



# Qualitative Assessment of Fire Safety of Commercial Buildings in Awka Anambra State, Nigeria

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*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background:** This study investigates the challenges affecting the implementation of fire safety measures in commercial buildings in Awka, Anambra State, Nigeria. With rapid urbanization and commercial growth, Awka faces increased fire risks due to inadequate fire safety infrastructure, regulatory enforcement, and public awareness.

**Materials and Methods:** Using a descriptive survey design, data were collected from 213 industry professionals, including architects, structural engineers, and builders, who directly influence fire safety practices. The primary data collection tool was a structured questionnaire analyzed through frequency analysis and the relative importance index (RII).

**Aim:** The study seeks to assess challenges affecting the application of fire safety measures in commercial buildings in Awka, Anambra State, with a view to recommending more efficient fire management approaches.

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**Results:** The findings reveal several key barriers: inadequate regulatory enforcement, financial constraints, lack of technical expertise, and limited public engagement in fire safety practices. Additionally, insufficient fire safety training and lack of routine drills contribute to the low preparedness of building occupants during emergencies.

**Conclusion and Recommendation:** The study underscores the need for stricter regulatory oversight, financial support for safety investments, enhanced technical training for local professionals, and mandatory safety drills for occupants. These strategies are essential to improve compliance with fire safety standards, mitigate fire risks, and safeguard lives and property in Awka's commercial spaces. This research highlights significant areas for improvement, offering valuable insights for policymakers, industry professionals, and stakeholders in fire safety management.

The research concludes that the Key challenges identified include financial constraints which were the primary obstacle, limited technical expertise, and inadequate enforcement of fire safety regulations.

The study recommends enhanced Regulatory Enforcement and Oversight and Financial Assistance Programs for Fire Safety Improvements. It also recommends development of Technical Training and Certification Programs.

*Keywords: Fire safety; commercial buildings; regulatory enforcement; fire risk; financial constraints.*

## 1. INTRODUCTION

Fire safety is an important aspect of building construction, use and maintenance management. Fire safety management is an application of policy, rules, tools, yard stick, information, and practice of the task of analysing, appraising, and controlling fire safety by the managers of buildings Kaseem, Yatim, Mahmood (2021). It is geared towards protection of life and properties. One of the most frequent and damaging disasters in the world is fire. It has been a troubling problem to deal with over the years, particularly in developing nations (Nimlyat, et al., 2017). The devastating impact of fire disasters has become increasingly pronounced in urban areas, where rapid development and population density create unique challenges for fire safety management. With an increasing global emphasis on urbanization and complexity of modern building structures, fire prevention and effective response strategies is a concern. Fire related incidents cause thousands of deaths and injuries as well as property damages (NFPA, 2022). This global concern finds particular resonance in Nigeria, where urbanization and commercial growth have outpaced the development of adequate fire safety infrastructure and protocols.

The devastating consequences of fire accidents affect the building users as well as the structural strength of the building. When fire outbreaks are dictated early, suppression mechanisms to reduce the effect are quickly put into place, proper evacuation strategies and fire-resistant

materials are resorted to which are some mechanisms employed at such incidences (Gudde, 2019).

Today's buildings are becoming larger and more complex (Liyanapelia, et al. 2023). Hence, Van Weyenberge et al. (2019) stated that fire safety considerations have been increasingly influenced when designing modern buildings. In the context of Nigerian urban centres, the challenge of fire safety has become particularly acute in commercial buildings, which often serve as economic hubs hosting numerous businesses and employing thousands of people (ILodiuba, et al. 2017). A large-scale commercial building is defined as any floor area of the building that is equal to or greater than 5000 m<sup>2</sup>, or the total area is equal to or greater than 15,000 m<sup>2</sup>. Based on this definition, the large-scale commercial building demonstrates the characteristics of large building area and scale, large number of people and electric equipment inside, complex evacuation route and high fire load, so it is a high fire risk (Liu, et al. 2017, Forkpah, 2024). Today, the challenge of fire safety has become particularly acute in commercial buildings, which often serve as economic hubs hosting numerous businesses and employing thousands of people. This is as a result of urbanization and more complex building structures used in commercial areas.

According to Jagiti (2019), Urbanization is an index of transformation from traditional rural economies to modern industrial ones. This has led to a proliferation of commercial structures,

raising significant concerns about fire safety measures and their implementation. This situation is especially evident in rapidly growing cities like Awka, the capital of Anambra State, where commercial expansion has created new challenges for fire safety management, which, in turn, has heightened the risk of fire incidents.

One of the primary challenges affecting the application of fire safety measures in Awka is the lack of awareness and education regarding fire safety protocols. Research by the Fire Industry Association (2024) reveals alarming levels of ignorance and complacency about fire safety and also highlights that many building owners and managers are not fully aware of the fire safety regulations that govern their properties. This lack of knowledge can lead to non-compliance with safety standards, ultimately increasing the risk of fire incidents. Furthermore, the absence of regular training for employees on fire safety procedures exacerbates this issue, as workers may not know how to respond effectively in the event of a fire.

The consequences of inadequate fire safety measures can be dire. The Balogun market, a popular trading centre located in Lagos State, Southwest Nigeria, has recorded fire outbreaks every year since 2015. In Dec. 2021, about three shops were razed by fire at the market. In Dec. 2019, a fire outbreak was recorded at the market after a previous one a month before. In Feb. 2018, a fire reportedly started around 11 a.m. local time and razed six flats at the Balogun market. In 2017, a similar case was reported. In Sept. 2015, about three persons were reported dead, and some others injured, after they jumped from various floors of the affected building to escape. (Victor & Muhammed, 2022). These tragic events underscore the need for enhanced training programs and awareness campaigns aimed at educating building owners, managers, and occupants about fire safety practices.

In a review conducted by Oluwunmi, 2023, it was revealed that the major causes of fire outbreaks are electrical-related issues, political-related issues, a low level of awareness of fire safety measures, the use of low-quality or substandard building materials, and carelessness or negligence. This translates that despite the presence of regulatory frameworks designed to safeguard buildings against fire, enforcement remains weak due to factors such as carelessness and a lack of political will. This is confirmed by a study by Cyprian and Alao, (2023) which concludes that the effective

application of fire safety measures is hindered by a confluence of factors.

## **1.1 Brief Description of Anambra State and Awka Community**

Awka, the capital city of Anambra State in Nigeria, is a vibrant urban center that plays a crucial role in the region's social, economic, and cultural life. This fire incidence which gulfs down buildings and other resources usually occurs between November and March because of the dry weather. Temperature of 26.7°, precipitation of 62mm, rainfall of 2.5 inches resulted in dryness, hence encouraging spread of fire. The diverse demographic of Awka encompasses government workers, traders, students, and professionals, contributing to a rich cultural tapestry and dynamic urban landscape.

### **1.1.1 Climate**

Awka experiences a tropical savanna climate, which is defined by two distinct seasons: the rainy season and the dry season. The rainy season lasts from April to October, characterized by heavy rainfall that averages around 1,800 mm annually. This period is crucial for agriculture, providing the necessary moisture for crop growth. The dry season, which extends from November to March, is influenced by the Harmattan, a dry and dusty trade wind that originates from the Sahara Desert. This wind brings cooler temperatures, reducing humidity levels and creating a contrasting weather pattern. The interplay of these seasonal changes significantly influences the lifestyle and economic activities of the residents.

### **1.1.2 Temperature and Soil**

The temperature in Awka typically fluctuates between 25 °C and 35°C, contributing to a warm and generally hospitable environment. The region benefits from fertile soil, primarily due to the rich organic matter and favorable climatic conditions, which are essential for agriculture. This fertility supports the cultivation of various crops, including cassava, maize, yam, and vegetables, making agriculture a vital aspect of the local economy. The agricultural productivity not only sustains the livelihoods of many residents but also contributes to food security in the region.

### **1.1.3 Economic activities**

As a central economic hub, Awka hosts a myriad of activities that cater to its diverse population. The presence of educational institutions,

particularly Nnamdi Azikiwe University (UNIZIK), significantly influences the economic landscape, drawing students and academic professionals from various regions. This influx fosters a vibrant market for goods and services, ranging from food and clothing to educational materials. The city is also home to numerous commercial establishments, including local markets, financial institutions, and cultural centers, which provide essential services and employment opportunities for residents.

In addition to education and trade, Awka's economic activities encompass a wide array of sectors, including healthcare, hospitality, and transportation services. Social services are also well-developed, with various medical institutions, banks, and cultural organizations present in the urban center. This dynamic economic environment not only supports the livelihoods of the local population but also attracts investments and facilitates the growth of small and medium-sized enterprises, contributing to the overall development of the city.

## 1.2 Problem Statement

The implementation of fire safety measures in commercial buildings is a critical aspect of urban safety and risk management. However, various challenges impede the effective application of these measures in Awka, Anambra State. Despite the existence of fire safety regulations and guidelines, numerous commercial establishments in the city remain inadequately equipped to prevent and respond to fire outbreaks. Factors such as non-maintenance, inadequate provision and non-functional fire safety equipment, often led to fire disasters in buildings. (Cyprian and Alao, 2023). Despite the safety regulations in existence, commercial buildings still experience significant fire related risks due to implementation of the fire safety rules. Some of the challenges are outdated building infrastructure, non-compliance with safety standards, lack of early detection and reduction strategies.

Onwumere, Jessica, Obiadi, Chinonye, and Onuorah (2023) has conducted research has in the south east as a region, but this study focuses on Awka, a region with few researches and also with an obvious increase in the construction of commercial buildings, as it is a major reason for the research. Understanding these challenges is essential for formulating effective strategies to enhance fire safety compliance, mitigate risks,

and ultimately protect lives and property in the face of fire hazards.

## 1.3 Significance of the Study

The significance of this study lies in its potential to enhance understanding of the challenges affecting the application of fire safety measures in commercial buildings in Awka, Anambra State. By identifying these challenges, the research aims to raise awareness among various stakeholders, including government authorities, building professionals—such as architects, engineers, and contractors—and the general public—about the critical need for effective fire safety protocols.

The findings of this study are intended to assist in addressing the prevalent fire safety issues in Awka, contributing to the overall goal of reducing the incidence of fire outbreaks, minimizing loss of life, and mitigating property damage. By evaluating the barriers to the effective implementation of fire safety measures, this research can inform policy recommendations that promote better regulation enforcement and compliance among commercial building owners and operators.

Moreover, this study aims to contribute to the development of enhanced design strategies that integrate fire safety considerations into the planning and construction of commercial buildings. By doing so, it seeks to ensure that these structures are equipped to prevent and respond to fire incidents effectively.

Furthermore, the study serves as a valuable resource for students and researchers interested in fire safety measures within commercial environments. The insights gained from this research can provide a foundation for future studies, paving the way for further exploration of innovative fire safety solutions. The data collected will offer guidance on the key indicators and parameters that should be considered when assessing fire safety in commercial buildings.

## 1.4 Aim and Objective of the Study

This aim of this study is to evaluate challenges affecting the application of fire safety measures in commercial buildings in Awka, Anambra State, with a view to recommending more efficient fire management approaches, whereas, the objective is to identify the current challenges that affects the application of fire safety measures in commercial buildings in Awka, Anambra state

## 2. REVIEW OF RELATED LITERATURE

Obasa, Mbamali, and Okolie (2020) carried out a study on "Assessment of Fire Disaster Preparedness of Commercial Buildings in Imo State, Nigeria.". The study revealed that fire safety culture and practices have been neglected in most commercial buildings in Nigeria and are a major threat to safety of occupants, owners of buildings and properties therein, particularly, where inflammable materials are commonly used.

Hence, its occurrence has been a major source of concern to stakeholders in the built environment. The study aimed at assessing the level of fire disaster preparedness and fire safety measures adopted by commercial building owners in Imo State. A set of structured questionnaires was used for data collection, which was the primary source. The study concluded that the level of fire preparedness of commercial building operators was grossly inadequate. The study suggests ensuring fire safety in commercial buildings through adequate fire safety equipment, regular inspections, and maintenance of necessary training and drills for occupants.

Similarly, a study done by Kaseem Yahya, Wanyusoff (2021) on the practice of fire safety management in buildings observed that proper fire safety management practice is critical for effective control of fire at both the construction and post-construction stages of the building. Therefore, effective fire safety management practice plays an essential role in enhancing the safety of the occupants, building, and its contents against fire disaster.

Furthermore, the results of the study show that fire safety training factors of fire safety management rank first and have a higher influence on the fire safety awareness of the building's occupants and public. The finding revealed that the standard level of fire safety awareness among the public is very poor, which normally leads to the primary causes of fire injury, death, and destruction of property. Adequate fire safety training is thereby proposed in order to enhance fire safety knowledge of the building occupants and general public for the achievement of fire safety objectives.

Commercial building's occupants and its contents are subjected to several fire safety problems, though there are various regulations, standards, codes, and guidelines developed to

provide an effective fire safety management of buildings. Ineffective fire safety management may cause danger to the life of occupants and destruction of property and non-functional installed fire safety systems, which can significantly affect the functionality of a building. However, several kinds of studies have been conducted to identify the factors affecting fire safety management programs in buildings (Ebenechi, et al., 2019). The studies have been conducted in which ten common factors affecting the performance of fire safety management strategies in building were highlighted and briefly explained as follows.

### 2.1 Non-Compliance to the Fire Safety Rule and Regulations

Fire safety are sets of programs put in place to achieve fire safety goal in buildings; non-compliance with this law will jeopardize the FSM program, which was developed to ensure that all fire safety measures are provided and functional at all times to enhance quick evacuation of the occupants in a fire (Kaseem, Yahya, and Wanyusoff, 2021) Fire safety measure (FSM) refers to precautions that are taken to prevent or reduce the likelihood of a fire that may result in death, injury, or property damage, alert those in a structure to the presence of a fire in the event one occurs, better enable those threatened by a fire to survive, or to reduce the damage caused by a fire. They include; policies and procedures will assist in providing safety precautions: Bonding and Grounding Fire Detection Systems Fire Resistive Rating for Furniture, Scenery, and Decoration Fire Response, Plan Fire Safety Emergency Action Plan, Fire Safety Policy, Fixed Fire Suppression Systems, Fire/Safety Review Program, High Rise Buildings, Hot Work Management, Portable Fire Extinguishers, Pre-Fire Safety Plan Program. Subramania (2024) on human factors influencing fire safety measures argued that only predisposing factors such as knowledge, attitude and belief have a positive relationship with the fire safety behavior and lifestyle.

### 2.2 Lack of Proper Fire Emergency Management in Building

Fire emergency management, consisting of fire emergency plan, fire procedure and fire routine notices, the management of buildings should provide evidence of the distribution and explanation of the emergency planning with defined responsibilities and goals. One of the articles (Sholanke, et al., 2020), suggested that

there should be signs of practical emergency planning for a wide range of anticipated events to include the uses of the building, fire growth characteristics, the types of occupants, fire safety systems in a building, etc.

### **2.3 Lack of Fire Safety Training and Education**

Fire training and education is an act of instructions and learning between trainers and trainees for an effective application and management of evacuation procedures. The research conducted by Sholanke, Ekhaese and Ekundayo (2024) on students' awareness of fire safety measures using stratified sampling proved that students were mostly not aware of the fire safety equipment and didn't know how to make use of them. Thus, fire training and education often provide knowledge about safety in terms of fire, which could help occupants of buildings in averting fire disasters.

### **2.4 Lack of Fire Safety Organization, Policy, and Auditing**

In line with several fire safety rules and regulations across the world, such as NFPA, evidence of fire safety responsibility for fire safety at the upper level of organization with a line of responsibility throughout the organization and authorization at a suitable practical level, this, however, should be achieved through clear fire safety policy developed to advance fire safety strategy and supported by an effective FSM system.

Fire safety auditing should be applicable in all buildings; independent auditing should be conducted by a fire editor who has recorded and established its inspection of system management to know whether it takes account of any implication of the fire strategy, such as changes to the occupancy and the fire growth characteristic, and the area where development can be made (UK legislation: the regulatory reform (fire safety) order 2005).

### **2.5 Communication and Information, Reporting and Investigating Fire, and Fire Safety Budget**

To achieve acceptable fire safety in buildings, there should be evidence of written and verbal communication to encourage cooperation and control, which includes dialoguing between management, staff, occupants, and any other

persons. Thus, a suitable relationship with fire and emergency services, which includes notice of materials, changes in the risk outline, and appropriate system/equipment is essential for warning in case of fire.

The report, which investigates and records all fire incidents, is an aspect of the FSM program in which an organization or manager can learn a lesson from the previous fire event to take corrective action in order to avert the subsequent incident. The fire safety budget is an aspect of the FSM program postulated by various fire safety legislation, to ensure that the fire safety system is replaced and maintained as needed. In line with general regulation the world over, there should be evidence of adequate financial budgeting for safety, which includes a fund for fire safety arrangements in building improvement and repair, fire training, and replacement of bad fire equipment (UK Regulatory Reform (Fire Safety) Order 2005).

### **2.6 Research Gap**

Despite existing studies on fire safety preparedness and management in commercial buildings, there is limited research addressing the long-term sustainability and effective implementation of fire safety measures in Nigeria's commercial buildings, particularly within resource-constrained environments. Current studies highlight inadequate fire safety practices and low compliance with safety regulations but do not examine the factors that hinder consistent, sustainable implementation over time. Issues such as lack of training, poor emergency management, and insufficient budgeting are identified as barriers, yet they are not explored in terms of their cumulative impact on sustained fire safety.

Furthermore, there is a need to understand the practical challenges that commercial building owners face in maintaining compliance amidst regulatory and resource constraints specific to Nigeria. Research that addresses these specific limitations would be valuable in providing a clearer understanding of how to improve long-term fire safety management in commercial buildings, especially in regions where enforcement mechanisms and resources are limited. Addressing this gap could yield insights into developing more robust fire safety protocols, ensuring adherence over time, and adapting policies to better suit the realities of resource-limited environments.

### 3. METHODOLOGY

This research utilized a descriptive survey design, gathering data from both primary and secondary sources. This approach was deemed suitable as the study aimed to examine respondents' perspectives on challenges affecting the application of fire safety measures in commercial buildings in Awka, Anambra State.

The study population comprised 213 professionals who are key stakeholders in the construction industry, including 62 architects, 84 structural engineers, and 67 builders (Anambra Secretariat of the Professions, 2023). These groups were selected due to their significant roles in fire safety practices, whether through direct involvement in designing and maintaining fire safety systems or as primary users of such systems. A sample size of 139 was determined using Taro Yamane's formula.

$$n = \frac{N}{1 + Ne^2}$$

Where:

n=sample size,

N=finite population,

e=level of significance

Applying the formula, we have that

$$n = \frac{213}{1 + 213(0.05)^2}$$

$$n = 139$$

The main data collection tool was a structured questionnaire, and the data were analyzed using frequency analysis and the relative importance index (RII). To ensure reliability, Cronbach's alpha was used to assess internal consistency, with a coefficient of 0.70 or above considered acceptable. The pilot test produced a Cronbach's alpha score of 0.82, indicating high consistency in responses and confirming the instrument's reliability for assessing views on fire safety strategies. A 5-point Likert scale is a psychometric response method where respondents can easily answer questions and state their level of agreement in five points. The 5-point Likert scale consists of the below points – (1) Strongly Disagree; (2) Disagree; (3) Undecided; (4) Agree; (5) Strongly Agree. Though narrowed to three points

### 4. RESULTS

The Challenges Affecting the Effectiveness of Improving Fire Safety Measures in Commercial Buildings in Awka, Anambra State. Out of 139 questionnaires distributed, only 114 were successfully filled and returned which is 82% return rate.

**Table 1. Analysis of survey on fire safety in Commercial Buildings in Awka, Anambra State.**

SN	What are the Challenges Affecting the Application of Fire Safety Measures in Commercial Buildings in Awka, Anambra State?	SA/A 3	U 2	SD/D 1	X	Rank
1	Financial constraints are a significant barrier to implementing and maintaining effective fire safety measures in commercial buildings	97	9	7	2.80	3
2	There is lack of technical expertise available to properly install, maintain, and operate fire safety equipment in commercial buildings	93	14	6	2.77	4
3	Communication and Information, Reporting and Investigating Fire, and Fire Safety Budget	99	11	3	2.85	2
4	Regulatory bodies do not adequately enforce fire safety standards and regulations in commercial buildings	102	9	3	2.89	1
5	There is resistance or lack of cooperation from building occupants to participate in fire safety drills and training programs	86	19	9	2.70	5

Key: SA- Strongly Agree/ A- Agree (3), Undecided (2), SD- Strongly Disagree/ D- Disagree (1). X – Mean  
Source: Field Survey and Questionnaire (2024)

## 5. DISCUSSION

Table 1 shows the challenges affecting the effectiveness of improving fire safety measures in commercial buildings in Awka, Anambra State. All challenges received high mean scores (above 2.70), indicating widespread agreement that these issues significantly impact fire safety effectiveness. The top-ranked challenge (mean 2.89) is inadequate enforcement of fire safety standards by regulatory bodies. This suggests a critical gap in oversight that may be undermining overall fire safety efforts. Close behind is the challenge of communication, information, reporting, and budgeting (2.85), highlighting systemic issues in fire safety management.

Financial constraints rank third (2.80), indicating that resource limitations are a major obstacle to implementing effective fire safety measures. Lack of technical expertise (2.77) and resistance from building occupants (2.70) round out the top five challenges, pointing to issues with both professional capacity and public engagement. This suggests that multiple factors are hindering the effective implementation of fire safety measures in commercial buildings in Awka.

## 6. CONCLUSION

The study clearly identifies several critical challenges that are hindering the application of effective fire safety measures. Key challenges identified include financial constraints which was the primary obstacle, limited technical expertise, and inadequate enforcement of fire safety regulations. These factors contribute to the inconsistent application and upkeep of essential fire safety protocols in Awka's commercial buildings. The lack of adequate resources to invest in modern fire safety equipment, combined with minimal enforcement of regulatory standards, creates a vulnerable environment where fire safety measures are either absent or insufficiently maintained.

Moreover, there is limited awareness and preparedness among building occupants, often due to a lack of fire safety training and regular drills. This gap in knowledge and readiness among occupants not only limits the effectiveness of existing safety measures but also impedes swift responses during emergencies. Addressing these issues requires a holistic approach, focusing on the availability of resources, strict regulatory enforcement, and public education on fire safety.

Efforts to overcome these barriers will be crucial in enhancing the overall safety of commercial buildings, reducing fire risks, and ensuring the well-being of occupants and assets. Effective collaboration between regulatory bodies, building owners, and fire safety professionals, along with targeted training and increased investment in fire safety infrastructure, can help bridge these gaps and foster a safer commercial environment in Awka.

## 7. RECOMMENDATIONS

Following the findings of this research, the recommendations are as follows;

1. Enhanced Regulatory Enforcement and Oversight: In response to the issue of weak regulatory enforcement, a dedicated regulatory task force should be established to oversee fire safety compliance in commercial buildings. Regular, unannounced inspections and strict enforcement of fire safety codes are necessary. The task force should impose significant penalties for non-compliance to ensure building owners prioritize fire safety. Strengthening regulatory oversight will create accountability and encourage adherence to fire safety standards.
2. Financial Assistance Programs for Fire Safety Improvements: Addressing financial constraints is essential for enabling building owners to implement effective fire safety measures. The government and financial institutions should collaborate to provide low-interest loans, grants, and tax incentives for commercial building owners. These financial supports can assist owners in investing in essential fire safety equipment, such as automatic sprinklers, fire alarms, and fire-resistant construction materials, which may otherwise be cost-prohibitive.
3. Development of Technical Training and Certification Programs: To tackle the lack of technical expertise, training and certification programs for fire safety system installers and maintenance personnel should be introduced. By equipping local technicians with the knowledge and skills needed for proper installation and maintenance, building owners can access reliable services within the community. This will enhance the effectiveness of fire safety equipment and ensure that systems are properly maintained. Also the building



users should be trained in fire safety measures. This outrightly is cheaper than fire protective devices

4. Improved Communication, Reporting, and Budgeting Systems: Effective fire safety management requires clear communication channels and adequate budgeting for maintenance. Building management should establish protocols for documenting and reporting fire safety incidents, conducting regular audits of fire safety equipment, and planning annual budgets dedicated to safety improvements. Additionally, building owners and managers should establish a strong relationship with local fire and emergency services to ensure that they are promptly informed of risks or incidents.
5. Mandatory Fire Safety Drills and Training for Occupants: To address the resistance or lack of cooperation from occupants regarding fire safety drills, fire safety training should be made mandatory for all occupants of commercial buildings. Regularly scheduled fire drills and evacuation exercises should be required by law, ensuring that occupants are familiar with emergency procedures and confident in using fire safety equipment. By fostering a culture of safety awareness, building occupants will be better prepared to respond in emergencies.
6. Cheaper smoke detectors should be installed to lower the risk of uncontrollable fire outbreaks.
7. Non-flammable materials should be used in constructing the warehouses which should be a little away from the commercial buildings to reduce spread of fire.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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