

Mitigating the Effects of Fire Outbreaks in Secondary Schools: Strategies for Safeguarding Children at Risk in Tanzania

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ABSTRACT

This paper investigated alternative strategies for safeguarding Tanzania children from school fire disasters. The study was guided by change management theory. Data were collected from four secondary schools from two regions of Tanzania Mainland. A qualitative approach was employed and data were collected through face-to-face interviews, Focused Group Discussions and physical observations. The study involved 101 participants – 61 students, 35 teachers, 3 Heads of Schools and 2 members of the School Board. The study revealed that improved school infrastructures, provision of education to people, building harmony with the community, improved school security, installation of firefighting facilities in schools and identification of sources of fire were the appropriate strategies to manage fire. Combined efforts of the school, community, government and education supporters are of paramount importance for mitigating regular fire outbreaks in secondary schools.

Keywords: Fire disaster, secondary school, Tanzania, policy, change management

INTRODUCTION

Disasters like fire outbreaks in schools can have devastating effects on both human life and infrastructure. Unfortunately, the frequency of school fire incidents is on the rise globally, affecting about 175 million children every year due to both natural and human-caused disasters (UNESCO, 2017; National Education Union, 2017; Fire Fighter Forum, 2009; UNICEF, 2015). Children in schools are particularly vulnerable to disasters like fires, earthquakes, tsunamis, and floods, which can cause significant harm and property damage. In India, for example, in 2004, 93 children died in a school fire; in Uganda, in 2006, 13 children lost their lives in a similar incident (Patel, 2008; ISDR, 2012). In the United States, more than 4,000 school fire events occur annually, resulting in injuries and property loss worth millions of dollars (Federal Emergency Management Agency [FEMA], 2014; Satterly, 2014). The United Kingdom also faces a significant risk of school arson attacks, with 32% of reported cases resulting in severe damage and death (Ruel, 2019; Salas, 2019; Atkinson et al., 2007). Developing countries in Africa and Asia are particularly at risk of severe school fires due to limited institutional capacity to respond adequately to such outbreaks. For example, in India, a school fire in 1995 claimed the lives of 400 students; in 2008, another school fire resulted in the death of 90 children (Nyagawa, 2017; CNN, 2004).

In Uganda, 13 children died in a dormitory fire caused by unextinguished candles used for lighting (Patel, 2008; CNN, 2004). To mitigate the negative effects of school fires, countries worldwide have implemented various strategies such as early warning systems, to reduce deaths and property damage. However, more needs to be done, particularly in developing countries where there is a high risk of school fires. In Tanzania, school fire is a major concern for student safety, affecting their peace of mind, trust, and the learning environment (Amuli, 2019; Nyagawa, 2017). These incidents disrupt normal school operations; they damage buildings and facilities and lead to injuries and deaths. The most affected group for these incidences is school children, especially those in boarding schools (Amuli, 2020; Mosenda, 2020, Nestory, 2017; Nyagawa, 2017). In Tanzania, the number of school fires has increased over the years, with more than twenty-

nine schools being affected between 2010 and the early 2020s. This results in loss of life, property damage, and injuries in different regions of Tanzania. Studies conducted in Tanzania discovered that many schools have little ability on disaster preparedness to protect children from fire outbreaks and other hazardous situations (Amuli, 2020; Nestory, 2017; Nyagawa, 2017). Table 1 shows a list of schools affected by fires between 2010 and 2020.

Table 1. 1: Schools gutted by fire in Tanzania Mainland from 2010-2020

#	Name of the school	Year of fire outbreak
1	Ali-Hassani Mwinyi Secondary School	2013
2	Iyunga Secondary School	2016
3	Lindi secondary school.	2016
4	St. Joseph Rotuba Primary School	2018
5	Katunguru Secondary school.	2018
6	Kiwanja Secondary school	2019
7	Old Tanga Secondary School	2019
8	Ashira secondary school.	2019
9	Mkalani secondary school	2019
10	Islamic Byamungu English Medium	2020
11	Ilala Islamic seminary	2020
12	Mvumoni Islamic seminary	2020
13	Is-tiqama Islamic seminary	2020
14	Yustus secondary schools	2020

Source: (Amuli, 2020; Nyagawa, 2017; MOEST, 2020)

Research shows that there are many causes of fire in schools and around communities in the world (UNESCO, 2017; Mutch, 2014; Tanaka, 2012). In Japan, New Zealand, Indonesia, and Australia reports indicate that earthquakes and tsunamis are responsible for 45.5% of school fire disaster fatalities, while gas piping or electric wiring damage causes 26.2% (Bird et

al., 2011; O'Connor & Takahashi, 2014; Kitagawa, 2014; Mutch, 2014; Tanaka, 2012). In other parts of the world, fire disasters in schools and communities are caused by cooking facilities, intentional actions, heating, earthquakes, tsunamis, arson attacks and damage to gas piping or electric wiring (Mutch, 2014; O'Connor & Takahashi, 2014; Tanaka, 2012; Sebela, 2012). According to Kirui, Mbugua, and Sang (2011) and Shibutse, China and Omuterema (2007; 2014), school fires can also be caused by waste burning, students' unrest, and lighting. In addition, poor school management and mishandling of child rights can contribute to safety and security issues, putting children at risk of fire disasters. Literature reveals that various countries have implemented different strategies to address the causes of fire outbreaks (Sayed et al., 2020; FEMA, 2007; 2014; MoEST, 2017).

To mitigate school fire disasters, some governments have incorporated disaster issues into school curricula, re-evaluated disaster risk assessments, and implemented disaster management policies and frameworks. These frameworks direct schools to provide education, training, and public awareness to promote safety among students and the community. In Tanzania, the government has issued a circular recognizing the risks of school fire and clarifying the roles of the school management team in implementing measures to mitigate risks (MoEST, 2017). These measures include ensuring the availability of firefighting facilities, prohibiting the use of fire sources, and conducting regular fire safety training and drills. However, despite these efforts, fire outbreaks in secondary schools continue to occur, revealing a gap between government guidelines and actual practices on the ground. Therefore, this paper discusses alternative practices for mitigating fire incidents in secondary schools. The following research question guided the study: What should be done to mitigate the consequences of fire outbreaks in Tanzania's secondary schools?

Theoretical Framework

This study follows the Change Management Theory, which suggests that people are more likely to respond positively to changes that lead to positive outcomes, rather than punitive ones (Kreitner, 2009; Mullins & Christy,

2013). Kritsonis (2005) outlines a three-stage process for change, involving moving from the current situation (unfreezing), towards the desired change (moving), and then consolidating the change (freezing). It is argued here that to ensure successful change, school communities must be aware of the consequences, both positive and negative, and commit to a plan for change. The theory transitions individuals and resources using methods to achieve efficient and effective results. The focus of the theory is on the future and making accurate decisions at the moment. This theory is relevant to the issue of fire outbreaks in secondary schools as recurring incidents may prompt people to change their behaviours. Hussain et al. (2018) and Pryor et al. (2008) suggest that school leaders should guide school community members towards a safer future by taking measures to prevent fire disasters. In this study, school management is responsible for monitoring and addressing any potential risks of fire outbreaks in schools.

Methodology

The study used a qualitative approach to gather detailed data on the strategies employed to prevent fire outbreaks in secondary schools. This involved engaging in evidence-based research that encouraged communication between the researcher and the participants (Creswell, 2013). The participants assessed and discussed the strategies implemented by schools to prevent fire outbreaks, drawing on their first-hand knowledge. The data were collected across two regions in Tanzania's mainland namely Iringa and Kilimanjaro involving four purposively selected schools that had previously experienced fire outbreaks. A total of 101 participants were involved, including 61 students, 35 teachers, 3 Heads of Schools, and 2 members of the school board, each chosen based on their relevant responsibilities. The participation of students was particularly vital as they were often directly affected by fire outbreaks and sometimes even the cause. As such, they had valuable experience and in-depth knowledge to share on the topic. The study used several methods of data inquiry including face-to-face interviews, Focus Group Discussions (FGD), and physical observations. A checklist was created based on their observations of fire safety equipment such as fire extinguishers, smoke detectors, first aid kits, and sand. Interviews were conducted with school leaders to gain insight into

their perspectives on the matter. Participants were encouraged to express their opinions freely and debate strategies for preventing and mitigating fires in schools. Before recording the interviews, participants were asked for their consent; the time and duration of interviews were agreed upon. The researchers also introduced themselves to the participants to create a comfortable environment. Participants were allowed to speak in their native language, Kiswahili, which was later transcribed into English. The researchers used probing strategies to help participants understand the questions and encouraged them to share information. Physical observations were also conducted by the researchers with the help of school staff to assess the availability of fire safety equipment in classrooms, teachers' offices, dormitories and previous photography of school fire incidents. Focus group discussion was conducted with students and teachers to gather their views on fire safety strategies in schools. In the process of data analysis, researchers began by transcribing the audio recordings. They familiarized themselves with the data by reading and re-reading the transcripts. The collected data were then entered into NVivo 11, a computer software, which helped to manage the extensive information and organize it into codes. The researchers identified themes that emerged from the codes and grouped similar codes. They also searched for categories and themes using NVivo. To present the data, they used thematic paraphrases and quotes.

Results

This section presents the study findings obtained through focus group discussions, face-to-face interviews, and observations. The findings are organized by themes.

The Need to Improve School Infrastructure

During data collection, the question of how to prevent fire outbreaks in secondary schools was raised. It was disclosed that improving infrastructure is key to tackling regular fire outbreaks in secondary schools. Heads of Schools stated that some buildings are old and require renovations. They also suggested that genuine building materials such as electrical wire cables and fire-resistant materials like gypsum and watercolours should be used. Additionally, they believe that dilapidated buildings should be rehabilitated;

regular inspections should be conducted, and dormitory wardens should be employed. A teacher from one school shared his views on the matter:

Both the government and the community need to consider using different materials for constructing various infrastructures. Many of our school buildings are old and have inadequate wiring. To prevent the risk of fire, the government should opt for the use of genuine materials such as gypsum and watercolours, which have proper insulation properties and do not easily ignite (Teacher 12).

This was supported by one of the heads of schools. He commented:

Our school infrastructures are old and have not been renovated for a long time. This puts schools at risk of disasters such as fire outbreaks, and the collapse of buildings because some have huge cracks. (Head of school 2).

During a focus group discussion with students, it was determined that to prevent future fire outbreaks, there is a need for the government to regularly conduct maintenance and renovation of school buildings. The dilapidated infrastructure was found to contribute to the occurrence of fire disasters in secondary schools. Renovating school buildings can help replace the old and expired materials that were previously used in construction and are now believed to be the cause of fires in secondary schools. Additionally, participants revealed that school buildings are not regularly inspected by School Quality Assurance Officers to identify areas that require immediate repair. A student from one secondary school commented:

Our school is too old and no repair has been done recently. The buildings were built during the colonial period, I think in the 1950s, and we still use until now. Likely, electric wires are rotten, or their strength lowered. In that case, the incidents of fire in our school, which took place almost three times, with two events in one week are contributed by the weakened electric wires which have not been repaired over a long time (Student 19).

Furthermore, a teacher from a different school expanded on the topic by adding:

Inspection of schools should be done physically rather than theoretically after the issuance of policies ... the policies should state that maybe every three to five years, institutions should inspect electrical installations in their buildings to ensure tight enforcement of fire regulations in secondary schools (Teacher 23).

The Need to Educate the School Community

During face-to-face interviews, it was found that neither teachers nor students were taught about firefighting techniques to manage emergencies. The participants agreed that training students, teachers, heads of schools and other staff is important as they should be able to identify the source of a fire and use appropriate techniques and facilities to overcome the problem when it arises. A school board member also advised:

Students should be empowered with fire prevention skills through training and practical exercises. Knowledgeable students will know how to operate fire extinguishers to extinguish fire in the gutted buildings. The school will be able to rescue life, properties and infrastructures if fires are managed earlier at the onset. Moreover, trained students would have a culture of controlling fire disaster events and ensure that school infrastructures are safe all the time (Member of School Board 1).

The school heads supported the idea of teaching disaster issues as a separate subject to students, making it more intensive. One head of school commented:

The basic issue I do see is educating students efficiently, I mean that, for instance, the issue of fire disasters should be taught as a component of General Studies (Head of School 1).

The Need to Build Good Relationships between the School and the Community

Participants in the study showed that management in some secondary schools had poor relationships with teachers, students, and the surrounding community. The study also found that some fire incidents were worsened by the strained relationships within the school, particularly between teachers and students, which led to the eruption of fires. The study revealed

that establishing a harmonious relationship between all parties involved was deemed a significant factor in preventing fire disasters in secondary schools. One teacher emphasized this point:

We should create a friendly environment in our boarding secondary schools. I mean building good relationships with the surrounding communities. If there is no good relationship between our schools and the surrounding community, the incidents of fire will never end, because if you collide on matters such as land, you have declared war. Therefore, there should be a friendly relationship between the school and the community to make the community feel it is part of the school while also educating them as beneficiaries of the school (Teacher 2).

Furthermore, a student from a different school expanded on the topic by adding:

Our security is in the hands of school management; I think there is a need for us to have a good relationship with our teachers and the community surrounding us. When teachers have good relationships with students and the community, they will be able to know what is taking place in and outside the school, including discontent leading to the burning of the school, and this the possibility of reducing the incidences (Student 45).

Use Mobile Phones and Boiling Water Equipment

During focused group discussions with students, it was discovered that certain fire incidents were caused by students who tampered with the wiring systems to unlawfully charge their mobile phones and use hitting facilities from the ceiling. To address this issue, participants advised that the government and school management should permit students to use mobile phones and boiling facilities in school, but with specific guidelines in place. One student justified this argument by linking the use of mobile phones with the challenge of books in their school. He commented:

Our school has an acute shortage of science books. I am here to learn so that I can perform well in my science subjects. When I use a mobile phone to search for materials, teachers are reluctant to see

it. Some students are, for instance, suspended for some days because were caught with mobile phones. In the dormitories and classrooms, the sockets are not installed. What should we do? The only alternative is to find electric wires from the roof and cut some wires to charge our mobile phones in hidden places (illegally). I think this is the source of fire in some schools and the only solution is for the government to allow us to use mobile phones. (Student 31).

Furthermore, another student from a different school expressed his view on the topic by adding:

We are now in the era of globalisation. Limiting students from using mobile phones in schools is outdated. As such, the government should lift the ban on using mobile phones. They should install switch sockets for charging phones and I think that such an arrangement may help to reduce disorderly connections of electricity carried out by students which sometimes cause fire disasters (Student 59).

The need to Improve School Security

The study discovered that many schools have weak security systems which exposed them to human-induced fires. Alternatively, participants suggested improved security systems including increasing the number of watchmen, the deployment of participatory security, installation of early warning systems and security cameras. One student recommended:

The government could also use the current technology for security purposes, for example, installing CCTV (Closed-circuit television) cameras in the dormitories and other strategic points in the school compound. Also, the government should improve school infrastructures to allow easy exits and for the Fire Brigade vehicles to access easily various parts of the school in case of fire outbreaks (Student 16).

Furthermore, one of the school board members provided a supporting view to the idea given by students. She noted:

The government must ensure that our schools and colleges have a strong security system which does not allow anyone from outside to

encroach upon the school and cause destruction. This has to go with the provision of sufficient education to all stakeholders around the school, including the School Board, parents and the whole community (School board member 2).

The Need to Install Firefighting Facilities

The findings suggest that managing fire disasters in secondary schools required the management to install firefighting facilities such as smoke detectors and fire extinguishers. Through physical observation, the study discovered that most of the visited secondary schools had an acute shortage of firefighting facilities such as active fire extinguishers, exit plans and a complete absence of smoke detectors. The study found low disbursements of funds from the government for purchasing facilities to manage fire outbreaks. This is arguably one of the causes of this shortage. One head of school noted:

The new classes should have facilities which detect fire or smoke, that will help trigger noise if there is a problem somewhere but none from the government wants to listen to us. As we ask them, they keep telling us what we want first classrooms or fire detectors obvious you will say classrooms because it is our priority (Teacher 10).

During the FGDs with the teacher it was found that most of the secondary schools had a shortage of fire extinguishers and sand buckets and those available were not serviced for a long time (hence with inactive gas cylinders). The facilities were unlikely to work when a fire erupted in a school compound. One teacher added:

Our school should have enough active portable gas cylinders. Students should be drilled to use these cylinders when fire erupts and there should be at least a sand bucket in each class, at the corner; water should be near, and children should know the types of fire to be able to fight them appropriately (Teacher 2).

The Need to Establish Community-Based Fire-Fighting Efforts

The study discovered that once schools are gutted by fire it is the only time various authorities visit to conduct the inspection. The study found that

schools are not provided with feedback on the sources and what should be done to prevent the problem in future. The participants claimed that failure to know the actual sources of fire and how to deal with the problem made it difficult for them to come up with appropriate measures to mitigate such incidents. A teacher in one secondary school argued:

The incidents of fire shall never end in our schools because all of us lack education in identifying the origin of the fire and specific action which should be taken. Usually, when a fire erupts, we run away to save our lives. Sometimes, facilities like fire extinguishers can be around water is also available but there is nothing we do because we have poor knowledge of managing fire outbreaks (Teacher 9).

Furthermore, it was revealed that the implementers at the secondary school level, for instance, heads of schools and students were not involved in formulating policies, directives and plans aimed at managing fire disaster incidents. One head of school added:

You cannot initiate something at the top and expect appropriate implementation at the lower levels. If teachers are involved, they will be aware that this is my daily responsibility; I should supervise (Head of School 1).

Discussion

Ensuring that schools have proper fire safety facilities is important for the safety of students and staff. However, this study found that the infrastructure in secondary schools, including classrooms, libraries, dormitories, offices, toilets, and entries/exits were not in good condition and required renovation to prevent fire outbreaks. This finding is consistent with previous research indicating that regular renovation of school infrastructure is necessary for safety (Nyagawa, 2017; Amuli, 2019). The study found that many secondary schools lack crucial safety features, such as proper fire exits, clear windows, and outward-opening doors, indicating non-compliance with MoEST Education Circular Number 4 of 2011. In that regard, it is argued here that the failure of schools to adhere to the government's directive can increase the risk of recurrent fire disasters, potentially leading to the loss of life and property. To prevent this from happening, school authorities and the government must frequently rehabilitate school

buildings, install fire extinguishers and detectors, and allocate sufficient funds for school security. Besides, school quality assurance activities should also be conducted regularly to help improve the infrastructure of secondary schools to meet fire management guidelines to overcome this problem. The findings also revealed that to prevent fire breaks at school, staff, the community around the school and students should be educated as the key persons responsible for managing fire in secondary schools. Findings from most participants disclosed that fire management awareness was very low. In addition, most of the school community was not aware of the guidelines or directives issued by the government for managing fire disaster incidents. Lack of awareness about managing fire disaster events among the teachers and students to manage the problem is supported by Kirui, Mbugua and Sang (2011); and Shibutse, China and Omuterema (2007).

To overcome the problem of fire disasters in secondary schools, the participants recommended educating all people (community, staff and students) in secondary schools to build capacity for managing the problem. This suggestion is in line with the study by Pasipamire (2011) and Shibutse, Omuterema and China (2014) who found that school communities should be aware of fire disaster management frameworks issued by government entities. Education makes people change their mindset and perform according to the existing situation (Kritsonis, 2005; Kreitner, 2009). Supported by principles of change management theory, school administrators can establish and enforce measures to minimize the occurrence of fire disasters through awareness creation and preparedness among all school members whether positive or negative, which is important for preventing school disasters (Hassain et al., 2018). The theory of change management calls for regular training sessions on fire safety protocols, the establishment of comprehensive emergency response plans, and the enforcement of strict adherence to safety regulations for all school community members. The study discovered that dormitories are on security alert due to cell phone prohibitions that are associated with illegal phone charging. The study discovered that some of the students often use phones hiddenly for educational purposes like searching for materials and linking

with classmates through platforms like WhatsApp, while others use phones for negative aspects, including cyberbullying, antisocial behaviour, and academic dishonesty (Gajdics & Jagodics, 2022; Smale et al., 2021). However, it was revealed that charging phones hidden can pose a safety risk, as it sometimes leads to fires in schools. Therefore, frequent inspection in the dormitories by school leadership is suggested to be important to alleviate this problem and strict laws should be established for students who charge phones in the ceiling of their dormitories. This was supported by the theory of management change which requires school leaders to guide and monitor all school community members about a safer future school (Hassain et al., 2028).

Furthermore, the research discovered that many secondary schools lack adequate security measures, which can result in disasters like fires. For example, it was found that poor security systems such as a lack of face walls can allow outsiders to enter school premises easily, leading to incidents of arson and other indiscipline cases. This finding concurs with a study conducted by Nyagawa (2017) who found that fire disaster events emanate from poor security systems in secondary schools and are not specifically disclosed because of inefficient security systems. Additionally, Amuli (2019) cemented that reducing hostile relationships between the school and community will increase security and reduce the incidents of activated fire disasters in secondary schools.

This study found that most of the visited secondary schools had an acute shortage of active firefighting facilities such as fire extinguishers, water reels, and hydrants and a complete absence of smoke detectors. Further, it revealed that one of the dormitories that gutted fire and escalated to most of the dormitories was the absence of firefighting facilities. These observations are in line with the study conducted by Nyagawa (2017), Amuli (2019) and Mosenda (2020) who observed that secondary schools run short of fire extinguishers and smoke detectors. The study supported that failure to have the facilities in place and having a few inactive instruments might have been the root cause of the continued existence of fire disaster events in secondary schools. More importantly, the study found that almost all students, teachers

and other staff lack expertise in operating firefighting equipment such as fire extinguishers although they are available in some schools.

Conclusion

Despite the government's guidelines for school safety and the requirement for each school to have firefighting facilities, most schools have limited resources for fire prevention. Many school buildings are old and not renovated; staff and teachers lack knowledge of how to mitigate fire outbreaks. Additionally, students illegally charging their mobile phones and boiling water in the ceiling of rooms can cause fire outbreaks in schools. The directives issued by the Ministry of Education, Science and Technology to manage fire outbreaks in secondary schools have proven insufficient to overcome the problem, and other factors have affected their effectiveness. To address this issue, a recent study has proposed alternative methods for managing fire outbreaks in secondary schools. These methods include improving school infrastructure, educating staff and students, enhancing school security, installing firefighting facilities, and involving stakeholders in managing fire disasters.

Recommendations

Firstly, school infrastructures should be improved using genuine and fire-resistant building materials such as gypsum and watercolours. Secondly, regular repair and inspection of school buildings should be conducted to prevent leakages and sparks of fire caused by exposed electrical wiring. Thirdly, government directives for managing school fires should be accompanied by awareness campaigns and educational programmes to mitigate fire sources and control the problem. Fourthly, School Management Teams (SMTs) should build harmonious relationships with the surrounding communities to enhance school security and ensure the safety of the students. Lastly, the researchers also recommend that directives for managing fire outbreaks in secondary schools should take into account contextual factors at the school level to ensure the safety of all children.

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