained that basing on the Fire Brigade Unit, proposal and local knowledge of Lusaka District, Lusaka Central Fire Station being the only fire station was expected to have 10 Turntable ladders available. In the

event of a fire occurring, they will provide an immediate service to the survivors in high-rise buildings. He said that:

> *In the event of a fire occurring in high-rise buildings or towers, it cannot be put out quickly due to lack of turntable ladders and this could lead to loss of property and life.*

It was revealed that only one out of the forty fire stations in the country had a turntable ladder. An informant further explained that this was because the Ministry of Local Government (MLG) has not provided turntable ladders for the other 39 stations in the country. The only station that has a functional turntable ladder apparatus is Ndola Fire Station. Lusaka Central Fire Station had one but was involved in an accident. The Ministry has not procured turntable ladders for the other 38 fire stations. This means that in the event of a fire occurring in high rise buildings in the places where there are no turntable ladders, life and property would be destroyed.

This section has shown that Lusaka fire brigade unit has no turntable ladders. This makes it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services in high-rise buildings. The researcher notes that lack of turntable ladders accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

These findings above do not support the International Fire Service Training Association's (2008) report which recommended that fire stations require fire engines with extension ladders and elevators especially for suppression of fires in high-rise buildings and since the use of fire engines is seasonal and unpredictable, it is important to make provision for their periodic servicing. However, these recommendations and policy stipulations are not applied on the ground making it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services.

6.3 Availability of Fire Trucks (Ordinary Fire Tenders)

The study found out that Lusaka Fire Brigade Unit does not have enough ordinary fire trucks. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that there were only five fire trucks of which two were not reliable and two of the three reliable fire trucks were the ones that were given to Lusaka Fire Brigade Unit from the 42 famous one million dollar each fire truck and one was a donation from the former first lady Esther Lungu

when she visited the US and it was not modern. These three fire trucks that were functional were really overwhelmed that they may start breaking down soon as well. He stated that:

> *"There is need for hi-tech trucks (fire tenders and turntable ladders) that have a larger water tank, stretch ladders that can go up to 50 story buildings, fitted with first aid kits and other life supporting facilities. The fire brigade unit also lacks modern elastic hose pipes that can stretch as far as 100 meters."*

An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that basing on the Fire Safety and Rescue Services Standards of 2017 Lusaka District being the Capital City and a model of other towns in the country, the station is required to be equipped with at least 15 modern fire trucks that should be distributed around the City. That is ten turntable ladders (Arial fire trucks) and 15 hi-Tec fire trucks (ordinary fire tender), modern breathing apparatus, fire detection systems around selected points in the City, fire hydrants around strategic positions in the City, hazardous chemical prevention kits, marine and rescue tools among others (GRZ,2017). The informant further explained that when such apparatus is available there would be no excuse for delay in fire and rescue services delivery. However, equipment at Lusaka Fire Brigade Unit was not modern, but in terms of affectivity, some equipment could be effective to the least and among the equipment that are effective are ladders, and safety climbing belts which were recently procured from the US and as in being modern, they are, depending on how efficient they can be when being used and that was what is modern to some extent but not very modern as compared to what other neighboring countries have. Other equipment that was a bit modern were the helmets that were recently procured and the torches. The rest of the equipment was not that modern. Fire fighters also revealed the unreliability of the fire trucks. The respondents indicated that, out of the five fire trucks that are present, three are the ones that are reliable and functioning. One respondent indicated that:

> *In cases where there are multiple fires around the City, there arises a crisis due to scarcity of spare parts for our trucks, two of our trucks are most of the time grounded.*

This section has shown that Lusaka Fire Brigade Unit does not have enough ordinary fire trucks. This makes it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and

rescue services. The researcher notes that lack of ordinary fire trucks accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The above findings do not support United Nations Development Program's (2010) recommendations which state that fire departments need well maintained vehicles, machinery, and equipment. In this regard, the parameters to be considered include their status, the physical condition of fire engines, the availability of spare parts, the servicing of fire engines and fuel management as well as the availability of search and rescue tools. In addition to the above, to be properly prepared for fire hazards, each fire brigade should keep engines at international standards operations by establishing repair and maintenance workshops within the municipalities themselves. Fire stations are also required to safely store fuel to run engines for use in emergencies. It further recommended that after every fire response, engines should be refueled fully.

Figure 6.2 below shows a fire truck responding to an emergency in Lusaka City.

Figure 6.2: Fire Truck

Source: Author's field work (2023)

The following question was asked to the firefighters. To what extent do you agree with the statement: "*the fire station has modern and well-equipped firefighting engines to deliver*

effective fire and rescue service?" (a) Agree [ ] (b) Strongly Agree [ ] (c) Disagree [ ] (d) Strongly Disagree [ ]. The table below shows the expressions.

Table 6.1: Firefighters' responses to the question.

Variable	Agree	Strongly Agree	Disagree	Strongly Disagree	Total
Number of respondents	0	0	109	43	152

Table 6.1 clearly shows the views of fire fighters regarding the state of the equipment. None of them agreed or strongly agreed with the statement but true to the figures, everyone has indicated that the firefighting equipment that includes the fire engines are not modern and are to some extent not very effective. The 109 fire fighters out of 152 representing 71 percent indicated on *disagree* and 43 firefighters representing 28 percent indicated on *strongly disagree*. These finding revealed that Lusaka Fire Brigade Unit was not well equipped and has no modern firefighting trucks.

This section has shown that fire trucks at Lusaka Fire Brigade Unit are not modern and enough. The researcher notes that lack of modern and enough fire trucks at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

6.4 Availability of Fire Hydrants

The study found out that Lusaka Fire Brigade Unit does not have enough fire hydrants around Lusaka City. An informant from Engineering Department at Lusaka City Council explained that a fire hydrant is a fitting in a street or other public place by which a fire hose may be attached to a water main. However, the National Fire and Rescue Services Policy of 2019 state that the Ministry responsible for water shall provide fire hydrants and water for firefighting through open sources, workable fire hydrants and exhuming buried fire hydrants. Fire and Rescue Services Standard Operation Guide of 2018 also state that the maximum distance between fire hydrants shall not exceed 244m for low risky and 123m for high risky areas as such generally Lusaka City is supposed to have 147,540,984 active fire hydrants. These stipulated policies are not applying on the ground as there are only 196 functional and 612 damaged or buried fire hydrants.

The findings revealed that the number of fire hydrants in each district varied according to the number of risky areas in each location and size of the location. Lusaka City has 808 available fire hydrants out of which 196 fire hydrants representing 24 percent were fully functional. The remaining 612 fire hydrants representing 24 percent were either damaged or buried because they were old and were not working as the network for the fire hydrants was laid in 1959 when Lusaka Central Fire Station was constructed. This means that in the event of a fire, the firefighters will draw water from farfetched places, thereby leading to delayed response time. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station, explained that access to some fire hydrants was difficult as the sizes of the water outlet for the hydrants and those of the hose pipe for the fire engines were different. This is because the outlets for the fire hydrants were changed from the British to the Chinese make, which are smaller resulting in the low flow rate of water which inadvertently affects the effectiveness and efficiency in putting out fires. He added that:

> *Fire hydrants are vitally non-existent. The only ones that were installed in the pre-colonial era can only be found dysfunctional in Matero and Chilenje compounds. The rest which are functional mostly have low water pressure. And some of these hydrants have been buried due to road constructions, illegal buildings, and disorderly construction of households.*

The fire fighters also indicated that fire hydrants were not enough in Lusaka City. Out of the 152 respondents, 90 percent of them representing 136 fire fighters indicated that they had problems with water sourcing. One of the fire fighters indicated that:

> *Most of the time when there is a fire outbreak, we rush there with our filled tanks, but when we run out of water, we usually have a challenge resourcing it due to lack of fire hydrants or any reliable water source in the vicinity.*

Another fire fighter indicated that should a fire break out in their areas; it would be very difficult to get water to extinguish the fire since most people would be unwilling to give their water which they had bought to be used for putting out the fire. Therefore, even a fire that would have been contained using water would get out of hand simply because water is a rare resource.

Reality has it that water is a major requirement in the service of firefighting. Without water sources nearby, firefighting would be proved futile. About 136 out the 152 fire fighters

representing 90 percent highlighted the need for fire hydrants in selected points around town. As can be seen fire hydrants are important in the provision of fire and rescue services, as they are the main source of water for firefighting purposes. They are in designated places which at times may be far from where the actual fire is taking place and this is found to be a major drawback in times of fire emergencies.

This section has shown that Lusaka Fire Brigade Unit does not have enough fire hydrants. This makes it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services. The researcher notes that lack of ordinary fire trucks accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

Figure 6.3 below shows an old and damaged fire hydrant in Lusaka City.

Figure 6.3: Fire Hydrant

Source: Author's field work (2023)

The findings above show that fire hydrants in Lusaka City are not enough. The researcher notes that lack of enough fire hydrants accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

6.5 Availability of Fire detection system, Imaging and Data Drones, And Thermal Imaging Cameras

The study found out that Lusaka Fire Brigade Unit has no fire detection system that is used to detect fires, no imaging and data drones, and thermal imaging cameras. An informant from Fire Brigade Unit at Lusaka Central Fire Station explained that lack of a fire detection system created a challenge to locate fire out breaks in shanty compounds. He also explained that there were no imaging and data drones, and thermal imaging cameras. He stated that:

> *Locating fire outbreaks is usually by instruction from the victim through the phone or by sight-seeing the smoke or fire. However, for the low-density areas, locating fire outbreaks is a bit easier.*

This section has shown that there is no fire detection system, imaging and data drones, and thermal imaging cameras at Lusaka Fire Brigade Unit. The researcher notes that lack of Fire detection system, Imaging and Data Drones, and Thermal Imaging Cameras accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

6.6 Availability of Ambulances

The research found out that Lusaka Fire Brigade Unit has no ambulance. An informant from Engineering Department at Lusaka City Council explained that whenever there was a fire, the first to arrive at the fire scene were the fire fighters accompanied by an ambulance if available at the fire station. The findings revealed that lack of an ambulance meant that the fire authority had to rely on the hospital ambulance. However, the hospital ambulances at times delayed in picking up the victims and in that case the fire engines were instead used to transport the victims and at the same time fight fires. This may lead to loss of life due to either delay to transport the victims or use of inappropriate transportation for the victims. The National Fire and Rescue Services Policy of 2019 state that, there shall be always an ambulance available in the event of a fire occurring that will provide an immediate service to the survivor (GRZ,2019). These stipulated policies are not implemented on the ground making it difficult for the Lusaka Fire Brigade Unit to effectively deliver fire and rescue service.

This section has shown that there are no ambulances at Lusaka Fire Brigade Unit. The researcher notes that lack of ambulances accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

6.7 Availability of Utility Vehicles

The study found out that utility vehicles at Lusaka Central Fire Station are not enough. An informant from Engineering Department at Lusaka City Council explained that there were only two official vehicles of which one was not reliable. The findings revealed that lack of utility vehicles at Lusaka Central Fire Station made it difficult to give commands at the fire scenes as well as carry out fire inspections and attend fire prevention meetings. As a result, in some instances the Chief Fire Officer was using the fire engines to carry out such tasks, thereby using them on non-firefighting activities. This means that this would lead to loss of property or life in the event of a fire occurring during the time that the fire engine was attending to other services. However National Fire and Rescue Services Policy of 2019, state that there shall be always utility and rescue vehicles available in the event of a fire occurring that will provide an immediate service to the survivors (GRZ, 2019). In real sense these policy stipulations do not apply on the ground making it difficult for the Lusaka Fire Brigade Unit to effectively deliver fire and rescue service.

This section has shown that Utility Vehicles at Lusaka Fire Brigade Unit are not enough. The researcher notes that lack of enough Utility Vehicles accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

6.8 Availability of Emergency Communication System

The study found out that Lusaka Fire Brigade Unit has a poor communication system. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that the brigade's communication system was old and unreliable. According to United States Fire Administration (USFA) and Federal Emergency Management Agency (FEMA) (1995), Communication is another vital element in the provision of fire and rescue services and communications systems are critical to safe and effective fire ground performance. The basic elements of a communication system include transmitters, antennas, receivers, and their power supplies and other ancillary equipment.

Lusaka Central Fire Station has a 993-toll free emergency line. A toll-free line refers to a telephone number with distinct three (3) digit codes that can be dialed with no charge to the person placing the call, 993 in this case. However, the phone line at Lusaka Central Fire Station usually jams. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that many fire victims have complained that the emergency line does not go

through or if it does, the line was very bad. This has prompted the Fire Prevention Wing which is a department of Lusaka Central Fire Station to give out their personal numbers during issuance of fire certificates and inspection of buildings of which occasionally the victims may get hold of and use them in case of a fire outbreak. Sometimes people have used the police phone lines knowing that Lusaka Central Fire Station is just next-door neighbor to Lusaka Central Fire Station. This is despite the 2019 National Fire and Rescue policy indicating that there should be a 993-toll free fire emergency line. Further the same policy state that, all fire brigades should be equipped with appropriate radio communication systems and the response of fire brigades to emergencies must be timely, reliable, and comparable to the international norms and standards (GRZ, 2019). However, these policy stipulations do not apply on the ground making it difficult for the Lusaka Fire Brigade Unit to effectively deliver fire and rescue service.

The study established that citizen's phone calls were misdirected, reporting fires outside other districts. An informant from Fire Brigade Unit at Lusaka Central Fire Station explained that this was an emergency setback as the other districts must call Lusaka Fire Brigade Unit to relay the message. This caused delays in the reaction time of the fire brigade leading to major losses of life and property from fire. He added that in addition to the 993-toll free line, there was also a landline which was usually unreachable during load shedding times and fires and accidents can occur at any time. This usually caused delay in reaching the fire incidences within the prescribed time leading to further property damage.

Further the fire fighters were asked to rate Lusaka Central Fire Station's emergency communication system with the public in case of a fire outbreak. The study found out that the emergency communication system was poor. The figure below shows fire fighters views on the emergency communication line.

Figure 6.4: Responses to the question; 'How would you rate your emergency communication with the public in case of a fire outbreak/?' (Add a comment to your answer)

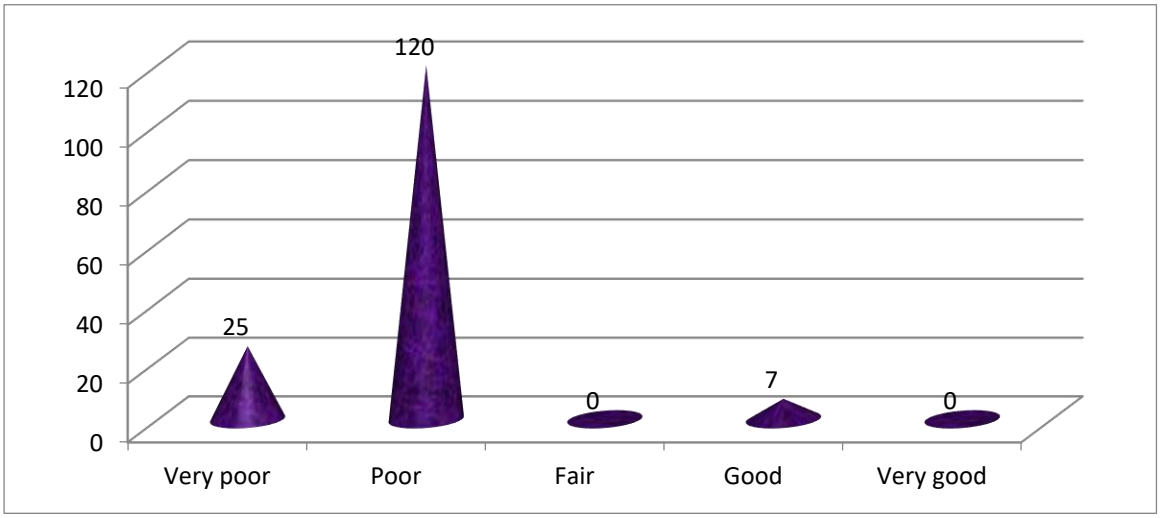


Figure 6.4 shows the responses from the 152 fighters in relation to the emergency communication system of Lusaka Fire Brigade Unit. The comments were synthesized and the most comment views were drawn for each variable. Respondents who rated the communication system as *very poor* were 25, representing 16.4 percent and they indicated that the system was very old and it had out lived its lifespan. Respondents who rated the communication system *poor* were 120 representing 78 percent and they indicated that it was congested and noisy most of the time. Those that rated the emergency communication service with the public as *good* were seven representing 4.6 percent and they indicated that the toll-free line easily became congested when two or more clients called at the same time. However, the findings revealed that the seven firefighters that rated it good were recruit firefighters who just came from training and had only served for one month. They had not yet used it for a long time. They were lacking experience.

This section has shown that the Emergency Communication System at Lusaka Fire Brigade Unit is poor. The researcher notes that the Emergency Communication System at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

These findings support Mweetwa's (2018) findings which revealed that Mazabuka Fire Station lacked an effective communication system. This makes it difficult for Lusaka Fire Brigade Unit to effectively deliver fire and rescue services. Menya's (2016) study also argues

that it is important for local governments to establish a communications centre or the dispatch centre as others call it. This is the hub centre of fire department operations and usually the first point of contact to the public. The dispatch centre must manage and allocate the fire and rescue resources of the fire department in a way that ensures that the proper resources are dispatched in a quick, efficient, and professional manner to emergency incidents.

6.9 Availability of Personal Protective Equipment (PPE)

The study found out that Lusaka Fire Brigade Unit does not have enough personal protective equipment. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station, explained that personal protective equipment is designed to protect firefighters from serious injuries or illnesses resulting from direct contact with fire. It covers a variety of devices and garments such as respirators, turnout gear, gowns, gloves, shoe covers, eye protection, face shields, fire blankets, gas masks and goggles. The findings revealed that firefighters were sharing the little personal protective equipment which was there among themselves in the line of duty. This is because the ministry has not procured personal protective equipment for all the firefighters and some fire fighters did not have firefighting clothing. They had one pair of uniform each which was worn in different circumstances including removing dead bodies, firefighting, and toxins. The sharing of personal protective equipment could result to health and occupational safety issues.

The study revealed that fire fighters at Lusaka Fire Brigade Unit did not have modern breathing apparatus. An informant from Lusaka Fire Brigade Unit at Lusaka Central fire station explained that Lusaka and Ndola had the old breathing apparatus but at the time of the interview, the breathing apparatus for Lusaka were uncharged as there was no charging system available. This meant that, in the event of a fire occurring, the fire fighters would not be able to fight fires on time as their own lives would be threatened due to lack of breathing apparatus which would lead to loss of property and life. This is despite the National Fire and Rescue Services Policy of 2019 stating that the provision of both firefighting and Personal Protective Equipment (PPE) are a requirement to all firefighters (GRZ, 2019). In real sense these policy stipulations do not apply on the ground making it difficult for the Lusaka Fire Brigade Unit to effectively deliver fire and rescue service.

It was revealed that Lusaka Fire Brigade Unit had no night vision glasses, the only fire glasses which were there could only be used during the day in an event that fire broke out at night fire

fighters would find it difficult to effectively deliver fire and rescue services. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that the fire gloves which were there were not enough and not modern to which they could not with stand the heat from burning materials. This made it difficult for the fire fighters in the line of duty to effectively deliver fire and rescue services. The National Fire and Rescue policy of 2019 state that, there shall always be personal protective equipment available for all firefighters in the event of a fire occurring that will help in providing an immediate service. Each fire station shall have fire fighters with full personal protective clothing comprising fire protection suit, acid proof, electric shock proof, safety shoes/boot and breathing apparatus among others (GRZ, 2019). However, these policy stipulations do not apply on the ground, limiting Lusaka Fire Brigade Unit to effectively deliver fire and rescues service

Fire fighters confirmed the inadequacy of personal protective clothing. The 152 firefighters were asked *to describe how adequate their personal protective equipment is at the fire brigade*. The findings revealed that out of 152 respondents, 96 fire fighters representing 63.1 percent indicated that they did not have adequate protective clothing while 55 respondents representing 36.1 percent said the protective clothing was not adequate. This disagreement in the fire-fighters' views indicated an element of dissatisfaction regarding protective clothing. Notwithstanding the satisfaction of the minority, it can be noted that most of the fire fighters are not okay with the personal protective clothing. The researcher further sought to understand why there was a contrast in the views of the fire-fighters. The findings revealed that most of those that were satisfied with the protective clothing took it upon themselves to acquire whatever was missing in their protective kit, hence their satisfaction. One of the firefighters indicated that: "*I noticed that my safety boots were not in good condition any more, therefore I just thought of buying a pair for myself*."

This section has shown that personal protective equipment at Lusaka Fire Brigade Unit is not enough. The researcher notes that personal protective equipment is not enough and this accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The findings above support Indrayani's (2023) findings which revealed that in their work, firefighters have a great risk of danger and require Personal Protective Equipment. However, the reality in the field is that personal protective equipment management is still not well implemented. This happens because the facilities provided by the local government of

Kabupaten Jember in Indonesia were not maximal and the availability of Personal Protective Equipment were not in accordance with the standard.

6.10 Availability of Fire Fighting Foam

The study found out that Lusaka central fire station has no firefighting foam used to stop burning chemical spillage. An informant from Lusaka Fire Brigade Unit at Lusaka Central Fire Station explained that among the five fire trucks that were at Lusaka Central Fire Station, two of the fire engines had no foam concentrate for some time now and the other three had firefighting foam, even though it was not enough. This finding revealed that in the event of an emergency occurring where there was a chemical spillage, fire fighters may not be able to suppress the fire thereby leading to loss of life and property.

This section has shown that firefighting foam at Lusaka Fire Brigade Unit is not enough. The researcher notes that firefighting foam at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The above finding does not support United Nations Development Programme and Government of Nepal's (2011) report which recommended that the fire department need to stock other forms of fire suppression materials such as hydrogen gas, liquid fuel, and platinum chemical foams. However, these policy stipulations do not apply on the ground, making it difficult for the Lusaka Fire Brigade Unit to effectively deliver fire and rescue service.

6.11 Available Equipment against what is required to effectively deliver fire and rescue services

The Local Government Act of 2019 state that every district council is declared to be a fire authority for its respective area for fire-fighting purposes and shall establish and maintain a fire brigade in the area. The act asserts that the local authority shall provide the required equipment. The table below shows the equipment at Lusaka Fire Brigade Unit against what is required. The items shown in table 6.2 were chosen as they are regarded key to effectively deliver fire and rescue service.

Table 6.2: Equipment at Lusaka Fire Brigade Unit against what is required

FIGHTING AND RESCUE EQUIPMENT	AVAILABLE	REQUIRED
Turntable Ladder Trucks	0	10
Fire Trucks	5	15
Ambulance	0	7
Utility Vehicles	2	10
Firefighting Drone	0	10
Fire hydrants	196 (Active),612 (Inactive)=808	147,540,984
Ladders	7	50
Helmets	35	380
Torches	35	380
Thermal Imaging Cameras	0	25
Climbing Belts	35	380

Source of data: Engineering Records Lusaka City Council (2023)

Table 6.2 shows the available equipment at Lusaka Fire Brigade Unit against what is required to effectively deliver fire and rescue service. There are no turntable ladders at Lusaka fire brigade as for one which was there was involved in an accident, the required number is 10. There are five fire trucks and the required number of fire trucks is 15. There is no ambulance and the required number of ambulances is seven. There are two utility vehicles and the required number of utility vehicles is ten. There are no fire firefighting drones and the required number of firefighting drones is 10. There are 808 fire hydrants, of which 196 fire hydrants were active and 612 fire hydrants were inactive and the required number of fire hydrants is 147,540,984. There are 10 climbing ladders and the required number is 50. There are 35 helmets and the required number is 380 indicating that each one of the 190 firefighters should have two pairs in case one is misplaced. There are 35 torches and the required number of torches is 380 indicating that each one of the 190 fire fighters should have two pairs of torches in case one is lost or the battery goes flat. There are 35 climbing belts and the required number of climbing belts is 380 indicating that each one of the 190 fire fighters is supposed to have two pairs of climbing belts in case one is misplaced.

This section has shown that equipment at Lusaka Fire Brigade Unit is not enough. The researcher notes that equipment at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

The findings above support Chigwanda and Mupindu's (2022) study which revealed that absence and insufficient equipment could have been responsible for the City of Mutare Fire Brigade's poor state of disaster preparedness. It was recommended that Mutare City Council specifically budget for disaster preparedness trainings, workshops, mass casualty disaster preparedness drills, upgrade the Fire Brigade vehicles and equipment and update the disaster profile and disaster plans. Menya's (2010) findings also support the above finding, the research identified inadequacies in Nairobi such as lack of fire disaster management plans and inadequate machinery and equipment among others. The study provided recommendations on improvements and policy measures on fire disaster mitigation and preparedness, key among them being development of fire disaster management and contingency plans, adequate budgetary allocation, community awareness creation and capacity development.

6.12 Conclusion

The chapter endeavored to answer the following question with a view to contributing to solutions that could lead to improved service delivery by Lusaka Fire Brigade Unit in Lusaka: *To establish the extent to which equipment at Lusaka fire brigade unit accounts for limitations to effectively deliver fire and rescues service in the City*. The equipment is not modern and enough to cater for 21st century needs regarding firefighting in Lusaka District. The study has revealed that there are no turntable ladders and ordinary fire trucks are not enough; there is no fire detection systems owned by the fire department; fire hydrating points around the city are not enough; the protective clothing is not enough and there is need to be restocked; emergency communication system is bad. Utility vehicles are not enough, there are no ambulances and firefighting foam is not enough, in general, the fire fighters have indicated that equipment wise the fire section is below par and it obviously has contributed to limiting the full potential of fire and rescue services in Lusaka District. Therefore, the researcher concludes that the equipment of Lusaka Fire Brigade Unit is poor. This accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The purpose of this chapter is to present the conclusions and recommendations of the dissertation. In order to achieve its purpose, the chapter begins with a presentation of conclusions. Thereafter, recommendations are given.

7.2 Conclusions

The conclusions are presented in line with the objectives of the research. The first specific objective was to examine the extent to which the human resource capacity of Lusaka City Council accounts for limitations to effectively deliver fire and rescue services in the City. From the presented and discussed data it can be concluded that the human resource of Lusaka Fire Brigade Unit is not enough since Lusaka Central Fire Station is the only fire station in the City sided by one sub-station Matero which does not have its own human resource. The human resource which is at Matero sub-station is deployed from Lusaka Fire Brigade Unit at Lusaka Central Fire Station. It can be concluded that the human resource has the required education qualifications and is well trained and skilled in basic firemanship and other in-service fire and rescue training courses. It can also be concluded that the human resource has the required experience in order to effectively deliver fire and rescue services. Generally, what can be deduced from this chapter is that the human resource capacity at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City because the problem of lack of human resource outweighs their professional qualifications and working experience.

The second specific objective of the research was to investigate the extent to which financial capacity of Lusaka City Council accounts for limitations to effectively deliver fire and rescue services in the City. From the presented and discussed data, it can be concluded that the financial capacity of Lusaka Fire Brigade Unit is poor in order to effectively deliver fire and rescue services in the City. Lusaka Fire Brigade Unit receives funding from five sources, that is firstly, funding from Lusaka City Council as the main source of funding, secondly funding from government through Fire Safety and Rescue Services, thirdly Equalization Fund from the Ministry of Local Government through Lusaka City Council and fourth funds raised from

issuance of fire certificates inspection of buildings and short courses training programs provided by the fire prevention wing of Lusaka Fire Brigade Unit and lastly Infrastructure Development Fund from the central government. It can be concluded that with the growth of the City of Lusaka, financing has not increased and is currently not enough. Lusaka City Council's revenue collections are not enough to meet the financial needs of Lusaka Fire Brigade Unit. It can be concluded that Lusaka City Council receives money from the government through the Fire Safety and Rescue Services under the ministry of local government, however this money is not enough and reliable because it is political and erratic, the government chooses when to fund hence the council could not budget for it. It can also be concluded that Equalization fund is poor, 80 percent is meant for operating expenditure and only 20 percent goes to capital expenditure, however this is not the case because even the 20 percent is added up to 80 percent and paid as salaries to fire fighters and other council workers. It can further be concluded that money collected from issuance of fire certificates and inspection of buildings is equally not enough and well accounted for. Lastly it can be concluded that funding for infrastructure development is poor, this is because just like funding from the Fire Safety and Rescue Services under the ministry of local government, it is also political. Generally, what can be deduced from this chapter is that the financial capacity of Lusaka City Council accounts for limitations to effectively deliver fire and rescue services in the City. Despite Lusaka City Council having five sources of funding towards Lusaka Fire Brigade Unit, these sources of funding have been inadequate to facilitate effective delivery of fire and rescue services because the fire brigade's budget is never met.

The third objective of the research was to establish the extent equipment at Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in the City. From the presented and discussed data, it can be concluded that equipment at Lusaka Fire Brigade Unit is not modern and enough to cater for 21st century needs to effectively deliver fire and rescue services. It can also be concluded that there are no turntable ladders and ordinary fire trucks are not enough; there are no fire detection systems owned by the fire department; there are no fire hydrating points around the City; the protective clothing is not enough and needs to be restocked; emergency communication system is bad. Furthermore, it can be concluded that utility vehicles are not enough, there are no ambulances and firefighting foam, in general, the firefighters have indicated that equipment wise the fire section is below par and it obviously has contributed for limiting the full potential of fire and rescue services

in Lusaka District. The researcher concludes that the equipment of Lusaka Fire Brigade Unit accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

7.3. Recommendations

The recommendations are in two categories. These are policy recommendations and areas for future research.

7.3.1 Policy Recommendations

1. With increase in population, residential and industrial areas, there is need for the government to establish several fire stations and satellite fire stations within Lusaka District and increase the human resource to enhance fire and rescue service delivery.

2. The staff establishment and staffing levels in the Fire and Rescue Services units should be revisited to ensure that staff resources are as per establishment and in line with the population being served.

3. There is need to upgrade the fire section which is a section under engineering department to a stand-alone department so that it can be funded directly.
4. The Ministry of Finance needs to increase the budgetary allocation to the Ministry of Local Government for the procurement of various firefighting equipment.

5. The fire station must ensure that revenue collected from fire certificates, building inspection and training programs should not be diverted for other uses. The Ministry must provide guidelines on the use of the money raised from the issuance of fire certificates, building inspections and training programs provided by the fire brigade so that it can be accounted for.

6. The Ministry should ensure that the number of operational hydrants in the district are identified and the distance between them is according to the recommended standard of not more than 244 meters apart. The Ministry should also work with the water utility companies in ensuring that the hydrants are functioning and the damaged ones are repaired.

7. Personal Protective Equipment should be bought by the Ministry of Local Government and it should be included in their budget.

8. The Ministry should put in place a task-force that will help resolve the defective 993 toll free fire emergency line as this would help the fire stations to respond quickly to emergencies.

7.3.2 Areas for Future Research

This research has provided valuable insights on how human resource capacity, financial capacity and equipment factors accounts for limitations to effectively deliver fire and rescue services in Lusaka City.

Below are suggested areas for future research.

1. A research can be conducted to assess the firefighting services in the rural councils of Zambia.

2. A feasibility study can be conducted to assess the prospects of opening other fire stations in the Cities.

3. A study can be conducted to determine The Challenges in Preventing and Fighting Structural Fires in Zambia's Informal Settlements.

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APPENDICES

APPENDIX I: INTERVIEW GUIDE FOR LOCAL AUTHORITY PERSONNEL FROM HUMA RESOURCE DEPARTMENT (LCC).

My name is Steward Hamulangu, a postgraduate student at the University of Zambia in the school of Humanities and Social Sciences. I am conducting research on *Factors Limiting Lusaka City Council from Effectively Delivering Fire and Rescue Services: A Case of Lusaka Fire Brigade Unit*. This study is purely an academic exercise and is meant to enable me to partially fulfill the requirements of the Degree of Master of Public Administration [MPA].

You have been selected to be part of the key informants and I would be very grateful if you would spare a few minutes to respond to the questions. Please answer the questions to the best of your knowledge and be assured that the information you will offer will be kept strictly confidential. However, you are free to withdraw at any time from the study without giving reasons.

I thank you in advance.

PART 1. BACKGROUND

1. Name of the Council: .....

2. Position held in the Council: .....

3. Gender: .....

4. Date of interview: .....

5. Start time of interview: .....

PART 2. HUMAN RESOURCE CAPACITY OF LUSAKA FIRE BRIGADE UNIT AS A LIMMITING FACTOR TO EFFECTIVELY DELIVER FIRE AND RESCUE SERVICES IN LUSAKA

1. What is the human resource establishment at Lusaka Central Fire Station?
2. How many fire fighters do you currently have at Lusaka Central Fire Station providing fire and rescue services?
3. Is the number of fire fighters currently providing fire and rescue services enough at Lusaka fire station?
4. What kind of training and skills do fire fighters go through in order to provide effective fire and rescue services?
5. How many fire fighters with the training and skills indicated in the preceding question are there at Lusaka fire station?
6. Do you give any special training to fire fighters?
7. Do you have volunteer fire fighters and if any how many and how are they trained?
8. What incentives or motivational programmes do you provide to the fire-fighters?

PART 3. RECOMMENDATIONS

What do you think should be done by the local authority to improve the delivery of fire and rescue services?

Finish time of the interview date: ..... Duration of the interview and place: .....

END OF INTERVIEW

THANK YOU

APPENDIX II: INTERVIEW GUIDE FOR LOCAL AUTHORITY PERSONNEL FROM FINANCE DEPARTMENT (LCC).

My name is Steward Hamulangu, a postgraduate student at the University of Zambia in the school of Humanities and Social Sciences. I am conducting research on *Factors Limiting Lusaka City Council from Effectively Delivering Fire and Rescue Services: A Case of Lusaka Fire Brigade Unit*. This study is purely an academic exercise and is meant to enable me to partially fulfill the requirements of the Degree of Master of Public Administration [MPA].

You have been selected to be part of the key informants and I would be very grateful if you would spare a few minutes to respond to the questions. Please answer the questions to the best of your knowledge and be assured that the information you will offer will be kept strictly confidential. However, you are free to withdraw at any time from the study without giving reasons.

I thank you in advance.

PART 1. BACKGROUND

1. Name of the Council: .....

2. Position held in the Council: .....

3. Gender: .....

4. Date of interview: .....

5. Start time of interview: .....

PART 2. FINANCIAL CAPACITY OF LUSAKA FIRE BRIGADE UNIT AS A LIMMITING FACTOR TO EFFECTIVELY DELIVER FIRE AND RESCUE SERVICES IN LUSAKA

1. What are the sources of funding for Lusaka Fire Brigade Unit?
2. From each source of funding how much was funded to Lusaka Fire Brigade Unit in the past 10 years?
3. Is the funding to Lusaka Fire Brigade Unit enough?
4. How much money was allocated each year to buy fire equipment and servicing it at Lusaka fire station?

5. How much money was allocated each year to buy and service support motor vehicles at Lusaka fire station?
6. How much money was allocated each year for salaries and allowances for fire fighters at Lusaka fire station?
7. Do you face any financial challenges at Lusaka fire station to effectively deliver fire and rescue services in Lusaka City?
8. If yes, to the preceding question, what measures have you put in place to mitigate the financial challenges?
9. Do you think the budget allocation towards fire and rescue services is adequate to deliver effective fire and rescue services Lusaka City?

PART 3. RECOMMENDATIONS

What do you think should be done by the local authority to improve the delivery of fire and rescue services?

Finish time of the interview date: ..... Duration of the interview and place: .....

END OF INTERVIEW

THANK YOU

APPENDIX III: INTERVIEW GUIDE FOR LOCAL AUTHORITY PERSONNEL FROM ENGINEERING DEPARTMENT (LCC).

My name is Steward Hamulangu, a postgraduate student at the University of Zambia in the school of Humanities and Social Sciences. I am conducting research on *Factors Limiting Lusaka City Council from Effectively Delivering Fire and Rescue Services: A Case of Lusaka Fire Brigade Unit*. This study is purely an academic exercise and is meant to enable me to partially fulfill the requirements of the Degree of Master of Public Administration [MPA].

You have been selected to be part of the key informants and I would be very grateful if you would spare a few minutes to respond to the questions. Please answer the questions to the best of your knowledge and be assured that the information you will offer will be kept strictly confidential. However, you are free to withdraw at any time from the study without giving reasons.

I thank you in advance.

PART 1. BACKGROUND

1. Name of the Council: .....

2. Position held in the Council: .....

3. Gender: .....

4. Date of interview: .....

5. Start time of interview: .....

PART 2. EQUIPMENT OF LUSAKA FIRE BRIGADE UNIT TO EFFECTIVELY DELIVER FIRE AND RESCUE SERVICES

1. What is the ideal equipment needed to successfully operate a fire station such as Lusaka Central Fire Station.
2. What types of modern firefighting equipment do you have?
3. Do you have fire detection systems for fire out breaks in Lusaka City?
4. How do you locate fire outbreaks in Lusaka City?
5. How is the communication system of Lusaka Fire Brigade Unit?
6. Do you have fire hydrants around the city? (If yes), what is your comment on how they are distributed in terms of

   a. High Density Areas…….

   b. Medium Density Areas…….

   c. Low Density Areas…….
7. What kind of firefighting trucks does the fire station have to effectively deliver fire and rescue services in Lusaka City?

PART 3. RECOMMENDATIONS

What do you think should be done by the local authority to improve the delivery of fire and rescue services?

Finish time of the interview date: ..... Duration of the interview and place: .....

END OF INTERVIEW

THANK YOU

APPENDIX IV: INTERVIEW GUIDE FOR AN OFFICIAL FROM LUSAK FIRE BRIGADE UNIT.

My name is Steward Hamulangu, a postgraduate student at the University of Zambia in the school of Humanities and Social Sciences. I am conducting research on *Factors Limiting Lusaka City Council from Effectively Delivering Fire and Rescue Services: A Case of Lusaka Fire Brigade Unit.* This study is purely an academic exercise and is meant to enable me to partially fulfill the requirements of the Degree of Master of Public Administration [MPA].

You have been selected to be part of the key informants and I would be very grateful if you would spare a few minutes to respond to the questions. Please answer the questions to the best of your knowledge and be assured that the information you will offer will be kept strictly confidential. However, you are free to withdraw at any time from the study without giving reasons.

I thank you in advance.

PART 1. BACKGROUND

1. Name of the Council: .....

2. Position held in the Council: .....

3. Gender: .....

4. Date of interview: .....

5. Start time of interview: .....

PART 2

1. What is the human resource establishment at Lusaka Central Fire Station?
2. How many fire fighters do you currently have at Lusaka Central Fire Station providing fire and rescue services?
3. Is the number of fire fighters currently providing fire and rescue services enough at Lusaka fire station?
4. What kind of training and skills do fire fighters go through in order to provide effective fire and rescue services?

5. How many fire fighters with the training and skills indicated in the preceding question are there at Lusaka fire station?
6. Do you give any special training to fire fighters?
7. What are the sources of funding for Lusaka Fire Brigade Unit?
8. From each source of funding how much was funded to Lusaka Fire Brigade Unit in the past 10 years?
9. Is the funding to Lusaka Fire Brigade Unit enough?
10. How much money was allocated each year to buy fire equipment and servicing it at Lusaka fire station?
11. How much money was allocated each year to buy and service support motor vehicles at Lusaka fire station?
12. Do you face any financial challenges at Lusaka fire station to effectively deliver fire and rescue services in Lusaka City?
13. If yes, to the preceding question, what measures have you put in place to mitigate the financial challenges?
14. Do you think the budget allocation towards fire and rescue services is adequate to deliver effective fire and rescue services Lusaka City?
15. What is the ideal equipment needed to successfully operate a fire station such as Lusaka Central Fire Station.
16. What types of modern firefighting equipment do you have?
17. Do you have fire detection systems for fire out breaks in Lusaka City.
18. How do you locate fire outbreaks in Lusaka City.
19. How is the communication system of Lusaka Fire Brigade Unit?
20. Do you have fire hydrants around the city? (If yes), what is your comment on how they are distributed in terms of
    a. High Density Areas…….…….…….
    b. Medium Density Areas…….
    c. Low Density Areas…….…….
21. What kind of firefighting trucks does the fire station have to effectively deliver fire and rescue services in Lusaka City?

PART 3. RECOMMENDATIONS

What do you think should be done by the local authority to improve the delivery of fire and rescue services?

Finish time of the interview date: ..... Duration of the interview and place: .....

END OF INTERVIEW

THANK YOU

APPENDIX V: QUESTIONNAIRE FOR FIRE FIGHTERS

My name is Steward Hamulangu, a postgraduate student at the University of Zambia undertaking a study on the *Factors Limiting Lusaka City Council from Effectively Delivering Fire and Rescue Services: A Case of Lusaka Fire Brigade Unit* in partial fulfilment of my Master of Public Administration degree. You have been selected to complete this questionnaire and I would be very grateful if you would spare a few minutes to respond to the questions. Be assured that the information collected from you will only be for academic purposes and will be treated with the required guaranteed confidentiality. However, you are free to withdraw at any time from the study without giving reasons.

Instructions: Tick in the spaces provided or fill in the blank spaces.

Section A: Demographic Data

1. **Gender** Male [ ] Female [ ]
2. **What is your age**? [ ]
3. **Education level**: Primary [ ] Secondary [ ] College [ ] University [ ] Any other specify

   ……..

Section B: Human Resource Capacity to Deliver Fire and Rescue Services

4. For how long have you been working with the fire department?.....
5. What is your other qualification other than being a fire fighter? ……....…
6. What do you like about your job?.....

   ……..……..
7. What don't you like about your job?.....

   ……

Section C: Firefighting and Rescue Equipment to Deliver Fire and Rescue Services

8. What kind of firefighting equipment does your fire station have?.....

   ……...
9. What has been your experience with the fire engines?.....

   ……

10. To what extent do you agree with the statement: "***we have adequate and modern uniforms (personal protective equipment) and firefighting kit to effectively deliver fire brigade services in Lusaka City? (add a comment to your answer) (***a) Agree [ ] (b) Strongly agree [ ] (c) Disagree [ ] (d) Strongly disagree [ ]
11. How would you rate your emergency communication with the public in case of a fire outbreak.

    Very poor [ ] Poor [ ] Fair [ ] Good [ ] Very Good [ ] (give further comment for your answer)……..

    ……

Section D: Other Factors That Could Limit Effective Fire Fighting in Lusaka.

12. What other challenges do you face in the process of managing fire outbreaks?.....……

    ……
13. In your own opinion what do you think should be done to enhance the delivery of fire and rescue services in Lusaka?.....……

    …….

End! Thank you for your time and responses.