Medox Journal of Public Health

Homepage: https://journals.medoxhrc.org/index.php/mjph

Original Article

Assessment of Fire Disaster Preparedness and Situation Analysis in Higher Learning Institution Students' Dormitories in Unguja, Zanzibar

Ali Omar Rashid[1*], Mustapha Akajewole Masud[2], Rahibu Abdalla Abass[3]

[1]*Department of Allied Health, State University of Zanzibar*
[2]*Department of Anatomy, State University of Zanzibar*
[3]*Department of Natural Sciences, State University of Zanzibar*

Article history: *Received: 13 Aug 2026 | Revised: 20 Sep 2026 | Accepted: 27 Sep 2026 | Published online: 02 Oct 2026*

**** Corresponding author:*** *Ali Omar Rashid | Email: aliomarashid5@gmail.com*

ABSTRACT

Background: Fire disaster preparedness is essential for protecting students living in dormitories in higher learning institutions. However, inadequate training, limited access to firefighting equipment, and insufficient awareness of fire safety regulations may compromise emergency response. This study assessed fire disaster preparedness among students residing in dormitories of higher learning institutions in Unguja, Zanzibar, Tanzania.

Materials and Methods: A cross-sectional study was conducted in seven higher learning institutions in Unguja. Data were collected from 420 students using a structured online questionnaire administered through KoboToolbox and from seven dormitory managers. Convenience sampling was used to recruit student participants. Descriptive statistics were generated using SPSS version 25, and Chi-square tests were used to examine associations between firefighting training and selected preparedness-related indicators, with statistical significance set at $p < 0.05$.

Results: Of the 420 student respondents, 50.5% were male and 49.5% were female. About 62.1% knew the fire brigade emergency number and 73.3% could recognize a fire alarm, 55.2% had never received fire safety training and 83.7% had never participated in fire drills. Approximately 70.2% reported the availability of firefighting resources, 51.7% reported being able to access them, and 55.5% considered them adequate. Five of the seven institutions had installed fire extinguishers, of which two institutions had expired extinguishers among those assessed. Approximately 67% of respondents reported adequate evacuation routes, while 54.5% were unaware of fire safety regulations. Chi-square analysis showed statistically significant associations between firefighting training and identification of firefighting sources ($p = 0.013$), awareness of safety regulations ($p < 0.001$), and knowledge of the public fire rescue number ($p = 0.015$). No statistically significant association was observed between firefighting training and firefighting familiarity ($p = 0.640$).

Conclusion: Fire disaster preparedness in the surveyed student dormitories was characterized by gaps in training, participation in fire drills, access to firefighting resources, and awareness of fire safety regulations. Regular fire safety training, practical evacuation drills, routine equipment inspection, and improved communication of institutional safety procedures are needed to strengthen preparedness.

Keywords: Fire Safety, Disaster Preparedness, Student Dormitories, Firefighting, Institutions, Zanzibar.

Cite this article as: *Rashid AO, Masud MA, Abass RA. Assessment of Fire Disaster Preparedness and Situation Analysis in Higher Learning Institution Students' Dormitories in Unguja, Zanzibar. Medox J Public Health. 2026;1(2):e7. https://doi.org/10.66531/mjph.2026.v1i2.e7*

© The Author(s) 2026. Published by Medox Healthcare and Research Centre Limited, Dodoma, Tanzania.
Open Access. *This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, sharing, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source.*

INTRODUCTION

Disaster preparedness is a vital component of disaster risk reduction (DRR), but more often communities fail to prepare for disasters adequately [1]. Despite its importance, less has been done globally to improve the levels of disaster preparedness [2]. Fire safety preparedness is a continuous process of planning, organizing, training, equipping, exercising, evaluating and improving strategies to ensure effective coordination and enhancement of capabilities to respond to fire disasters. Incidents of fire in student dormitory have been happening worldwide, and many countries are being affected by fire disasters, though the magnitude and severity of fire disasters differ from one country to another and the levels of awareness and preparedness differ. A variety of factors affect fire disaster preparedness in student dormitories. These include knowledge and training, availability of firefighting resources, and fire policies [3].

Fires result in over 300,000 deaths annually and are the fourth most common reason for accidental injury in the world (behind traffic, falls, and drowning) [4]. It is quite alarming that high-density living environments such as the college dormitory building bring about serious personal injuries, loss of property, and social impacts as the experiences with fire incidents demonstrate [5]. Fire disaster response in this context is defined as actions taken beforehand to eliminate or minimize the effects of disasters. This comprises forecasting, probable prevention, suitable responses, as well as suitable strategies of managing the impacts. Such prevention and reduction with proper responses is much related to the public awareness degree and the quality and number of auxiliary facilities provided [6].

Fire disaster preparedness can be built up by increasing and bettering the community-related capacities, knowledge, and prevention mechanisms. Knowing the levels of preparedness can help the disaster management process and guarantee the correctness of the given plans and decisions. However, poor disaster preparedness, as pointed out in some types of disasters including floods and landslides, hurricanes, earthquakes, and fires, has consequences that negatively affect economic and social life. Consequently, preparedness is adopted as one of the key factors in attaining sustainable disaster management.

Various studies indicate that, poor knowledge of students and staff, stressing on the lack of systematic outlooks for fire safety training [7]. Lack of fire control knowledge and training low safety awareness among students in university dormitories, highlighting the need for improved training and awareness to enhance fire disaster preparedness and safety measures within these environments [8]. Some of the research focuses on the poor knowledge of students and staff, stressing on the lack of systematic outlooks for fire safety training [7]. Research shows that outdated equipment can lead to catastrophic outcomes during emergencies [6].

Many dormitories lack adequate firefighting equipment [9]. Research indicates that compliance with regulations significantly reduces the incidence of fire-related injuries and fatalities in dormitories [10]. According to Hostetter & Naser, (2024) people with disabilities are particularly vulnerable in building fires [11]. According to Rana et al., (2025), inadequate measures fail to meet standard regulations, increasing vulnerability during fires [12]. This article assesses fire disasters preparedness among dormitory users of the higher learning institutions in Unguja Zanzibar, Tanzania. Previous studies have identified several factors influencing fire disaster preparedness, including the availability and condition of firefighting facilities, compliance with safety regulations, and students' and dormitory managers' awareness and training. The study highlights important and relevant factors for the prevention of fire disasters in dormitories and reveals the supportive capacity of the institution and highlights the ability to render appropriate responses in case of fire outbreak.

MATERIALS AND METHODS

Study Area

Seven higher learning institutions or campuses were included in the study: State University of Zanzibar's School of Agriculture (SoA), School of Health and Medical Sciences (SHMS), School of Kiswahili and Foreign Language (SKFL), School of Business (SoB), Abdurahman SUMAIT University, Zanzibar University (ZU), and Karume Institute of Science and Technology (KIST). The institutions were selected based on the availability of student dormitory facilities and their relevance to the study objectives.

Study Design and Collection Technique

A cross-sectional study was considered to meet research objectives. Data were collected at a single time point. Data were collected using structured questionnaires administered to students through an online KoboToolbox link.

Sample Size and Sampling Procedure

A convenience sampling method was used to recruit student participants from the selected higher-learning institutions in Unguja, Zanzibar. Students residing in the selected dormitories who were available and willing to participate during the data collection period were invited to complete an online questionnaire administered through a KoboToolbox link. A total of 420 students participated in the survey. In addition, seven dormitory managers, one from each participating institution, were included to provide information on dormitory-level fire safety preparedness and the availability of firefighting facilities.

The required sample size for students was estimated using Yamane's formula for a known population, expressed as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n= Sample size

N= Population size (2,464)

e= Margin of error (5% or 0.05)

Substituting the values:

$$n = \frac{2464}{1 + 2464(0.05)^2}$$

$$n = \frac{2464}{7.16} \approx 344$$

The calculated minimum sample size was approximately 344 students. However, 420 students participated in the survey, exceeding the estimated minimum. The seven dormitory managers were included separately to provide additional information on fire safety preparedness and firefighting facilities at the institutional level.

Convenience sampling was adopted because recruitment depended on students' accessibility and willingness to participate during the data collection period, while the online questionnaire facilitated participation across multiple institutions within the available time and resources. The findings should nevertheless be interpreted cautiously because non-probability sampling may introduce selection bias and limit the generalizability of the results to all students residing in higher-learning institution dormitories in Unguja.

Study Variables and Data Analysis

Fire disaster preparedness was assessed using several indicators covering students' knowledge, training, practical experience, awareness of fire safety regulations, knowledge of emergency contacts, ability to identify firefighting resources, and reported confidence in responding to a fire emergency. Additional indicators assessed the availability, accessibility, adequacy, and visibility of

firefighting resources, as well as institutional evacuation arrangements, assembly points, accessibility for persons with disabilities, and the condition of stairwells. The questionnaire responses were summarized using frequencies and percentages. For inferential analysis, firefighting training status was examined in relation to selected preparedness-related indicators using the Chi-square test of association at the 5% significance level.

RESULTS

Table 1 indicates that 50.5% of respondents were male and 49.5% were female, reflecting a well-balanced gender distribution in the study. Many participants (23.8%) came from Abudulrahman SUMAIT University, while the lowest representation was from Kurume Institute of Science and Technology (KIST) at 8.6%. In terms of academic level, most students (64%) were enrolled in bachelor's degree programs, followed by diploma students at 34.8%, and a small proportion (1.2%) pursuing certificate courses. By year of study, second-year students formed the largest group, accounting for 52.6% of those residing in dormitories.

Table 1: Demographic Characteristics of Respondents (N = 420)

Demographics category	Frequency (n)	Percent (%)
Gender		
Female	208	49.5
Male	212	50.5
Institution		
KIST	36	8.60
SHMS	62	14.8
SKFL	57	13.6
SOA	50	11.9
SOB	66	15.7
SUMAIT	100	23.8
ZU	49	11.7
Study level		
Certificate	5	1.2
Diploma	146	34.8
Bachelor	269	64.0
Year of study		
First year	97	23.1
Second year	221	52.6
Third year	94	22.4
Fourth year	8	1.9

Concerning students' knowledge, training, and confidence in handling fire emergencies within dormitories, the study revealed that 62.1% of respondents knew the fire brigade emergency number, and 73.3% could recognize the sound of fire alarms. However, 55% had never received training on fire emergency procedures, and 83.7% had not participated in any fire drills. Furthermore, 79.3% of students reported lacking confidence in their ability to respond effectively during an actual fire incident, highlighting weaknesses in institutional safety programs where training and drills are insufficiently conducted. Overall, the results point to a considerable gap in practical preparedness and confidence, despite a moderate level of awareness regarding fire emergency contacts and alarm recognition.

About the availability and accessibility of firefighting resources, Figure 1 indicates that about 70% of students reported the presence of such equipment in their dormitories. However, only 52% stated they could access these resources, and around 56% felt the equipment available was adequate.

Additionally, 64% of students knew the locations of the firefighting resources, while just 47% noted the presence of clear signage at those locations. These findings suggest that although institutions provide basic firefighting equipment, there remain considerable gaps in terms of adequacy, accessibility, and visibility of these resources.

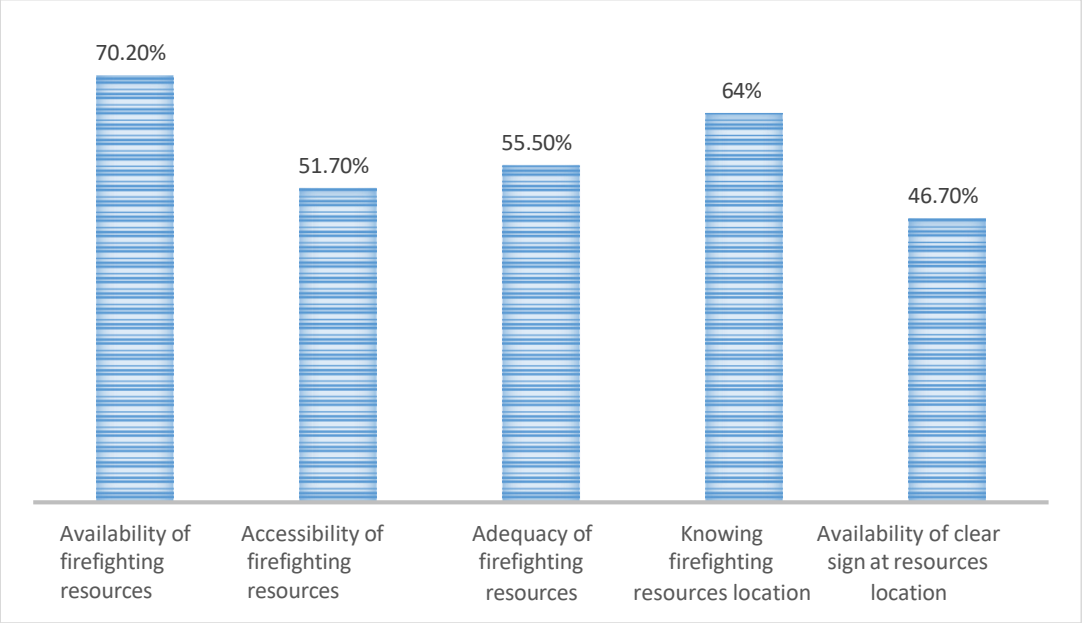


Figure 1: Ratings on Availability and Accessibility of Firefighting Resources in Dormitories

Regarding the availability and functionality of firefighting equipment (fire extinguishers) in students' dormitories, the study found that 5 out of 7 institutions (71.4%) had installed fire extinguishers, while 2 institutions (28.6%) lacked them entirely. The absence of such equipment in some dormitories raises concerns about preparedness and the ability to respond promptly in case of a fire outbreak. This underscores the need for institutions to ensure the provision of basic fire safety tools to strengthen emergency readiness and safeguard lives and property. Moreover, in assessing the validity of the installed extinguishers, results showed that 3 out of 5 (60%) were still functional, whereas 2 out of 5 (40%) had expired. This indicates potential risks regarding the reliability and effectiveness of firefighting equipment during emergencies. Therefore, the findings emphasize not only the necessity of installing fire extinguishers but also the importance of regular maintenance and inspections to ensure they remain in proper working condition. Effective safety infrastructure requires both availability and functionality.

In terms of institutional readiness and compliance with fire safety regulations, Figure 2 indicates that approximately 67% of students reported the presence of sufficient fire evacuation routes, while 33% indicated that their dormitories lacked adequate routes. Additionally, about 58% noted the availability of dedicated evacuation paths for individuals with disabilities, whereas 42% reported their absence, leaving such individuals vulnerable during fire emergencies. Regarding assembly points, nearly 72% of respondents confirmed their existence, while 28% stated otherwise. Furthermore, 41% indicated that stairwells were free from obstructions, but 59% observed blockages, which could severely hinder evacuation and increase the risk of disaster during a fire. When asked about awareness of fire safety regulations, 54.5% of respondents admitted being unaware, highlighting the urgent need for stronger communication and training on institutional fire safety protocols.

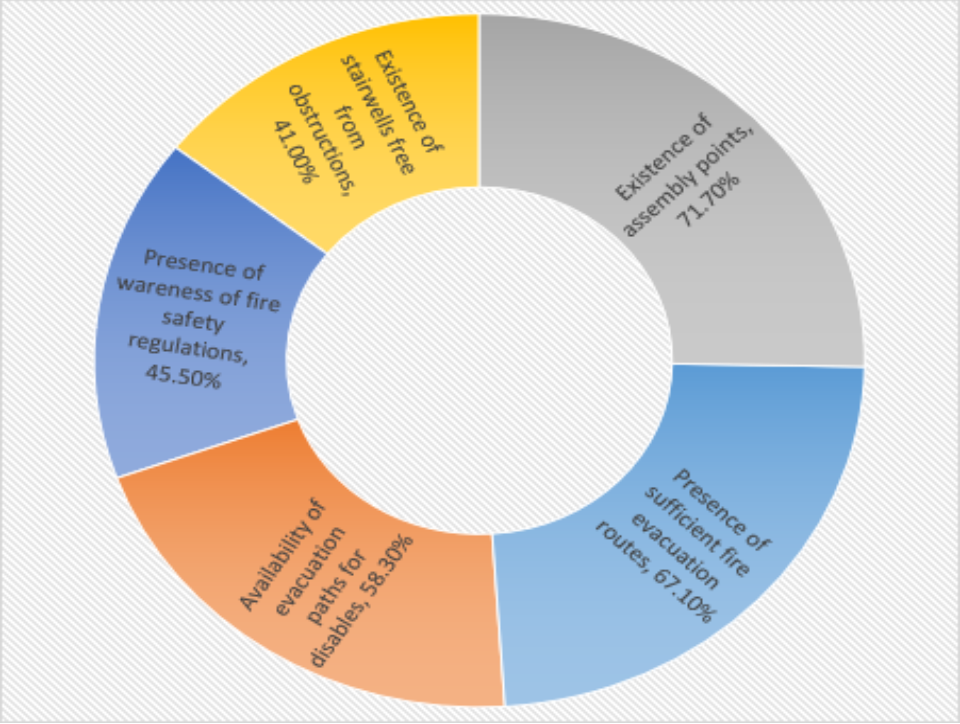


Figure 2: Institutional Readiness and Compliance with Fire Safety Regulations

Table 2 shows a statistically significant association between students' ability to identify firefighting sources and the firefighting training (p=0.013<0.05). This indicates a statistically significant association between firefighting training and the ability to identify firefighting resources.

Table 2: Association Between Variables and Firefighting Training for Observed Responses

Variables	**Responses n (%)**	**Firefighting training n (%)**		**Chi-square test**	
		YES	NO	χ^2 value	p-value
Identification of firefighting sources	YES	149 (35.5)	159 (37.9)	6.104	0.013
	NO	39 (9.3)	73 (17.4)		
Firefighting familiarity	YES	38 (9.0)	231(55.0)	0.890	0.640
	NO	16 (3.8)	109 (26.0)		
Awareness of safety regulations	YES	38 (9.0)	153 (36.4)	13.053	< 0.001
	NO	18 (4.3)	211 (50.2)		
Knowing public fire rescue	YES	43 (10.2)	218 (51.9)	8.889	0.015
	NO	13 (3.1)	146(34.8)		

The Chi-square analysis demonstrated statistically significant associations between firefighting training and identification of firefighting sources (χ^2 = 6.104, p = 0.013), awareness of safety regulations (χ^2 = 13.053, p < 0.001), and knowledge of the public fire rescue number (χ^2 = 8.889, p = 0.015). In contrast, no statistically significant association was observed between firefighting training and firefighting familiarity (χ^2 = 0.890, p = 0.640). These findings indicate that students who had received firefighting training differed significantly in their distribution of knowledge and awareness indicators compared with those who had not received training. However, because the analysis was based on cross-sectional data, these associations should not be interpreted as causal relationships.

DISCUSSION

The findings of this study reveal significant gaps in fire disaster preparedness within higher learning institution dormitories in Unguja, Zanzibar. While some level of awareness and firefighting resources were reported, the results highlight that these measures are insufficient to guarantee effective emergency response in the event of a fire outbreak. More than half of the respondents (55.2%) had never received training, and 83.7% had never participated in fire drills. This lack of practical preparedness undermines confidence in handling emergencies, as shown by nearly 80% of students expressing low confidence in responding effectively. These findings are consistent with studies by [7,8], which also reported inadequate fire safety training and poor safety consciousness among students in university dormitories. The study further revealed limitations in the availability, accessibility, and validity of firefighting resources. Although 70.2% of students acknowledged the presence of equipment, only 55.5% considered them adequate, and observation confirmed that some equipment was expired or missing. Such shortcomings increase vulnerability during emergencies, aligning with Kihila, 2017 [6], who emphasized that outdated or poorly maintained equipment can lead to catastrophic outcomes. Institutional compliance with fire safety regulations also emerged as a concern. While most respondents reported sufficient evacuation routes (67.1%) and designated assembly points (71.7%), nearly half indicated that stairwells were obstructed, and 41.7% noted a lack of accessible routes for individuals with disabilities. These findings are consistent with those of Hostetter and Naser (2024), who emphasized the heightened risks faced by persons with disabilities during fire emergencies [11]. Furthermore, the lack of awareness of fire safety regulations among 54.5% of students suggests weak communication and enforcement of policies, consistent with findings by [10], which demonstrated that regulatory compliance reduces fire-related injuries and fatalities.

Overall, the study highlights that while some infrastructure and awareness exist, the absence of systematic training, inadequate maintenance of equipment, and poor enforcement of safety standards severely undermine fire preparedness in student dormitories. This reflects broader global patterns where disaster preparedness is often neglected despite its recognized importance [2]. Strengthening institutional fire safety policies, regular training, and systematic monitoring are therefore essential to build resilience, safeguard lives, and minimize property damage in higher learning institutions. The results align with existing literature, which emphasizes that inadequate training, insufficient maintenance of safety infrastructure, and poor awareness of regulations significantly heighten vulnerability to fire-related disasters in communal living spaces [6,7]. The findings reveal that identification of firefighting sources, awareness of safety regulations, and knowledge of the public fire rescue number are all significantly linked with students' preparedness for fire emergencies. However, familiarity with firefighting equipment alone showed no statistically significant association, implying that without proper training and drills, familiarity may not equip students with the necessary confidence or skills to act effectively in real emergencies.

STRENGTHS AND LIMITATIONS

This study provides an assessment of fire disaster preparedness in student dormitories across seven higher learning institutions in Unguja, Zanzibar. The inclusion of 420 students and seven dormitory managers provided information on students' knowledge, training, confidence, access to firefighting resources, and institutional fire safety arrangements. The study also examined several aspects of preparedness, including awareness of fire safety regulations, knowledge of emergency contacts, availability and accessibility of firefighting equipment, evacuation routes, assembly points, and provisions for persons with disabilities. The use of both descriptive statistics and Chi-square tests enabled the researchers to describe preparedness-related conditions and examine associations between firefighting training and selected indicators.

This study has several limitations. First, convenience sampling was used, and participation depended on students' accessibility and willingness to complete the online questionnaire. This may have introduced selection bias and limits the generalizability of the findings to all students residing in higher learning institution dormitories in Unguja. Second, student-level information was self-reported and may have been affected by recall or social desirability bias. Third, the cross-sectional design captured preparedness-related conditions at a single point in time and therefore does not

allow causal relationships to be established. Finally, the assessment covered seven participating institutions and may not represent all higher learning institutions in Zanzibar. These limitations should be considered when interpreting the findings.

CONCLUSION

Fire disaster preparedness in higher learning institution dormitories in Unguja, Zanzibar, remains inadequate despite the availability of some firefighting resources and existing safety awareness. More than half of the students had never received fire safety training or participated in fire drills, limiting their confidence and readiness to respond to emergencies. In addition, insufficient, expired, or poorly maintained firefighting equipment and weak compliance with fire safety regulations further compromised dormitory safety. Preparedness was significantly associated with the ability to identify firefighting resources, awareness of fire safety regulations, and knowledge of public fire rescue contacts. However, familiarity with firefighting equipment alone showed no statistically significant association with preparedness. These findings highlight the need for strengthening fire safety preparedness by conducting regular training and fire drills, maintaining firefighting equipment, improving evacuation routes, raising awareness of safety regulations, and collaborating with fire and rescue authorities to ensure regular safety inspections and compliance with fire safety standards.

DECLARATIONS

Ethical Approval: The research proposal was reviewed and approved by the SUZA-SHMS Research Committee, followed by ethical clearance from the Zanzibar Health Research Ethics Committee (ZAHREC) (Ref. No. ZAHREC/02/ST/FEB/2025/88). Permission to access the study sites and collect data was also obtained from the respective universities and colleges.

Informed Consent: Written informed consent was obtained from all participants prior to data collection.

Consent for Publication: Not applicable.

Conflict of Interest: The authors declare no conflict of interest.

Funding: This research received no external funding.

Authors' Contributions: Study concept and design: AOR, MAM. Data collection, organization and initial manuscript development: AOR. Manuscript development and editing and revision: MAM. Data analysis, active manuscript revision and editing: RAA. All authors read and approved the final manuscript.

Data Availability: The datasets generated and analyzed during this study are not publicly available due to ethical and confidentiality restrictions. However, they may be obtained from the corresponding author upon reasonable request, subject to approval by the relevant ethics committee.

Acknowledgments: We thank Zanzibar Health Research Institute (ZAHRI) for granting permission.

REFERENCES

1. Adhikari M. Modelling earthquake hazard preparedness during recovery in Nepal (Doctoral dissertation, Massey University); 2018. Available from: https://mro.massey.ac.nz/items/ab64a00c-9da0-44d4-b0b2-28e2b7fe1dd9. Accessed 20 January 2025.
2. Paton D, McClure J. Preparing for disaster: building household and community capacity. Springfield (IL): Charles C Thomas Publisher; 2013. Available from: https://www.researchgate.net/publication/267270317_Preparing_for_Disaster_Building_Household_and_Community_Capacity. Accessed 21 January 2025.
3. Mutua EM. School-Based Factors Influencing Fire Safety Preparedness in Public Secondary Schools in Lower Yatta Sub-County, Kenya. [PhD thesis]. Nairobi: University of Nairobi; 2016. Available from: https://erepository.uonbi.ac.ke/items/15e0df4f-90fd-435e-aec9-777057c11479. Accessed 21 January 2025.
4. Silas A, Yusuf D, Kamaldeen J, Isaac A. Urban fire safety management and preparedness: case study of Asaba Metropolis, Delta State, Nigeria. Int J Innov Res Dev. 2021;10(12). https://doi.org/10.24940/ijird/2021/v10/i12/OCT21059.
5. Jiang S, Wang C, Bimenyimana S, Yap JBH, Zhang G, Li H. Standard operational procedures (SOP) for effective fire safety evacuation visualization in college dormitory buildings. J Vis. 2021;24(6):1207-1235. https://doi.org/10.1007/s12650-021-00761-3.
6. Kihila JM. Fire disaster preparedness and situational analysis in higher learning institutions of Tanzania. Jàmbá J Disaster Risk Stud. 2017;9(1):a311. https://doi.org/10.4102/jamba.v9i1.311.
7. Onyekwere WC, Ajayi OO, Owolabi TOS. Assessment of fire safety measures in on-campus housing facilities: a case study of Caleb University's male hostel. Afr J Environ Sci Renew Energy. 2024;16(1):71-83. https://doi.org/10.62154/ajesre.2024.016.010377.
8. Yijun S, Chunying L. Research on fire risk assessment and safety management of college students' dormitory. In: Proceedings of the 14th International Conference on Innovation & Management; 2017. Available from: https://www.researchgate.net/publication/323485871_Design_Thinking_and_Product_Roadmapping_in_the_Fourth_Industrial_Revolution#page=672. Accessed 21 January 2025.
9. Daramola OF, Bakare AJ, Owabumowa IS. Assessment of fire safety preparedness and risk management in Caleb University hostels. Afr J Environ Sci Renew Energy. 2024;17(1):57-68. https://doi.org/10.62154/ajesre.2024.017.010449.
10. Salaheldin MH, Hassanain MA, Hamida MB, Ibrahim AM. A code-compliance assessment tool for fire prevention measures in educational facilities. Int J Emerg Serv. 2021;10(3):412-426. https://doi.org/10.1108/IJES-06-2020-0030.
11. Hostetter H, Naser MZ. Characterizing egress components for wheelchair users in dormitory building fires. Natural Hazards Research. 2024;4(1):173-86. https://doi.org/10.1016/j.nhres.2023.11.012.
12. Rana IA, Nisar MA, Lodhi RH, Waseem HB, Nawaz A, Aslam A, et al. Multi-phase residential fire vulnerability assessment. Fire Technol. 2025;61(4):2073-2103. https://doi.org/10.1007/s10694-024-01673-y.