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Assessment of Fire Safety Preparedness and Risk Management in Caleb University Hostels

Daramola, Oluwatunmise Favour; Bakare, Abiola Joshua; and Owabumowa, Iyioluwa Samuel

Department of Architecture, Caleb University, Imota, Lagos State, Nigeria.

Corresponding author: daramola.oluwatunmise@calebuniversity.edu.ng

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Abstract

Fire safety in university hostels is a critical concern, particularly in developing countries where resources and awareness may be limited. This study evaluates the effectiveness of fire safety measures in student hostels at Caleb University, Lagos, highlighting the current state of fire safety protocols and identifying areas for improvement. Employing a descriptive research design, the study gathered data from 329 respondents, including students and hostel staff, through structured questionnaires and semi-structured interviews. The findings reveal that while basic fire safety measures such as fire extinguishers are present, awareness and confidence in fire safety protocols among students are alarmingly low. A significant percentage of respondents (61.8%) expressed doubts about the effectiveness of existing measures, and only 6.7% reported participating in fire drills or training sessions. Furthermore, the study identified critical weaknesses in the current fire safety protocols, with 56.8% of students having experienced fire-related incidents during their residence. The research underscores the necessity for regular fire safety training, improved equipment maintenance, and enhanced communication of emergency procedures to ensure the safety and preparedness of hostel occupants. Recommendations include implementing mandatory fire drills, increasing the number of safety equipment, and collaborating with local fire authorities to develop comprehensive fire safety programs. This study contributes to the existing literature on fire safety in university settings and emphasizes the need for effective strategies tailored to the unique challenges faced by educational institutions.

Keywords: Caleb University, Emergency Preparedness, Fire Safety, Risk Management, University Hostels.

Introduction

Fire safety is a critical aspect of residential management, especially in university hostels where large numbers of students live in shared spaces (Botchway, Agyekum, Amudjie & Pittri., 2023). Ensuring that effective fire safety measures are in place is vital to protect lives and property. In recent years, there has been a growing concern about fire safety preparedness in educational institutions, particularly in Nigeria, where incidences of fire outbreaks have exposed gaps in risk management and emergency response systems (Adeyanju, Mopa-Egbunu & Olajire., 2024). Caleb University, located in Imota, Lagos, is a rapidly growing private institution with an expanding student population (Daramola,

Babamboni, Owolabi & Ajayi., 2024). The university's hostels, which house hundreds of students, present unique challenges in fire safety management, making it an ideal case for evaluating the effectiveness of current measures. Despite the importance of fire safety in university hostels, many Nigerian universities, including Caleb University, face significant challenges in implementing and maintaining adequate fire safety measures (Nwokeocha., 2023). Students often lack awareness of fire safety procedures, and safety equipment, such as fire extinguishers and smoke detectors, may not be effectively used or maintained (Sholanke, Ekhaese & Ekundayo., 2024). There are also concerns about the adequacy of fire drills and the training provided to students and staff. These gaps in fire safety measures pose serious risks to both the occupants and the infrastructure. This study seeks to evaluate the existing fire safety protocols in Caleb University's hostels and identify areas for improvement. This study focuses on the student hostels at Caleb University, Imota, Lagos, with particular attention to the fire safety measures implemented in these residential facilities. The research will cover male and female hostels, evaluating fire prevention, detection, and emergency response systems. Data will be collected from students and staff residing or working in the hostels, and the analysis will be limited to the fire safety infrastructure and procedures currently in place. The findings of this study are expected to be significant for several stakeholders. For Caleb University, the research will provide a comprehensive assessment of their fire safety measures, highlighting areas that need urgent attention. The recommendations will offer practical solutions for improving fire safety and risk management in the hostels. Furthermore, the study will contribute to the broader discourse on fire safety in Nigerian universities, potentially influencing policies and safety standards in other institutions. Lastly, it will raise awareness among students and staff about the importance of fire safety and their role in ensuring a safe living environment. The aim of this research is to assess the effectiveness of fire safety measures in student hostels at Caleb University, Lagos, and to propose recommendations for enhancing safety protocols.

Research Objectives

i. To assess the current fire safety protocols in Caleb University hostels.
ii. To evaluate the awareness and confidence of students regarding fire safety measures.
iii. To identify specific gaps in fire preparedness and recommend improvements.

Problem Statement

University hostels in Nigeria, like those at Caleb University, face significant fire safety challenges, impacting the security and wellbeing of their student residents. Despite the increasing frequency of fire-related incidents in educational settings, limited attention has been given to comprehensive fire safety preparedness in Nigerian university hostels. The

high density of student populations, combined with inconsistent implementation and maintenance of fire safety protocols, makes these environments particularly vulnerable. Students often lack training in emergency procedures, and hostel infrastructure may not comply with modern fire safety standards, leaving both students and buildings at risk. The absence of a rigorous fire safety protocol, limited awareness among students, and under-maintained safety equipment are major factors that contribute to these risks. This study seeks to address this gap by assessing fire safety preparedness at Caleb University, identifying specific weaknesses in current safety measures, and proposing actionable recommendations for improvement. By focusing on a Nigerian university setting, this research contributes to the existing literature on fire safety in higher education institutions, offering insights that may inform policy adjustments and improve fire safety standards in similar residential academic environments.

Literature Review

Fire Safety Awareness in University Hostels

Fire safety in university hostels is a global concern, particularly in densely populated campuses where students live in close quarters (Babatunde & Samuel., 2024). University hostels often house a diverse population with varying levels of knowledge regarding fire safety protocols, creating a complex environment for fire prevention and risk management. Research has shown that many university students are unaware of basic fire safety measures, such as how to operate a fire extinguisher or respond during an evacuation (Carvalhais, Dias, Costa & Silva., 2023). Additionally, hostel infrastructures, especially in developing countries, may not be adequately equipped with modern fire safety features, further increasing vulnerability to fire outbreaks. Another issue is the age and condition of many university buildings. Older hostels may not comply with current fire safety codes, and renovations are often costly (Botchway., 2023). In countries like Nigeria, universities frequently operate under tight budgets, and fire safety measures may not receive the necessary attention or funding (Amegbor., 2023). Consequently, the combination of outdated facilities and insufficient student training on fire safety can lead to significant risks in the event of a fire.

Overview of Fire Safety Measures

Fire safety measures in university hostels generally consist of both passive and active systems (Adeyanju et al., 2024). Passive fire safety measures are built into the structure of the building and include fire-resistant materials, compartmentation (dividing the building into sections to prevent the spread of fire), and proper emergency exits (Oaikhena & Akande., 2024). Active fire safety systems, on the other hand, include devices such as fire alarms, sprinklers, smoke detectors, and fire extinguishers (Selvan., 2023). Both systems must work in tandem to provide comprehensive fire protection in residential buildings like

student hostels. The effectiveness of these measures largely depends on their maintenance and proper use. For example, fire extinguishers must be serviced regularly, and students need to be familiar with how to operate them. Smoke detectors and fire alarms must be tested frequently to ensure they are in working condition. Unfortunately, research suggests that many hostels, particularly in developing nations, struggle to maintain these systems. Limited resources and technical expertise can result in outdated or malfunctioning equipment, which severely compromises the safety of residents (Yang & Lin., 2024).

Risk Management strategies in University Hostels

Effective risk management in university hostels involves a systematic approach to identifying, evaluating, and controlling potential fire hazards (Obida & Aminu., 2023). This process begins with regular fire safety audits to identify risks, such as faulty wiring, blocked exits, or improper use of cooking appliances. Additionally, universities must implement strict fire safety policies, enforce regulations, and provide clear signage that directs students toward emergency exits (Orono., 2022). Comprehensive risk management should also include regular fire drills to ensure that students and staff are well-prepared to respond to a fire emergency. Another critical aspect of risk management is ensuring that fire safety training is integrated into hostel orientation programs (Obida., 2022). Students should be educated on fire hazards, proper use of safety equipment, and evacuation procedures. In many cases, students are unaware of how to respond to a fire because they are not adequately trained (Wulandari, Budijanto, Bachri & Utomo., 2023). Moreover, it is essential that university administrators and hostel staff are properly trained to oversee fire safety protocols and assist students during emergencies. Collaboration with local fire services can enhance risk management efforts, ensuring that the university complies with national fire safety standards (Echavaria & Espiritu., 2024).

Challenges in Fire Safety Implementation

One of the main challenges in implementing fire safety measures in university hostels is funding (Chmiel, Chmiel & Smyk., 2023). Fire safety equipment, such as sprinkler systems and smoke detectors, can be expensive to install and maintain. In many cases, universities prioritize other infrastructural needs over fire safety, leading to gaps in preparedness (Waryoba & Mung'ong'o., 2023). Additionally, administrative inefficiencies can lead to delayed or inadequate safety inspections, allowing potential fire hazards to go unnoticed until it is too late (Karaburun., 2023). A lack of government oversight and enforcement of fire safety regulations also exacerbates the issue. Furthermore, student behavior can present challenges. Many students may ignore fire safety guidelines, block emergency exits, or misuse fire extinguishers (Muiruri., 2023). Overcrowding in hostels also presents a serious challenge, as it increases the potential for fire incidents and makes evacuation more difficult. In developing countries, fire safety measures may be further compromised by

unreliable power supplies, which can affect fire detection systems and emergency lighting during a fire outbreak (. Varshini., 2024).

Theoretical Framework: The Fire Triangle and Compartmentation

The fire triangle is a basic theoretical model used to explain the conditions necessary for a fire to start (Mohammed, Kadhom, Oladoye & Yousif., 2023). It consists of three elements: heat, fuel, and oxygen. Removing any one of these elements will prevent a fire from igniting or spreading. For example, fire safety systems like sprinklers work by removing heat, while fire extinguishers work by cutting off oxygen. Understanding the fire triangle is essential for developing effective fire safety measures, as it provides the foundation for designing systems that can prevent or control fires in university hostels (Amegbor., 2023). Compartmentation, on the other hand, is a fire safety strategy that involves dividing a building into separate sections or compartments (Hassan., 2023). These compartments are designed to contain a fire within a limited area, preventing it from spreading to other parts of the building. This is particularly important in large buildings like university hostels, where the spread of fire can have catastrophic consequences. Compartmentation is achieved by using fire-resistant walls, floors, and doors, as well as strategically placing fire doors and escape routes. Together with the fire triangle, these concepts form the theoretical basis for fire safety design and management in university environments.

Gaps in Existing Research

Although there is a growing body of literature on fire safety in residential buildings, specific research on fire safety in university hostels, particularly in Nigeria, remains limited. Much of the existing research focuses on commercial or industrial buildings, which have different fire safety needs compared to residential hostels. Additionally, studies on student behavior in relation to fire safety are scarce, making it difficult to develop targeted fire safety education programs for university students. Another significant gap is the lack of data on the effectiveness of fire safety drills and training in Nigerian universities. While research in other countries has demonstrated the importance of regular drills in improving fire response, little is known about how often drills are conducted in Nigerian hostels or how effective they are in preparing students for fire emergencies. Furthermore, there is a need for research on how socio-economic factors, such as limited resources or overcrowding, impact fire safety in university hostels. Addressing these gaps could lead to more effective fire safety strategies tailored to the specific challenges faced by universities in Nigeria and other developing countries.

Methodology

This study employs a descriptive research design to assess the effectiveness of fire safety measures in Caleb University's student hostels. A descriptive design is suitable for this study

because it allows for the systematic collection and analysis of data to describe the current state of fire safety protocols and their adequacy in preventing and managing fire incidents. The research also incorporates both qualitative and quantitative methods, using surveys to gather numerical data from students and interviews to collect detailed insights from hostel staff. This mixed-methods approach ensures a comprehensive understanding of the research problem.

The population for this study comprises students residing in Caleb University's hostels, particularly those in Elisha and Joseph Halls, as well as key hostel staff members responsible for managing fire safety protocols. A stratified random sampling technique was used to ensure representation from both male and female hostels. The sample includes 329 students who have resided in the hostels for at least six months, as they are more likely to have adequate knowledge of the existing fire safety measures. Additionally, purposive sampling was employed to select hostel managers and staff for qualitative interviews, as they possess specific knowledge regarding fire safety operations within the university. The primary data for this study was collected using structured questionnaires and semi-structured interviews. The questionnaires were distributed to the selected students, focusing on their awareness of fire safety measures, their experience with fire drills, and their confidence in responding to a fire emergency. The semi-structured interviews were conducted with hostel staff to gather information about the existing fire safety systems, challenges they face in implementing safety protocols, and their suggestions for improvement. This study faced several limitations. First, it focused solely on Caleb University, limiting the generalizability of the findings to other institutions. While the results offer valuable insights, they may not fully apply to universities with different infrastructural and administrative conditions. Second, the study relied heavily on self-reported data from students, which may be subject to bias, particularly in terms of their knowledge and awareness of fire safety. Finally, the relatively short data collection period may not capture long-term trends in fire safety management, which could fluctuate over time due to changes in policies, infrastructure, or student population. Despite these limitations, the study provides a solid foundation for understanding fire safety issues in Nigerian university hostels.

Results and Discussion

This section presents the findings of the study, focusing on the analysis of fire safety measures in student hostels at Caleb University. The results are based on data collected from 329 respondents, highlighting their awareness, perceptions, and confidence in existing fire safety protocols. The discussion further examines the adequacy of these measures in protecting hostel occupants, identifies key weaknesses in current practices, and explores recommendations provided by the respondents for improving fire safety. A

comparison with established best practices is also made to assess the alignment of Caleb University's fire safety measures with global standards.

The study collected data from a total of 329 respondents, consisting of students residing in Elisha Hall and Joseph Hall at Caleb University. The demographic breakdown revealed that 175 participants were from Elisha Hall, while 154 were from Joseph Hall. Among the respondents, 60% were female and 40% were male. The majority of respondents were in the age group of 18 to 22 years, representing the typical demographic of university students. Table 1 summarizes the demographic characteristics of the participants.

Table 1: Demographic Information of Respondents

Demographic Characteristics	Frequency	Percentage
GENDER		
Female	197	60%
Male	132	40%
AGE GROUP		
18-22 years	295	89.7%
23-25 years	34	10.3%
HALL OF RESIDENCE		
Elisha Hall	175	53.2%
Joseph Hall	154	46.8%

Source: Authors fieldwork

Table 2 provides an overview of the fire safety measures recognized by the respondents. The analysis of fire safety measures implemented in the hostels revealed a range of practices currently in place. The majority of respondents (96.6%) reported awareness of fire extinguishers within their hostels. However, only 51.7% confirmed the presence of emergency exit signs, and a mere 17.2% noted adequate lighting in hallways. This aligns with the study's first objective: to assess the current fire safety measures in place. The low availability of key safety indicators, such as emergency signage and hallway lighting, reveals critical gaps that undermine students' preparedness and safety during potential fire incidents. Additionally, the data indicated that 93.3% of respondents had never participated in fire drills or safety training sessions.

Table 2: Analysis of Fire Safety Measures in Hostels

Fire Safety Measures	Frequency	Percentage
Fire extinguishers	318	96.6%
Emergency exit signs	170	51.7%
Adequate lighting in hallways	57	17.2%
Participation in fire drills	22	6.7%

Source: Authors fieldwork

Table 3 illustrates the respondents' confidence levels regarding fire safety measures. When evaluating the adequacy of the existing fire safety measures, 61.8% of respondents expressed low confidence in the effectiveness of these measures in protecting occupants during a fire incident. Only 5.7% felt that the current safety protocols were reliable. This indicates a significant concern regarding the ability of the hostels to safeguard students during emergencies. This finding is directly related to the study's second objective, which seeks to evaluate student awareness and confidence in emergency response. The lack of hands-on experience with safety drills highlights a serious deficiency in student preparedness, which could hinder effective evacuation during an emergency.

Table 3: Adequacy of Fire Safety Measures in Protecting Occupants

Confidence in Fire Safety Measures	Frequency	Percentage
Not at all confident	203	61.8%
Somewhat confident	87	26.5%
Moderately confident	19	5.7%
Very confident	20	6.0%

Source: Authors fieldwork

Several weaknesses in the current fire safety protocols were identified through the survey. Notably, 56.8% of respondents reported having experienced a fire-related incident during their stay in the hostels, raising concerns about the effectiveness of existing measures. Moreover, 89.2% of participants believed that improvements were necessary in the fire safety protocols. Table 4 summarizes the reported experiences and perceptions regarding fire safety weaknesses.

Table 4: Identified Weaknesses in Fire Safety Protocols

Weaknesses in Fire Safety Protocols	Frequency	Percentage
Experienced a fire-related incident	187	56.8%
Belief that improvements are needed	294	89.2%
No improvements needed	35	10.8%

Source: Authors fieldwork

Table 5 presents the data on respondents' confidence in their fire emergency response abilities. The respondents demonstrated varying levels of confidence in their ability to respond effectively during a fire emergency. Approximately 52.8% of participants indicated a lack of confidence in their skills to react appropriately in such situations, while only 8.3% reported being "very confident." This lack of confidence is concerning, as it reflects inadequate preparation and awareness among students regarding fire emergencies. This finding reflects the third objective, which aims to identify weaknesses in current fire safety

protocols. The general lack of confidence among students underscores the need for more rigorous training and reliable equipment, as proposed in the study's recommendations.

Table 5: Respondents' Confidence in Fire Emergency Response

Confidence in Fire Emergency Response	Frequency	Percentage
Not confident	174	52.8%
Somewhat confident	83	25.0%
Moderately confident	46	13.9%
Very confident	27	8.3%

Source: Authors fieldwork

In the quest for improved fire safety measures, respondents offered various recommendations. Common suggestions included conducting regular fire drills (mentioned by 90% of participants), increasing the number of fire extinguishers and smoke detectors, and ensuring clear and accessible emergency exit routes. Additionally, many respondents emphasized the importance of fire safety training for both students and staff. Table 6 summarizes the key recommendations made by respondents.

Table 6: Recommendations from Respondents for Improved Safety

Recommendations for Improved Safety	Frequency	Percentage
Conduct regular fire drills	297	90.0%
Increase number of fire extinguishers	210	63.8%
Improve smoke detector availability	215	65.4%
Ensure clear emergency exit routes	190	57.7%
Provide fire safety training	245	74.6%

Source: Authors fieldwork

Comparison with Best Practices in Fire Safety

When comparing the findings of this study with established best practices in fire safety, it is evident that significant gaps exist in the implementation of effective fire safety measures in Caleb University's hostels. Best practices recommend a comprehensive fire safety plan that includes regular training, equipment maintenance, and the incorporation of advanced detection systems, none of which were adequately addressed in the current protocols. For instance, regular fire drills and training programs are crucial in ensuring that residents know how to respond to emergencies. The lack of participation in drills at Caleb University starkly contrasts with best practice guidelines, which advocate for frequent training to enhance students' preparedness and confidence in emergency situations. This comparison underscores the urgent need for the university to adopt a more proactive approach to fire safety management, aligning with best practices to ensure the safety of its residents.

Conclusion and Recommendation

Conclusion

This study assessed the effectiveness of fire safety measures in student hostels at Caleb University, highlighting significant gaps in current practices and the need for urgent improvements. The findings indicate that while some basic fire safety measures, such as the presence of fire extinguishers, are acknowledged by students, there is a concerning lack of awareness regarding other critical safety protocols. Many respondents expressed low confidence in the adequacy of existing measures to protect occupants during a fire, revealing a pervasive sense of vulnerability among students. Furthermore, the limited participation in fire drills and safety training underscores the necessity for a comprehensive approach to fire safety management. Overall, the research emphasizes that enhancing fire safety measures is vital for ensuring the well-being of students and safeguarding university property.

Recommendations for Fire Safety Improvements

To address the identified deficiencies in fire safety measures, several recommendations are proposed. First, Caleb University should implement regular fire drills and safety training programs for all hostel residents to familiarize them with emergency procedures and equipment use. Increasing the number of fire extinguishers and smoke detectors throughout the hostels is also essential, along with ensuring that all safety equipment is regularly inspected and maintained. Additionally, improving the visibility and accessibility of emergency exit routes and signage will enhance the safety of residents during emergencies. Collaboration with local fire services can provide valuable insights and assistance in developing effective fire safety protocols tailored to the specific needs of the university. By prioritizing these improvements, Caleb University can significantly enhance the safety and preparedness of its student hostels.

Contribution to Knowledge

This study contributes to the body of knowledge on fire safety in university settings, particularly within the context of Nigerian institutions. By focusing on the unique challenges faced by student hostels at Caleb University, the research provides a comprehensive assessment of current fire safety measures and highlights the gaps that need to be addressed. The findings serve as a valuable resource for university administrators, policymakers, and safety professionals seeking to improve fire safety standards in educational facilities. Furthermore, this research raises awareness among students regarding the importance of fire safety and their role in fostering a secure living environment.

Suggestions for Future Research

Future research should expand the scope of this study by exploring fire safety measures in a broader range of Nigerian universities to identify common challenges and best practices across different contexts. Investigating the long-term impact of implemented fire safety improvements on student awareness and emergency response effectiveness would also provide valuable insights. Additionally, examining the role of technological advancements, such as smart fire detection systems and automated alarm responses, could enhance understanding of modern fire safety solutions. By addressing these areas, future research can contribute to the ongoing development of effective fire safety strategies tailored to the needs of university populations.

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