

**AN ASSESSMENT OF FIRE DISASTER MANAGEMENT IN URBAN AREAS:
A CASE STUDY OF NAIROBI CITY COUNTY, KENYA**

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A Research Project Submitted in Partial Fulfillment of the requirement for the award of the
Masters of Arts Degree in Environmental Planning and Management, Department of
Geography & Environmental Studies, University of Nairobi

AUGUST 2019

DECLARATION

This is my original work and to the best of my knowledge it has not been presented to any other institution for examination. All information from other sources has been acknowledged accordingly.

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This project has been submitted for examination with our approval as the university supervisors.

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DEDICATION

I dedicate this work to my late father Mureithi who believed in girl child education and encouraged me to study hard, and to my late mother Gathoni who took over where he left and actualized the dream. This also goes to my children Ngima, Gathoni and Wachira as well as my grandsons Taye Munene and Etai Munene who supported me through this journey with love and understanding.

ACKNOWLEDGEMENT

I give thanks to the Almighty God who gave me strength even when the journey felt too tough to bear. I am especially indebted to Dr. Kithiia S.M and Mr. Karingi L.K, my project supervisors, for the important help they accorded to me. Through their guidance and unwavering support, I was able to complete the work without hitches. I would also like to convey my sincere gratitude to the members of staff of Nairobi City County Fire disaster management Agencies for availing the necessary information that was needed for the research. I deeply appreciate the understanding of my family members for the long absence during data collection and report writing, and for the support and comfort they offered me during hard financial difficulties. I further wish to state that for any errors of omission, commission and or interpretation, I take full responsibility and none of any individuals or agencies mentioned herein should be held responsible for the same.

ABSTRACT

In most urban areas including Nairobi City, fire disasters have been blamed on poor management regime that lacks requisite efficiency and effectiveness to prevent, mitigate, respond or recover from fire disasters if and when they occur. Against this background, this study set out to contribute to a solution through four general objectives in respect to Nairobi City area: (i) develop a profile of roles of various stakeholders in fire disaster management; (ii) determine the nature of stakeholders collaborations in the management of fire disasters; (iii) assess the individual and combined capacity of stakeholders and how it influences efficiency and effectiveness of fire disaster management; and (iv) suggest ways in which strengthening of interventions against fire disasters can be achieved. The specific objectives of the study were to: (i) examine the contributions of policy framework, (ii) assess the engagement of stakeholders' relationships, (iii) determine the efficiency of technological capacity of stakeholders' and (iv) assess the level of stakeholders' awareness and their influence on fire disaster management in Nairobi City County. To achieve this, the Study used the correlation research design. The target population involved all the fire disaster management agencies in Nairobi City County as indicated in the Kenya National Disaster Response Plan (2009,) selected using Purposeful sampling procedure. Both qualitative and quantitative data were collected by use of questionnaires. Qualitative data was subjected to a thematic analysis while the Quantitative data were analyzed by use of descriptive and inferential statistics. Bivariate correlation analysis was used to determine the degree of relationship between variables using Pearson's correlation. The intention was to determine whether the independent variables (effectiveness of policy framework, effectiveness of stakeholder relationship, level of stakeholder awareness and technological capacity of stakeholder) together predict a given dependent variable (fire disaster management). Based on the findings, the study concluded that policy framework, Stakeholder awareness and, stakeholder technological capacity all have a minimum but positive influence on the fire disaster management. However, Stakeholder involvement presented a relatively strong relationship with the fire disaster management for the Nairobi City County. Recommendations of the study are that the Nairobi City Government needs to appoint a task force to formulate effective policy framework on fire disaster management which should come up with an integrated approach to collaboration and coordination of all the stakeholders involved in fire disaster Management to ensure seamless management of the frequent fire outbreaks. Furthermore, the researcher acknowledges the fact that this study did not cover all the areas of fire disaster management and suggests that further research on the area of fire disaster prevention be carried out since it can assist in stopping or reducing the effects of these disasters on the onset.

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CHAPTER ONE: INTRODUCTION

1.0 Background

The recent decades have experienced a rise in natural disasters as a result of which social development as well as political and economic activities have been adversely affected (Munasinghe 2014). The impacts of these disasters are either tangible or intangible depending on their nature, and their effects may be direct or indirect. The direct impacts may include issues such as actual bodily harm which may cause disabilities, forced relocations, interruption of social amenities, and loss of property and livelihoods, while the indirect impacts are related to general responsibility taken by individuals or the state in taking care of the victims of these disasters. According to Government of Kenya (GOK), (2009), any event that causes serious disruption in the way the society or community lives causing serious human, economic, environmental and material losses can be classified as a disaster. This occurrence almost always leads devastating effects on health status, disruption of ordinary services such as water power, communication and serious effects on businesses/ livelihoods (GOK, 2009). To be classified as a disaster, this situation should be so serious that the affected communities cannot cope with it within its available economic capacity and therefore calls for external assistance EMA. (1998.) Assistance comes in form of rapid response; transfer to health facilities and / or morgues, and in most cases rehabilitation and reconstruction of affected services. From the foregoing, it therefore follows that anything that creates a situation that would lead to that or similar occurrence is a potential disaster risk.

Urbanization leads to increased house density; a situation that is experienced in both planned and unplanned settlements the world over. As a result of this, the fire brigades are unable to access into settlements, which aggravates fire disaster risks (Isabela Wilfred Mtani and Mbuya 2018). Recurrent fire catastrophes are also frequent in crowded central business districts (CBDs) and markets (Oladokun & Emmanuel 2014). Henk (2004) observes that with this general increase in disasters globally fire disasters take the lead. Masellis M., Ferrara M.M., Gunn S.W.A. (1999) states that the effects of tragedies brought about by fire have continued to change over the centuries, especially in the twentieth. Fire disasters that occurred between 1900 all the way to 1969 were mainly to lack of prevention and poor safety regulations not to mention the evacuation plans that lack coordination. This resulted to preventable fire accidents that occurred in theaters, schools, nightclubs and even hospitals causing serious casualties in death and disfigurement, loss of property and environmental

destruction. This study focuses on the role of various stakeholders and agencies involved in fire disaster management to find out if these roles are well understood by these agencies and the citizen. The assessment, response and reaction time of these agencies is very critical when the disasters occur since it can determine the number of fatalities. The debate on fire disaster management should cover the issues of stakeholders' collaboration in the event of a fire disasters. Currently it is not clear whether these collaborations have been fruitful.

From the foregoing, it is evident that all urban areas should have mechanisms to deal with fire disasters. This can only be achieved through a comprehensive fire disaster management system. According to Gunn (1992), disaster management is the aspect of preventing and minimizing the potential circumstances that lead to fire disasters through training of the communities on how to plan, predict and prepare for them. Further, the agencies and stakeholders involved in fire disaster management needs to be involved in the formulation of training, policy, education, legislation, and planning. This shall strengthen the aspects of fire disaster management through meaningful debate that can benefit from stakeholders' experience.

This would reduce the effects of disasters to the environment as well as human. As indicated by Arturson (1987), disaster management should be done in reference to results of research studies previously carried out on the possible risks that can cause them. According to the Government of Kenya (GOK) (2009), a systematic process of fire Disaster Risk Management has been adopted in the country. This approach puts in place systems that ensure the occurrences of fire disasters are reduced as much as possible while at the same time guide on how to control the impacts of these disasters to the minimum if/ when they occur. Consequently, trainings based on how to improve the community's coping capacity, improve skills on execution of the developed strategies, guide on interpretation of policies and the need to follow the organizations operational frameworks are recommended. This study sort to find out what deficiencies exists within the stakeholders and fire disaster management agencies which affect their capacity to perform effectively, and whether they are aware of them and therefore doing anything about it.

1.1 Problem Statement

Nabutola (2004) observes that although Nairobi City Fire Service has a responsibility to safety against fire within the county, Nairobi City County continues to experience devastating fire outbreaks both within the city Centre and its environs. For instance, Kigunda (2012) observes that despite Kimathi house being located less than 200 meters away from the Nairobi City County's firefighting department, the fire brigades arrived at the scene 30 minutes after the fire had consumed two floors of the 10-storey building in the year 2012. Other institutions around Nairobi have not been spared either in subsequent years. The Jomo Kenyatta International Airport, which is the main air gateway to Kenya, situated a few kilometers from the city centre but within the Nairobi City County was on fire on August 7, 2013. As a result, a whole international arrivals passenger terminal went down (Dave, 2013). Slums have also had a fair share of fires mainly caused mainly by human errors. At the Sinai slums, on August 12, 2011, a fire occurred as a result of an accidental fuel leak leading to estimated 95 deaths, 112 severely burnt and loss. This is however only one of the fires that keep occurring in these areas. The markets have not been spared either. Gikomba open air market has had its share of fires, the notable ones accruing in quick succession in September 08, 2010, March 13, 2012, March 18, 2014, October 16, 2014, June 23, 2015, in October 6, 2017 just to mention a few. All these fires cause mental and physical anguish not to mention serious economic losses to the traders

While it may be impossible to eliminate fire disasters in the urban areas such as Nairobi, it is prudent that response is prompt to avoid major effects of these disasters. However, as Kabubi (2010) observes, in reference to Nairobi City, when fire breaks out, time taken by the fire officers to get to site is unnecessarily too long, while at the same time they come without the necessary equipments and apparatus, carrying too little water and other firefighting agents to fight the fire. Kigunda (2012) also states that for many years, fire disaster management and mitigating units in the country has been blamed for being reluctant and slow in responding to disasters whenever they are called at the scene to help.

While there exists standalone institutional, legal and policy frameworks on disasters, Nairobi City County does not have a coordinated policy and legal framework specific to Fire Disaster Management. As a result, Fire Disaster Management is done on an ad hoc bases when disaster strikes. There is therefore lack of a planned and systematic approach to fire disaster management. There is lack of coordination leading to overprovision of services in some

aspects while others are neglected. The available resources are therefore not optimally used resulting to poor or slow response by the agencies which respond to these fire disasters which eventually increases the risk to the victims (Government of Kenya (GOK), (2009). The community and general members of the public are not properly trained and sensitized on aspects of fire disaster management. This is evidenced by their observed behavior in events of fire disasters especially the tendency is to crowd around the disaster or potential disaster sites oblivious of the dangers that come with it.

The presence of concentrated population, settlements as well as other buildings, within the many slums located within the county presents problems for fire disaster risk reductions and humanitarian assistance. Moreover, lack of water from the few water fire hydrants in Nairobi City County and poor infrastructure results in a weak and ineffective fire disaster management. In addition, the trained fire fighters experience challenges in their effort to protecting lives and property in building through prevention of fire risks since in most cases the water supplies at fire hydrants is inadequate and unreliable. Fire disaster management is further compounded by heavy traffic congestions during firefighting. From the foregoing, it was necessary to investigate what structures have been put in place in terms of preparedness, prevention, response and recovery strategies through the existing legal, policy and institutional framework on fire disaster management in Nairobi City County. This study was therefore geared towards assessing the effectiveness of Management of Fire Disaster in Nairobi County.

1.2 Research Questions

The following research questions guided the study.

- a) To what extent does policy framework influence Fire Disaster Management in Nairobi City County?
- b) To what extent does stakeholder's relationship influence in the Management of Fire Disasters in Nairobi City County?
- c) How does the technological capacity influence Fire Disaster Management in Nairobi City County?
- d) How does the level of stakeholders' awareness influence Fire Disaster Management in Nairobi City County?

1.3 General Objective of the Study

The General Objective of the study was to develop a profile of roles of various stakeholders in fire disaster management; determine the nature of stakeholder collaborations in the management of fire disasters; assess the individual and combined capacity of stakeholders and how it influences efficiency and effectiveness of fire disaster management; and suggest ways in which a strengthening of interventions against fire disasters can be achieved.

1.4 Specific Objectives of the Study

The research aimed at achieving the following specific objectives:

- a) To examine the contributions of policy framework on the Management of Fire Disasters in Nairobi City County.
- b) To assess the influence of stakeholder relationship involved in Management of Fire Disasters in Nairobi City County.
- c) To determine the efficiency of technological capacity in Fire Disaster Management in Nairobi City County
- d) To assess the level of stakeholders' awareness and its influence on Fire Disaster Management in Nairobi City County.

1.5 Hypotheses of the Research

The study tested the following hypotheses based on the above objectives:

- a) H_0 : - There is no substantial connection between policy frameworks and fire disaster management in the Nairobi County.
- b) H_0 : - There is no significant relationship between stakeholder's relationship and fire disaster management in Nairobi County.
- c) H_0 : - There isn't a significant association between technological capacity and fire disaster management in Nairobi County.
- d) H_0 : - There is no substantial relationship between level of awareness of stakeholders' and fire disaster management in Nairobi City County.

1.6 Justification of the enquiry

Disasters are on the rise both at the global and local level. This has been blamed on improper and uncontrolled human actions on the environment. The loss of human life as well as

property as a result of disasters has increased substantially in the last three decades. Kenyans, as well as Nairobi City County residents, and indeed all other urban areas within the country are always at risk from mainly fire disasters. Over and above the effects on life and property, hazardous gasses such as carbon dioxide, are released which contribute to the greenhouse effect in the atmosphere. It also courses serious pollution to the surrounding environment with emissions harmful to human health. These fire related disasters have created concerns across the country, raising questions on how well the fire disaster management institutions within the urban areas are equipped on matters related to mitigation, preparedness, response and the recovery process if /when a fire disaster occur. This observation created the need to urgently investigate the processes currently being employed by various stakeholders in the industry with special reference to Nairobi County, and evaluate the gaps that exists. The study area has had is fair share of tragic fire disasters over the years resulting to death and loss of property. Some of the recent fire disasters have greatly affected households especially when they occur in the relatively congested informal settlements. In order to reverse this trend, it is important to incorporate the discipline of fire Disaster management in all developmental programs. All stakeholders therefore need to be aware of the basic rules of fire disaster management by gaining knowledge on how to implement safety practices within and around the environments they live in. Based on the foregoing, the researcher felt that although it is impossible to completely prevent fire disasters, a deeper investigation on aspects of fire disaster management, could help alleviate their worst effects. Justification of the study therefore was based on the premise that safety of Kenyans is a basic right. This further justified the need to carry out this study with a view to establishing how fire disaster management agencies operating within the Nairobi City County were carrying out this business and the level of success/effectiveness achieved. This study is important since it brought out major gaps that exists in fire disaster management within the Nairobi city. Based on the observations made in the course of this investigation, the researcher used the outcomes to make various recommendations to the policy makers.

1.7 Scope of the Study

This research was mainly directed towards Policy framework, stakeholders' relationship, stakeholder's technological capacity, stakeholders' awareness as well as the strategies that influence fire disaster management within the Nairobi City County. The role of stakeholders involved in this sector comprising of the government agencies such as County Government

and relevant ministries and, private companies, was examined. This was done in view of the existing fire disaster management mechanisms, equipment, infrastructure, financial resources, personnel as well as the strategies.

This study therefore investigated the state of fire related disaster in urban areas in Kenya and how they have been managed, relative to Nairobi County. The study concentrated on the following aspects

- i. Policies, regulations, and strategies that influence fire disaster within the Nairobi City County.
- ii. Role of government agencies such as County Governments, relevant ministries and, private companies that are involved in fire disaster management within the Nairobi City County.
- iii. An assessment of the existing fire disaster management mechanisms, equipment, infrastructure, financial resources, and personnel at the disposal of the stakeholders involved in the management of fire disasters within the Nairobi City County.
- iv. An assessment of the challenge and opportunities in management of fire disasters in urban areas with special attention on the Nairobi City County.

The study limited itself to the Nairobi City County which covers approximately 639 Square Kilometers in land area, and a population of approximately 3,138,369, people by 2009 (KNBS). This reflects a population density of roughly 4,510 people per square Kilometer.

1.8 Limitations and delimitations of the Study

Although this study was carefully planned, the researcher was still aware of its limitations and shortcomings. In data collection, questionnaires were used for this study, part of which included self-assessment by respondents. Nonetheless, due to the professional/ technical nature of the subject under investigation, the researcher expected that most of the responses on the self-assessment by the respondents would be reasonably fair and factual. On the other hand, the items in the questionnaires might have asked questions that elicited subjectivity and hence distorting facts of the study. To overcome limitation on subjectivity, the researcher zeroed in on the senior level of employees within the organizations responsible for fire disaster management namely the managers and section heads. That way, the researcher was assured of some high level of accuracy in the opinions as well as facts presented in the

questionnaires. Again, fire disasters have been widely experienced within the country. However, this study only addressed fire disaster that occur within the Nairobi City County which is a densely populated urban settlement and the findings may not reflect the overall position of the urban centres in other counties in Kenya. However, this delimitation did not pose any risk to the external validity of the current study since no generalisation of the findings was made as concerning other counties in Kenya. Furthermore, the fact that the entire population was Purposeful picked as the sample, the researcher eliminated the need to generalise the findings on the study area. These delimitations therefore did not have a negative effect on the overall findings of this study.

1.9 Operational Definition of Terms

While these terms may have several meanings, the definitions given herein are those relevant to the subject under investigation.

Capacity building: organizational development including enhancement of management structures, processes and procedures, within organizations. (Definitions & Translations)

Disaster: is an abrupt, catastrophic event that extremely disrupts the functioning of a community causing human, material (financial or physical), and environmental losses that surpasses the victim's ability to cope using their resources. (International Federations)

Disaster Prevention: Those activities taken to prevent a natural phenomenon or potential hazard from having harmful effects on either people or economic assets (USAID)

Disaster risk reduction: Reducing disaster risks by way of adopting the concept and practice of systematic efforts to analyze and manage the factors that lead to disasters, including through reduced exposure to dangers, lessened vulnerability of people and property and improved preparedness for adverse events. (UNISDR).

Disaster management: The attempt to understand the driving mechanisms (spatial, temporal, and mechanical) of natural disasters, such as various types of mass movement. (ScienceDirect)

Fire: It is a very fast, oxidation process that is self-sustaining which is accompanied by the development of heat, light and numerous reaction products such as carbon dioxide and water, in different forces. (Intro 101 Chapter 4 Quiz)

Hazard: Any item, condition, or action that has the likelihood to cause harm, injury, or damage to property, humans, animals or the environment. (Safeopedia)

Fire hazard is a probable fire accident that could happen at a residential, commercial, social, workplace or general environmental surrounding such as a forest which could lead to a wide range of accidents leading to loss of life and property. (Petropedia)

Squatter Settlement: A low income settlement usually in an urban locality occupied by people who do not have tenure of land of their own, and therefore “squat” on unoccupied land either public or private. (Hari Srinivas 2015)

Infrastructure: The fundamental structures and amenities such as transportation, water and power supplies, that is required for a country or society to work or function effectively (Cambridge dictionary).

Mitigation: Measures taken to avert or lessen the risk to life, assets, public and economic activities, and natural resources from hazards.

Preparedness: is the state of being ready for something to happen, especially for war or a disaster. (Collins English Dictionary).

Risk: A likelihood or danger of damage, hurt, accountability, forfeiture, or any other undesirable incidence that is triggered by external or internal exposures, and that may be avoided through preventative action. (Business dictionary)

Slum is a human settlement section of a city where living surroundings are deplorable and where the houses are in bad condition (Collins English Dictionary).

Urban area: An area that is characterized by higher population density and vast human features in comparison to areas surrounding it. An urban area must have been designated by relevant Authorities as a city, town or conurbation. (Academia)

Urbanization: The aspect of people moving from the countryside to towns and or cities, enlargement of cities or expansion of urban areas. (Market Business News)

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter covers review of literature relevant to the field of investigation. It also includes a theoretical framework as well as a conceptual framework. It is quite obvious that a lot has been achieved in regards to technical and managerial aspects on the field of study in recent years. However, the methods used have so far not been effective enough to predict natural and man-made disasters. It is therefore not possible to prevent them. However, more efforts can be made to reduce and mitigate the effects of these disasters.

Globally, all types of hazard are experienced on a day to day basis in urban areas. These are mainly health and fire related due to the poor standards of living generated by congested and mostly temporally building structures in low income settlements. Fire disasters can lead to deaths and damage to property and cause devastating effects to the environment. Specialists tend to be concerned with mainly the big fire disasters which are basically only one end of the spectrum. Very little attention has been given to the medium or to the smaller scale fire disasters that lie in the middle and the end of the spectrum (Bull-Kamanga *et al.*, 2003). Effectively very many small but serious fire disasters go unreported and subsequently unnoticed and therefore are not documented. According to the Global Policy on Urban Disasters (2010) it is possible to avoid future disasters in urban areas if all the agencies involved in fire disaster management can jointly deal with the issues that create disaster vulnerable environmental. This is more so in the low-income countries where special emphasis should be directed towards prevention, response, rescue and, recovery.

The African continent has not been spared from fire and others disasters which are mostly related to rapid urbanization. Tibaijuka, (2007) describes urbanization in Africa as growing exponentially. Tibaijuka continued to observe that according to the World Bank Group 2013 report, the number of disasters reported in Africa has increased significantly since the 1970s and their economic impact on countries is becoming more and more clear. Tibaijuka further observed that most African countries have minimal economic capacity to finance relief and the necessary reconstruction that is needed to deal with the aftermath of a disaster. The capacities of many national and local disaster prevention and response authorities remain limited. As noted by Holloway (2013) because of the high rate of urbanization in the African Continent today, the cities are experiencing rapidly growing unplanned informal settlements

that have poor infrastructures. This leads to frequent fires whose courses and eventual management is poorly handled leading to devastating effects. Shannon (2013) observes that many African countries do not have in place a fire disaster management strategy to assist in preventing and responding to these disasters. Shannon continues to observe that this aspect is mostly manifested in Sub-Saharan Africa.

In Kenya, the Government and other stakeholders, including the general public have tried but not managed fire disasters adequately. The researcher therefore, set out to examine how the fire disaster management agencies within the Nairobi City County have been carrying out this noble but difficult task relative to the existing policy and institutional frameworks and how effective it has been.

Over the years, the world has experienced fires disaster some of them resulting to great losses both in lives lost and properties destroyed. Some of them mentioned in this research are barely representative and therefore not exhaustive. The Great Boston fire of 1760 was a major fire that occurred on March 20, 1760. While it is not clear what started the fire, it is suspected that some gun powder was ignited by the blaze, causing a huge explosion that resulted to the spread of fire. The fire destroyed 349 buildings as well several ships in port, and left over a thousand people homeless (Brayley, Arthur Wellington 1889). The Great Fire of London started on Pudding Lane of September 2nd, 1666 is destroying close to 70,000 homes in London and affecting roughly 80,000 residents. Although by then, London had some advanced firefighting technology fire services had to use water to control the fire due to the fact that the roads were too narrow for the fire engines. Furthermore, only a few fire engines were on wheels (Bell, Walter G.1971). (Ellis Peter Berresford (1986). Another account by E. Merton Coulter (1939) indicates that in 1796, Savannah, an American city was struck by a Great Fire considered one of the most shocking fires ever to have struck America at that time. He further observes that Savannah's council had implemented several procedures geared towards minimizing the risk of fire by putting a number of strategies in place to allow for a swift response to any developing fire. However, the city had a very small and poorly equipped fire service which had very few fire engines. These were a hand pulled by volunteer and were also in bad condition. Closer home in Kenya, a blaze at Kimathi House in the centre of Nairobi almost wiped out at least two floors since as firefighters arrived poorly equipped to fight the blaze Kaberia (2015).

The markets areas of Nairobi have also experience fire disasters over the years. Gikomba is a huge open-air market in Nairobi that holds small scale traders operating a wide range of businesses. Fires outbreaks are a very common occurrence in this section of Nairobi that results to loss worth millions of shillings in goods fixed investments and sometimes loss of

life. As presented by David (2017) some of the fires include the September 08, 2010 which occurred in an afternoon fire raging for three-hours as city council firefighters struggled to fight it but their work was hampered by inaccessibility in the overcrowded market. On March 13, 2012 again hundreds of market traders lost a fortune following a night fire whose cause was not made public. March 18, 2014 another fire started at around 8pm and razed a large section of the market. Property and goods of unknown value was destroyed by a huge night fire at the market, near Shauri Moyo lower bridge. Again, in October 16, 2014, yet another fire left several stalls razed and properties destroyed in a 10pm incident. Traders later complained to the media about the delay in arrival of the emergency services, saying the county government must improve on its response to disasters. In June 23, 2015 even before the trades had settled in their reconstructed structures; goods worth millions of shillings were destroyed when fire burnt down stalls at the market. Several traders, were injured in the incident as they tempted rescue their properties. Again, on October 06, 2017, same old story repeated itself. Firefighters in Nairobi took hours to put out a huge fire that broke out at the open-air market. The fire is said to have started at around 3am at the fish and groceries section. In 2018, another fire erupted at Gikomba market on 7th November at dawn destroying a number of shops. An earlier fire that happened On June 28, 15 people died and more than 60 others were injured after timber and second-hand clothes went up in flames (. Melanie 2018).

In Kenya and indeed within the Nairobi City County serious fire disasters have continued to occur. Some of the areas most affected are the informal settlements where the residence shows behaviors related to ignorance and cases of negligence. Syphoning of fuel from tankers and scooping up of leaked fuel have triggered serious fire disasters leading to loss of life and property. Sinai slum fire of March 18 2012 in which approximately 100 people died and 160 injured is a good example. In 2001 merchandise worth millions of shillings were destroyed when fire broke out at a Free Market then located at Uhuru Park in Nairobi, razing down the entire market. Later, in 2004, valued documents and property estimated to be worth Ksh 70 million were destroyed when another fire occurred at the City hall in Nairobi destroying the entire third floor of the building. Again in 2009, 14 deaths and 40 injuries were confirmed when a fire disaster struck the Nakumatt Supermarket in downtown Nairobi. (GoK, 2010).

2.1 Policies, legislation and institutional frameworks in fire disaster management

Internationally, there have been attempts to formulate policies to guide fire disaster management. For instance, The Hyogo Framework for Action (HFA) (United Nations for Disaster Risk Reduction 2005), was a Ten-year plan to make the world safer from natural hazards. The policy framework was adopted by 168 member states that were represented at the United Nations World Disaster Reduction Conference held in 2005 in Kobe, Hyogo, in Japan. As provided in page 12 section 5, firming disaster awareness for effective response and reduce the effect of disaster if the people in disaster prone areas are educated, armed and are also ready to act in the event and a disaster thereby building capacities for effective disaster management is necessary. Further firming of policy, technical and institutional capacities in local, and national disaster management, including those associated to technology, skills, as well as human and material possessions is another characteristic of disaster management that was also suggested to inspire and encourage exchange of thoughts/information and organization among others. Early warning, disaster risk reduction, disaster response, and development of the appropriate agencies and organizations at all levels, with the intention of promotion an all-inclusive method towards disaster risk reduction was discussed and appreciated as an important aspect of disaster management.

Recommendations were also made on how to develop and coordinated local and regional approaches, upgrade regional policies, operational mechanisms, communication systems prepare , review and periodically update disaster preparedness and contingency plans. Promotion of regular disaster preparedness exercises, including evacuation drill was also appreciated as an integral part of disaster management. Sendai Framework for Disaster Risk Reduction (Third United Nations World Conference on Disaster Risk Reduction 2015-2030) was a follow up of the Hyogo framework for action. The most notable point from the conference is that level of exposure and vulnerability of the settlement where any disaster situation occurs dictates the extent of damage coursed by the disaster. Consequently.

In Kenya, a number of Policies and legislation frameworks on fire management among other disasters have been put in place. Occupational Safety and Health Act (OSHA), Government of Kenya (GOK), (2009), The Occupational Health and Safety Act (OSHA) provide for the well-being, protection and wellbeing of people hired, and all persons legitimately present at workplaces and related matters. It is mandatory for occupant to offer and sustain plant and structures and procedures of work that are safe and without risk to workers' well-being. The proprietor must guarantee safety and absence of risks to health in connection with the use, handling, storage and conveyance of articles and materials at the work place. From the foregoing, there are enough references that guide fire disaster management within the Nairobi

City County and indeed the whole country. However, there is need to tie up all of them together to create one document that would remove any possible repetition and /or contradictions but nonetheless include all the relevant aspects of fire management.

As observed by Kabubi (2010), major disasters experienced in Kenya's urban setups have been handled in a poorly coordinated manner posing very high risks to the inhabitants and property even in cases of potentially simple events such as fires. A comprehensive national disaster policy is therefore overdue. The Nairobi City County has had several fire disasters which caused loss of life and property. While the effort toward disaster management by the County is demonstrated through the recently enacted Nairobi City County Disaster and Emergency Management Act (2015) the experience is that there is still a lot that needs to be done if this trend is to be reversed. This study attempted to assess the effectiveness of policy, legislation and institutional frameworks on fire disaster in Nairobi City County in regard to their understanding, adherence and implementation among the agencies involved.

2.2 Stakeholders in Fire Disaster Management

In reference to fire disaster management, a stakeholder is any individual, agency or any private or governmental institution that have an interest in the aspect of fire management (Michelle, 2010). Not all fires are unwanted. However, when fire breaks out at an unwanted area and time, it has a capacity to course devastating negative effects. This therefore means that all willing partners must to put in place suitable fire management systems, to effectively develop and conserve all necessary resources required to manage unwanted fires. According to the Integrated Fire Management Expert Group (IFMEG) (2007), this requires an Integrated Fire Management (IFM) concept that addresses all aspects of fire management including the facilitation of multi-stakeholder and community consultation processes. Identifying stakeholders for fire and safety management requires figuring out who will affect or be affected by fire and safety management decision making. This study took time to identify the stakeholders who are involved in fire disaster management within the Nairobi city county. The researcher concentrated on the institutions and agencies based on the research objectives considering that they operated within some structured guidelines.

2.3 Stakeholders in Fire Management in Kenya

There are various stakeholders operating in the fire disaster management sector. The Nairobi City County under has mandated The Nairobi City Fire Service with the responsibility of ensuring fire safety in Nairobi City County. This is the main coordinating body in the event of any fire outbreak within the county. It however calls in other stakeholders for support depending on the magnitude of the disaster. These stakeholders include the Kenya Red Cross Society which is constitutionally authorized with the obligation of supporting the Kenyan Government carry out humanitarian work in times of natural disasters such as fire. In response to a fire tragedy, a team of Kenya Red Cross Society employees and volunteers rush to the scene to help evacuate the injured. They also help in retrieving, packing and transporting the dead and the injured to mortuaries and hospitals respectively as well as counseling the bereaved families. During funerals especially where mass a burial is involved, Red Cross staff help to console and offer first aid to the friends and relatives who are overcome by grief. Another agency is The Society of Fire and Disaster Emergency Community Conflict Agency, (SOFADCECCA). This agency is involved in improving communities' capacities for human and environmental fire disasters. It achieves this through training on how to prepare, alleviate, respond and organize, while interacting with other local as well as international agencies in implementing, organizing and handling fire disaster response and extenuation programs. Another agency involved in fire management within the Nairobi City County is the International Centre of Technology (ICT) Fire & Rescue. According to their website, the ICT Fire and Rescue offers international standards of general and tailor-made fire disaster management training in fire rescue (fire warden training, fire safety audit, fire risk assessments, fire marshal training), first aid and disaster management.

G4S Fire Solutions based in Nairobi, is private agency involved in Fire solutions which includes fire disaster avoidance and safety measures. The G4S Fire and Safety solutions are offered in 3 categories namely Fire Protection Services, Fire Fighting & Rescue Services; and Standby Services and equipment. KK securities are another private agency involved in fire management in Nairobi City County. As indicated in their website, KK fire service is involved in fighting urban, industrial and residential fires. The Company also conducts Fire assessments as well as offering basic fire awareness and Fire Marshalls. The government through the Kenya Air Force Fire School is also involved in fire disaster management. Kenya armed forces and especially the Air Force, almost always participates in firefighting

whenever a fire disaster occurs. Others include the Kenya National Fire Brigade Association (KNFBA), a consortium of fire brigades, involved in firefighting aspect of fire disaster management Kenya. Considering that Kenya has in recent years experienced fire and other disasters that would certainly have been avoided if only certain preventive measures were in place, the ministry of education decided to be more involved in fire management together with other stakeholders. Pursuant to that, they published the Safety Standards Manual for Schools in Kenya (First Edition) April 2008. This is an attempt to educate the young in society about disasters which are mainly manmade such as fires.

From the foregoing, it is evident that there are quite a number of agencies that work towards managing fire disasters within the Nairobi City County. It is also clear from the literature reviewed that these agencies have put in a lot of effort in an attempt to manage these disasters. However, these disasters still continue to occur with glaring magnitude. This study was therefore geared towards assessing the effectiveness of participants in fire disaster management within the Nairobi City County with a view to determine whether their involvement is effective and if not what act as factors hindrances. The study then gave recommendations based on the findings.

2.4 Civic Education on Fire Disaster Management

In order to achieve meaningful levels of fire disaster management, it is important to create public awareness about these hazards. This shall impact skills related to risk reduction through drills, exposure to local and international news. media, local community experience and traditional knowledge (United Nations & World Meteorological Organization, 2002).

In Kenya, as in nearly all other developing countries, due to sprawling poverty in some of sections within the countries, civic education regarding fire disaster management is at its lowest. This is not only but also low levels of literacy (Van, 2010). In Kenya, this crisis has lately been exhibited in a shocking manner. The country has witnessed instances where residents rush to siphon off fuel from overturned fuel tankers on the roads and highways with devastating consequences. The highly inflammable petrol and jet fuel inevitably explode leading to are horrific situations such as charred bodies and others burnt beyond recognition. This happened at least 3 times within a period of 6 months alone, and many hundreds of lives were lost. The common practice of illegal power connections installed by untrained people

has also been noted to cause fires and loss of life through electrocutions in the informal settlements within the urban areas. Van, (2010) observes rightly so the only action likely to bring immediate impact is civic education of communities living in major slums in Nairobi on appropriate accident behavior, especially with regard to fire accidents. This study was undertaken to investigate whether the fire disaster management agencies within the Nairobi City County incorporate civic education in their fire disasters programs especially in areas of prevention and response. This is responded to within the research finding of this study.

2.5 Fire Disaster Management Strategies

Disaster management can be divided into alleviation, preparation, reaction and recuperation. Alleviation is the process of using existing policies to minimize its effects of a fire disaster after it occurs Quarantelli (1992). Disaster control on the other hand, does not have to focus on strict rules and regulations (Kartez, 1984). Based on the two studies there is a basic need to plan for control, mitigation and response to achieve a high level of fire disaster management. This is supported by Dynes (1994) who observed that disaster prevention and control necessitate a holistic or overall perspective based on coordination and cooperation rather than on a 'command-and control' system. This allows the fire managers to use their discretion depending on the presentation of the disaster instead of operating within rigid guidelines. This is because disasters are occasioned by different agents where some can be warned against such as minimizing potential hazard while others just occur without warning.

This study recognizes that some policy documents which attempts to concentrate on the essential concerns and to create links that are necessary in order to sustain steadiness, dependability and harmony in Government policy are in place at the National level. This effort can be seen through Government Development Plans and numerous guidelines, such as Sessional Paper No.10 (Government of Kenya (GOK) 1965), on African Socialism and its relationship to development in Kenya. As indicated in Article 138 of the aforementioned paper, the main aspects of Physical planning, among others, deals with land use and layout, setting, transport and design problems both in rural and urban areas. Poverty Reduction Strategy Paper (PRSP) (International Monetary Fund 2003) recognizes under section 8.15 that urban infrastructure management in Kenya is wanting. The current urban transport problems in the Nairobi City County have a direct relationship in fire disaster management. It

is very challenging for the fire engine or a rescue ambulance to maneuver through traffic jam during the rush hours to access the disaster site.

The paper recognizes the need to improve overall County Government management, focusing on among others, infrastructure management service delivery systems. Under section 8.18 which deals with building and construction, the Government proposes to boost incomes to improve housing and living environments in informal settlements while under section 8.19 it is appreciated that there is a strong connection between poverty and absence of access to good-quality water supply and hygiene (WSS). Both the aforementioned have a strong bearing towards success in fire disaster management in the informal settlements within the Nairobi City County. The Government of Kenya (GOK) (2008), National Urban development policy deal, with appropriate technology and infrastructure systems and emphasizes on the use of construction materials, building methods, infrastructural systems and project administration which relate with local settings. It also recognizes the linkages of rural/urban, urban/urban, urban governance and management to urban safety and disaster risk management.

Perhaps the most recent and ambitious strategy is the Government of Kenya (GOK) (2007), Kenya National Vision 2030. While recognizing the need for infrastructure development within Nairobi City County among other urban areas, it proposes under chapter 2.1, to have a Nairobi urban region bus rapid transit/System. Within the first phase, three transportation corridors, namely Athi River Town to Kikuyu Town (estimated at 38 kms); Thika Town to the Nairobi City Centre (around 50 kms); and Jomo Kenyatta International Airport to the Central Business District (roughly 25 kms), be upgraded to assist in decongesting the city. It also recognizes under chapter 4.8 that there is overcrowding and lack of adequate sanitation within the unplanned informal settlements, that poses the challenge to the Nairobi City growth both economically and socially among them fire disaster management.

This study also recognizes the existence of relevant national legislations that relates to guidelines as well as set controls on fire management. Some of these which are by no means the only, ones include; Government of Kenya (GOK) (1999), The Environmental Management and Coordination Act No.8. This act describes what “air quality” is and what translates to pollution. All fires course emission of gasses that could be potentially hazardous.

The act gives guidelines on potential hazards that could course pollution raging from burning and storage of inflammable materials to waste. The water Act (Cap 372), under section 5.6 recognizes the need to cater for water for Fire Fighting and states that since water for firefighting is only used in the occasion of a disaster, water allocation for firefighting in urban and rural centers will therefore need to be warranted on an individual basis for each project, user or supply. Government of Kenya (GOK) -Grass Fires Act Chapter 327 Revised Edition (2012). gives the then local Authorities which are now replaced by the Counties power to prohibit burning of vegetation. Section 1 (b) It issued an order prohibiting burning of vegetation except in situations stated in the order. The petroleum Act (Cap 116), classifies the petroleum by the level at which they can catch fire. Class A petroleum has a flashpoint of 73° Fahrenheit. Petroleum that has a flashpoint of 73° Fahrenheit can catch fire very easily and therefore the person transporting or storing it is by law required to exercise extra caution.

If / when fire occurs, there should be a system in place to manage it. An Integrated Fire Disaster Management approach is a concept for planning and putting in place working systems that include social, economic, technological, cultural and environmental assessments with the intention of abating the harm and capitalizing on the benefits of fire (European Forest Institute, 2010). Brian *et al.*, (2009) observes that fire management can be achieved by bringing agencies, organizations, and the community together to plan for and manage all types of fire in a coordinated manner.

Proactive Disaster Risk Reduction (DRR) approach is advocated by the Hyogo Framework for Action (HFA, 2005), which gives emphasis on a proactive fire and other Disaster Risk Reduction (DRR) approach. This approach stresses on prevention, mitigation as well as recovery. Another approach is based on Disaster Risk Management. In this case, approaches to fire management are framed by the assessment of fire risk. This involves fire hazard risk assessment and planning (Lampin *et al.*, 2009) as well as a technique for susceptibility assessment and mapping (Galiana *et al.*, 2009). Ellis *et al.*, (2004) describe fire risk management approach as ‘a fire management strategy that broadly follows the 5Rs: Research information and analysis which include Risk modification; Readiness; Response; and Recovery.

From the foregoing, it is evident that serious attempts have been made in the past mostly in areas of registration, in trying to come up with various aspects of fire disaster management nationally and for the Nairobi City County. Nonetheless, as earlier indicated, fire disasters are still a common occurrence within the study area of the Nairobi City County. It is therefore evident that there is a gap that needs to be closed in terms of policy implementation or otherwise, which is what the study undertook to investigate.

2.6 Fire Disaster Management Entities Collaboration

A fire disaster management strategy should support and guide the development of an integrated fire management plan in a structured and collaborative manner (Tran & Carmel, 2002). It should also support that integration, consistency and coordination of the fire management planning of government, the fire management sector, and communities to achieve fire management (Brian, 2009). Fire disaster agencies must also work closely in collaboration with other disaster management agencies such as flood management department bearing in mind that one disaster can easily lead to another one if not well managed creating a catastrophic situation. According to Yodmani (2004) if key partners in fire disaster management were to build strong networks, this would go a long way in reducing disaster occurrences and provide safe living environments This study undertook to investigate whether the entities that deal with fire disaster management collaborate and if so, to what level and its effect on the subject under study.

2.7 Budget Allocations to Manage Fire Disasters

Most urban disasters almost always are accompanied by a fire which aggravates the costs involved due to economic resources and environmental losses. To ensure that the fire management budget does not keep on going up each year due to unnecessary losses occasioned by fire disasters, there is need to put in place measures that will ensure that fewer fire outbreaks occur each year in our urban areas. As indicated in the Draft National Policy for Disaster Management in Kenya (Government of Kenya (GOK) (2009), the Government intends to establish one national fund to cater for Management of National Disasters that would harmonize the various accounts created for all savings related to fire disaster related activities including the proposed government contribution of 2% of the annual budget. However, it is observed that this percentage is quite low considering that the funds should be distributed to all the 47 counties Nairobi being one of them. This study established that due to

the many aspects of disaster management, the Government must be ready to provide enough resources to deal with it if success to be achieved. In fire disaster management for example, success can only be achieved when recovery of the victims and reconstruction /rehabilitation of affected properties as well as the environment has been done. Depending on the extent of the fire disaster effects this support period can take quite long. The researcher further established that while some gains have been made in this area, the Nairobi City County Government still has a lot to do in order to overcome the challenges experienced in the course of fire disaster management as indicated in the conclusions of the study and therefore requires to either generate its own funds or receive a higher allocation from the national Government.

2.8 Theoretical Framework

Based on the reviewed literature, it is clear that Fire disasters especially in urban areas are a major concern both globally, within the African continent and indeed in Kenya. Within the Nairobi City County, several fire disasters have been experienced leading to injury and death and damage to property as well as causing devastating effects to the environment. Management of these fire disasters therefore becomes a subject of major interest. According to The National Policy for Disaster Management in Kenya (GOK 2009), Disaster Management involves the use of available information and skills within the government, other organizations and agencies to mitigate occurrence of disaster and to create capacities of coping with it if/when it occurs to reduce its impact on humans and the environment.

The United Nations International Strategy for Disaster Reduction (UNISDR) (United Nations & World Meteorological Organization, 2002) refers to Disaster risk management as the avoidance or reduction through preparedness, of hostile effects of risks through mitigation and awareness. To manage these fire disasters, it is important to establish a framework through which to operate in. Swanson, Richard A. (2013) states that the theoretical framework is the structure that can embrace or support a theory of investigation. Furthermore, Cooper *et al.*, (2014) describes theory as a set of systematically interrelated concepts, propositions and definitions that are advanced to explain and predict phenomena (facts). According to HeylmAra (2013) the function of a theory is to spot the starting point of the crisis and create the vision to which the problem is directed.

John M. Cobin (2013) refers to the theory of regulation, public choice theories of organization and perverse incentives, and the “knowledge problem” theory, as factors that influence and affect why building fires might continue to occur and also increase. He continues to observe that planning theory is central in fire disaster management and should be used by the administration and indeed all fire management agencies in their decision making. He further observes that in dealing with fire disaster management, these theories at times provide quite descriptive and foretelling power. The Bayesian decision theory that defines which choices would be most valuable in the presence of uncertain conditions and provides models that predict experiential behavior, further supports this idea.

This study is premised on the proposition that policy frameworks, stakeholder’s relationship, technological capacity and level of awareness of stakeholders, together or singularly affect the way fire disasters are managed within the Nairobi City County. The study was geared towards establishing the relationship if any, between the aforementioned variables and fire disaster management, the extent of these relationships and their effects on the onset of a fire disaster. This was done in reference the aspects of fire disaster which includes avoidance, alleviation, awareness, response and recuperation all that form the backbone of fire disaster management.

2.9 Conceptual Framework

This study adopted policy, and institutional frameworks (stakeholder’s relationship, stakeholder’s technological capacity and stakeholders’ awareness) on management of fire related disasters in Nairobi City County as its conceptual framework. It is clear that to achieve sustainable management systems for fire disasters, there is need to identify stakeholders, state the part they play in fire disaster management and provides a coordinating mechanism for these stakeholders through creation of communication structures. Systems should also be put in place to ensure that the public is trained on essential fire disaster management concepts as well as the agencies that can be contacted in the event of fire disaster. The role of an effective and comprehensive policy framework supported by an implementable institutional framework cannot be over emphasized. A policy that brings all stakeholders on board and facilitates the implementation of their mandate is critical in fire disaster management. There is also need to periodically organize multi-stakeholder conferences involving policy and decision makers in national and regional agencies, donors,

bilateral and multilateral institutions, the NGOs and private sector organizations involved in fire disaster management to review and evaluate the state of fire disaster management. This forms part of the recommendation of this study. From the reviewed literature the independent variables are found to influence the dependent variable as indicated in Figure 2.1 which shows the Conceptual Framework.

The arrow in the figure indicate individual relationship of the independent variables, Policy Framework, Stakeholders' relationship, Stakeholders' awareness, Stakeholder technological capacity with the dependent variable, Fire disaster Management. However, all the independent variables have collective relationship with the independent variable. The study was carried out to establish whether any of the independent variables either independently or jointly had an influence on the independent variable, whether it was positive or negative influence and the extent of the influence.

CONCEPTUAL FRAMEWORK

Independent Variables

Policy Framework

- Existence of policy
- Number of policies
- Effectiveness of policy framework

Stakeholders' relationship

- Presence of stakeholder engagement
- Aspects of stakeholder engagement
- Level of stakeholder relationship

Stakeholders' awareness

- Central institutional awareness framework
- Extent of awareness among stakeholders

Stakeholder technological capacity

- Presence of Technological capacity building
- Effectiveness of combined institutional capacity

Dependent Variable

Fire disaster management in urban areas

- Adequacy of trained personnel
- Adequacy of resources
- Rescue of lives and properties

Influence

Fig 2.1
Source: The researcher felt to

ork
of the study

Some aspects of fire disaster management that the researcher literature reviewed. Internationally, there have been attempts management of fire disasters. In Kenya, a number of policies and legislation frameworks on fire disaster management among other disasters have been put in place. However, there has been no attempt to evaluate the effectiveness of such policies in global arena and Kenya in particular. According to the Integrated Fire Management Expert Group (IFMEG), fire disaster management requires an Integrated Fire Management (IFM)

that involves the facilitation of multi-stakeholder and the community's discussion processes to develop a common appreciation about individual fire issues. There is however no evidence of that integration when it comes to the agencies involved in fire disaster management in the Nairobi City County. Unfortunately, there has been no serious attention among researchers on the emphasis towards the need to have an effective integration of stakeholders involved in fire disaster management in both developed and developing countries. Integration is a very vital aspect of fire management because it creates a smooth flow of events and removes duplication and confusion that is usually experienced in these disaster sites. The researcher therefore focused the investigation on the issues of collaboration of the fire disaster management entities with special attention to, policy framework, stakeholder's relationship, institutional capacity, technological capacity, institutional strengths and opportunities and stakeholder awareness on fire disaster management in Nairobi City County as well as other stakeholders involved in the same. The intention was to establish the gap that exists in these areas.

CHAPTER THREE: METHODOLOGY

3.0. Introduction

This chapter identifies the research design and methodology employed in collection of data for the study. This research applied a Purposive research strategy, where Nairobi City County was selected not only because it is the largest urban complex in the country with very high incidences of fire, but also since it presents all the urbanization processes fit for the study. A report by *Kenya open Data initiative* indicates that Nairobi County is 100% urban.

3.1. Location of the Area of Study



Figure 3.1: Location of Nairobi City County in Kenya

Source: <https://www.tuko.co.ke/261967-nairobi-sub-counties-explained.html#261967>

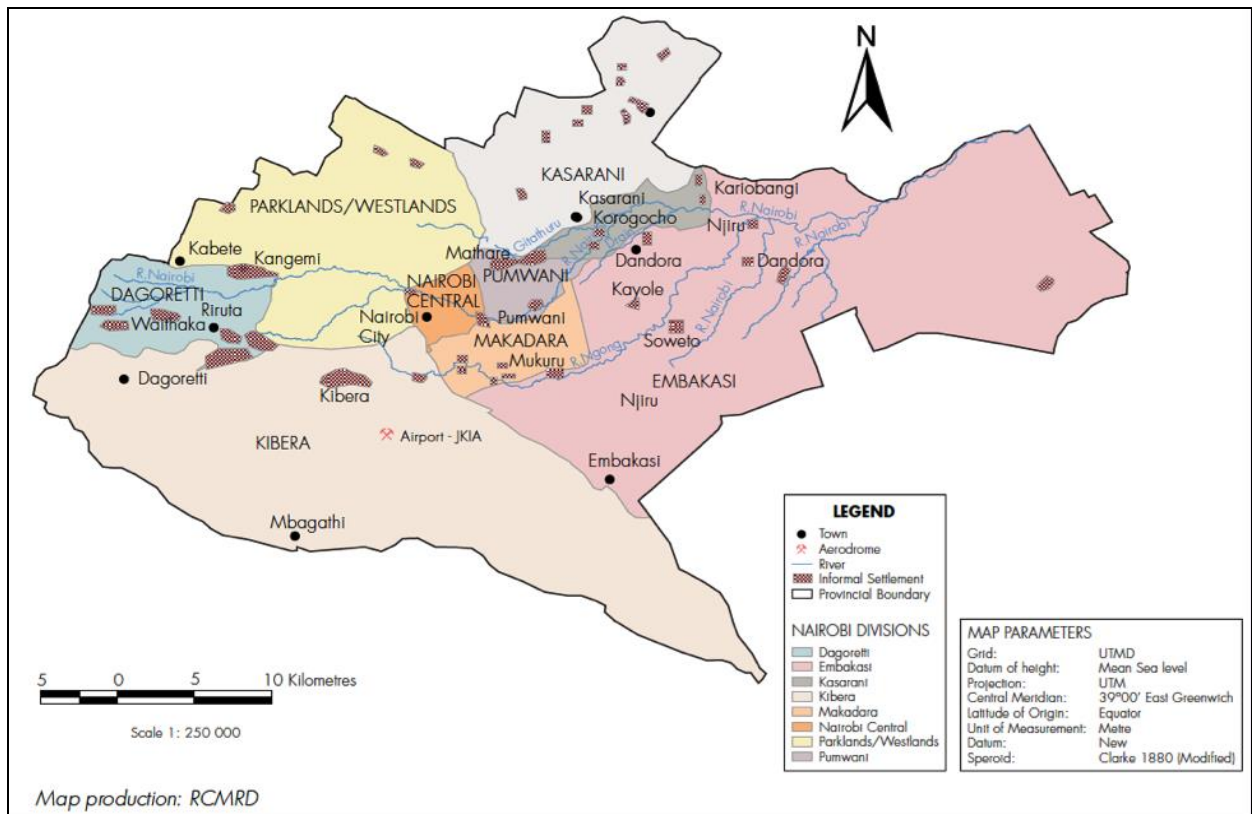


Figure 3.2: Nairobi City County

Source: <http://hungrycities.net/city/nairobi-kenya> (10th September 2017)

Nairobi city is Kenya’s capital and also the largest city in the country. In 1899 Nairobi was as a stopover during the construction of the Mombasa Uganda rail line and has since grown to become the main city in East Africa in spite of it being the newest city in the region (Cities of the world 2007). In terms of population size and infrastructure Nairobi currently ranked 13th largest city in Africa (Kenya Laborum 2018). Based on the 1999 census, 2,143,254 people were living within Nairobi. As per the 2009 Census nevertheless, in the administrative area of Nairobi, 3,138,369 people lived within 696 km² presenting a density of 4,515 /km², making it the most populated city in East Africa. The study area is located in Nairobi City County, in this case, represented by the central business district (CBD) and its surrounding divisions namely Kibera, parklands/Westlands, Kasarani, Pumwani, Embakasi, Makandara and Dagoreti Nairobi’s population has been rapidly growing. With a inhabitants of 3.36 million in 2011, Nairobi is rated second based on population , within in the Africa great Lakes region after Dar es Salaam. As indicated by the Kenya National Bureau of Statistics (KNBS) Collins O, Opiyo (2009,) the development rate of Nairobi is presently 4.1% while it is predicted that

Nairobi's population will reach 5 million in 2025 (Softkenya.com.,2017). This has resulted to strained services ranging from housing to other physical infrastructure such as power, water, sewer as well as road network. Informal settlements have developed all over the areas surrounding the central business district without proper planning to cater for these services. This makes Nairobi City County a very venerable area for fire disasters yet the same situation creates serious challenges in the area of fire management.

3.2 Research Design

The intention of this research was to critically assess the state of fire disaster management in urban areas with special reference to Nairobi City County by examining how policy framework, stakeholder relationship, technological capacity and the level of stakeholders' awareness singly and jointly influence Fire Disaster Management in Nairobi City County. To achieve this, the researcher used the correlation research design. Correlation research Design is the measure of two factors to determine or estimate the extent to which the value of the two factors are related or change. Correlation establishes the extent to which the change in value of one factor may predict the change in the value of the other. (Gregory J. Privitera 2016).

3.3 Sampling procedure

The study adopted Purposeful sampling procedure. This sampling procedure was especially important given that the numbers of institutions within Nairobi that are engaged in fire disaster management are not very many and can therefore all be studied. Furthermore, these institutions have been dealing with fire disaster management for a long time and therefore have a wealth of experience in the subject under study. As indicated by Patton (2002), purposeful sampling is a method generally used in qualitative research for the proof of identity and selection of cases rich in the relevant information for the most current use of limited resources. Cresswell & Plano Clark (2011) further observes that this procedure involves categorizing and selecting persons or groups of persons that are particularly well-informed about or experienced with a phenomenon of interest. The main target respondents were managers and section heads in-charge of fire disaster management in private and public corporations within Nairobi city.

3.4 Sample Size

Due to the nature of this study, the researcher targeted stakeholders with practical experience with the problem under study (Kothari, 2004), comprising of companies involved in fire disaster management in Nairobi city. According to the Kenya National Disaster Response Plan, (GOK 2009), the 20 agencies listed in Table 3.1 are involved in fire disaster management in one way or the other within the Nairobi City County. The subject under investigation was mainly administrative and policy requiring the respondents to be drawn from the relatively senior level of employees in the agencies. The researcher therefore purposefully identified a manager heading the fire department and a head of the fire management section for interview in each agency, who formed the sampling list. The entire population comprising of all the managers and section heads in the Twenty (20) fire disaster management agencies therefore, formed the sample size totalling 40 respondents. The fire disaster management agencies are listed in table 3:1.

Table 3:1: List of Agencies involved in fire disaster management.

Item	Name of Institution	Managers	Head of sections
1	Society of Fire and Disaster Emergency Community Conflict Agency, (SOFADECCA)	1	1
2	Nairobi City County Fire Service	1	1
3	ICT Fire & Rescue Nairobi	1	1
4	G4S Fire Solutions,	1	1
5	KK securities	1	1
6	Kenya Armed Forces	1	1
7	Office Of President (National Disaster Operation Centre)	1	1
8	Kenya National Fire brigade association (KNFBA).	1	1
9	Kenya Red Cross Society	1	1
10	Kenya Wild Life Service	1	1
11	National Youth Service	1	1
12	St John Ambulance,	1	1
13	Kenya Police service	1	1
14	Ministry of Environment, Water and Natural recourses.	1	1
15	Ambulance Service Kenya Ambulance Services.	1	1
16	National Platform for Disaster Risk Reduction	1	1
17	Kenya Airports Authority	1	1
18	National Disaster Coordination Committee	1	1
19	AMREF	1	1
20	National Disaster Management Unit	1	1
	Total	20	20

Source: Kenya National Disaster Response Plan 2009

3.6 Data Collection Methods

Methods of data collection applied in this study included questionnaires and interviews where the same questionnaire was used as the interview guide. A questionnaire and an unstructured comprehensive interviews schedule were carried out and recorded for purposes of transcription and scrutiny. The unstructured Interview schedules guided by questioners provided an appropriate way of achieving reasonable level of inquiry on the subject of fire

disaster management. This allowed for free interaction with the respondents who were at liberty to respond to any probing without having to be restricted by the structured questions, effectively providing deeper understanding on the subject under study. This further allowed for the specifics, assistance or interrogation of thoughts since data was composed from individuals who have varied views leading to richness as data were collected. However, the disadvantages in this mode of data collection are that the researcher ended up with a lot of notes and recordings which took long to analyse.

3.7 Data collection

Primary data collected included details such as who constitutes the decision-making organ of the fire management agency, nature and how the information on disasters was communicated, what equipment was at the disposal of these agencies for fire disaster management and who is involved in the disaster management and at what level. The rest of the data included issues related to the collaborating agencies if any, how the collaboration is coordinated, who funds the fire management activities, and how training for both staff and the communities is conducted. Data was also collected on the challenges experienced by these agencies in the course of fire management and specific roles of identified stakeholders, policies that guide their operations and their recommendations regarding sustainable fire disaster management. The data collection instrument used was questionnaire with both open ended and closed ended questions. The questionnaire was managed by way of the dropping and latter picking them while in some cases the research assistants guided the respondents through the questionnaire.

3.8 Validity

Weirsmas (1980), states that validity is the degree to which the tool measures what it was intended to measure. While it is appreciated that there are many forms of validity in a research, in the case of this study only content validity was crucial. The researcher intended to check out the level to which the substance of the instruments used in parameters such as accounts, cross-examinations or pointers signified the item being measured. The purpose was to ensure internal validity was achieved since the research outcome was dependent upon the actual variables under investigation.

To guarantee superiority and correctness of data collected the researcher used several quality control measures. First, two research assistants who aided in data collection were trained on how to use interviewer-administered questionnaires. The research assistants were introduced to essential concepts such as basic interviewing practices, gaining cooperation, and preserving respondent privacy. Another control measure used in the current study was through monitoring interviews. Monitoring served the objective of obtaining information about the interview process and preventing data falsification. Finally, where possible, telephone verification was used to connect with the selected respondents to confirm the direct interview was properly accomplished and with the right sample members.

3.9 Reliability

Once the questionnaire was developed, reliability was addressed by conducting a pilot study with two managers and two heads of sections. Reliability refers to consistency of measurement or the degree of similarity of the results based on dissimilar structures of the same tool or locations of data collection as well as the level to which measures are free from errors (McMillan & Schumacher, 2001).

Once the responses were collected, Chronbach’s coefficient was computed using SPSS version 21 and was used as measure of scale reliability of the instrument (Sekaran, 2001). This is a reliability coefficient that indicates how well the items in the data collection instrument are positively correlated to one another (Hatcher, 1994). The study had a 0.873 Cronbach value which was considered reasonably high on a scale of 0.00-1.00 as it tends to 1.00 on attitudinal measurement scales and above the 60 percent cut off value for being suitable (Sekaran, 2001).

A summary of the output results is shown in Table 3.2.

Table 3.2: Reliability Coefficient Results

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.873	0.899	40

Source: Field Data (2017)

3.10 Study Variables

The dependent variable for this study was fire disaster management in urban areas. The independent variables were policy framework, stakeholder involvement, stakeholder awareness and technological capacity.

3.11 Data Analysis Methods

The steps used in data analysis for this study is discussed in this section. After collection of the questionnaires, it was necessary to count them to confirm their numbers. The next step was to peruse through them to check if the respondents dealt with all sections in the questionnaires. After that the data were then subjected to descriptive statistics such as frequency distribution tables and percentages. The fourth step involved testing the hypotheses formulated in the study. In addition, multiple linear regression analysis was applied to test whether the independent variables influenced the dependent variable. Information from qualitative data was subjected to thematic analyses which rely heavily on narratives to supplement information from the questionnaires.

3.11.1 Descriptive Statistics

The study used statistics such as percentage and frequency distributions in the data analysis. Descriptive statistics contain distinct arithmetical data (Mugenda and Mugenda, 1999). The summary of findings was based on these analyzed data. Both text and tables were used to present results from descriptive analysis while in some cases, pie charts and bar graphs were used to present results drawn from tables.

3.11.2 Qualitative Data Analysis

Qualitative analysis encompasses getting comprehensive information about phenomenon being studied and creating patterns and trends from the information collected (Nachmias 2006). Open-ended questions in the questionnaire guided the collection of Qualitative data. The rejoinders were systematized in according to the phrases or research objectives. The researcher then used this information to write the narratives and interpretive reports for the purposes of explaining and reflecting the situations as they were occurring in the selected sample.

3.11.3 Hypotheses Testing

Inferential statistics were analyzed using correlation coefficients to establish association among study variables. The main question in hypothesis testing is: whether to reject the null hypothesis or fail to reject the null hypothesis (Kothari, 2003). The significance value (p or sig.) that represent the percentage or the probability that the results are due to chance was used as overall parameter in the hypothesis testing. In order to claim the association to be truly significant, the significance value (p or sig.) must be smaller or equal to 0.05 (Kothari, 2003). Bivariate correlation analysis was used to determine the degree of affiliation between variables using Pearson's correlation. This measure was signified by letter **r** which varies from -1 to 1 with 0 suggesting no linear relationship.

3.12 Multiple Regression

Multiple regression attempts to establish whether a set of variables jointly predict a given dependent variable. According to Kothari, (2004) multiple regressions includes more than one independent variable, to explain variations of the dependent variables. In this study, the multiple regression models presumed the form shown in equation 1:

$$Y=B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4+E \dots\dots\dots \text{(Equation 1)}$$

Y= Fire Disaster Management, X₁= Policy Framework,

X₂= Stakeholder Involvement, X₃= Stakeholder Awareness,

X₄= technological capacity, B₀= The Intercept

B₁, B₂, B₃ and B₄ = regression coefficients (shows the change in the expected value of Y for a unit change in X), E= random Error

For every value of β (slope), significance level was determined. The overall fit of multiple regressions was based on the F-test. The study's main test of importance was to determine whether the dependent variable (response) is determined by any group of independent variables (predictors) or not.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

Under this chapter an analysis of the data collected from organizations dealing with fire disaster management in Nairobi City County is presented. The data was collected using structured questionnaires which were administered to the respondents. The SPSS software was used to analyse data from the duly filled questionnaires using both descriptive and inferential statistics, the results of which were presented in tables, graphs and charts. Qualitative data was analysed through content analysis. The following subsections provide details of the findings of this research.

4.1 Response rate

Due to the small size of the population, the researcher opted to use the census approach. Out of the 40 respondents targeted, the researcher received feedback from 31 respondents. This amounts to a response rate of 77%. According to Mugenda & Mugenda (2003), a response rate of 50% is suitable for analysis, therefore the response rate obtained in this study was deemed adequate.

4.2 Demographic data of the respondents

The subjects of this study included managers and heads of sections dealing with fire disaster management in their respective organizations. Several items such as gender, education level, designation, years of service in the respective designation, number of staff working under the respondent and the number of institutions that the respondent's organizations directly corroborates with on fire management were used to provide further information on the subject's background.

4.2.1 Gender Distribution

Out of the 31 respondents, 24 of them (77%) were men while 7 were women (23%) indicating that the fire disaster management sector is majorly composed of men as presented in figure 4.1.

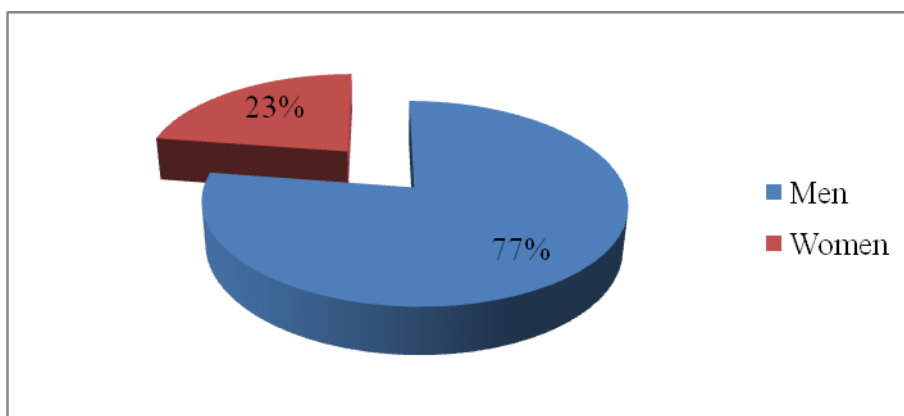


Figure 4.1 Respondent's gender distribution

Source: Field Data (2017)

This indicates that female participation in agencies involved in fire management is lower despite the affirmative action by the government for equal opportunity in employment. This is however expected considering that the bigger part of fire disaster management is mainly technical, masculine and also risky in nature thus discouraging many women from participating in this occupation.

4.2.2 Education Level

Table 4.1 shows the respondents' level of education. All the respondents indicated that they had achieved relatively high level of education with 24 (77%) indicating that they had attained university education while 7 (23%) indicated that they had college level education. This implies that most of the heads of sections and managers engaged by the agencies involved in fire disaster management within Nairobi City County have educational capacity with which to discharge their duties. This is quite impressive considering that these are the people charged with the decision making on matters of fire disaster management.

Table 4.1: Education Level of respondents

Level of Education	Responses	
	Frequency	Percent (%)
College	7	23%
University	24	77%
Total	31	100%

Source: Field Data (2017)

4.2.3 Designation of Respondents

The data collection instrument was intended for the manager and head of section in the organizations under study. Of the 31 respondents; 15 were managers, 15 were heads of section while 1 was a senior supervisor standing in for the section head. Fire disaster management is a highly technical field which requires prompt and precise action in terms of readiness; response; and recovery. At these supervisory levels, the respondents were familiar with both the Nairobi City County and the respondent organization's fire disaster management policies. The researcher therefore identified this group of high-level managers as respondents since they are involved in the internal policy decisions of their institutions and were in a position to adequately respond to the administered questionnaire. This was expected to enhance the quality of study. The designation distribution of the respondents is presented in figure 4.2.

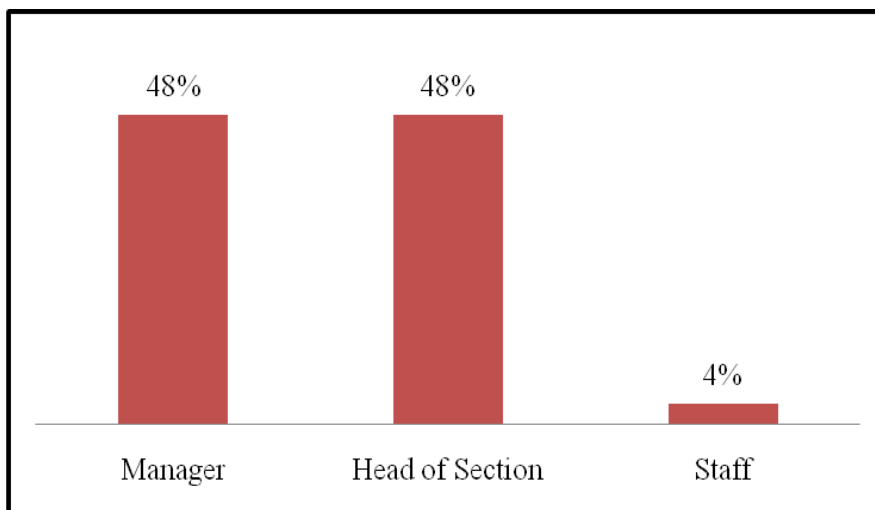


Figure 4.2: Designation of respondents

Source: Field data (2017)

From Figure 4.2 it can be observed that the Fire Disaster Management units were headed by either a section head or a manager who in turn made the required decisions in regard to responses to fire disaster prevention in the City County.

4.2.4 Years acted in the present designation

Like in every other field, experience in fire disaster management is important. Different fires disasters present different challenges depending on the circumstances under which they occur. Exposure on different fire occurrence and experience on how they were managed

translates to future performance of the employees dealing with this disaster. The researcher therefore felt that this was a worthwhile area of investigation under this study. Based on that, the researcher sought to establish the durations/time the respondents had served in their respective designations. From the findings, 16% had served for less than two years, 29% had served between 3-5 years, 26% had served between 6-7 years and 13% had served between 8-10 years while 16% had served for over 10 years. Since, the majority had served in their organizations for over two years; the respondents must have been conversant with the subject matter of this research and hence would give credible feedback. The results are summarized in figure 4.3.

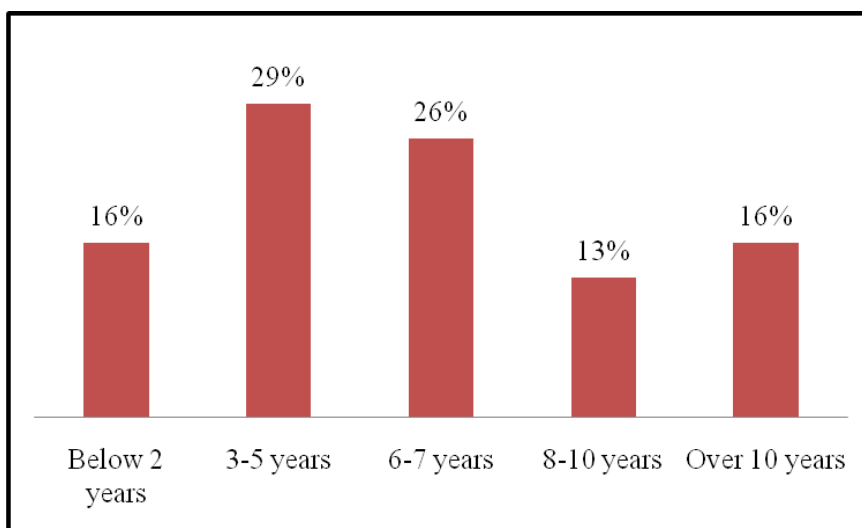


Figure 4.3: Years acted in present designation

Source: Field Data (2017)

4.2.5 Number of staffs under respondent's supervision

The researcher needed to ascertain the number of staffs under the respondent's control. Majority of the respondents indicated that they had less than 20 members of staff under their supervision. This is not unexpected considering that for most of these agencies; fire disaster management is not the core business. In most cases, it is a small department within the organization. The indication therefore is that majority of the firefighting agencies are understaffed in as far as fire disaster management is concerned leading to a serious challenge when it comes to effective management of fire disasters. This is of major concern considering the high frequency of fire occurrences within the Nairobi City County. These agencies therefore need to recruit more staff to enhance their capacity in managing fire disasters. Table 4.2 provides a representation of the analysis.

Table 4.2: Number of staffs under respondent’s supervision

Number of Staff	Responses	
	Frequency	Percent (%)
Below 20	13	42%
Between 21-40	6	19%
Between 41-60	6	19%
Between 61-80	4	13%
Over 80	2	7%
Total	31	100%

Source: Field data (2017)

4.2.6 Number of institutions your organization directly collaborates with

Collaboration refers to a situation where persons or organizations work together to accomplish or attain a goal or project successfully and it comprises close teamwork, clear common goals, and an organized system of discussion and action to accomplish them. The researcher recognized this as an important aspect of fire disaster management since close collaboration would be expected to bring in the synergy required in this very delicate service to the residents of the Nairobi City County. The findings were that 3% of the respondents collaborates with less than 2 institutions, 32% collaborates with between 3-5 institutions, another 19% collaborates with between 6-7 institutions, 13% work with between 8-10 organizations while another 32% works with more than 10 organizations as shown in Table 4.3. This shows that stakeholders in the fire disaster management space work collaboratively to serve the needs of the County but more collaborations would be necessary to effectively mitigate fire disasters in the City County.

Table 4.3: Number of institution respondent’s organization collaborates with.

Number of Institutions	Responses	
	Frequency	Percent
Less than 2	1	3%
Between 3-5	10	32%
Between 6-7	6	19%
Between 8-10	4	13%
Over 10	10	32%
Total	31	100%

Source: Field Data (2017)

4.3 Policy Framework on Fire Disaster Management in Nairobi City County

Policy framework was recognized as one of the areas of study in regard to its weight on fire disaster management within the Nairobi City County. This study required that the respondents discuss availability or otherwise existence of a policy framework in their institution, number of policies guiding their organizations fire disaster management, aspects of fire disaster management covered by the internal organization policies and the effectiveness of Nairobi County Government fire disaster management policy framework.

4.3.1 Availability of a fire policy framework

Policy sets down the framework by which all members and general community of an institution are expected to undertake their relevant duties. A Fire Safety Policy is very important in an institution since it provides the guidelines on how to respond in the event of a fire outbreak within the institution premises or communication on a fire disaster in regard to the subject of this study. It brings out the main responsibility for statutory compliance with the relevant fire Acts, employee's responsibility, communication, procedures to be followed in the event of a fire disaster as well as the emergency evacuation plan. It directs on fire safety management details that guide the managerial delivery process to ensure all fire safety provisions are maintained.

Based on the foregoing, the researcher sought to establish whether the respective organizations in this sector have developed their own fire policy framework suited to their respective operations, besides the County policies on fire disaster management covered under the Nairobi City County Disaster and Emergency Management Act 2015. 90% of the respondents affirmed that they have an internal policy framework while 10% mentioned that they did not have one, as presented in Figure 4.4. This implies that many of the organizations/institutions dealing with fire disaster management in the city are well organized with well laid done policies and strategies dealing with the fire disaster as it occurs. The only problem may be on the co-ordination process which requires a central command point since most of the organizations operate independently.

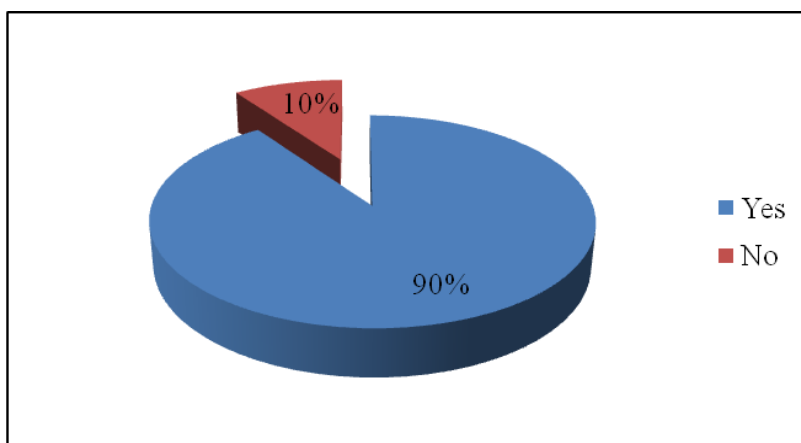


Figure 4.4: Availability of policy framework

Source: Field Data (2017)

4.3.2 Number of policies guiding respondent's organization fire disaster management

For the organizations that already have an internal fire disaster management policy, the researcher sought to find out how many policies guide the fire disaster management strategies. Most of the respondents, 42% confirmed having between 3-5 policies, 19% have between 8-10 policies, 16% have less than 2 policies, 10% have between 6-7 policies while 3% have over 10 policies. This shows that majority of the organizations have developed internal policies to form the basis of their operations. This is good because it reduces the reaction time taken by the respective institutions in the event of a fire break out.

The information is presented in table 4.4.

Table 4.4: Number of policies guiding fire disaster management

Number of Policies	Responses	
	Frequency	Percent
Not applicable	3	10%
Less than 2	5	16%
Between 3-5	13	42%
Between 6-7	3	10%
Between 8-10	6	19%
Over 10	1	3%
Total	31	100%

Source: Field Data (2017)

The established policies guided the operations of the various institutions on firefighting strategies and created a better working environment for the workers to operate and effectively

deliver their mandate of protecting both people’s property and humans against fire disasters in the city in more organized manner as discussed in section 4.3.3.

4.3.3 Aspects of fire disaster management covered by the internal organization policies

The respondents further provided information concerning the aspects of fire disaster management that their organizational strategies cover. The responses were varied but majorly comprised the following: mitigation, preparedness, response, recovery, rescue, communication flow and logistics.

4.3.4 Effectiveness of Nairobi County Government fire disaster management policy framework

Regarding the policies, the researcher queried the respondents on whether they thought that the County government fire disaster policy framework is effective. As presented in figure 4.5, 61% of the respondents felt that the policy framework was ineffective while 39% felt that the policy framework is effective. The information is presented in table 4.5.

This implies that various policy areas need to be improved to bolster the effectiveness of the County Government policy framework among which may include: decentralization of fire services, Training of CBOs, change in response strategies, traffic control in case of a disaster, provision of adequate resources and better integration with other responding agencies such as the police and the military.

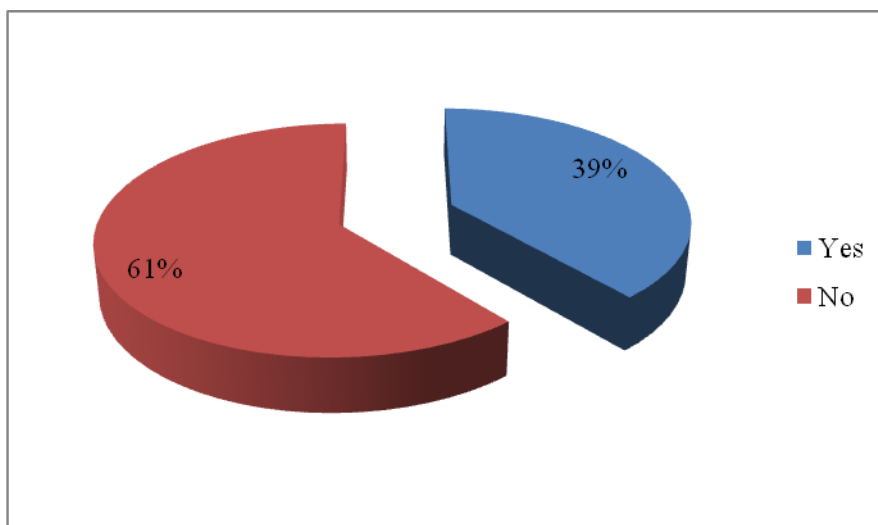


Figure 4.5: Effectiveness of Nairobi City County fire disaster management policy

Source: Field Data (2017)

4.4 Stakeholders relationship in fire management in Nairobi City County

In regard to the issue of stakeholder relationship, this study required the respondents to discuss their direct relationship with other stakeholders, adequacy of infrastructure set up for fire disaster management and effectiveness of combined institutional capacity in improving disaster management in the Nairobi City County.

4.4.1. Direct relationship with stakeholders dealing with fire disaster management in the County.

The respondents needed to give their opinion on whether their respective organizations had a direct relationship with stakeholders dealing with fire disaster management in the County or not. All the respondents, 100%, responded in the affirmative. This further supports the findings in section 4.3.6 where the respondents were indicating the number of organizations they directly corroborate with. The stakeholder relationship involves such aspects as information sharing/exchange, logistics and joint training sessions. This was found to be quite useful in mitigating fire disasters in future in the County.

4.4.2 Adequacy of Infrastructure set up as it affects the relationship between the fire disaster stakeholders involved in management of fire disasters in Nairobi City County.

The respondents' opinion was sought with regard to the adequacy of the infrastructure set up for fire disaster management in Nairobi City County. On this issue, 19% of the respondents agreed that the current infrastructure set up is adequate while 81% did not as presented in figure 4.6. Those not in agreement suggested various improvements that the fire disaster management stakeholders, spearheaded by the County fire disaster management should consider, namely: decentralization of fire services, acquisition of more fire-related equipment, improvement of road network within the county by creating easy access especially in the informal settlements, traffic control in case of disasters by fire disaster traffic control marshals, decongestion of the Central Business District, training of staff on new technologies and ways of combating disasters and improvement of communication systems and sensitization of general members of the public on how to behave in the event of fire outbreaks both on disaster site and on the roads. This in overall means that these are the various challenges facing the disaster management which needs to be addressed in order to effectively deal with various disasters as they occur in the City County.

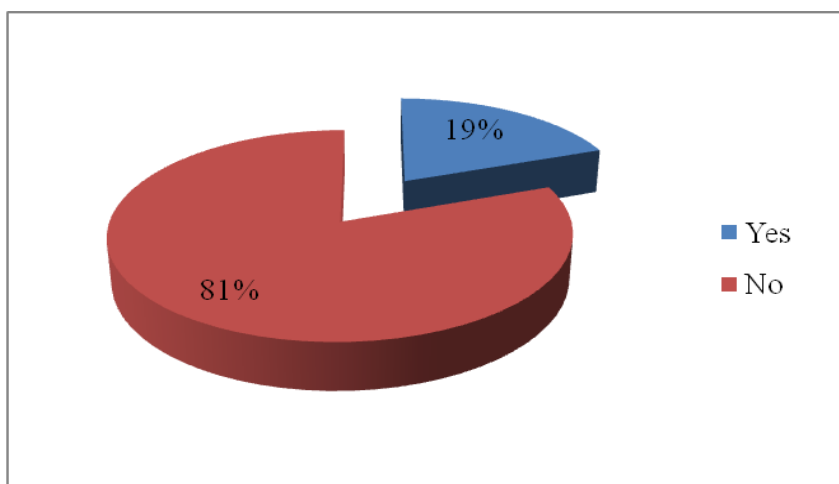


Figure 4.6: Adequacy of Nairobi County’s infrastructure set up

Source: Field Data (2017)

4.4.3 Effectiveness of combined institutional capacity in improving management of fire disasters within the Nairobi City County

The study went ahead to establish the degree of effectiveness of the respondents’ combined institutional capacity in improving fire disaster management in the County. The respondents were required to rate their responses on a 4-point scale with: 1=Very effective; 2= Effective; 3= Not sure; 4= Not effective. 3% of the respondents indicated that the combined institutional capacity was very effective, 39% felt it was effective, 29% were not sure, while another 29% felt that it was not effective. The results are presented in Table 4.5

Table 4.5: Effectiveness of combined institutional capacity in improving fire disaster management

Institutional capacity effectiveness	Responses	
	Frequency	Percent
Very Effective	1	3%
Effective	12	39%
Not sure	9	29%
Not effective	9	29%
Total	31	100%

Source: Field Data (2017)

It is observed that only 13% of the respondent felt that the combined institutional capacity in improving fire disaster management is either very effective or effective. This is a very alarming concern considering that the success of fire disaster management relies heavily on

combined efforts of the stakeholders in the industry. It brings the urgent need to equip all the institutions to create human, financial, and technological capacity to manage fire disasters while at the same calling for close collaboration among all the stakeholders.

4.5 Stakeholder technological capacity in fire disaster management in Nairobi County

Regarding the issue of technological capacity, this researcher sought to investigate whether the respondents were aware of any central institution that deals with technological issues on fire disaster management. The respondents were required to enumerate some of the technological capacity, social, economic, physical and institutional challenges. Further, the respondents were further requested to list the Institutional Strengths and Opportunities as a result of technological capacities of the various institutions.

4.5.1 Technological capacity building for all stakeholders engaged in fire disaster management in Nairobi City County

The study queried the respondents on whether they were aware of any institution that offers technological capacity building for all stakeholders engaged in fire disaster management in City County of Nairobi. 71% of the respondents indicated that they were aware while 29% of the respondents indicated they were not aware of such an institution as shown in figure 4.7.

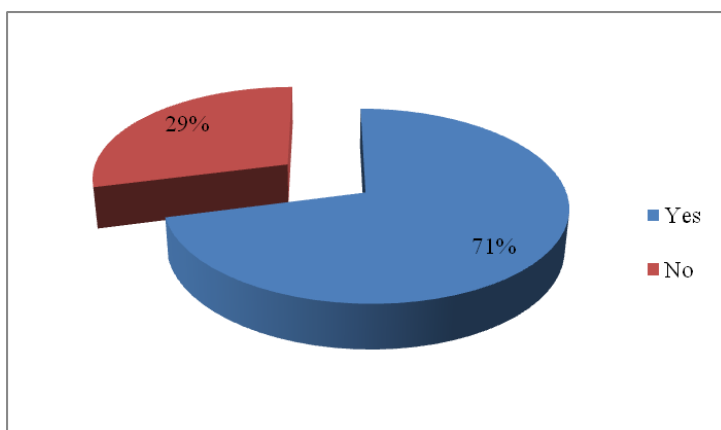


Figure 4.7: Respondents’ awareness of an institution offering technological capacity building to all stakeholders in fire disaster management

Source: Field Data (2017)

The implication of this is that ineffective manner in dealing with disasters in the City cannot be attributed to poor/lack of man power capacity.

4.5.2 Technological capacity challenges faced by fire disaster management stakeholders

This study requested the respondents to give their opinion on the technological capacity challenges they encountered in the course of their duty in dealing with fire disasters which are as tabulated in table 4.6.

Table 4.6: Capacity challenges faced by stakeholders in fire disaster management

<ul style="list-style-type: none"> • Social Challenges <ul style="list-style-type: none"> ○ High level of ignorance among residents on fire disaster management issues. ○ The public are yet to understand/appreciate the role of fire disaster managers ○ Poor communication amongst stakeholders in the field of fire disaster management. ○ Some Instructions on fire management equipment used in homes and offices are written in foreign languages thus users are unable to effectively use them in the event of fire. ○ Sprouting of informal settlements where illegal electrical connections are rampant increasing fire disaster risk though the residents have low capacity to combat fire in such environments
<ul style="list-style-type: none"> • Economic Challenges <ul style="list-style-type: none"> ○ Inadequate funds available for purchasing fire disaster management equipment which is expensive and also for recruiting and training additional staff
<ul style="list-style-type: none"> • Physical challenges <ul style="list-style-type: none"> ○ Poor and congested road network in the County ○ Rise of slums and population/overcrowding in some parts of the County which impedes access and rescue operations ○ Lack of modern communication systems ○ Theft/vandalism of fire management equipment
<ul style="list-style-type: none"> • Institutional Challenges <ul style="list-style-type: none"> ○ Lack of experts in specialized areas of fire disaster management ○ Keeping up with new technology (training) ○ Poor response coordination among stakeholders/response teams

Source: Field Data (2017)

4.5.3 Institutional Strengths and Opportunities with regard to respondents' organization technological capacity in fire disaster management

In light of the challenges noted, the study established some of the institutional strengths and opportunities drawn from the respondent organization's technological capacity that assist in fire disaster management. The responses are summarized in table 4.7.

Table 4.7: Institutional Strengths and Opportunities with regard to respondent organization technological capacity

<ul style="list-style-type: none"> • Institutional Strengths
<ul style="list-style-type: none"> ○ Some logistical support from the government for some organizations ○ Training on information communication systems pertaining to fire disaster management ○ Conducting fire-drills within the organizations to enhance the staff members on aspects of fire disaster management ○ Exchange programs with the organizations based in the developed world to create capacity building and exposure to international fire disaster management practices. ○ Use of modern technology such as internet, goggle maps and GPS location tools. ○ Organizing local training events in fire disaster management in collaboration with other stakeholders
<ul style="list-style-type: none"> • Institutional Opportunities
<ul style="list-style-type: none"> ○ Availability of disaster guide by the County Government through the Nairobi City County Disaster and Emergency Management Act 2015 ○ Networking with other organizations ○ Collaboration with other government departments ○ Availability of training opportunities in fire disaster preparedness and prevention ○ Technical cooperation with international bodies ○ Government to government training programs

Source: Field Data (2017)

4.6. Stakeholder awareness on fire disaster management in Nairobi City County

On issues of stakeholders’ awareness on matters of fire disaster management, the study requested the respondents to respond to several issues. These included their Knowledge or otherwise of any central institutional framework for awareness creation, Economic challenges encountered in awareness rising, institutional Challenges encountered in attempts to raise the level of stakeholders’ awareness on fire disaster management and on whether in their opinion, these attempts have been Effective in raising the level of the stakeholders’ awareness and if so, by what extent.

4.6.1 Knowledge of a central institutional framework for awareness creation on fire disaster management.

The pertinent issue in awareness creation is whether the respondents were aware of a central institutional framework on awareness creation among stakeholders in fire disaster management. 81% of the respondents mentioned that they were aware of such a framework while 19% indicated that they were not aware as presented in figure 4.6.

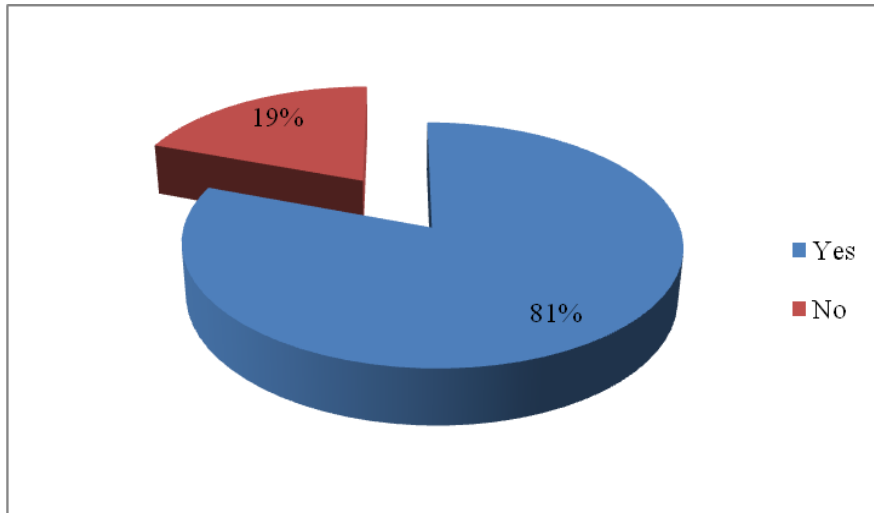


Figure 4.8: Knowledge of central institutional framework for awareness creation

Source: Field data (2017)

The result shows that most of the respondents are aware of this awareness framework. This is good because it means that activation of this framework would go a long way in creating awareness to all the stakeholders in the industry effectively improving on fire disaster management.

4.6.2 Major Economic Challenges encountered in awareness rising on fire disaster management

Several challenges were cited by respondents regarding the issue of awareness-raising among stakeholders on fire disaster management issues. Economic challenges still include lack of adequate financing to cater for awareness raising activities such as those mentioned in section 4.5.

4.6.3 Major institutional Challenges encountered in raising the level of stakeholder's awareness on fire disaster management

According to the respondents interviewed, the institutional challenges encompass the following: reluctance among members of the public to associate with some fire disaster management organizations such as the police, some stakeholders fail to turn up for fire drills, meetings and seminars, rapid expansion of the city and increase in informal settlements. Competition among stakeholders was also cited. This in general affects negatively the service delivery in disaster management in the city and hence making the city more prone to disasters as witnessed in the recent times.

4.6.4 Effectiveness in raising the level of the stakeholders' awareness on fire disaster management.

Pertaining to the level of awareness on fire disaster management among Nairobi city County residents, the respondents were asked to gauge their responses on a 5-point scale: 1=Very high level, 2=High level, 3=Not sure; 4=Low level, 5=Very low level. None of the respondents was of the opinion that there is a 'very high level' of awareness, 3% of the respondents indicated that there is a high level of awareness among County residents and another 3% indicated that were not sure. In addition, 81% of the respondents felt that there is a low level of awareness while 13% indicated that there was very low level of awareness among residents. The mean was 4.03 indicating that majority of the respondents felt there was a low level of awareness with a standard deviation of 0.547. This is concerning considering that the level of effective stakeholders' participation in the event of a fire disaster has a direct bearing on the level of awareness of basic rules of fire disaster management. It is these basic rules that guide on the 5Rs of fire disaster namely: Review and Analysis, Risk Reduction, Readiness, Response to fires and Recovery. That the respondents were willing to bring out this concern is a good stride for this study since it created a basis for recommendation to create this awareness among the Nairobi City County residents. The outcomes of the responses are indicated in Table 4.8.

Table 4.8: Level of Nairobi City County residents' awareness on fire disaster management

Level of residents' awareness	Responses		Mean	Std. Deviation
	Frequency	Percent		
Very high level	0	0%	4.03	0.547
High level	1	3%		
Not sure	1	3%		
Low level	25	81%		
Very low level	4	13%		
Total	31	100%		

Source: Field Data (2017)

Some recommendations made by the respondents on what needs to be done to improve the level of awareness among residents included: conducting sensitization activities among residents, training of Community Based Organizations staff members, conducting fire drills regularly (in residential areas and work places), introducing disaster training in learning institutions, workplace training and awareness programs on fire disaster management. Some respondents proposed that the Nairobi City County administration should spearhead the awareness raising programs such as, and not limited to: airing advertisements on the various media platforms, distributions of free copies of the County Disaster Management Act 2015 with special emphasis to fire disasters and organizing a County fire safety week where residents can be guided on fire disaster management issues.

4.6.5: Recommendation on future fire disaster management for the Nairobi City County

The respondents were asked to make recommendations concerning future fire disaster management in Nairobi County. The suggestions made include:

- Engage more in mitigation/preparedness
- Decentralize services to the sub-counties
- Have a strong disaster management team
- Conduct joint trainings among the different stakeholders
- Conduct regular fire drills in residential areas, work places and other institutions
- Training residents on how to prevent fire disasters
- Investment in new technology for fire disaster management

- Increased budgetary allocations to meet the requirements for effective fire disaster management
- Enhance welfare of officers in fire disaster management
- Training and capacity building of officers
- Hire more and skilled officers
- Ensuring that safety guidelines are implemented in all buildings
- Establishment of a central fire coordination response centre
- Increased awareness efforts on fire disaster management
- Monitoring and evaluation of policies and activities in fire disaster management.

4.7 Fire disaster management in Nairobi City County

The researcher then decided to seek for generally guided responses on issues identified through the literature review as those that mainly affect fire disaster management. The respondents were then given a number of statements about which they were to specify their level of concurrence. These were rated on a 5-point scale: 1=strongly agree, 2=agree, 3=neutral, 4=disagree and 5=strongly disagree. The responses are summarized in table 4.9.

Table 4.9: Fire disaster management in Nairobi City County

	1	2	3	4	5	Mean	Standard Deviation
There is adequate number of trained personnel ready to deal with fire disaster management in Nairobi County	0%	3%	7%	29%	61%	4.48	0.769
The Nairobi City County government has enacted effective laws to guide fire disaster management	0%	13%	32%	52%	3%	3.45	0.768
Fire disaster management agencies within Nairobi have adequate resources for fire disaster management	0%	7%	16%	42%	35%	4.06	0.892
The agencies tasked with fire disaster management within Nairobi City County have managed to save a lot of properties in the past	10%	84%	3%	3%	0%	2.00	0.516
Proper spatial planning has improved fire disaster management within the Nairobi City County	0%	13%	36%	36%	16%	3.55	0.925
There is enough sensitization of stakeholders on issues related to fire disaster management within Nairobi City County	3%	7%	23%	48%	19%	3.74	0.965

Source: Field Data (2017)

The results of table 4.9 indicate that none (0%) of the respondents strongly felt that there is adequate number of trained personnel ready to deal with fire disaster management in Nairobi City County, only 3% were in agreement, 7% were neutral, 29% disagreed while 61% strongly disagreed. The study shows that quite a high number of the respondent (90%) either disagree or strongly disagree with the assertion that there is adequate number of trained personnel ready to deal with fire disaster management in Nairobi County.

Presented with a statement suggesting that the Nairobi City County government has enacted effective laws to guide fire disaster management, none of the respondents strongly agreed presenting a 0% output. 13% agreed, 32% were neutral, 52% disagreed with the statement while 3% strongly disagreed. It is observed that a relatively low percentage of residents think that effective laws to guide fire disaster management have not been enacted with more than half or the respondents feeling that the enacted laws are not effective.

The respondents were then requested to react to the statement indicating that Fire disaster management agencies within Nairobi have adequate resources for fire disaster management. Again, 0% agreed with this statement, 7% agreed, 16% were neutral, 42% disagreed with the statement while 35% strongly disagreed. Cumulatively, 77% of the respondents either disagreed or strongly disagreed with the statement.

Further observations from the table indicate that 10% of the respondents agreed that the agencies tasked with fire disaster management within Nairobi City County have managed to save a lot of properties in the past. A very high percent (84%) agreed, 3% were neutral, 3% disagreed with the statement while none (0%) strongly disagreed.

The researcher also presented a submission to the effect that proper spatial planning has improved fire disaster management within the Nairobi City County. The reaction to this was that none (0%) of the respondents strongly agreed to this submission. It is further observed that 13% agreed with the statement, 36% were neutral; a further 36% disagreed with the statement while (16%) strongly disagreed.

As to the issues of stakeholders, the researcher proposed that there is enough sensitization of stakeholders on issues related to fire disaster management within Nairobi City County which the respondents were requested to react to. To this, 3% strongly agreed with this statement. 7% agreed 23% were neutral; a further 48% disagreed with the statement while 19% strongly disagreed. From the foregoing, it is clear that the institutions dealing with fire disaster management Nairobi City County should collaborate in improving all spheres of fire management.

4.8 Inferential statistics

The inferential statistics used for testing of the formulated null hypothesis were the correlation and regression. These are discussed in the following sub-sections; 4.8.1 and 4.8.2.

4.8.1 Regression analysis Coefficients

The coefficients obtained after regression analysis are presented in Table 4.10.

Table 4.10: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	.887	.691		1.284	.211	-.533	2.307
Policy Framework.	.086	.166	.081	.521	.607	-.255	.428
Stakeholder Involvement.	.549	.146	.581	3.757	.001	.248	.849
Stakeholder Technological Capacity.	.261	.150	.286	1.745	.093	-.046	.569
Stakeholder Awareness.	.203	.121	.268	1.684	.104	-.045	.452

Source: Field Data (2017)

Dependent Variable: Fire Disaster Management

Recalling, the model employed in this study,

$$Y=B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4+E..... \text{ (Equation 2)}$$

Where:

Y= Fire Disaster Management

X₁= Policy Framework

X₂= Stakeholder involvement

X₃= Stakeholder Awareness

X_4 = Stakeholder Technological Capacity,

B_0 = The Intercept/ Constant

B_1, B_2, B_3 and B_4 = partial regression coefficients (shows the change in the expected value of Y for a unit change in X)

E= random Error

The coefficients obtained are as follows: The constant, $B_0 = 0.887$ ($p= 0.211$); $B_1= 0.081$ ($p= 0.607$); $B_2= 0.581$ ($p= 0.001$); $B_3= 0.286$ ($p=0.093$) and $B_4= 0.268$ ($p= 0.104$). Of all the variables studied in this model, stakeholder involvement is the most statistically significant with $p=0.001<0.05$. The other factors were not statistically significant despite the fact that they influence fire disaster management.

The linear regression equation is therefore summarized as follows:

$$Y = 0.081X_1 + 0.581X_2 + 0.286X_3 + 0.268X_4 + E \dots \dots \dots \text{(Equation 3)}$$

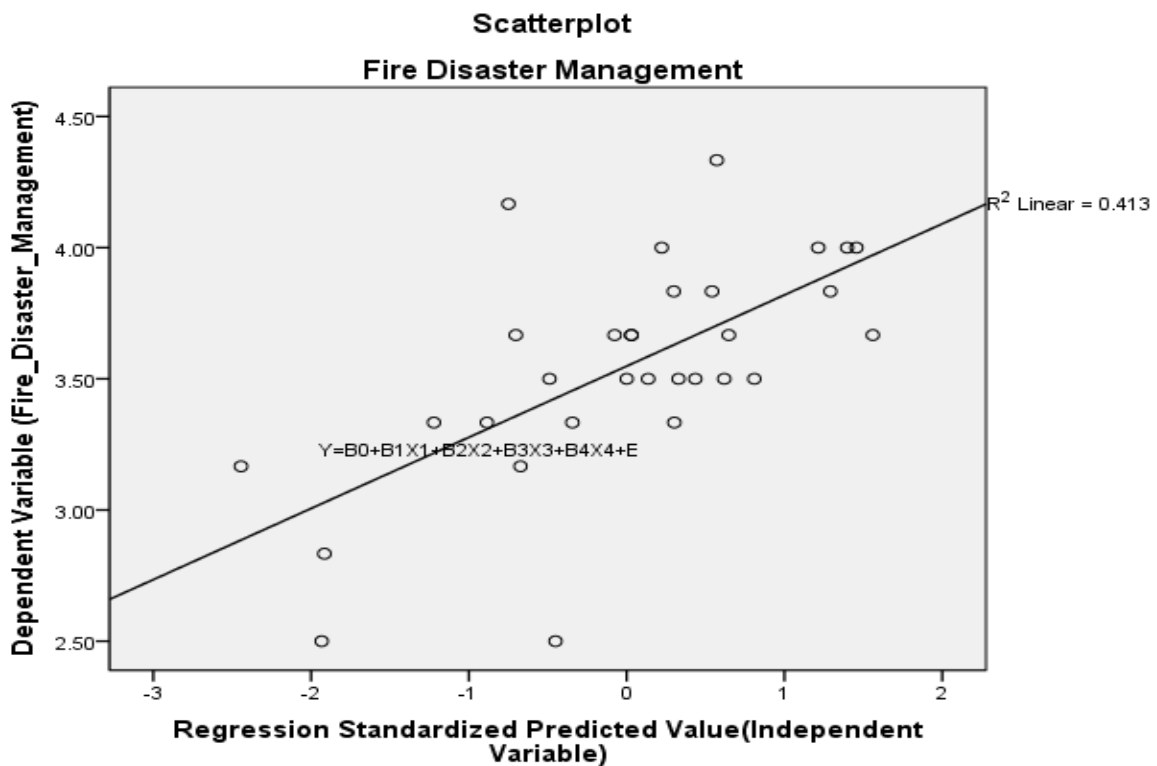


Figure 4.9: Regression Line Scatter Plot

Source: Field Data (2017)

From the figure 4.9 shows a weak but positive correlation between the dependent and the predictor variables. This generally low degree of correlation presents a line of best fit

($Y=B_0+B_1X_1+B_2X_2+B_3X_3+B_4X_4+E$) which shows that $r^2 = 0.413$ indicating that only 41.3% of the changes in fire disaster management are accounted for by the predictors (stakeholder awareness, stakeholder involvement, policy framework and stakeholder technological capacity) in this study. Factor variable are not in line with the line of best fit.

4.8.2 Model Summary

From the model summary presented below, it is shown that 41.3% of the changes in fire disaster management are accounted for by the factors presented in this study i.e. policy framework, stakeholder involvement, stakeholder awareness and stakeholder technological capacity. The other 58.8% is accounted for by factors beyond the scope of this study. This can be explained by the fact that while the study only covered the agencies that are involved in fire disaster management; the researcher is alive to the fact that there are other very major players/ factors that contribute to fire disaster management within the Nairobi City County. These include the residents in homes, work places or even arsonists who were not investigated in this study. Other environmental factors such as hazardous dumping, and general accidents, just to mention a few were also not investigated. All these factors could have affected the outcome of this study. Consequently, researcher therefore recommends that further study be carried out in these areas to achieve a wider coverage of the subject under investigation.

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.643 ^a	0.413	0.323	0.34733

a. Predictors: (Constant), stakeholder awareness, stakeholder involvement, policy framework and stakeholder technological capacity

Source: Field Data (2017)

4.8.3. Correlation Analysis

The first section of inferential statistics presents the correlation analysis of the variables in the study. The independent variables are: effectiveness of policy, effectiveness of stakeholder involvement, effectiveness of stakeholder awareness and stakeholder technological capacity. The dependent variable is fire disaster management. The researcher first computed composite

indices of each of the variables by consolidating the individual items/questions in the questionnaire. The values obtained in the composite indices for each of the variables were correlated as indicated in table 4.12.

Table 4.12: Correlation Analysis

		Policy Framework	Stakeholder Involvement	Stakeholder Awareness	Stakeholder Technological Capacity	Fire Disaster Management
Policy Framework	Pearson Correlation	1	-.049	.134	-.209	.029
	Sig. (2-tailed)		.796	.472	.259	.878
	N	31	31	31	31	31
Stakeholder Involvement	Pearson Correlation	-.049	1	.126	-.201	.553**
	Sig. (2-tailed)	.796		.499	.277	.001
	N	31	31	31	31	31
Stakeholder Awareness	Pearson Correlation	.134	.126	1	-.312	.263
	Sig. (2-tailed)	.472	.499		.087	.153
	N	31	31	31	31	31
Stakeholder Technological Capacity	Pearson Correlation	-.209	-.201	-.312	1	.068
	Sig. (2-tailed)	.259	.277	.087		.716
	N	31	31	31	31	31
Fire Disaster Management	Pearson Correlation	.029	.553**	.263	.068	1
	Sig. (2-tailed)	.878	.001	.153	.716	
	N	31	31	31	31	31

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data (2017)

According to Field (2013) while using the Pearson's correlation coefficient, the strength of the relationship is ranked as follows: $\pm 0.01-0.299$ was a weak relationship, $\pm 0.3-0.499$ was a moderate relationship and ± 0.5 and above represents a strong relationship. The correlation analysis revealed that policy framework has a weak positive correlation with fire disaster management ($r=0.029$). Stakeholder involvement ($r=0.553$) showed a strong positive correlation with fire disaster management. Stakeholder awareness was shown to have a weak positive correlation to fire disaster management ($r= 0.263$). Lastly, stakeholder technological capacity ($r= 0.068$) also indicated a weak but positive relationship with fire disaster management. This means that policy framework, Stakeholder awareness and, stakeholder technological capacity all have a minimum but positive influence on the fire disaster management. It therefore implies that any change on the three parameters should have a minimum but positive change on the aspects of the fire disaster management in the Nairobi City County. However, Stakeholder involvement presented a relatively strong relationship with the fire management for the Nairobi city county. This is expected because the study showed that stakeholder's collaboration was very strong.

4.8.4 Correlation coefficients

R square or coefficient of determination is the percentage variation in y explained by all the x variables together (Gaurav Bansal 2011). The Pearson correlation coefficient "R" is 64.3% as presented in the model. This means that the relationship between the dependent variable (fire disaster management) and the independent variables (stakeholder awareness, stakeholder involvement, and policy framework and stakeholder technological capacity) is quite strong. This indicates that the entire four Hypotheses are rejected and the alternative hypotheses are accepted. These are that: there is a substantial association between policy frameworks and fire management in the study area; there is a significant connection between stakeholder's relationship and fire tragedy management in Nairobi County; there is a strong relationship between technological capacity and management of fire disaster in Nairobi City County and there is a significant relationship between level of awareness of stakeholders' and management of catastrophic fire occurrences in Nairobi City County.

4.8.5 Coefficients of determination

Coefficients of determination R-squared is a statistical measure of how near the statistics are to the fitted regression line (Agnes Ogee and Mark Ellis 2013). The model presents a

coefficient of determination “R²” of 41.3% variation in fire disaster management explained by all the dependent variables (stakeholder awareness, stakeholder involvement, and policy framework and stakeholder technological capacity) together. This coefficient of determination is rather low considering that the relationship presented by the correlation coefficient is reasonably high. However, Agnes Ogee (2013) observes that there are cases where it should not be a surprise if this is so especially in any case that tries to envisage human behavior where R-squared values can even be below 50%. This is due to the fact that people are more difficult to predict than, say, a mechanical or chemical process. This is further supported by Raghuveer (2015) who observes that R-squared does not confirm that the coefficient estimated figure and its estimates are prejudiced since it gives the proportion of explained disparity as if every independent variable in the model has an effect on the dependent variable. It is anticipated that in this study the respondents could have been subjective in their responses due to the sensitive nature of the subject under study thereby affecting the outcomes.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the study findings as well as the deductions of the study. It also covers recommendations of the research and suggestions for further study.

5.1 Summary of Major Findings

The study sought to assess the extent to which policy framework, stakeholders' relationship, level of stakeholder awareness and Stakeholders' Technological Capacity influences the way fire disasters are managed within the Nairobi City County. The objectives were to examine the effectiveness of policy framework, and the stakeholder's relationship affects the management of fire disasters in Nairobi City County. This study further intended to establish, the extent to which the level of stakeholder awareness and the efficiency of stakeholder technological capacity had a bearing towards disaster management in Nairobi City County with special reference to fire disasters. According to the study findings, all the institutions represented by the respondents collaborated with other institutions directly on matters of fire disaster management. As Regards to policy framework, the study established that most institutions had a fire policy framework mainly covering aspects of internal organization; mitigation, preparedness, response, recovery, rescue, communication flow and logistics as some of the policies used to guide fire disaster Management. Regarding the Stakeholders relationship, study established that the respondents were aware of the existence of a direct relationship between their organization and others involved in fire disaster management. However, the study indicated that infrastructure and stakeholder's coordination, are the weakest point of fire disaster management in Nairobi City County.

5.2 Conclusions

The correlation analysis revealed that policy framework, stakeholder awareness and stakeholder technological capacity all indicated weak positive correlation with fire disaster management, stakeholder relationship however showed a strong positive correlation with fire disaster management at 64.3%. According to the study only 41.3% of the changes in fire disaster management are accounted for by policy framework, stakeholder relationship, stakeholder awareness and stakeholder technological capacity. Of all the variables studied, stakeholder relationship is the most statistically significant to management of fire disasters in

Nairobi County. Other factors were not statistically significant despite the fact that they influence fire disaster management.

5.3 Recommendations to policy makers.

Based on the study, the researcher came up with various recommendations that could help improve on the fire disaster management within the study area. On policy framework the study recommends that the Nairobi City County Government appoints a taskforce as a matter of urgency which shall come up with a framework on fire management. This should be a comprehensive document combining all the Policy frameworks on fire management that exist in the country but nonetheless customized to serve the specific purpose of the County.

Reference should be made to the Factories and Other Places of Work Act (Cap. 514) (Fire Risk Reduction) Rules 2007, Occupational Safety and Health Act (OSHA) 2010, and The Kenya Fire Safety Manual 2009. Further reference should be made to all those policies that are in draft stage which includes the Draft Fire Policy 2009 and proposed National Policy for Disaster Management in Kenya 2010. This shall then be adopted by the County Assembly as the County policy framework for the Nairobi City County. It is also recommended that the Nairobi City County Fire and Rescue Services Bill, 2015 be enacted to law to guide fire disaster management. The bill is set to make provision of Fire and Rescue Services Authority (FRSA) whose main purposes shall include shall: advancement of all aspects of fire protection by adoption of a collaborative multidisciplinary and multi sectoral all approach. The authority shall also be expected to encourage community volunteer services and establish a fire disaster management arrangement with both institutional and legal frameworks within the Nairobi City County.

On stakeholder's relationship the study recommends that the Nairobi City County Government adopts an integrated approach to collaboration and coordination of all the Management of fire disasters by the stakeholders involved within the in the study area. All the government agencies and Ministries both at the County and National branches, private agencies, NGOs, and the general public should be involved in this process. Formation of a coordinating, well-funded agency shall ensure continued collaboration and continuous information flow to ensure swift action in the event of a fire disaster. The agency should be

mandated to disseminate information and offer training to private institutions as well as the public on fire disaster management. This shall create very strong structures of stakeholder's involvement.

As concerns stakeholder technological capacities, the study recommends that both the private and public institutions involved in fire disaster management adopt updated technology. While it is appreciated that most private institutions involved in this field within the county have high-tech firefighting equipment, the Nairobi City County Government need to enhance its fleet of firefighting machines and other equipment keeping in mind that it should be the leading agency in firefighting within the county. These should be accompanied by training of the members of staff that is expected to operate this equipment.

5.4 Suggestions for Further Study

The current study only covered Nairobi City County. The study thus suggests that more research be carried out to assess the aspects of fire disaster management in other counties. Further, the study confined itself to the Agencies involved in fire disaster management only, thus looking at the “bigger picture”. However, the researcher appreciates that the triggers of these disasters are in homes and work places. Arson is another factor that courses fire disasters. While the latter may be very difficult to deal with since it is deliberate and unpredictable, civic education on the residents in general and training of workers are areas that can be further explored. This should include advice on what firefighting equipment should be available for controlling fires and how to operate them. The study recommends that further study be done on how more awareness campaigns through public fire drills, billboards adverts, seminars and public ‘Barazas’ can be enhanced to bring all stakeholders at all levels to speed on the how to manage fire disasters in Nairobi and other urban set-ups. The researcher therefore suggests that further research on the area of fire disaster prevention be carried out since it can assist in stopping or reducing the effects of these disasters on the onset.

REFERENCES

- Arturson, G. (1987). *The tragedy of San Juanico--the most severe LPG disaster in history*. Uppsala; Published by Elsevier Ltd.
- Agnes Ogee and Mark Ellis (2013) *Regression Analysis: How Do I Interpret R-squared and Assess the Goodness-of-Fit?* Pennsylvania: Minitab Inc. State College of Pennsylvania
- Anna Tibaijuka (2007) “*Urbanization in low-income countries – some critical issues*”: The Norwegian University of Science and Technology Trondheim, Norway.
- Bull-Kamanga, L., Diagne, K., Lavell, A., Leon, E., Lerise, F., Macgregor, H., Behr, A.L (1983). *Empirical Research Methods for Human Sciences*. Durban:
- Butterworths.Brayley, Arthur Wellington (1889). *A complete History of the Boston Fire Department, Including the fire alarm service and the protective department, from 1630 to 1888, part 1*: Boston: John P. Dale & Co
- Bell, Walter G (1971). *The great Fire of London in 1666*: London: Westport, CT: Greenwood Publishing Group.
- C. Lampin-Maillet, M. Jappiot, M. Long, C. Bouillon, D. Morge, et al. (2009). *Mapping wildland-urban interfaces at large scales integrating housing density and vegetation aggregation for fire prevention in the South of France*: United Kingdom: Journal of Environmental Management, Elsevier, 91, p. 732 - p. 741.
- Cresswell JW, Plano Clark (2011). *Designing and conducting mixed method research*. 2nd Sage; Thousand Oaks, CA:
- Collins O. Opiyo (2009). *A Case of 2009 Kenya Population and Housing Census*: Nairobi: National Bureau of Statistics (KNBS).
- Dave Opiyo, Fred Mukinda and Zadock Angira (2013) *Fire destroys Jomo Kenyatta International Airport arrivals unit*.Nairobi: Dairy Nation .newsdesk@ke.nationmedia.com.
- Dynes, R. (1994). *Community Emergency Planning: False Assumptions and Inappropriate Analogies*. New York: International Journal of Mass Emergencies and Disasters.
- Ellis Peter Berresford (1986). *The Great Fire of London: An Illustrated Account*: London: New English Library.
- Ellis et al (2004). *Livelihoods and Rural Poverty Reduction in Kenya*: London: Development Policy Review. Overseas Development Institute (London, England), Wiley

- Field, A. (2013). *Discovering Statistics using SPSS*. London: Sage Publications Limited.
- EMA. (1998.) *Australian emergency management glossary. (Australian emergency manual)*. Canberra:Emergency Management Australia .
- Gunn S.W.A. (1992). *The scientific basis of disaster medicine: Definition, damage, assessment and relief operations. The Management of Mass Burn Casualties and Fire Disasters; Chapter 1*. Boston, Dordrecht, London: Kluwer Academic Publishers.;
- Gaurav Bansal (2011) *What does coefficient of determination explain? (in terms of variation)* Wisconsin: University of Wisconsin.
- Galiana-Martin, L., Herrero, G., Solana, J. (2009). *Modelling, Monitoring and Management of Forest Fires: WIT Transactions on Ecology and The Environment*. United Kingdom: WIT Press, Ashurst Lodge, Ashurst, Southampton SO40 7AA,
- Government of Kenya (GOK) (1965) *Sessional Paper No.10, African Socialism and Its Application to Planning in Kenya*: Nairobi: National government publication
- Government of Kenya (GOK) (2009). *National Policy for Disaster Management in Kenya Report*. Nairobi: Kenya Institute for Public Policy Research and Analysis.
- Government of Kenya (GOK) (2010). *Population and Housing Census*. Nairobi: Kenya National Bureau of Statistics.
- Government of Kenya (GOK) (2007). *Factories and Other Places of Work Act (Cap. 514) (Fire Risk Reduction) Rules*. Government Printer.
- Government of Kenya (GOK) -*Grass Fires Act Chapter 327 Revised Edition (2012). An Act of Parliament to provide for the control of grass fires*. Nairobi: National Council for Law Reporting.
- Government of Kenya (GOK) -*Occupational Safety and Health Act (OSHA), (2007). An Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces*. Nairobi: Government Printer.
- Government of Kenya (GOK) (1999). *Environmental Management and Coordination Act No.8. An Act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment.*: Nairobi: Government Printer.
- Government of Kenya (GOK) 2009). *The Kenya Fire Safety Manual*: Nairobi: Government Printer.
- Government of Kenya (GOK) -*Petroleum Act (Cap 116) (1948) (revised 1972)/Energy Act No. 12 (2006): An Act of Parliament to make provision for restricting and regulating*

- the importation, transport and storage of petroleum.* Nairobi: Nairobi: Government Printer.
- Government of Kenya (GOK) -*Water Act Chapter 372 Revised Edition 2012 [2002]. An Act of Parliament to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water.* Nairobi: National Council for Law Reporting.
- Government of Kenya (GOK) (2007): *Kenya National Vision 2030'* Nairobi: Government Printer. Government of Kenya (GOK) (2008); *National Urban development policy.* Nairobi: Government Printer.
- Gregory J. Privitera (2016) *Research Methods for the Behavioral Sciences, Second Edition:* chapter 8: Survey and correlation research Design.; SAGE Publications, Inc;
- Heri Gadani (2011). *Difference between Census and Sampling.* San Francisco: Scribd.
- Henk Staats, Paul Harland, Henk A.M. Wilke (2004). *Effecting Durable Change: A Team approach to Improve Environmental Behavior in the Household. Volume: 36 issue: 3, page(s): 341- 367.:* Netherlands: Department of Social and Organizational Psychology at Leiden University.
- Heri Gadani (2011). *Difference between Census and Sampling.* San Francisco:
- Holloway, D., Green, L. (2013). *Fire watch: Use of satellite imagery by remote communities in northern Australia for fire risk communications.* Denmark: Conference: The Eighth International Conference on Cultural Attitudes Towards Technology and Communication (CATAC), At Aarhus.
- Hyogo Framework for Action (2005). *Building the Resilience of Nations and Communities to Disasters:* United Nations Office for Disaster Risk Reduction.
- Hatcher, L. (1994). *A step-by-step approach to using the SAS(R) system for factor analysis and structural equation modeling.* Cary, NC: SAS Institute.
- Integrated Fire Management Expert Group (2007). *Forest fires; fire management.* Germany: Integrated Fire Management Expert Group.
- International Monetary Fund (2003). *Poverty Reduction Strategy Paper (PRSP):* Washington: International Monetary Fund • Publication Services 700 19th Street, N.W. • Washington, D.C. 20431.
- John M. Cobin (2013) *Theory review: Does fire safety regulation work? Lessons from Turin: Italy.* Research Article: Universidad Andrés Bello, Chile

- Isabela Wilfred Mtani and Mbuya (2018). *Urban fire risk control: House design, upgrading and replanning*. JAMBA: Journal of Disaster Risk Studies.
- Kabubi (2010). *Plugging the gaps in disaster preparedness*: Nairobi: Integrated Regional Information Networks (IRIN)
- Kaberia (2015). *Fire Damages Two Floors of Nairobi's Kimati House*: London: Global Networks for Disaster Reduction (GNDR)
- David Kwalima (2017). *The curious case of rampant fire in Gikomba Market*: Nairobi: Nairobi News.
- Kothari, C.R. (2003). *Research Methodology: Methods and Techniques*. New Delhi: Wishwa Prakash.
- Kothari, C.R. (2004) *Research Methodology: Methods and Techniques, 2nd Edition*: New Delhi: New Age International Publishers.
- Kartez, Jack D (1994) *Crisis Response Planning Towards a Contingent Analysis*: journal of the American Planning Association 50 (Winter):9-21 UK: Edward Elgar Publishing.
- Kenya Laborum (2018) *City Information.*: Nairobi - Kenya
- Kartez, J. (1984). *Research-based disaster planning: Conditions for implementation*. Durham: Duke University Press.
- Lampin, C., Jappiot, M., Long, M., Mansuy, N., Borgniet, L. (2010). *Interfaces characterizing and mapping for forest fire risk assessment*. Portugal: Figueira da Foz.
- William Wiersma (1980). *Research methods in education: An introduction by William Wiersma* F. E. Peacock (1850)
- Wanjohi Hellen Njoki (2010) *A Planning-Based Approach to Address Fire Disasters in Vietnam Village in Mukuru Kwa Njenga*: Nairobi: University of Nairobi Department of Urban and Regional Planning.
- Mcmillan, J. H. & Schumacher, S. (2001). *Research in Education*. London: Addison Wesley Longman.
- Mugenda and Mugenda, (1999). *Research Methods: Quantitative and Qualitative Approaches*: Nairobi: African Centre for Technology Studies (ACTS) Press.
- Mugenda, O. & Mugenda, A. (2003). *Research Methods – Quantitative and Qualitative Approaches*. Nairobi: African Centre for Technology Studies (ACTS) Press.
- Masellis M., Ferrara M.M., Gunn S.W.A. (1999). *Fire Disaster and Burn Disaster: Planning and Management*: Annals of Burns and Fire Disasters - vol. XII - n° 2 - June 1999

- Munasinghe M., (2014,) *The urban environmental degradation and vulnerability of disaster; World Conference on Natural Disaster Reduction*. Sendai Japan: Technical Committee Session C.
- Nairobi City County Government (2015). *Nairobi City County Disaster and Emergency Management Act 2015*. Nairobi: Government Printer.
- Nabutora (2004), *Affordable Housing in Kenya: A Case Study of Policy on Informal Settlements*: Jakarta:3rd FIG Regional Conference Jakarta, Indonesia.Nachmias, J. (2006). *The role of virtual standards in visual discrimination*. *Vision Research*, 46(15), 2456-2464
- Oladokun V.O and Emmanuel C.G. (2014) ‘Urban Market Fire Disasters Management in Nigeria: A Damage Minimization based Fuzzy Logic Model Approach’ *Int. J. of Computer Applications* Vol 106 No 17 pp 1-6.
- Patton MQ. (2002). *Qualitative research and evaluation methods*. 3rd Sage Publications; Thousand Oaks, CA.
- Patrick Mayoyo (2012). *Established Course of Sina Fire Tragedy*: Nairobi: nationmedia.com.
- Quarantelli, E.L. (2000). *Disaster Planning, Emergency Management and Civil Protection*. Delaware: Disaster Research Center.
- Quarantelli, E.L. (1992). *Patterns of sheltering and housing in US disasters*. Disaster Research Center, University of Delaware, Newark, Delaware, USA.; MCB UP Ltd
- Swanson, Richard A. *Theory Building in Applied Disciplines*. San Francisco, CA: Berrett-Koehler Publishers 2013
- Softkenya.com. (2017). *Population of Nairobi County*. Nairobi: Science journal publishers.
- Shannon (2013). *Emergency preparedness and disaster planning in Africa*: Nairobi.Polity.org.za.
- Sekaran, U. (2001). *Research Methods for Business: A Skills Building Approach*. 2nd Edition, John Wiley and Sons, Inc., New York.
- S. Ellis, P Kanowski,RJ Whelan (2004). *National Inquiry on Bushfire Mitigation and Management*. Australian: Council Governments.
- Scott Cooper, Kristie Klose, Shila W. Wisema (2010). *Effects of wildfire on stream communities in southern California*; press@researchgate.net
- Tran & Carmel (2002). *Developing a Fire Management Strategy for Local Government Lands*. Queensland: Natural Heritage Trust.

- United Nations Development Programme (2010). *Global Policy for Urban Development*; New York; United Nations Development Programme One United Nations Plaza, NY 10017 USA
- United Nations & World Meteorological Organization, (2002). *Disaster Reduction for Sustainable Mountain Development*: United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction.
- Van Ryneveld, P. (2010) *Assessment of Public Transport in SA Cities*, New York: Institute for Transportation and Development Policy.
- Walter J Fraser, (2003). *Savannah in the Old South*. University of Georgia Press,
- Weirsmas W. (1980). *Research Methods in Education: An Introduction (fifth edition)*. Itasca, Illinois: F. E. Peacock Publishers Inc.
- Yodmani, S. (2004). *Disaster Risk Management and Vulnerability Reduction: Protecting the Poor*. London: Earth scan.
- Yin, R.K. (1994). *Case Study Research Design and Methods*. London: Sage Publications.

**APPENDIX 1
INTERVIEW GUIDE/QUESTIONNAIRE**

Section A: Respondents Back Ground Information

Question	Personal Information (tick the box which relates to you)				
The Designation					
Gender (sex)	Male[]		Female[]		
Education Level	None []	Primary []	Secondary[]	College []	University []
Years acted in this designation	Under 2 yrs []	3-5 yrs []	6-7yrs []	8-10 []	Over 10 yrs
Number of staff under your control	Below 20[]	21-40[]	41-60[]	61-80[]	Over 81[]
Number of other institutions you directly corroborate with on fire disaster management in Nairobi City County	Less than 2 []	3-5 []	6-7[]	8-10 []	Over 10 []

Se

Yes [] No []

How many policies within the framework are you aware of that guide your fire disaster management strategies?

Less than 2 [] 3-5 [] 6-7[] 8-10 [] Over 10 []

What aspects of fire disaster management are covered by the internal fire policies of your organization?

- i.....
- ii.....
- iii.....
- iv.....
- v.....
- vi.....

How effective are the County fire management policies?

Very effective effective Not Sure Not Much Not At All

Section C: Stakeholders Relationship in Fire Disaster Management in Nairobi City County

Do you have direct relationship with other organisations in fire disaster management logistics and equipment sharing?

Yes No

What is the extent of your relationship with other institutions on fire disaster management?

Very Great Extent Great Extent Not Sure Not Much Not At All

How effective is your combined institutional capacity in managing fires disasters in Nairobi?

Very effective effective Not Sure Not Much Not At All

How adequate is the infrastructure setup in terms of its effect on affect the relationship between the stakeholders in management of fires disasters in Nairobi City County?

Very adequate adequate Not Sure Not Much Not At All

In your opinion what is the level of fire disaster management awareness levels among Nairobi City County residents?

Very high level high level Not Sure low level very Low level

To what extent would you say fire disaster management stakeholder's relationship is effective?

Very Great Extent Great Extent Not Sure Not Much Not At

All

Section D: Stakeholder Technological Capacity in Fire Disaster Management Nairobi City County.

Is there a central institutional Technological Capacity building for all institutions engaged fire disaster management?

Yes No

What are the major Social challenges that you face in Technological Capacity building the fire disaster management?

i.....

ii.....

What major economic challenges that you face in Technological Capacity building for the fire disaster management?

i.....

ii.

What major physical challenges that you face in Technological Capacity building in the fire disaster management?

i.....

ii.

What major institutional challenges that you face in Technological Capacity building in the fire disaster management?

i.....

ii.....

What are the major institutional strategic strengths that you use in Technological Capacity building in the fire disaster management?

i.....

ii.

What are the major institutional strategic opportunities that you exploit in Technological Capacity building in the fire disaster management?

i.....

ii.....

Section E: Level of Stakeholder Awareness on fire Disaster Management in Nairobi City County.

Is there a central institutional Awareness strategy for all institutions engaged fire disaster management?

Yes [] No []

What two (2) major economic challenges do you face in raising the Level of stakeholder awareness in fire disaster management?

i.....

ii.....

What two (2) major institutional challenges that you face in raising the Level of stakeholder Awareness the fire disaster management?

i.....

ii.

In your opinion how effective is raising the Level of stakeholder Awareness of fire disaster management?

Very effective [] effective [] Not Sure [] Not Much [] Not At All []

What are your five (5) recommendations on the future fire disaster management in?

i.

ii.

iii.

iv.

Section F: Fire Disaster Management Nairobi City County.

To what extent do you agree or disagree with the following statements concerning fire disaster management

Strongly agree=1, agree=2, neutral=3, disagree=4 and 5=strongly disagree.

Tick the relevant box.

Question	1	2	3	4	5
There is adequate number of trained personnel ready to fight fire					
The government have enacted enough laws to prevent fire					
Resources are adequate to fight fire					
A lot of properties and lives have been saved during fire breaks					
Proper spatial planning has improved firefighting process					
Other stakeholders (public) are made aware in fighting fire					

~END~