**INFLUENCE OF KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON FIRE DISASTER MITIGATION AND PREPAREDNESS IN INFORMAL SETTLEMENTS IN NYERI COUNTY, KENYA**

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**H60/CE/21046/2012**

**A RESEARCH PROPOSAL SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (COMMUNITY RESOURCE MANAGEMENT) IN THE SCHOOL OF BUSINESS, ECONOMICS AND TOURISM DEPARTMENT OF COMMUNITY RESOURCE MANAGEMENT OF KENYATTA UNIVERSITY.**

**DECEMBER, 2025**

# DECLARATION

This proposal is my original work and has not been presented for an award of a degree in any other university.

Signature ………………………………...  **Date**………. .………………….

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# ABREVIATIONS AND CRONYMS

**CBO** Community Based Organization

**DM**  Disaster Management

**ERC** Ethical Review Committee

**GOK** Government of Kenya

**KAP** Knowledge Attitudes and Practices

**KPLC** Kenya Power and Lighting Company

**KU** Kenyatta University

**NACOSTI** National Commission for Science Technology and Innovation

**NGO** Non-Governmental Organization

**SPSS** Statistical Package for Social Sciences

**UN** United Nations

**USA** United States of America

**WCDRR** World Conference on Disaster Risk Reduction

**WDR** World Disaster Report

**WHO** World Health Organization

**OPERATIONAL DEFINITIONS OF TERMS**

**Attitude**- This refers to the perception of the causes, effects and prevention that influence fire safety

**County governments-** The tier of governance in the devolved system of governance that is very close to informal settlements where policies can be formulated and implemented to prevent fire disasters

**Fire disaster**- Will refer to widespread fire destruction to property, lives, emotional health, displacement from social environment of people in the informal settlements

**Fire safety -** Refers to considerable protection from fire disasters in an informal settlement.

**Hazard-** Will refer to anything that triggers fire disasters, for example unattended open fires

**Household** – Refers to one shelter in an informal settlement

**Household head**- Will refer to a male or female person above the legitimate age of eighteen years and who oversees a household.

**Informal settlement –** This refers to an area inhabited by poor people, mostly characterized by poorly constructed combustible shelters, impassable narrow roads and highly risky fire disasters.

**Knowledge**- Refers to awareness on causes, effects and prevention of fire disasters.

**Livelihood**- Refers to shelters, tangible valuables, economic activities in an informal settlement

**Mitigation**- Refers to strategies taken in an informal settlement to reduce loss or damage from fire disasters

**Natural hazard** - Refers to a hazard that is not under any human influence. For example, earthquake

**Policy makers-** Refers to people entrusted to benefit from the findings of this study to implement the way forward

**Practices**- It refers to the actions, methods and tools used in fire disasters prevention

**Preparedness-** Will refer to the outcome of the influence of knowledge, attitude and practices geared towards reduction of fire disasters in an informal settlement

**Risk**- It refers to the likelihood of experiencing fire disasters due to, for example, congestion and inflammable housing materials in an informal settlement

**Technological hazards**- Refers to hazards that are influenced by humans. For example, open fires, illegal electricity connections.

**Urban-** Will refer to regions with many residents, closely staying to each other engaging in many types of businesses or economic activities where informal settlements are located.

**Informal settlers-** Residents living in informal settlements

**Vulnerability-** Refers to the likelihood of a disaster happening due to the presence of a mentioned trigger factor

# ABSTRACT

This study examines the knowledge, attitudes, and practices (KAP) of informal settlers in Nyeri County, Kenya, and their influence on fire disaster preparedness and mitigation. The objectives are to assess the level of fire risk awareness, explore perceptions towards preparedness, and evaluate safety practices among residents of Kiawara, Witemere, and Majengo informal settlements. The study further investigates how these KAP factors collectively influence fire disaster response and prevention efforts. A cross-sectional survey research design will be employed, integrating both qualitative and quantitative methods. Data will be gathered through questionnaires, interviews, focus group discussions, and direct observations. A Stratified Random Sampling approach will be used to select 130 household heads, while Purposive Sampling will be used to select 20 Key Informants (community leaders and local authorities), totaling 150 respondents. Descriptive statistics and Chi-square tests, along with regression analysis, will be applied to analyze the data and identify significant relationships between KAP variables and fire preparedness levels. Ethical approval will be obtained from the Kenyatta University (KU) Ethical Review Committee and a research permit from NACOSTI prior to data collection. The study aims to provide practical recommendations for improving fire disaster mitigation in informal settlements through enhanced community engagement and targeted policy intervention.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the study

Fire disasters pose a significant threat to life and property, particularly in informal settlements where poor living conditions, inadequate infrastructure, and limited access to essential services amplify the risk and impact. Moreover, the absence of effective preparedness and mitigation strategies often results in substantial losses, making this a critical area of study from a public health and human rights perspective (WHO, 2023).

Globally, fire disasters remain a major concern, with an estimated 180,000 people dying annually from burns, mostly in low- and middle-income countries (WHO, 2023). The vulnerability is heightened in settlements where 1.1 billion people live, facing overcrowding, unsafe electrical connections, and flammable housing materials (UN-Habitat, 2023). Regionally, in Sub-Saharan Africa, informal settlement fires are near-daily occurrences, leading to profound livelihood losses and human displacement, as evidenced by major incidents in Cape Town and the need for context-appropriate early warning systems (UNDRR, 2024).

Nationally, in Kenya, fires are recognized as priority hazards, prompting the National Disaster Risk Management (DRM) Policy (2017) to call for mainstreaming disaster risk management across county and national plans. Despite this, urban fires continue to cause severe losses. For example, a fire in Nairobi’s Gikomba Market in May 2021 destroyed numerous stalls and resulted in fatalities (Daily Nation, 2021). Furthermore, a significant fire in Mukuru Kwa Njenga in March 2022 displaced over 3,000 people, highlighting ongoing risks due to inadequate infrastructure and fire safety resources (Amnesty International, 2022).

Locally, in Nyeri County, recurrent fire disasters in both schools and informal settlements underscore the urgency of the problem. Research indicates persistent gaps in Knowledge, Attitudes, and Practices (KAP) among residents. A study by Wepukhulu and colleagues (2022) in Nyeri's informal settlements found that while 93% of respondents were aware of potential disasters like fires, only 51% were aware of specific fire safety measures, revealing a critical knowledge-practice gap. The same study revealed that attitudes are shaped by education and religious beliefs, showing significant associations between these factors and risk awareness. Furthermore, the implementation of safety practices remains limited due to challenges like inadequate infrastructure, the use of flammable building materials, and a lack of community-based disaster plans. Consequently, these findings emphasize the urgent need for improved disaster preparedness and tailored mitigation strategies based on local KAP. Addressing these issues requires a comprehensive approach that includes community education, infrastructure improvements, and the development of localized disaster response strategies to strengthen resilience in these settlements.

## 1.2 Problem statement and justification

Fire disasters represent a persistent and severe threat to human life and property, especially within informal settlements characterized by dense living conditions, inadequate housing materials, and limited access to essential services. Fire disasters pose significant threats to informal settlements in Nyeri County, Kenya, due to factors such as high population density, substandard housing materials, and limited access to emergency services. The knowledge, attitudes, and practices (KAP) of residents regarding fire safety are crucial in shaping their preparedness and mitigation strategies.

Ondieki, Matoke, and Mwenda (2021) highlight that awareness of fire safety measures is crucial for preventing and mitigating such disasters. Consequently, this study will investigate whether a significant portion of residents in Nyeri County are insufficiently informed about effective fire safety practices despite the frequent occurrence of fire incidents.

Complementary studies, such as those by Owusu and Asumadu-Sarkodie (2020), underscore the impact of residents' attitudes towards fire safety on their preparedness and mitigation efforts. Many individuals within informal settlements exhibit minimal engagement with proactive fire prevention strategies, thereby exacerbating the frequency of fire outbreaks. In addition, in Nyeri informal settlements, recurring fire incidents continue to cause significant loss of property, disruption of livelihoods, and threats to human safety. Despite the relevance of existing studies, there is limited research that specifically addresses the unique environmental conditions such as terrain of the land, availability of water, access roads and rain of Nyeri, including the knowledge, attitudes, and practices (KAP) of residents towards fire disaster preparedness. Consequently, this study aims to fill this gap by examining how these community-level factors influence the effectiveness of fire mitigation strategies in Nyeri informal settlements.

Furthermore, the existing literature, while informative, reveals specific gaps concerning Nyeri informal settlements, where annual fire outbreaks continue to occur. These gaps include inadequacies in disaster preparedness and mitigation strategies, as well as a lack of exploration into intervening variables that might affect the frequency and impact of fire disasters. Therefore, this study seeks to investigate additional factors influencing fire disaster preparedness and mitigation in Nyeri informal settlements to inform the development of more effective, context-specific strategies.

**Knowledge**: A study assessing disaster risk preparedness in Nyeri informal settlements found that 93% of respondents were aware of potential disasters, including fire, that could affect their communities. However, awareness of specific fire safety measures and disaster risk reduction policies was less prevalent, with only 51% acknowledging the existence of such policies.

**Attitude**: Residents' attitudes toward fire safety are influenced by their education levels and religious beliefs. The same study revealed significant associations between education and awareness of disaster risks, as well as between religious affiliations and awareness levels. This suggests that personal beliefs and educational backgrounds play a role in shaping attitudes toward fire safety.

**Practice**: Despite a general awareness of fire risks, the implementation of fire safety practices remains limited. Challenges include inadequate infrastructure, such as narrow pathways that hinder emergency response, and the use of highly flammable building materials. Additionally, the lack of community-based disaster preparedness plans and limited access to firefighting equipment further exacerbates vulnerabilities.

**Influence on Preparedness and Mitigation**: The gaps in knowledge, attitudes, and practices directly impact the community's ability to prepare for and mitigate fire disasters. Limited awareness and proactive measures contribute to higher susceptibility to fire incidents. Enhancing fire safety education, fostering positive attitudes toward risk reduction, and promoting practical safety measures are essential steps toward improving disaster preparedness and mitigation in these settlements.

Addressing these issues requires a comprehensive approach that includes community education programs, infrastructure improvements, and the development of localized disaster response strategies. By strengthening the KAP related to fire safety, Nyeri County's informal settlements can become more resilient to fire disasters.

## 1.3 Purpose of the Study

## This study aims to assess the knowledge, attitudes, and practices (KAP) related to fire safety among residents of informal settlements in Nyeri County, Kenya. Specifically, it seeks to evaluate residents’ knowledge of fire safety and awareness of disaster risks. The study will support the development of targeted and context-specific fire safety interventions aimed at improving disaster resilience in Nyeri’s informal settlements.

The purpose of this study is to assess how residents' knowledge, attitudes, and practices (KAP) regarding fire safety influence fire disaster preparedness and mitigation efforts in Nyeri’s informal settlements.

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## 1.4 Objectives of the study

1. To examine the level of knowledge of informal settlers in Nyeri County on fire risks and safety measures, and how this influences their preparedness and mitigation of fire disasters.
2. To examine attitudes of informal settlers’ in Nyeri County towards fire safety and their influence on fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya. To examine the attitudes of informal settlers in Nyeri County towards fire safety, and how these attitudes influence their preparedness and mitigation of fire disasters.
3. To examine fire safety practices adopted by informal settlers’ in Nyeri County and their influence on disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya.
4. To establish the relationship the combined influence of knowledge, attitudes, and practices on levels of fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya. To establish the relationship between the combined influence of knowledge, attitudes, and practices on levels of fire disaster preparedness and mitigation in informal settlements in Nyeri County.
5. To propose actionable strategies for improving fire disaster preparedness and mitigation in Nyeri County's informal settlements.

## 1.5 Hypotheses

**H01**: There is no significant influence of residents’ knowledge of fire risks and safety measures on the level of fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya.

**H02**: There is no significant influence of residents’ attitudes towards fire safety on the level of fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya.

**H03**: There is no significant influence of residents’ fire safety practices on the level of fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya.

**H04**: Knowledge, attitudes, and practices related to fire safety do not have a significant combined influence on the level of fire disaster preparedness and mitigation in informal settlements in Nyeri County, Kenya.

## 1.6 Significance of the Research

The Research aims to provide crucial insights into the knowledge, attitudes, and practices of residents regarding fire risks and mitigation in Nyeri County's informal settlements. The findings are expected to significantly impact several key areas. First, it will inform policymakers in developing and refining disaster management policies specifically tailored to the unique needs of informal settlements. Second, it will guide resource allocation decisions, ensuring that funding and infrastructure improvements prioritize fire safety in vulnerable areas. Third, the study will enhance the preparedness strategies of emergency services, such as fire brigades, to ensure sustainable mitigation of fire disasters. Additionally, the study will aid NGOs in designing and implementing targeted educational programs and awareness campaigns aimed at promoting fire safety in informal communities. Furthermore, the research will provide a foundation for future studies on fire disaster management and preparedness, advancing the field of disaster risk reduction. In addition, the study will offer practical recommendations on the knowledge, attitude and practices of residents in informal settlements to undertake effective fire safety disaster preparedness and mitigation measures.

## 1.7 Delimitations of the study

The study is specifically focused on the Mitigation and preparedness phases of the fire disaster cycle in urban informal settlements within Nyeri Municipality. These phases are essential for reducing the impact of fire disasters and are thus the primary focus of this research, though they are treated as the scope of inquiry rather than variables to be measured. In addition, the research is limited to this geographic area, characterized by high fire vulnerability, dense population, and significant poverty, which presents a specific context for the study. The characteristics of this location define the study's context but are not the primary variables measured for variation. In addition, findings from this study may not be universally applicable to informal settlements in other regions due to variations in intervening variables such as education level, demographic factors like population distributions, income generation activities, infrastructure, and local practices. Consequently, caution is advised when generalizing the results to different contexts.

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## 1.8 Limitations of the study

The study recognizes potential limitations that may influence data reliability and interpretation. Methodological and contextual challenges, such as security risks, difficult terrain, and restricted access within informal settlements, may also limit data collection, but collaboration with local leaders will be used to mitigate these barriers. Variability in respondents’ knowledge of fire risks and safety measures could affect the accuracy of self-reported information; to address this, only residents with at least one year of settlement experience will be included. In addition, resource constraints related to time, funding, and personnel may restrict the breadth of data collected, yet the use of representative sampling and standardized research tools will help maintain the validity and credibility of findings. Finally, the possibility of social desirability bias poses a risk to validity, which will be minimized through anonymous surveys and triangulation with focus group discussions.

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## 1.9 Assumptions

This study is founded on several key assumptions that guide its research design and methodology. Firstly, it is assumed that household heads in informal settlements will participate willingly and provide truthful information, which is fundamental for data reliability. Secondly, the study operates on the premise that informal settlements generally lack a coordinated and formalized system for fire disaster management, primarily due to inherent challenges such as inadequate infrastructure and limited resources. Furthermore, it is assumed that the variations in fire safety practices among residents are a significant determinant of the community's overall preparedness and mitigation capabilities, thereby directly influencing fire risk dynamics. Collectively, these assumptions provide a necessary foundation for contextualizing and interpreting the research findings.

## 1.10 Theoretical framework

This study employs Ludwig von Bertalanffy’s General Systems Theory (1946) as its theoretical framework to analyse disaster management systems, with a particular focus on fire safety in informal settlements. In this theory, a system is conceptualized as an integrated whole composed of interacting elements, which, in this context, is applied to view disaster management as a network of sub-systems working together to address fire risks. Within this framework, the system boundary defines the scope of the system by considering the characteristics of informal settlements and external factors that affect fire safety. Furthermore, the transfer of energy represents the flow of critical factors, like knowledge, attitudes, and practices, that influence fire preparedness and mitigation efforts. Finally, system balance reflects the community’s ability to manage and respond effectively to fire risks, thereby ensuring resilience and safety within these settlements.

* 1. **Interactive Principles of Systems Theory**

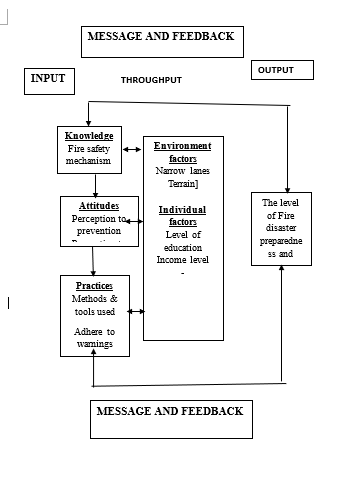
The interactive principles of General Systems Theory are reflected through the stages of Input, Throughput, Output, and Feedback. In applying these stages to the present study, Input involves identifying fire hazards and assessing the level of fire safety knowledge within the informal settlements. Subsequently, Throughput refers to processing these inputs through the lens of community attitudes, infrastructure, and available resources in order to implement effective fire safety measures. Following this, Output represents the measurement of how well fire disaster preparedness and mitigation strategies are executed within the community. Finally, Feedback encompasses evaluating the effectiveness of these outcomes and making necessary adjustments to enhance fire risk management continuously. Taken together, these interactive principles of General Systems Theory provide a holistic framework for understanding how various factors interact to influence fire safety, thereby enabling the evaluation and improvement of existing practices in informal settlements.

Stimulus Message Message 



## 1.11 Conceptual framework

The conceptual framework of this study, grounded in General Systems Theory, outlines how fire disaster preparedness and mitigation operate within informal settlements. It views the informal settlement as a system composed of interacting sub-systems, including residents, households, and Community-Based Organizations (CBOs). The framework is structured around several components. First, the input consists of the fire disaster hazard and the independent variables measured in this study: the community's knowledge, attitudes, and practices (KAP) regarding fire safety. This then undergoes throughput, involving the interaction of KAP with the intervening variables measured in this study, such as socioeconomic factors, environmental conditions, and institutional support, which can either facilitate or hinder preparedness. The output, which is the dependent variable measured in this study, is reflected in the community’s level of fire disaster preparedness and mitigation. Lastly, feedback comes into play through the evaluation of this output, leading to the proposed strategies for improving fire safety measures.



*Source: Adopted from Von Bertallanffy, (1946), General systems theory model*

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# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

Fire disasters are a recurring and devastating challenge in informal settlements worldwide, where poor infrastructure, severe overcrowding, and limited access to firefighting resources collectively heighten vulnerability and amplify the impact of each incident. The global significance of this issue is underscored by the World Health Organization (2023) estimates of approximately 180,000 annual fatalities from fire-related burns, with a disproportionate majority occurring in low- and middle-income countries. This trend is acutely visible in Sub-Saharan Africa, where informal settlement fires are a near-daily occurrence, causing significant livelihood losses and human displacement, as evidenced by major incidents in cities like Cape Town (UNDRR, 2024). Within Kenya, fires are officially recognized as a priority hazard, a concern formalized in the National Disaster Risk Management Policy (2017) which mandates the mainstreaming of disaster risk reduction across all levels of government. Nonetheless, devastating urban fires persist, exemplified by the Gikomba market fire in Nairobi that resulted in numerous fatalities and the destruction of property (Daily Nation, 2021). At the local level, Nyeri County faces recurrent fire disasters, with research indicating persistent gaps in disaster preparedness within its informal settlements, highlighting an urgent need for targeted mitigation strategies (Wepukhulu et al., 2022).

Against this backdrop, this literature review explores the knowledge, attitudes, and practices (KAP) of residents regarding fire safety in these high-risk environments. Guided by the KAP framework as a conceptual foundation, the review examines existing research conducted between 2020 and 2024 on fire disaster preparedness in informal settlements. Moreover, it identifies significant gaps in the literature that the current study seeks to address. The review is organized into three main sections: knowledge of fire safety, attitudes toward fire safety, and practices related to fire disaster preparedness. Each section will critically assess relevant studies, identify knowledge gaps, and highlight areas for further research, particularly in the context of Nyeri County. The goal is to synthesize the current research landscape and lay out robust groundwork for developing effective, context-specific fire disaster preparedness strategies.

## 2.1 Knowledge of Fire Safety

Fire safety knowledge is foundational to effective fire disaster preparedness and mitigation efforts. It encompasses residents' understanding of fire risks, preventive measures, and appropriate responses during a fire outbreak. However, recent studies highlight significant gaps in knowledge among informal settlement dwellers, which contribute to the frequent occurrence of fires.

### 2.1.1 Gaps in Fire Safety Knowledge

### Ngau and Boit (2020) conducted a cross-sectional study in Nairobi’s informal settlements, which revealed that residents possessed limited knowledge of fire safety. Specifically, while many were aware of fire risks, they lacked practical knowledge on how to mitigate those risks, such as the proper use of fire extinguishers or basic fire prevention techniques. Furthermore, the researchers identified the absence of community-based fire safety programs as a major barrier to improving knowledge levels. These findings highlight the need for targeted educational initiatives, particularly in regions like Nyeri County, where similar challenges are likely to be prevalent.

A similar knowledge gap was observed in Amasi’s (2021) study of fire safety awareness among pupils in Tanzania's informal settlements. Although there was general awareness of the dangers posed by fires, practical knowledge on prevention and response was insufficient. Amasi’s study concluded that fire safety education

Programs in informal settlements should not only focus on theoretical knowledge but also impart practical skills that residents can apply during fire emergencies. This reinforces the need for practical, hands-on training in fire safety preparedness, an area that is notably absent in much of the current fire safety education offered in Kenyan informal settlements.

In a broader context, Chandra and Kumar (2021) examined fire safety knowledge in informal settlements in India, revealing significant gaps in residents' understanding of essential fire safety measures, including hazard identification, evacuation protocols, and electrical safety practices. Moreover, they argued that increasing awareness through localized and culturally sensitive educational initiatives could substantially improve fire safety practices. The relevance of these findings to the Kenyan context is particularly noteworthy, as informal settlements in both countries share similar socioeconomic and infrastructural characteristics, thereby suggesting that strategies proven effective in India may also be adapted for use in Kenya.

Li and Zhang (2022) expanded on this by studying the fire safety knowledge of peri-urban informal settlements in China. They found that while residents were aware of fire risks, there was a disconnect between awareness and actionable knowledge, particularly regarding firefighting tools and early warning systems. This gap highlights a critical issue: awareness alone is insufficient without the accompanying knowledge of how to effectively respond to fire hazards. In the case of Nyeri County, this gap in practical knowledge may also be exacerbated by the lack of access to firefighting resources and the limited reach of public safety campaigns.

Taken together, these studies emphasize the urgent need for comprehensive fire safety education programs that not only raise awareness but also provide practical, applicable knowledge. Indeed, the current literature consistently points to a significant gap in practical fire safety skills, particularly within the Kenyan context, where residents often lack access to the resources or training necessary to effectively mitigate fire risks. Addressing this gap forms a central focus of the present study, which seeks to assess the level of fire safety knowledge among residents of Nyeri County’s informal settlements and to identify the most effective methods for enhancing this knowledge.

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### 2.2 Attitudes Toward Fire Safety

Attitudes toward fire safety significantly influence the engagement of residents in fire disaster preparedness and mitigation efforts. While knowledge may inform individuals about fire risks and safety protocols, it is their attitudes that ultimately determine whether they adopt preventive behaviors. A positive attitude toward fire safety is closely associated with proactive practices, such as acquiring basic firefighting equipment, attending community awareness programs, and developing household evacuation plans.

Research in urban informal settlements has revealed that attitudes are shaped by a mix of cultural beliefs, socioeconomic challenges, previous exposure to fire incidents, and trust (or lack thereof) in local governance. For instance, communities with a history of fire outbreaks tend to be more cautious and alert, while others may display indifference due to a sense of helplessness or normalization of such disasters. In some cases, residents may downplay fire risks due to the absence of immediate consequences or due to competing priorities like food security, employment, and housing.

Furthermore, limited access to information and poor communication channels can hinder the development of safety-oriented attitudes (Chege & Ngugi, 2021). Where awareness campaigns or educational programs are lacking, misconceptions and myths about fire causes and prevention may persist. Additionally, low levels of community cohesion may reduce collective efforts to implement safety measures. Thus, transforming attitudes requires not only knowledge dissemination but also consistent community engagement, trust-building with local authorities, and culturally sensitive awareness strategies.

Understanding and improving community attitudes toward fire safety is essential for sustainable disaster risk reduction in informal settlements. Programs that involve community participation, promote shared responsibility, and provide practical, low-cost solutions are more likely to shift attitudes positively and inspire long-term behavioral change.

### 2.2.1 Attitudinal Barriers to Fire Safety

Chege and Ngugi (2021) conducted a study in Nairobi’s informal settlements and found that negative attitudes toward fire safety were a major barrier to effective fire disaster preparedness. Many residents believed that fire safety was the sole responsibility of the government, resulting in a lack of personal initiative in adopting preventive measures. This reflects a broader issue in informal settlements, where residents often rely on external actors (such as local authorities or NGOs) for disaster response rather than taking personal responsibility for preparedness. These findings are pertinent to Nyeri County, where similar attitudes may hinder individual and community-level engagement in fire safety.

In contrast, Ismail and Binti (2022) studied fire safety attitudes in Malaysia’s informal settlements and found that residents who had previously experienced fire disasters exhibited proactive attitudes toward fire safety. These residents were more likely to engage in preventive measures, such as regularly maintaining firefighting equipment and participating in fire drills. This study suggests that experience with disasters plays a crucial role in shaping attitudes toward fire safety. For Nyeri County, this insight points to the potential value of targeted interventions aimed at residents who have experienced fires, as they may be more receptive to fire safety education and practices.

Macharia and Kariuki (2021) observed a somewhat different trend in Mombasa’s informal settlements, where residents expressed positive attitudes toward fire safety, but these attitudes did not always translate into effective practices. The researchers identified a disconnect between attitude and behavior, with many residents citing financial constraints as a reason for not investing in fire safety equipment or infrastructure. This gap between intention and action underscores the need for subsidized fire safety programs and affordable firefighting tools in informal settlements, where residents may be willing but financially unable to engage in fire safety measures. The proposed study in Nyeri County will investigate whether similar disconnects exist and explore potential solutions to address them.

Ndung’u et al. (2023) provided further insight into attitudinal barriers, finding that fatalism was a significant factor in the attitudes of residents in Kiambu’s informal settlements toward fire safety. Many residents viewed fire disasters as inevitable and outside of their control, leading to a general sense of apathy and a lack of preparedness. This fatalistic mindset poses a serious challenge to fire disaster preparedness efforts, as it discourages proactive behavior. Addressing this psychological barrier is essential for improving fire safety in informal settlements, and the proposed study will explore whether similar attitudes are prevalent in Nyeri County.

These studies collectively suggest that while positive attitudes toward fire safety are crucial, they are often insufficient without the resources or motivation to act on these attitudes. Furthermore, the presence of negative attitudes, such as fatalism and reliance on external actors, highlights the need for behavioral change campaigns that encourage individual and community-level engagement in fire safety. The proposed study will assess residents’ attitudes toward fire safety in Nyeri County’s informal settlements and explore strategies for shifting negative attitudes to foster a culture of preparedness.

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### 2.3 Practices of Fire Safety

Fire safety practices refer to the concrete actions undertaken by individuals, households, and communities to prevent fire incidents and effectively respond when they occur. These practices include safe cooking and lighting habits, proper storage of flammable materials, installation of fire extinguishers or sand buckets, participation in fire drills, and the creation of escape plans. In theory, such practices are informed by individuals’ knowledge and shaped by their attitudes. However, in the context of urban informal settlements, several systemic and socioeconomic constraints severely limit the implementation of these practices.

For instance, informal settlements are often characterized by high population density, unregulated construction, narrow pathways, and proximity of flammable structures conditions that not only increase fire risk but also impede effective fire response (UN-Habitat, 2023). Moreover, in many cases, residents rely on makeshift wiring and cooking equipment, which significantly heightens the probability of accidental fires (Ngau & Boit, 2020). Despite awareness of these dangers, residents may be forced to continue unsafe practices due to economic hardship or lack of alternatives (Macharia & Kariuki, 2021).

Additionally, the literature emphasizes that poverty is a key limiting factor. Many households are unable to afford basic fire safety equipment such as fire extinguishers or smoke alarms. Furthermore, there is often a lack of formal training opportunities or organized fire safety education at the community level. Infrastructural challenges, such as poor access roads and the absence of reliable water sources, also diminish the community’s capacity to respond to fires effectively.

Nonetheless, studies suggest that targeted interventions can improve fire safety practices even in resource-constrained environments. For example, community-based disaster preparedness programs, partnerships with local authorities and NGOs, and the integration of fire safety into broader urban development plans have been shown to enhance resident engagement and resilience. In addition, encouraging local leadership, promoting peer learning, and incorporating indigenous knowledge play crucial roles in fostering sustainable fire safety practices.

In conclusion, while knowledge and attitudes are essential precursors, the practice of fire safety in informal settlements must be addressed through a multi-dimensional approach—one that acknowledges structural limitations and empowers communities to take ownership of their safety through practical, context-sensitive strategies.

**2.3.1 Fire Safety Practices in Informal Settlements**

Keter and Karanja (2022) investigated fire safety practices in Nyeri County, focusing on the availability and use of fire safety equipment such as fire extinguishers and smoke detectors. They found that the vast majority of residents did not have access to basic firefighting tools, leaving them vulnerable to fire outbreaks. The researchers attributed this to both economic constraints and a lack of awareness about the importance of such equipment. This study is particularly relevant to the proposed research because it provides a direct assessment of fire safety practices in the region and underscores the need for affordable firefighting resources.

Similarly, in Ghana, Owusu and Asumadu-Sarkodie (2021) identified comparable gaps in fire safety practices, noting that residents of informal settlements often neglected basic preventive measures, such as conducting electrical safety checks and properly storing flammable materials. They argued that these lapses in practice were largely due to socioeconomic challenges and inadequate education on fire safety. Consequently, they recommended the development of community-based fire safety programs that provide both education and resources to help residents adopt safer practices. Such an approach could be highly effective in Nyeri County, where similar barriers to fire safety practices are likely to be present.

In addition, Rautela et al. (2023) explored the relationship between fire safety practices and attitudes in India’s informal settlements. Their study revealed that individuals who regularly engaged in fire safety practices, such as participating in fire drills or maintaining fire extinguishers, were more likely to hold positive attitudes toward fire safety. This finding suggests a reciprocal relationship between practices and attitudes, where improved practices can reinforce positive attitudes and vice versa. The proposed study in Nyeri County will therefore investigate whether similar patterns exist and whether improving fire safety practices could help foster more positive attitudes toward fire safety within the community.

## 2.4 Identified Gaps in Knowledge, Attitudes and Practices in Informal Settlements

While the literature offers valuable insights into fire safety knowledge, attitudes, and practices, significant gaps remain, particularly concerning informal settlements in Nyeri County, Kenya. One notable gap is the lack of practical fire safety knowledge; although residents may be aware of fire risks, they often lack the essential skills needed to mitigate these risks effectively. Moreover, there is a disconnect between attitudes and practices, as positive perceptions of fire safety do not always lead to the implementation of effective practices, often due to financial constraints or other barriers. In addition, psychological barriers, such as fatalism and a reliance on external actors, significantly hinder individual and community engagement in fire disaster preparedness. Furthermore, these gaps highlight the need for targeted research and interventions to improve fire safety in these communities.

## 2.5 Conclusion

This literature review has examined recent studies (2020–2024) on fire safety knowledge, attitudes, and practices in informal settlements, with a focus on identifying gaps and areas for further research. Moreover, the review has highlighted the need for comprehensive fire safety education programs, attitude change campaigns, and affordable fire safety resources to improve fire disaster preparedness in informal settlements. Furthermore, the proposed study will address these gaps by investigating the KAP of residents in Nyeri County’s informal settlements and developing practical recommendations for enhancing fire disaster preparedness in these communities.

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# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0 Introduction

This study will be confined within the Cross-sectional Survey that combines both qualitative and quantitative methods to provide a comprehensive understanding of fire safety in informal settlements.

## 3.1 Research Design

The research will adopt a cross-sectional survey design, appropriate for investigating the fire disaster preparedness phenomenon in informal settlements with their unique and dynamic characteristics. This design is suitable for collecting data at a single point in time to examine relationships between variables. A mixed-methods approach will be employed, integrating qualitative and quantitative techniques. Qualitative data will be gathered using semi-structured interviews and focus group discussions (FGDs) to obtain detailed insights into residents' experiences, perceptions, and the underlying reasons for their fire safety strategies. Concurrently, quantitative data will be collected through structured questionnaires to quantify levels of fire preparedness, access to safety resources, and engagement in fire safety practices. The quantitative data will help identify patterns and associations, such as the correlation between knowledge levels and preparedness scores. This mixed-methods approach aligns with established research guidelines (Creswell & Plano Clark, 2017), combining both approaches to provide a comprehensive understanding of the research problem by describing the current state of KAP and its relationship with preparedness levels.

## 3.2 Measurement of Variables

Clearly defined variables will guide the study, ensuring that relevant data are collected to address the research objectives. The variables will be measured using both qualitative and quantitative data collection tools.

### 3.2.1 Independent Variables

The independent variables in this study encompass the key factors that affect fire disaster preparedness and mitigation, namely knowledge, attitudes, and practices. The study will measure knowledge of fire safety by evaluating residents' understanding across core domains, including identifying fire hazards and causes, early warning and detection, prevention practices, first response and basic firefighting, evacuation procedures, and knowledge of emergency contacts. This will be assessed through survey questions that determine the frequency and source of fire safety information, such as government campaigns, NGO programs, or community-based initiatives. Additionally, interviews will delve into the depth of this knowledge and its practical application within households. Attitudes, another critical variable, will focus on residents' perceptions and beliefs, measured using Likert-scale questions to capture specific dispositions such as the perceived importance of fire safety, perceived responsibility (individual vs. governmental), perceived effectiveness of preventive measures, perceived barriers to action, and cultural beliefs or fatalism. Attitudinal data will be collected using framed questions in a Likert-scale, while focus group discussions (FGDs) will explore communal attitudes toward fire risks and the barriers that prevent action on fire safety.

Lastly, fire safety practices will examine the actual behaviors and actions taken by individuals and households. This encompasses key areas such as prevention practices (e.g., safe cooking methods, fuel storage), protective practices (e.g., maintaining clear escape routes, keeping firefighting tools accessible), preparedness practices (e.g., participating in drills), and response practices taken during past incidents. The study will measure the frequency and type of these practices through structured surveys and direct observations, with interviews probing the underlying reasons behind these practices, particularly in relation to socioeconomic constraints.

### 3.2.2 Intervening Variables

The study will account for intervening variables that may influence the relationship between independent variables and fire disaster preparedness. While these are not the primary focus of the study's objectives, they are essential for a contextualized analysis. One such variable is government support, which will assess the role of local authorities in providing fire safety resources and education to residents. This will be measured through survey questions about the accessibility of fire extinguishers, firefighting services, and public fire safety programs. In addition, interviews with government officials and community leaders will be conducted to evaluate the extent and effectiveness of government involvement. Moreover, environmental and socioeconomic factors will also be considered, particularly aspects such as overcrowding, poor infrastructure, and the use of flammable building materials, which can exacerbate fire risks. These environmental factors will be examined through surveys and field observations. Furthermore, socioeconomic factors, including income levels, education, and employment, will be examined to understand how they influence residents’ capacity to adopt and implement fire safety practices.

### 3.2.3 Dependent Variable

The dependent variable is fire disaster preparedness and mitigation, which will be measured as a composite score based on several key indicators. This score will provide a quantitative measure of preparedness levels. The indicators include access to fire safety resources, assessing the availability of firefighting equipment, fire extinguishers, and early warning systems through surveys and observations. Community engagement will be evaluated by the level of participation in fire safety initiatives like fire drills and awareness campaigns, gathered from survey data and interviews. Furthermore, household preparedness to respond will determine the presence of emergency plans, knowledge of evacuation routes, and the practice of safe behaviors. Data from these indicators will be combined to create a comprehensive Fire Preparedness Index for analysis.

## 3.3 Study Location

The study will be conducted in Kiawara, Witemere, and Majengo, three informal settlements in Nyeri County, Kenya. Nyeri County's informal settlements provide a critical context for this study, representing typical urban fire-risk zones in a Kenyan secondary city where such research is limited. These locations were selected due to their high incidence of fire disasters and the specific challenges they face regarding fire preparedness, as noted in local administrative reports and consistent media coverage of fire incidents in these areas. Specifically, Kiawara is a densely populated area with inadequate firefighting infrastructure, thereby rendering it particularly vulnerable to fire outbreaks. Furthermore, Witemere is characterized by informal housing structures that often utilize flammable materials and feature unsafe electrical connections, which significantly increase the fire risk. Meanwhile, Majengo faces substantial challenges related to overcrowding and poor access to fire safety resources. Collectively, these settlements exemplify the typical fire risk conditions found in many informal settlements across Kenya, thus making them ideal case studies for this research.

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## 3.4 Target Population

The target population for the study will encompass all households within the three selected settlements, with a specific focus on household heads aged 18 and above, as they are typically responsible for making decisions related to household safety. In addition to household heads, key informants will include county fire department personnel, local chiefs, and leaders of community-based organizations (CBOs) who play a significant role in fire safety management. Furthermore, the inclusion criteria for the study will consist of household heads, both male and female, who are eighteen years and above and who have lived in the settlement for more than two years because they are mentally mature and have understanding of the dynamics of fire disasters within that time period. In addition, fire department personnel with specific knowledge and experience in responding to fire incidents in informal settlements will be included, along with community leaders and local chiefs who have actively participated in fire safety initiatives within the settlements. Conversely, temporary residents who have lived in the settlement for less than one year will be excluded from the study, as they may not have encountered long-term fire safety challenges.

**3.5 Sampling Techniques**

The study will employ a stratified random sampling technique to ensure equitable representation of the different settlement clusters and households with prior fire experience. The strata will be purposefully defined based on the three informal settlements (Kiawara, Witemere, and Majengo) and further divided by prior fire experience (Yes/No). Within each stratum, household lists will be constructed with community leaders, and households will be randomly selected using computer-generated numbers. The total sample will be allocated proportionally to stratum size, maintaining a minimum of 25 households in small strata to ensure equity. For illustrative purposes, assuming a total population of 1200 households, a target sample of 150 would be allocated as follows: Majengo (60 households: 10 with fire experience, 50 without), Kiawara (40 households: 10 with, 30 without), and Witemere (50 households: 10 with, 40 without). The final sample size will be determined using the Cochran formula for a finite population with a 95% confidence level and a 5% margin of error, based on the actual settlement populations. Inclusion criteria will be adults (≥18 years) residing in the settlement for ≥12 months who provide informed consent. Up to two call-backs will be made before randomly selecting a replacement from the same stratum, and non-response will be recorded to assess potential selection bias.

The sample size calculation will rely on a standard statistical approach designed for large or infinite populations, which takes into account the desired confidence level, the estimated proportion of the population with the characteristic of interest, and the acceptable margin of error. Specifically, the confidence level (for instance, 95%) determines the level of certainty that the sample accurately reflects the population. The estimated population proportion, often assumed to be 0.5 when unknown, provides a conservative estimate that ensures a sufficiently large sample size. The margin of error, expressed as a decimal, defines the degree of precision expected from the study results. Collectively, these parameters guide the computation of an appropriate sample size that balances accuracy, reliability, and feasibility. The Cochran formula below will be used to get the sample size.

## 3.6 Research Instruments

The study will develop, and pilot test several instruments to gather comprehensive data. Interview guides will be created for structured and semi-structured interviews with household heads and key informants, focusing on aspects such as fire safety knowledge, practices, and challenges faced by the community, to elicit in-depth qualitative insights. Additionally, focus group discussion (FGD) guides will be utilized to engage residents and community leaders in exploring shared communal perspectives and norms on fire preparedness. Observation checklists will also be employed during field visits to document fire safety conditions, including the presence of fire extinguishers, fire exits, and potential fire hazards, providing objective evidence of the physical environment. Lastly, structured questionnaires will be designed for quantitative data collection from households, incorporating both open-ended and close-ended questions that address fire safety knowledge, attitudes, and practices, in order to measure and quantify these key variables.

## 3.7 Data Collection Techniques

Before commencing data collection, ethical approval will be sought from the National Commission for Science, Technology, and Innovation (NACOSTI) and the Ethical Review Committee at Kenyatta University. Following this approval, primary data will be gathered using a mixed-methods approach. Structured questionnaires will be administered to sampled household heads to collect quantitative data on fire safety knowledge, attitudes, and practices. Semi-structured interviews will be conducted with key informants for in-depth qualitative insights, while Focus Group Discussions (FGDs) with residents will explore communal perceptions and shared experiences. Furthermore, direct observation using a checklist will be employed to document physical fire hazards and safety conditions within the settlements. Secondary data will be obtained from a review of existing fire safety reports, policy documents, and relevant academic literature.

The study will employ a mixed-methods approach comprising a cross-sectional Knowledge, Attitude, and Practices (KAP) survey using a cluster sampling method, together with qualitative interviews to explore community barriers and inform the design of appropriate interventions. Data collection will involve both primary and secondary methods. Primary data will include semi-structured interviews with household heads and key informants, which will be audio-recorded (with consent) and subsequently transcribed for analysis. Focus group discussions (FGDs) with 8-12 participants in each session will facilitate a deeper exploration of community-wide fire safety challenges and potential solutions, while field observations will record fire safety conditions within the settlements, focusing on housing structures and identifying potential fire hazards. Secondary data will include a review of existing fire safety reports, policy documents, and previous studies on fire preparedness in informal settlements, providing additional context to complement the primary data.

Quantitative data will be analyzed using the Statistical Package for the Social Sciences (SPSS) for its user-friendly capability to identify patterns and correlations with minimal coding. The Chi-square test will be used to examine relationships between categorical variables such as knowledge, attitudes, and practices, while regression analysis will assess how these variables collectively influence preparedness, controlling for factors such as income and education. Qualitative data from interviews, FGDs, and field observations will be examined thematically to identify recurring patterns and emerging themes, ensuring a comprehensive understanding of the research problem.

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## 3.8 Data Analysis and Presentation

The data collected in this study will undergo systematic analysis to ensure comprehensive insights into fire preparedness. Descriptive statistics will be applied to the quantitative data to summarize and clearly present the general level of fire preparedness across the settlements. This will involve calculating frequencies, percentages, means, and standard deviations, which will help in identifying patterns, trends, and variations in the data. Inferential statistics, specifically chi-square tests, will be used to go beyond description and determine whether there are statistically significant relationships between variables such as fire safety knowledge and preparedness levels. This will allow the study to test hypotheses and make generalizations to the wider population. All quantitative analyses will be conducted using SPSS software, with significance levels set at p < 0.05 to ensure reliability and validity.

For the qualitative data, thematic analysis will be employed to interpret interview and focus group discussion (FGD) transcripts. This will involve identifying recurring themes and patterns to gain deeper insights into perceptions and experiences related to fire preparedness. NVivo software will be used to support systematic coding and organization of this qualitative data. The integration of both quantitative and qualitative findings will provide a holistic understanding of fire preparedness, highlighting not only statistical relationships but also the underlying social and behavioral factors. This mixed-methods approach will enhance the credibility of the study and provide actionable evidence for policy and community interventions. The findings will be presented through graphs, tables, and charts to make patterns and trends easily interpretable.

## 3.9 Logistical and Ethical Considerations

Before commencing data collection, ethical approval will be sought from the National Commission for Science, Technology, and Innovation (NACOSTI) and the Ethical Review Committee at Kenyatta University. Moreover, the research will strictly adhere to several ethical principles to ensure the integrity of the study. Informed consent will be obtained in writing from all participants prior to their involvement, with clear communication regarding the study’s purpose, their rights, and any potential risks associated with participation. Furthermore, confidentiality and anonymity will be paramount, as all data will be treated with utmost confidentiality, and personal identifiers will be excluded from the final report. However, participation will remain entirely voluntary, allowing participants the freedom to withdraw from the study at any time without facing any consequences.

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# APPENDICES

## Appendix 5.1: Work Plan

| **Activity** | **Timeframe** | **Responsible Personnel** |
| --- | --- | --- |
| Proposal Writing and Approval | Month 1-2 | Researcher |
| Pretest Study | Month 3 | Researcher, Research Assistant |
| Data Collection | Month 4-5 | Researcher, Research Assistants |
| Data Cleaning and Analysis | Month 6 | Researcher, Data Analyst |
| Report Writing | Month 7 | Researcher |
| Submission of Final Report | Month 8 | Researcher |

## Appendix 5.2: Budget

| **Item** | **Quantity/Units** | **Cost per Unit (Ksh)** | **Total Cost (Ksh)** |
| --- | --- | --- | --- |
| Research Assistants | 2 (for 5 months) | 15,000/month | 150,000 |
| Stationery (questionnaires, pens, etc.) | Lump sum | 5,000 | 5,000 |
| Transport (to and from research sites) | 5 months | 10,000/month | 50,000 |
| Data Collection Devices (tablets, phones) | 3 devices | 20,000 | 60,000 |
| Printing and Photocopying | Lump sum | 10,000 | 10,000 |
| Data Analysis Software | 1 license | 25,000 | 25,000 |
| Miscellaneous (food, unforeseen costs) | Lump sum | 10,000 | 10,000 |
| **Total** |  |  | **310,000** |

## Appendix 5.3: Map of Study Location

The following map represents the three informal settlements where the study was conducted: Kiawara, Witemere, and Majengo in Nyeri County, Kenya.



## Appendix 5.4:

# TOOLS AND INSTRUMENTS FOR DATA COLLECTION

# This section describes the various research instruments developed and utilized in this study to collect comprehensive data on the Knowledge, Attitudes, and Practices (KAP) related to fire disaster mitigation and preparedness among residents of informal settlements in Nyeri County, Kenya. The tools were designed to align with the study's objectives and theoretical framework, employing a mixed-methods approach that integrates both quantitative and qualitative data collection techniques. Each instrument will be pre-tested and refined to ensure clarity, relevance, and cultural appropriateness for the target population.

## Demographic Questions

1. What is your gender?  
 a) Male  
 b) Female

2. What is your age group?  
 a) 18–25  
 b) 26–35  
 c) 36–45  
 d) 46–55  
 e) 56 and above

3. How long have you lived in this settlement?  
 a) 2-3 years  
 b) 3–5 years  
 c) More than 5 years

## Knowledge Questions

In the past two years have there been any awareness programs in the community?  
 a) Yes  
 b) No

Are there any fire extinguishers near your surroundings?  
 a) Yes  
 b) No

In your opinion what causes fire disasters in your community?  
 a) Faulty electrical connections  
 b) Flammable materials  
 c) Cooking‑related fires  
 d) Other

## Attitudes Questions

Do you think fire safety programs or training are important?  
 a) Yes  
 b) No

How often do you check out hazardous materials?  
 a) Daily  
 b) Often   
 c)Occasional  
 d) Never

Would you be willing to attend a free community fire safety training?  
 a) Yes  
 b) Maybe  
 c) No

Do community members initiate their own fire safety measures or rely on external support?  
 a) Initiate their own  
 b) Rely on external support

## Practices Questions

What firefighting equipment do you have?  
 a) Fire extinguisher  
 b) Sand bucket  
 c) Water drum  
 d) None

e) Any Other (specify)

How often do you take precautions with cooking equipment?  
 a) Always  
 b) Sometimes  
 c) Never

How fast do fire engines access fire outbreak areas?  
 a) Very fast  
 b) Moderate  
 c) Slow  
 d) Very slow

## Focus Group Questions

1. Mention the ways in which members in your community prepare in advance to fight fire outbreaks.
2. Highlight the challenges the community encounters in accessing firefighting equipment.
3. ways in which fire safety measures can be improved in your community.
4. Suggest the roles county governments and NGOs would play in enhancing fire safety preparedness.

## County Fire Department Questions

1. Which informal settlement experiences the highest fire incidents?  
    a) Majengo  
    b) Witemere  
    c) Kiawara
2. What organizations do you partner with to mitigate fire disasters?
3. Mention the challenges you encounter when promoting fire safety in informal settlements.
4. Suggest the role that the community can play in mitigating fire disasters without relying heavily on external support.