



# **Enhancing Fire Emergency Response Readiness in Butiama District Secondary Schools in Tanzania: An in-depth Investigation**

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

Fire hazards in secondary schools are a global concern, impacting countries worldwide with varying rates and consequences. Tanzania, in particular, has grappled with recurring fire disasters, with schools bearing a significant brunt of these incidents. While government policies and circulars have mandated safety measures like smoke detectors, emergency exits, and the prohibition of candles and crude oil lamps in schools, compliance remains a persistent issue. This study is firmly grounded in three influential theories: Abraham Maslow's hierarchy of needs theory, the protection motivation theory, and modern disaster theory. Our study used a descriptive research design based on a mixed research approach, combining qualitative and quantitative methodologies. Data collection involved questionnaires, interviews, and observations. One of the significant findings is the glaring lack of awareness among both teachers and students regarding fire emergency preparedness and the lack of training in fire safety preparedness. The study also delves into the

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root causes of fire emergencies, which include poor electrical appliance installation, ignorance about fire materials, negligence, and deliberate sabotage. These findings highlight the vulnerabilities that schools face and emphasize the critical importance of preparedness measures. Financial constraints and a lack of fire safety resources emerge as formidable challenges. To bolster fire emergency response readiness, the study proposes a range of strategies. These include the development of comprehensive fire emergency plans, increased investment in fire safety education, procurement of essential fire safety equipment, the establishment of school dispensaries, budget allocation for preparedness efforts, and the promotion of regular fire drills.

*Keywords: Fire emergency; preparedness; secondary schools; disaster management; safety education; Tanzania.*

## 1. INTRODUCTION

Fire hazards in secondary schools occur worldwide, impacting numerous countries with varying rates and consequences [1]. For instance, the United States reports over 4000 school fire incidents annually, with causes including cooking (42%), intentional actions (24%), and heating (10%) [2]. These emergencies jeopardize the safety of students and staff [3,4]. Recently, there has been a growing emphasis on improving disaster preparedness in fire-prone regions [4]. In this context, secondary schools hold a dual role, not only imparting knowledge but also ensuring the safety of their occupants.

Research conducted by Gichuru [5,6] has shed light on the frequent incidents of fire outbreaks in African schools, as emphasized by Elijah [7]. These incidents have led to tragic consequences, including loss of life, damage to property, and disruptions to the educational process, as documented by Nderitu [8,9]. A poignant illustration of the severe repercussions of inadequate safety measures can be seen in the 2008 Buddo Primary School fire in Uganda, where lives were lost due to locked doors, as noted by Hirano [10]. Similarly, Tanzanian secondary schools have also witnessed alarming fire incidents resulting in fatalities, injuries, and the destruction of school facilities [11]. However, despite the critical importance of educational institutions in the Butiama District within the Mara Region, they often lack comprehensive fire emergency response plans. This paper aims to address the issue of fire emergency preparedness in secondary schools in the Butiama District, identifying vulnerabilities, addressing challenges, and proposing potential solutions.

In 2009, Ole Sokoine and Idodi secondary schools in Tanzania witnessed fatal fires, underlining the urgency of preparedness [12]. Subsequent incidents, such as the Kinondoni

Muslim Secondary School and Mivumoni Islamic Secondary School fires in 2020, underscore the ongoing risk [13]. However, the effectiveness of the entire secondary school system's preparedness is pivotal in preventing losses of life, property, and learning time. Hence, this study on the Effectiveness of Fire Emergency Preparedness for Secondary Schools Safety in Butiama District Mara Region is essential.

Tanzania has grappled with recurring fire disasters [14] especially affecting children in schools [15-18] and recently in Bumangi and Chief Ihunyo secondary schools [19]. Government policies and circulars issued in 2011 require smoke detectors, and emergency exits, and prohibit the use of candles and crude oil lamps in schools (WEMU, 2011; Citizen, 2017 [20]). Despite policy directives, school fires persist, raising concerns about safety and guideline adherence. Financial constraints, inadequate infrastructure, and a lack of awareness contribute to the inadequacy of fire emergency response readiness. Additionally, insufficient training for students and staff exacerbates risks. Given the potential consequences, a proactive approach is essential.

This paper conducts an extensive investigation into fire emergency response readiness in Butiama District secondary schools. It assesses infrastructure, firefighting equipment, awareness of fire safety protocols, and collaboration with local fire authorities. By identifying weaknesses, the study proposes strategies to enhance readiness, with implications for schools across Tanzania and similar contexts globally. Improved preparedness fosters a safer learning and working environment, promotes safety consciousness, and enhances community resilience.

Therefore, this research aims to address current deficiencies, offering targeted solutions to enhance the safety and well-being of Butiama

District's educational institutions and inspire broader efforts toward fire emergency preparedness in similar contexts.

## 2. THEORETICAL FRAMEWORK

Our study was influenced by three prominent theories: Abraham Maslow's hierarchy of needs theory, the protection motivation theory, and modern disaster theory. These theories provided a strong conceptual framework for our study. Firstly, Abraham Maslow's hierarchy of needs theory offers valuable insights into human motivation and behavior, emphasizing the importance of fulfilling basic needs before moving on to higher-level ones. Secondly, the protection motivation theory, on the other hand, sheds light on how individuals assess threats and take protective actions, making it particularly relevant in understanding human responses to potential disaster scenarios. Thirdly, modern disaster theory, a more recent framework, encompasses various aspects of disaster preparedness, response, and recovery, providing a comprehensive perspective on managing and mitigating the impact of disasters in contemporary society. By integrating these three theories, our study aimed to offer a well-rounded analysis of the factors influencing human behavior in disaster situations and contribute to the field's understanding of disaster management and preparedness.

### 2.1 Abraham Maslow's Hierarchy of Needs Theory

This study is informed by Abraham Maslow's Hierarchy of Needs theory from the 1950s, which underscores safety and security as fundamental human requirements. Maslow's hierarchy consists of five levels of needs: physiological, safety, love, esteem, and self-actualization [21]. Among these, physiological and safety needs are considered necessities, while love, esteem, and self-actualization needs fall into the category of secondary or higher-level needs [7]. This theory serves as a crucial foundation for our research because it highlights the significance of safety needs in the overall well-being of individuals, especially within a school community. Once individuals have their physiological needs met, they naturally seek assurance that their safety needs will be addressed. Creating a safe and secure environment is of paramount importance, not only for the general well-being of all school members but also for facilitating students'

enrollment, retention, completion, and the attainment of a quality education.

### 2.2 Protection Motivation Theory

This study was conducted with guidance from Rogers' [22] Protection Motivation Theory (PMT), which elucidates how individuals are driven to respond when they perceive a protective threat [23]. PMT comprises two central components: threat appraisal and coping appraisal, which integrate environmental influences into behavioral decisions through a series of cognitive processes [24]. The threat appraisal process centers on the origin of the threat and factors that enhance or diminish the likelihood of maladaptive behaviors, including severity, vulnerability, and rewards. In this study, severity elucidates the extent of harm that could befall school administrators, teachers, and students due to their insufficient knowledge of fire emergency preparedness, while vulnerability assesses the likelihood of facing the consequences of a fire disaster [23]. Furthermore, rewards, both intrinsic and extrinsic, highlight the positive aspects of initiating or sustaining adequate knowledge of fire emergency preparedness among students and staff. Therefore, threat appraisal refers to the evaluation by students and staff of the significance of fire disasters for their well-being [14]. Coping appraisal encompasses response efficacy, self-efficacy, and response costs. Response efficacy gauges the effectiveness of possessing adequate knowledge of fire emergency preparedness in reducing or averting potential harm [23]. Self-efficacy represents the belief held by students and teachers in their ability to successfully implement fire emergency preparedness practices. Response costs encompass the expenses associated with activities like providing training on fire emergency preparedness. The PMT is deemed suitable for this study because it encompasses cognitive processes that facilitate decision-making [23].

### 2.3 Modern Disaster Theory

Modern Disaster Theory by Chen [25] proposes modern disaster laws that consist of a portfolio of legal rules for dealing with catastrophic risks. According to Chen, disaster preparedness involves evaluating the performance of legal institutions and regulations in the context of disasters, while accounting for the risks associated with environmental hazards and social vulnerability [26]. By defining disaster preparedness as the institutional performance

adjusted for risks, this approach expresses the objectives of disaster law in financial terms. It implies that disaster law should enhance societal readiness for calamitous events and deploy an optimal set of rules when such events occur.

Breaking down vulnerability into its constituent elements of susceptibility and resilience allows us to align these variables along a single dimension: Hazard ↔ Susceptibility ↔ Resilience ↔ Capacity [26]. This perspective emphasizes that individuals, communities, and organizations are all susceptible to hazards and, therefore, should be empowered to enhance their resilience. The severity of disaster effects can vary based on the extent to which human activities have created an environment susceptible to damage, where both life and property are at risk [27]. Consequently, all institutions, including schools, must establish comprehensive legal frameworks for fire emergency preparedness, develop social networks, and foster social support systems to achieve effective disaster management.

### 3. MATERIALS AND METHODS

We have employed a descriptive research design that utilizes a mixed research approach, incorporating both qualitative and quantitative methodologies. Kothari [28] defines this mixed research approach as empirical research that involves the collection and analysis of both qualitative and quantitative data. Consequently, we have adopted this mixed approach to gain a comprehensive and in-depth understanding of our research questions, enhancing the accessibility of our inquiries. As highlighted by Mwonge and Naho [29] no single research approach can function in isolation; instead, the weaknesses of one approach can be compensated for by the strengths of the other. The study targeted a population of 24 secondary schools in Butiama district, encompassing 24 Headteachers (HOSs), 33 Ward Education Officers (WEOs), 8051 Senior Secondary Students (SSSs), 440 Subject-Specific Teachers (SSTs), District Education Officer (DEO), and District Secondary Quality Assurance Officer (DSQAO). To form our sample, we employed purposive sampling, resulting in the selection of eleven (11) secondary schools, eleven (11) HOSs, 11 WEOs, DEO, and DSQAO. Additionally, we utilized stratified and simple random sampling techniques to obtain 20 SSTs and 360 SSSs, ensuring a representative sample. Data collection involved the

administration of questionnaires to SSSs and SSTs, while interviews were conducted with HOSs, WEOs, DEO, and DSQAO. Furthermore, we employed an observation schedule. The collected data was analyzed using SPSS version 25 and presented in the form of frequency-percentage tables, pie charts, and bar graphs.

## 4. RESULTS AND DISCUSSION

### 4.1 Teachers and Students' Awareness of Fire Emergency Preparedness

Our study aimed to investigate the level of awareness among both teachers and students regarding fire emergency preparedness in secondary schools located in the Butiama District of Tanzania. Considering the fact that fire emergencies pose significant risks to the safety of students and staff in educational institutions, preparedness plays a crucial role in mitigating these risks. Our study sought to assess the extent to which teachers and students were informed about fire safety procedures, their understanding of evacuation protocols, and their knowledge of fire prevention measures. Understanding their awareness levels was essential to identify potential gaps in the emergency response readiness of these schools and to develop strategies to enhance fire safety awareness and preparedness within the educational environment. Table 1(a) and (b) present the study results from teachers and students respectively.

**Table 1(a). Teachers' responses to fire safety preparedness training**

Variable(s)	Frequency	Percentage
Trained	08	40%
Not trained	12	60%
<b>Total</b>	<b>20</b>	<b>100%</b>

Source: Field data (2023)

As shown in Table 1, a large number of teachers 12(60%) indicated that they had not been trained in fire safety preparedness while 8(40%) of teachers indicated that they had undergone training in fire safety preparedness. The study results indicate that most of the teachers in secondary schools in the Butiama district have not yet prepared for fire safety preparedness since they had not trained on how to handle fire emergencies.

Also, during the interview, one of the heads of schools attested that:

...Training have not been conducted for teachers in this school for more than seven years now from fire experts like fire brigadiers. And this is not only for my school, almost all schools in this district the level of firefighting is low as majority of teachers have no knowledge on effectiveness of fire preparedness. If teacher's lack fire safety knowledge, obviously their students lack fire safety knowledge because students depended much on their teachers for education. Fire brigadiers have a tendency of giving fire safety trainings after fire emergency happened in a place or school and not before fire events. (HT 003)

The view expressed by the respondent (HT 003) goes hand to hand with the findings of Mutua [30] who reported that schools are not well prepared for fire safety because in most school staff and students are not trained on fire safety preparedness. Again, Kukali [31] showed that lack of basics about fire safety issues or on how to react in events of fire disasters is to blame for the large number of casualties experienced. Basic fire emergency drills to teachers or students are often taken for granted to the extent that in event of a fire very few workers or students may know what to do. On the other hand, some employees who are first to stop the fire burning could be too frightened and may choose to run away instead of raising alarm. Basic training on the use of firefighting equipment and other lifesaving skills in events of fire disasters must be regularly done. Fire safety training increases the level of fire safety knowledge, the accuracy of responses to a fire and this could lead to a reduction in the rate of fire casualties. Most school stakeholders are not trained on fire safety because there has never been a need to train on fire safety and there are no materials to teach with Gichuru [5] [32,33] in their study showed that the majority of the schools in Uganda are not prepared for fire safety, among fifty schools randomly chosen from the five Kampala divisions 84% of the schools did not have fire safety plans in place. Nestory [34] observed that most of the secondary school teachers had no sufficient fire safety preparation in terms of knowledge and training.

Table 1(b) illustrates that a significant majority of students (86%) in Butiama district's secondary schools have not experienced fire safety parade sessions in their school settings, while only a small minority (14%) have had such sessions.

This finding suggests that there is a considerable gap in fire safety education and awareness among students in the district, as fire safety parades serve as a crucial means of disseminating knowledge about fire hazards and preparedness. The results align with prior research [35,16] which similarly indicated the infrequent conduct of drills in educational institutions. The absence of regular fire drills and parade sessions in schools suggests that these institutions are not effectively prioritizing fire preparedness as part of their safety programs, potentially leaving students and the surrounding community ill-prepared to respond to fire emergencies. Therefore, there is a need for increased emphasis on fire safety education and practical preparedness measures in schools to enhance overall fire safety awareness and readiness within the Butiama district.

**Table 1(b) Students' response to fire safety parade sessions**

Responses	Frequency	Percentage
Yes	46	14%
No	276	86%
<b>Total</b>	<b>322</b>	<b>100%</b>

Source: Surveyed data (2023)

Therefore, by examining teachers' and students' awareness of fire emergency preparedness, we aimed to shed light on the overall state of readiness within Butiama District secondary schools. The findings from this investigation provide valuable insights for school administrators, policymakers, and educators on how to improve fire safety education and training, implement effective emergency response plans, and enhance the safety and security of students and staff in the event of a fire emergency. Ultimately, this study aimed to contribute to the development of proactive measures to reduce the risk of fire incidents and ensure a safer learning environment for all stakeholders in the Butiama District secondary schools in Tanzania.

#### 4.2 Causes of Fire Emergency Disasters

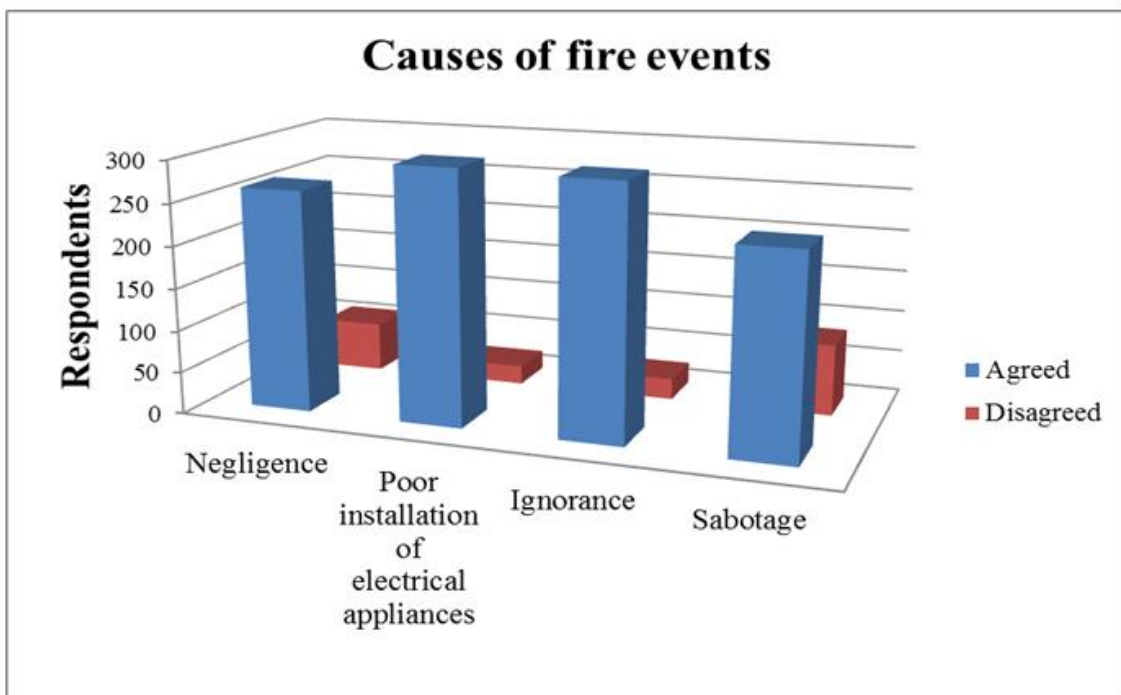
The study sought to assess the causes of fire disasters to increase the level of cautions to be taken in order to reduce fire outbreaks. Although one may be aware of some causes for fire occurrence and yet be ignorant of what to do when fire emerges. Fig. 1 presents the responses of students on the causes of fire events.

Of all the reasons that were identified, poor installation of electrical appliances in the school buildings ranked first in causing fire outbreaks by 300(93%) while 22(07%) of the respondents disagreed, followed by ignorance on the use of fire materials 297(92%) in the school buildings and only 25(08%) respondents disagreed, negligence 263(82%) agreed with negligence while 59(18%) respondents disagreed and then sabotage 237(74%) respondents indicated that they agreed while 85(26%) responded that they were not the causes of fire incidences. Through these findings schools in Butiama district seemed to be more vulnerable to fire emergencies and hence needed much preparedness for staff, non-staff, and students.

During data collection one of the respondents attested that: -

*...One of the major sources of fire emergency disasters in schools include; arson problem (intentional fires), technical problems like poor construction and installation of electrical equipment, carelessness problem, alcohol, drugs and smoking problems. For sure the causes of fire are just many to mention but all in all teachers and students are lacking basics in training on fire safety measures. (WEO 001)*

The views expressed by WEO 001 are in line with the findings of Amuli [14] who reported that students and members of the community surrounding the schools were behind the damage witnessed in the institutions aimed to disrupt the smooth running of the school. Moreover, Amuli revealed that these deliberate fires were intended to sabotage school management and infrastructure due to long-standing claims and dissatisfactions among students and communities. Furthermore, Kahwa [17] stated that the causes of fire in secondary schools were due to deliberate sabotage, electrical faults, and students' negligence. Kahwa [17] continued arguing that the respondents mentioned sabotage as one of the causes of fire in schools because it was associated with the land conflicts stemming from the areas where schools were built. It is claimed that the land used to build some of the schools was taken from some villagers without their consent. Electrical faults were mentioned as a major cause of fire in secondary schools by both school authorities and fire rescue forces as a result of improper use of electricity, lack of regular maintenance of electrical systems in schools, and the use of unqualified technicians to do electrical work, especially in community schools which largely depended on community contributions.



**Fig. 1 Causes of fire events**

Source: Field data (2023)

### **4.3 Challenges Facing the Fire Emergency Preparedness for Secondary Schools Safety**

Our study sought to uncover and understand the various challenges that impede fire emergency preparedness within secondary schools in the Butiama District. This inquiry was prompted by the critical need to ensure the safety and security of students, staff, and school properties in the event of a fire emergency. Given the significant potential risks associated with fire incidents, particularly in densely populated school environments, it was essential to ascertain the extent to which these institutions were equipped to respond effectively to such crises. This study aimed to delve into the specific issues and obstacles that hindered the readiness and response capabilities of these schools, ultimately seeking to inform policies and strategies to enhance their fire emergency preparedness.

Furthermore, our investigation aimed to provide context-specific insights that could guide local authorities and educational institutions in improving safety measures. Through a rigorous examination of the challenges faced by Butiama District secondary schools in terms of fire emergency preparedness, we aspired to contribute valuable data and recommendations to promote safer learning environments and protect the well-being of students and staff, aligning with broader goals of enhancing education and community safety in the region. Table 2 presents the study results.

Assessing the challenges facing fire emergency preparedness for school safety is a critical endeavor, as it directly impacts the well-being of students, staff, and the broader school community. One crucial aspect of this assessment involves understanding the presence of a school dispensary within the safety framework. The presence of a school dispensary is significant for several reasons. First and foremost, in the event of a fire or other emergency, quick access to medical supplies and first aid equipment is essential. School dispensaries provide immediate care to individuals who may have sustained injuries, helping to mitigate the potential severity of these injuries and save lives. Moreover, knowing the presence and adequacy of medical supplies within the school's dispensary is vital to determine if schools are well-prepared to handle medical emergencies that may arise during a fire incident. Inadequate supplies or a poorly

equipped dispensary could exacerbate injuries and pose a significant safety concern.

The results indicate that the majority of respondents (85%) reported the absence of a school dispensary has significant implications for fire emergency preparedness in schools. Firstly, it highlights a concerning gap in the safety infrastructure of these educational institutions. Without a school dispensary, schools may be ill-equipped to provide timely medical assistance during fire emergencies, increasing the risk of injuries and potentially endangering the lives of students and staff. This finding underscores the need for urgent attention and action to address this deficiency in emergency preparedness.

Moreover, the presence of a school dispensary is not only about having the physical space but also ensuring that it is adequately stocked with necessary medical supplies and staffed by trained personnel. In this context, the low percentage (15%) of schools indicating the presence of a dispensary raises questions about the quality of emergency preparedness even within those institutions that have a dispensary. It suggests that simply having a dispensary is not sufficient; its functionality and readiness are equally critical. As such, these results should prompt schools and relevant authorities to conduct a comprehensive review of their emergency preparedness plans, with a particular focus on addressing the lack of school dispensaries and improving their overall readiness to respond effectively to fire and other emergencies. Ultimately, the safety and well-being of students, staff, and the school community depend on such proactive measures.

A significant majority of secondary school teachers, comprising 90% of respondents, reported that their schools possess first aid kits, demonstrating a commitment to handling safety emergencies appropriately. Conversely, only 10% of the surveyed schools were without such kits. The presence of first aid kits serves as a critical indicator of a school's preparedness to address safety emergencies effectively. However, schools lacking dispensary facilities are potentially ill-prepared for safety emergencies. Notably, all the secondary schools examined, representing 100% of the sample, lacked fire safety policies, standards, and manuals. Furthermore, a substantial 75% of teachers revealed that their schools lacked fire safety plans, with only 25% of schools having such plans in place. It is noteworthy that even in

schools where fire safety plans were available, teachers were not typically involved in their formulation. Fire emergency plans play an indispensable role in enhancing fire safety preparedness, necessitating their inclusion in every school.

Financial constraints emerged as a pervasive issue, with all teachers (100%) citing financial problems or a lack of funds as a hindrance to adequate preparedness for fire emergencies. This financial shortfall impedes schools from acquiring essential firefighting equipment, conducting vital fire training, and procuring modern firefighting tools. Alarming, a substantial 80% of teachers reported the absence of emergency telephone numbers posted on public notice boards within their schools, indicating a deficiency in immediate response capabilities. Conversely, 20% of teachers acknowledged the presence of such emergency telephone numbers on notice boards within their schools.

Also, during the interview, DEO attested that: -

*...One of my responsibilities involves overseeing and managing education at the district level, encompassing tasks such as administration, supervision, inspection, guidance, and control. However, it is important to note that we currently do not possess specific manuals, standards, or policies that grant me direct authority to address fire-related issues within our schools. Instead, these matters fall under the jurisdiction of the Prime Minister's Office, specifically the Disaster Management Department and Fire Rescue Force. At the district level, we have the Fire Brigade Department, which assumes the role of providing education, conducting training, and*

*inspecting schools in relation to fire safety. During my recent visits to the schools within my district, I observed that a significant number of them lacked adequate fire training and education, experienced deficiencies in fire equipment, and faced unreliable access to water in some instances. (DEO 001)*

Also, DSQAO of Butiama District reported that: -

*... In accordance with the Tanzania Fire and Rescue Act of 2007 and the Fire Precaution in Buildings Regulations, it is mandated that school buildings must be equipped with fire detection and alarm systems, as well as automatic fire sprinklers. Additionally, with regard to classrooms and offices, the act specifies that exit doors and windows should be designed to open without the need for a key and that they should open outward. However, this particular requirement is not met in the schools that were visited. As a department responsible for ensuring the quality of education in schools, our daily mission includes educating and training school administrators. Our aim is to ensure that schools continue to serve as centers of high-quality education and comply with these essential safety standards and regulations. (DSQAO 001)*

Moreover, during data collection one of the students attested that: -

*...chools lack the financial resources necessary to cover expenses related to the installation of firefighting equipment, maintenance of current appliances, acquisition of costly fire safety fixtures, and the construction of new school facilities compliant with fire safety standards. (SSSs 001)*

**Table 2. Challenges facing fire emergency preparedness for school safety**

Challenges	Agreed	Disagreed	Total
School dispensary (safety concerns)	15%	85%	100%
First aid/kits	90%	10%	100%
Emergency telephone numbers	20%	80%	100%
Red Cross Clubs in schools	10%	90%	100%
Inadequate finances/ funds	100%	0%	100%
Fire safety plans in schools	25%	75%	100%
Fire Safety policy, standards & manuals	0%	100%	100%

Sources: Field data (2023)



The conclusions drawn from the study's findings, along with the insights shared by DEO 001, DSQAO 001 and SSSs 001 find support in the results of several prior studies. Notably, research conducted [30,34,17,36,18] corroborates these findings. These studies consistently reveal a prevalent deficiency in fire emergency plans within school policies. This inadequacy is a significant contributing factor to the overall lack of preparedness observed among secondary schools. These collective findings underscore the pressing need for schools to prioritize the development and integration of comprehensive fire emergency plans into their policies to enhance their preparedness for potential fire emergencies [37].

#### **4.4 The Strategies to Enhance Fire Emergency Response Readiness**

Our study sought to understand and evaluate the existing strategies in place for fire emergency response readiness within secondary schools in the Butiama District. This investigation was prompted by the critical importance of safeguarding the lives and well-being of students and staff members, as well as protecting valuable educational infrastructure. Fires pose a significant threat to school environments, and a lack of preparedness can lead to tragic consequences. Therefore, we sought to uncover the specific strategies currently employed, or perhaps lacking, to enhance fire emergency response readiness within these schools. By doing so, we aimed to provide valuable insights that could inform policy recommendations and practical measures to improve the overall safety and preparedness levels, ensuring a swift and effective response to fire emergencies in Butiama District secondary schools. Ultimately, our study sought to serve as a catalyst for positive change, promoting a culture of safety and preparedness within secondary schools and, by extension, helping to safeguard the educational pursuits and futures of the students. Table 3 presents the study results.

##### **4.4.1 Develop comprehensive fire emergency plans**

The study aimed to evaluate strategies for improving preparedness for fire emergencies, with a particular focus on the importance of developing thorough fire emergency plans. These plans serve as essential guides for both responders and organizations, outlining specific procedures, resource allocation, communication

protocols, and coordination strategies in the event of a fire emergency. By examining the details of such plans, our study aimed to clarify their crucial role in reducing fire-related risks, facilitating a prompt and efficient response, safeguarding lives and property, and ultimately enhancing the overall resilience of communities to fire emergencies. The study found that 85% of the participants agreed with this statement, while 15% disagreed. These findings imply that a majority of respondents recognize the significance of having well-structured and comprehensive fire emergency plans in place. This acknowledgment likely arises from an awareness of the benefits these plans provide in terms of risk mitigation, response effectiveness, and the protection of lives and property.

##### **4.4.2 Fire safety education**

It was found that the majority of respondents, representing 90%, recognize the significance of fire safety education as a vital component of enhancing fire emergency response readiness, underscoring its importance in equipping individuals and communities with essential knowledge and skills to prevent fires and respond effectively during emergencies. However, the 10% disagreement suggests the need for further investigation into the reasons behind this dissent and the potential for refining fire safety education programs to address any concerns or misconceptions. Overall, these findings highlight the continued importance of investing in and improving fire safety education as a key strategy to bolster public safety, reduce fire-related incidents, and enhance overall emergency response readiness.

##### **4.4.3 Invest in fire safety equipment**

The results in Table 3, which indicate that 80% of respondents agreed with the importance of investing in fire safety equipment as a fundamental component of preparedness, carry significant implications for fire emergency response readiness. This high level of agreement underscores the critical role that adequate fire safety equipment, including fire alarms, extinguishers, sprinkler systems, and protective gear, plays in not only preventing fires but also in effectively responding to them when they occur. These findings highlight the necessity of prioritizing and optimizing the allocation of resources towards acquiring and maintaining such equipment to enhance public safety and minimize the potentially devastating

**Table 3. Strategies to enhance fire emergency response readiness**

Variable(s)	Agreed	Disagreed	Total
Develop comprehensive fire emergency plans	85%	15%	100%
Fire safety education	90%	10%	100%
Invest in fire safety equipment	80%	20%	100%
School dispensaries	72%	28%	100%
Budget allocation	100%	0%	100%
Emergency contact information	96%	4%	100%
Regular fire drills	64%	36%	100%

Sources: Field data (2023)

consequences of fire incidents. This information is valuable for decision-makers in guiding resource allocation and ensuring the readiness of emergency response systems.

#### 4.4.4 School dispensaries

The results of Table 3, which assesses the role of school dispensaries in enhancing fire emergency response readiness, indicate that 72% of the respondents agreed with their potential significance in providing first aid and medical assistance during fire emergencies, while 28% disagreed. This suggests that a significant majority of those surveyed recognize the importance of school dispensaries in addressing health-related aspects of fire incidents within educational institutions. However, the 28% disagreement rate signifies that there may be some areas of concern or skepticism regarding the effectiveness of these facilities. These results imply that there is a need for further investigation and potential improvements in the capabilities of school dispensaries to ensure the safety and well-being of the school community in fire emergency situations, taking into account both the strengths and weaknesses identified in this assessment.

#### 4.4.5 Budget allocation

There is unanimous support among respondents for the allocation of budgets towards strategies aimed at enhancing fire emergency response readiness. This overwhelming agreement suggests a consensus on the critical importance of financial resources in effectively preparing for and responding to fire emergencies. The 100% agreement rate indicates a clear mandate for policymakers and stakeholders to prioritize budget allocation for these strategies. The implication is that there is a strong mandate for continued investment in preparedness, prevention, and response efforts, which is likely to result in a more robust and resilient fire

emergency response system, better equipped to handle crises efficiently and effectively.

#### 4.4.6 Emergency contact information

The findings from this study are compelling, as they reveal that 96% of respondents acknowledge the crucial importance of having accurate emergency contact information to enhance readiness for fire emergencies. This overwhelming consensus underscores the pivotal role of readily available and up-to-date contact details in fire emergency response. It is clear that the majority of participants recognize the significance of emergency contact information in shaping effective response strategies.

As a result, these findings imply that there should be a central focus on prioritizing and improving the availability and accessibility of such information in emergency preparedness plans. By taking these steps, responders and the general public can reap the benefits of improved communication and coordination during fire-related crises. This, in turn, will help mitigate potential gaps and challenges in disseminating vital information, ultimately leading to more efficient and effective fire emergency response strategies.

### 5. CONCLUSION

Our study has provided valuable insights into the awareness, causes, challenges, and strategies related to fire emergency preparedness in secondary schools located in the Butiama District of Tanzania. The findings reveal significant gaps in both teachers' and students' awareness of fire safety, with a majority of teachers not having received proper training in fire safety preparedness. Additionally, a vast majority of students have not experienced fire safety training sessions in their schools, indicating a lack of emphasis on fire safety education. Furthermore, the study has highlighted various challenges that

hinder fire emergency preparedness, including the absence of school dispensaries, inadequate fire safety equipment, financial constraints, and a lack of comprehensive fire safety policies and plans. These challenges pose a significant risk to the safety of students and staff in the event of a fire emergency. To address these issues and enhance fire emergency response readiness, our study suggests several strategies, including the development of comprehensive fire emergency plans, increased investment in fire safety education, the acquisition of necessary fire safety equipment, and the allocation of budgets for preparedness efforts. Additionally, improving school dispensaries and ensuring the availability of emergency contact information are crucial steps toward better preparedness and response.

## 6. POLICY RECOMMENDATION

Based on the findings of our study, which highlighted the significant gaps and challenges in fire emergency preparedness within secondary schools in the Butiama District of Tanzania, we propose the following policy recommendations to enhance fire safety awareness and readiness: -

- i. **Mandatory fire safety training for teachers:** The Ministry of Education should mandate comprehensive fire safety training for all teachers in secondary schools. This training should cover fire prevention, emergency response procedures, and the proper use of firefighting equipment. Schools should be required to conduct regular fire drills to ensure that both teachers and students are well-prepared to respond to fire emergencies.
- ii. **Fire safety education for students:** Schools should include fire safety education as part of the curriculum. Students should receive regular lessons on fire prevention, evacuation procedures, and the importance of fire safety. Additionally, schools should organize fire safety drills and sessions to familiarize students with fire safety practices.
- iii. **Fire safety parades and drills:** School administrators should prioritize regular fire safety parades and drills. These exercises should be conducted at least once a semester to ensure that both teachers and students are familiar with emergency evacuation procedures. The results of these drills should be documented and used for continuous improvement.

iv. **Establishment of school dispensaries:** The Ministry of Education should encourage and support the establishment of school dispensaries in secondary schools. These dispensaries should be adequately stocked with first aid supplies and staffed by trained personnel. In the event of a fire emergency, quick access to medical assistance can make a significant difference in reducing injuries.

v. **Financial support for fire safety:** The government should allocate specific funds for fire safety in educational institutions. This budget should cover the acquisition and maintenance of firefighting equipment, fire safety training programs, and the construction of fire-resistant school buildings.

vi. **Fire safety policies and standards:** The Ministry of Education should develop and enforce fire safety policies and standards for all secondary schools. These policies should include guidelines for the installation of fire detection and alarm systems, fire extinguishers, and other safety equipment. Compliance with these standards should be regularly monitored.

vii. **Emergency Contact Information:** Schools should prominently display emergency contact information, including contact numbers for fire brigades and medical services, in easily accessible locations. This information should also be disseminated to all teachers, students, and staff members.

viii. **Research and Monitoring:** Regular assessments of fire safety readiness in schools should be conducted, and the findings should be used to inform policy adjustments and improvements continually. Research institutions and education stakeholders should collaborate to monitor progress and identify areas that require further attention.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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