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Causes of Vulnerability to Disasters in Public Secondary Schools in Nairobi County, Kenya

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ABSTRACT

In recent years, there has been a noticeable increase in disaster incidents within secondary schools, which significantly disrupts the educational process. These disasters not only result in loss of life and injuries but also lead to damage to school property and extended closures, forcing students to stay away from school for extended recovery periods. Despite the efforts of the Kenyan government and various stakeholders to promote disaster preparedness, schools in Kenya continue to face numerous disasters. Many secondary school students' encounter daily risks, and often, school authorities, parents and students only take action after a tragedy occurs. This reactive approach hinders effective disaster response and mitigation, highlighting the need for this study. The main objective of this research was to investigate the factors contributing to vulnerability in public secondary schools in Nairobi County, Kenya. The study aimed to assess the level of disaster preparedness in these schools, employing a descriptive research design. The study was based on Modern Disaster Theory and System Theory. The target population consisted of 73 secondary schools, from which 13 schools were randomly selected for the study. A total of 458 respondents participated in the study, which included 6 quality assurance and standards officers from sub-counties, 3 officials from the Kenya Red Cross, 3 from St. John's Ambulance, 3 fire department officials, 1 representative from the department of disaster management, 13 teachers responsible for quality assurance and standards from selected schools, 13 head teachers, 13 members of the board of management, 13 parent association members, 6 station commanding officers, and 384 students. Key informants were selected using purposive sampling, while students were chosen through stratified random sampling. Data were gathered through questionnaires, interviews, focus group discussions, and observation checklists. The data was analyzed using descriptive statistics such as frequency distributions and percentages and presented in figures and tables. Findings indicated a lack of training and inadequate community awareness regarding disaster preparedness and safety standards. The study concluded that schools were generally unprepared for disasters, and many physical infrastructures were deemed unsafe. Recommendations included regular inspections of school facilities, safety training conducted by qualified personnel, and consideration of each school's capacity when establishing disaster preparedness and safety standards.

Keywords: Disaster, Practice Model, Secondary School, Students, Vulnerability

I. INTRODUCTION

According to the World Health Organization (WHO, 1999), vulnerability to emergencies and disasters depends on how exposed individuals are to hazards and their ability to cope with those hazards and their effects. Vulnerability represents the likelihood of experiencing negative outcomes; it reflects a person's susceptibility to harm from external events and the long-term factors that influence their capacity to respond to such events. Addressing vulnerability is crucial for communities, as it can intensify the impact of a disaster and hinder effective disaster response efforts.

A disaster is defined as overwhelming events and circumstances that challenge the adaptation responses of a community or individuals beyond their capacity, leading to significant disruptions in community or individual functions, at least temporarily (Twigg, 2015). In other words, a disaster refers to a sudden and widespread disturbance of a community's social system and daily life caused by an event or agent that is largely beyond the control of those affected. Turner (1978) adds that disasters disrupt normal life patterns, resulting in misfortune, helplessness, and suffering, which impact the socio-economic structure of a region or country and modify the environment to such an extent that external assistance and immediate intervention are required.

While in session, schools function as communities, much like any other. It is crucial to identify the hazards to which schools are vulnerable, especially given the moral and legal responsibility society places on them to ensure a safe and secure learning environment for students. Recent disasters in schools have raised alarm among parents and education authorities globally. A notable example occurred in Erfurt, Germany, where a student, seeking revenge for being expelled, tragically killed 14 teachers, two students, a police officer, and himself, marking one of the worst mass murders since World War II (Finn, April 26, 2002).

In another incident, an armed student entered Columbine School in Denver, Colorado, where he fatally shot 14 students and teachers. The assailant went on a shooting spree, seriously injuring several others (Jonson, 2017). According to Muchunguh (September 7, 2024), "Schools have never been immune to fire tragedies." They lament that "it's unfortunate that so many children have suffered due to the negligence of adults who either did not know or care about fire safety."

Like many other countries, Kenya has experienced its own school disasters. In 2001, school strikes and riots were prevalent throughout the education sector, threatening to spiral out of control and rendering it increasingly unmanageable. During the second term alone, a total of 118 schools faced unrest among students (Aduda, August 9, 2001). On the night of March 25, 1998, a devastating fire consumed the sole dormitory at Bombolulu Girls Secondary School in Mazeras, Mombasa, resulting in the tragic deaths of 22 students. Four additional survivors later died from their injuries in the hospital (Malenya, 2014).

At Nyeri High School, four prefects were doused with petrol and set on fire (Malenya, 2014). On June 14, 2002, thirteen students from Kangaru in Embu were brought before a juvenile court, facing charges of attempted arson, conspiracy to commit a felony, and malicious damage to property (Malenya, 2014). Another tragic incident occurred at St. Kizito, where innocent lives were lost when male students invaded a girls' dormitory at night. Additionally, at Kyanguli Secondary School in Machakos, located 65 km from Nairobi, a fire broke out at 1:40 am on March 26, 2001, resulting in the deaths of 67 male students. On average, at least two schools experience a fire outbreak each month. In 2002, there were at least 15 fire incidents reported in various schools across the country (Malenya, 2014).

The situation in Kyanguli may have stabilized, but the true tragedy would be if the loss of life became routine, as if the victims of Kyanguli, Bombolulu, St. Kizito, and others never existed. If we fail to address the vulnerabilities our schools face and ensure they are adequately prepared for disasters, all these innocent lives will have been lost in vain. This leads to several critical questions: Could the tragedies that resulted in such significant loss of life have been prevented? Might they stem from our failure to provide school community members with adequate training in disaster preparedness and mitigation? Are negligence and carelessness costing us the lives of our children? Do school administrators have an emergency preparedness plan that is effectively communicated to students, staff, parents, and workers regarding the procedures to follow in emergencies? Are disaster preparedness drills conducted in our schools?

The cases of disasters highlighted indicate that schools, like other institutions in the country, have not been immune to such events. The key question, however, is whether these disasters have prompted genuine efforts to enhance preventive and control measures. In light of this, this exploratory study aims to identify factors that may be contributing to the vulnerability of our schools to disasters.

1.1 Statement of the Problem

Without conducting vulnerability assessments, communities remain unaware of their specific vulnerabilities and how hazards may impact them. In the absence of emergency preparedness and response plans, an emergency can quickly escalate into a disaster. Reducing vulnerability, much like development, empowers communities to shape their futures (WHO, 1999) and should be integrated across all sectors and levels of a country.

The increasing number of disasters suggests a rise in vulnerabilities, particularly in schools, where incidents have become more frequent. These situations range from natural disasters like wind damage, flooding, and fires to man-made disasters caused by the interaction of organizational and technical processes. It is essential to investigate the factors that make schools vulnerable to disasters, as these institutions serve not only as learning environments but also as vital infrastructure within their communities. Schools house children and teachers, and the community often relies on them for various activities; thus, when a school is at risk, the entire community faces potential danger.

Turner (1978) observes that "many disasters stem from administrative causes or from a mix of technical and administrative factors." Those in positions of power and decision-making may inadvertently contribute to disaster risks through their actions. Focusing on schools in Nairobi, this research aims to identify the factors that render schools in Kenya vulnerable to disaster situations and to explore the mechanisms that have been established to manage these risks.

1.2 Research Objective

Determine the causes of vulnerability to disasters in public secondary schools in Nairobi County, Kenya.

1.3 Research Question

What are the causes of vulnerability to disasters in public secondary schools in Nairobi County, Kenya?

II. LITERATURE REVIEW

2.1 Theoretical Review

Calhoun *et al.* (1994) note that effective researchers examine existing knowledge on a topic to understand current theories, evaluate those theories, and identify significant gaps that need to be addressed. The study examined the theories and concepts established in the field of disaster management. The study explored the theories and concepts established in disaster management, grounded in Modern Disaster Theory and System Theory.

2.1.1 Modern Disaster Theory

The study was based on Chen (2011) Modern Disaster Theory, which introduces a modern disaster law comprising a set of legal rules designed to address catastrophic risks. According to Chen (2014), preparedness involves the functioning of legal institutions and rules during a disaster, taking into account the risks posed by environmental hazards and social vulnerabilities. By defining disaster preparedness as institutional performance adjusted for risks, the theory emphasizes the financial aspects of disaster law's goals. Effective disaster law should enhance social preparedness for catastrophic events and ensure the appropriate legal frameworks are applied when such events occur. Preparedness serves as a counter to disaster impacts, meaning that the effects of a disaster are contingent on the level of readiness of the organization, family, or individual involved.

Breaking vulnerability down into its components of susceptibility and resilience allows for a unified understanding of these variables. Individuals, communities, and organizations are vulnerable to hazards and therefore need to be empowered to build resilience. Huho, Mashara and Musyimi (2016) states that the severity of a disaster's effects can vary based on how much humans have created an environment prone to damage, where life and property are at risk. Consequently, all institutions, especially schools, must establish comprehensive legal frameworks for disaster preparedness, along with social networks and support systems, to ensure effective disaster management.

2.1.2 Systemic Theory

Santos-Reyes and Beard (2001) posit that a system can be deemed "failed" if certain aspects are viewed as undesirable by any of the stakeholders involved. In this context, fire can be considered a failure of the system, highlighting the importance of managing fire safety. Effective management involves the system (or authority) being prepared for fire control, which includes planning, resource mobilization, and intervention (Rudolf, 2011). If the system neglects fire emergency preparedness, it can lead to disasters and destruction.

A systemic approach emphasizes understanding the "dynamic wholeness" of a situation by recognizing patterns and interrelationships within a complex system. This underscores the necessity for collective action from various stakeholders in responding to fire incidents; as such events can lead to complex socio-economic issues.

According to Kironji (2022), the systems approach is valuable for managing fires in buildings, focusing on code enforcement related to fire protection systems, occupant communication, and structural fire protection. It also emphasizes the importance of public education about the protective features of buildings, appropriate actions during fire emergencies, and an understanding of fire service operations. Additionally, it covers fire suppression strategies, including dispatching, response policies, and firefighting techniques.

2.2 Empirical Review

In contemporary society, schools play a crucial role in transitioning children from home to the broader community (Calhoun *et al.,* 1989). Schools help socialize young people into the fundamental values of society. Durkheim argues that schools fulfill a function that neither families nor peer groups can provide. He claims that "society can only survive if there exists among its members a sufficient degree of homogeneity; education perpetuates and reinforces this homogeneity by instilling in the child from an early age the essential similarities required for collective life" (Haralambos, 1980). Thus, schools are essential components of society, equipping students with the skills necessary for active participation in modern life. Given their significant role in linking individuals to society, schools serve as a second home for children and youth.

Childhood is a period when children collectively create their own meaningful environments, striving to take control of their lives. They often engage in exploratory behavior, which can lead to risky situations, especially as they enter adolescence. According to Erik Erikson (1968), adolescents grapple with the challenge of identity versus role confusion, a period marked by "storm and stress" as teenager's experiment with different roles available to them.

As we move into a new century, our society confronts significant challenges that are unprecedented in our nation's history. Current technological and social conditions pose considerable risks to community safety. Critical situations can arise from the use of hazardous materials, social unrest, gang violence, terrorism, and unsafe environments, including fragile infrastructure and dangerous locations (National Research Council, 2003).

Natural disasters, like technological ones, have become common in schools today. Incidents such as fires, floods, shootings, and building collapses occur in educational institutions around the world. While various countries have attempted to address these disasters, they continue to pose challenges. With the looming threat of terrorist attacks, concerns about school safety are increasingly on the minds of educators, parents, and students (National Research Council, 2007). This indicates that school facilities, staff, and students are all vulnerable to a range of natural and technological hazards. When schools are at risk from natural hazards, the entire community faces potential danger. In the West, schools have experienced a series of tragedies. For instance, fire remains the leading cause of property destruction, and schools have not been exempt from its effects (Zhou, 2017).

A project conducted in Kenya on the impacts of the El Niño phenomenon from 1997 to 1998 reported that the education sector was severely affected, with schools becoming inaccessible due to flooding, which led to closures and low attendance rates (Republic of Kenya, MoEST, 1998). The end-of-year examinations were significantly disrupted as a result. In other instances, storms have caused roofs to be blown off school buildings, and shootouts between gangsters and police have spilled over into schools (Mwaura & Owino, 2002). Some schools have remained closed for months due to flooding, while students have been struck by lightning. Additionally, there have been tragic fire incidents affecting schools in recent years (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2003)

According to WHO (1999), there has been an increase in the number of people impacted by various types of disasters. Based on the examples presented in the study regarding schools in Kenya, it can be concluded that vulnerability within these institutions is increasing. It is crucial to identify the factors that make our schools susceptible to such disasters and assess how effectively they are equipped to mitigate their impacts. Risks must be accurately identified, thoroughly analyzed, and accompanied by a well-practiced safety program to ensure that all members of the school community understand their roles.

III. METHODOLOGY

3.1 Study Area

The study was conducted in Nairobi County, the capital city of Kenya. Nairobi is one of the 47 counties in the Republic of Kenya, bordered by Kiambu County to the north and west, Kajiado County to the south, and Machakos County to the east (NCIDP, 2014). Located between 1°09′S 36°39′E and 1°27′S 37°06′E, Nairobi covers an area of 696 square kilometers (270 square miles) and has a population of approximately 4 million people (Nairobi City-data, 2010). Figure 1 shows the map of Nairobi indicating the public secondary schools that were sampled.

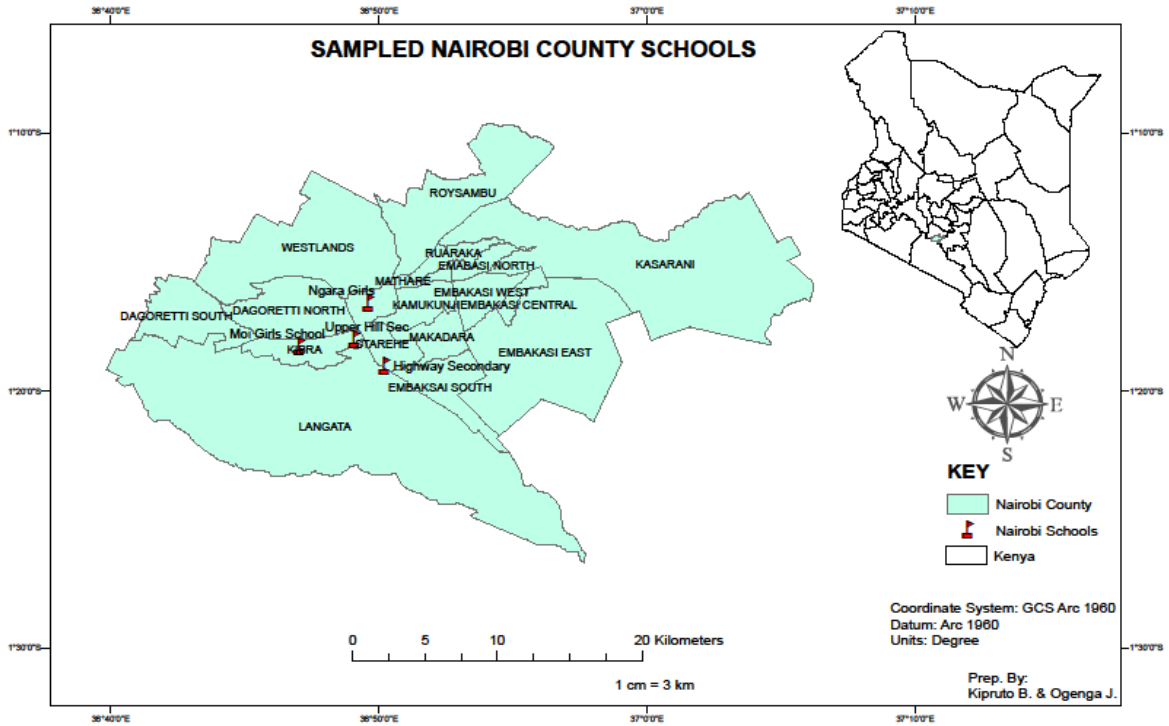

Figure 1
Map of Public Schools in Nairobi County, Kenya

3.2 Research Design

The study utilized a descriptive research design, which was considered suitable for exploring the vulnerabilities in secondary schools in Nairobi County. This design allows for effective summarization of statistics by capturing responses to various questionnaire items, facilitating the identification of necessary changes (Bryman, 2008). Descriptive survey studies primarily focus on determining "what is" (Mutai, 2000), making this approach valuable for gathering insights about a particular phenomenon. Surveys are particularly effective for collecting original data to examine the attitudes, orientations, and opinions of large populations. Descriptive survey design is ideal when the goal is to provide a detailed description of a phenomenon (Wiersma & Jur, 2005).

3.3 Target population

To begin, a list of 73 public secondary schools was obtained from the statistics section of the County Director of Education Office. Seven strata were established based on the gender composition of the schools: boys, girls, or mixed. Simple random sampling was then employed to select 6 sub-counties, representing 30% of the total sub-counties in Nairobi County. In each selected sub-county, 30% of the public secondary schools were sampled for the study. A total of 13 public secondary schools were sampled. The final sample size included 458 respondents, consisting of 6 quality assurance and standards officers from the sub-counties, 3 officials from the Kenya Red Cross, 3 from St. John Ambulance, 3 fire department officials, 1 official from the department of disaster management, 13 teachers responsible for quality assurance and standards from the sampled schools, 13 head teachers, 13 board of management members, 13 parent association members, 6 officers commanding police stations, and 384 students.

Table 1

The Sample Size of the Target Population

Category	Sample size	Sampling Technique
Sub County Quality assurance and Standards Officers (SCQUASO)	6	Purposive sampling
Branch Coordinator Kenya Red Cross	3	Purposive sampling
Branch Coordinator St. Johns Ambulance	3	Purposive sampling
Branch Heads Fire department	3	Purposive sampling
Director Department of Disaster Management	1	Purposive sampling
Head teachers	13	Purposive sampling
Teachers in charge of Quality Assurance and Standards	13	Purposive sampling
Chairs of Board of Management,	13	Simple random Sampling
Chairs of Parent Association,	13	Simple random sampling
Officer Commanding Station	6	Simple random sampling
Students	384	Multi-stage sampling

The study population included all public secondary schools in Nairobi County. According to the County Director of Education's statistics (2019), there are 73 public secondary schools in the area. The research targeted school principals, teachers, students, and officials from the Ministry of Education, specifically Quality Assurance and Standards Officers. Additionally, representatives from the Nairobi County Government's Department of Disaster Management, the Fire Department, Kenya Red Cross, St. John Ambulance, as well as members of school boards, parent associations, and local police were included in the study population.

For sampling, simple random sampling was employed to select students and teachers, while purposive sampling was used to identify key informants from the Ministry of Education, Kenya Red Cross, St. John Ambulance, the Director of Emergency Services in Nairobi County, and the principals of the public secondary schools. In simple random sampling, the researcher identifies groups within the population and selects participants from each group (Oso & Onen, 2005).

Data collection involves gathering both qualitative and quantitative information for research analysis (Bogdan & Biklen, 2007). This study utilized a mixed-methods approach, incorporating both quantitative and qualitative data to effectively address the research question.

3.4 Reliability and Validity

Validity refers to a research tool's capacity to collect data that is credible, transferable, objective, and dependable (Matula et al., 2018). Kimberlin and Winterstein (2008) suggest that an instrument is only considered valid when it meets the required reliability threshold. To ensure content validity, the researchers consulted with an experienced university supervisor and staff from the School of Disaster Management regarding the content of the questionnaires and

interview schedules. The supervisors conducted a peer review of the items and provided suggestions for improvements, aiming to enhance the accuracy and meaningfulness of the data collected (Matula et al., 2018).

Reliability refers to the degree to which a data collection process yields consistent results under stable conditions (Kothari, 2008). To assess reliability, a pilot study was conducted in two randomly selected secondary schools in Kiambu County, representing 3.4% of the total sample size. This percentage aligns with Mugenda and Mugenda (2008) recommendation of 1% to 10% of the sample size. The pilot study was repeated two weeks later, and the scores from both tests were correlated to evaluate the instruments' reliability. The results from the pretest were analyzed using Pearson's Product Moment Correlation Coefficient formula.

3.5 Ethical consideration

After the proposal received approval from the supervisors, the researcher obtained a letter of introduction from the Directorate of Postgraduate Studies at Masinde Muliro University of Science and Technology. Before beginning the data collection process, the researcher sought permission from NACOSTI to conduct the research. Informed consent was obtained from the respondents through an introductory letter, and any questions they raised were addressed prior to their participation. Participants were assured of the confidentiality of their responses. Participation was limited to those sampled respondents who were willing to take part in the study, and the data collected was used solely for its intended purpose. The researcher respected the participants' concerns and emphasized that their participation was voluntary, allowing them the freedom to withdraw at any time.

IV. FINDINGS & DISCUSSION

4.1 Population density of public secondary schools in Nairobi County

The study sought to establish the population density of secondary schools in Nairobi County. The respondents were asked about the schools' population. The results are shown in table 1

Table 2

Population Density of Public Secondary Schools in Nairobi County

Population Density	Frequency	Percent
High population	274	71.35
Low population	73	19.01
I don't know	37	9.64
Total	**384**	**100**

Table 2 shows that majority of the respondents felt that the schools were highly populated. 19.01% of the students responded that the schools had a low population. The findings correspond with the researcher's observation. The researcher observed that the classrooms and dormitories were majorly crowded. Some were filled to capacity giving rise to the need more capacity for the schools. These findings are similar to those of Gatua (2015) whose study on assessment of safety status of physical infrastructure (classrooms, dormitories, sanitation facilities, laboratories and kitchen) in public secondary schools in Nairobi West Region, Kenya revealed that safety items were either inadequate or lacking in some of the schools' dormitories. Also, the available fire extinguishers were not placed at easily accessible points and were not functioning. Students who felt their dormitories were not safe cited, inadequate facilities overcrowding, water scarcity, dirty bathrooms and toilets.

4.1.1 Allocation of Resources

The study sought to determine the impact of resource allocation on disaster preparedness and safety standards in public secondary schools in Nairobi County. Most of the head teachers decried inadequate resources in their efforts in ensuring disaster preparedness and response. Their statements corresponded with those of officials that responded to disasters in these schools. For instance, one of the Kenya red cross officials commented "most of the schools especially the low level public secondary school have inadequate resources and can barely afford the basic necessities to respond to emergencies." Kimathi (2015), noted that lack of funds is one of the most important causes of the vulnerabilities of secondary school buildings. The lack of staff and funds limits the capacity of the institution to fully develop its facilities. There are no professionals who are trained to handle disasters.

Similarly, Kukali (2013) found that the causes of vulnerability mentioned include lack of funds, low level of participation, poor management, and inadequate infrastructure. The findings show that lack of funds, poor management, and inadequate infrastructure contributes to vulnerabilities. Most of these institutions rely on external sources for

funding which cause delays in implementing development projects. According to FEMA (2009), to avert the disaster, emphasis should be on the availability of funds; training staff on disaster preparedness and evacuation procedures, and taking cognizance of the factors that create vulnerability with a focus on school facilities.

4.1.2 Organization Structure

In establishing if the school's organisation structure had a role to play in disaster preparedness and safety standards, the researcher observed that most schools did not have personnel appointed to be in charge of emergencies. Also, most of the schools lacked appointed teachers in charge of quality assurance and those who had, been insufficiently trained in that aspect. This could hinder the implementation of policies and achieving the standards for safety. Nyakundi (2012) also found the same result and argued that it because schools failed to incorporate clear policies on the level of security required for authorized access, including the roles and responsibilities of teachers, students, and support staff during an emergency.

Gichuru (2013) found that most school stakeholders lacked training on fire safety because there has never been a need for fire safety training and there were no materials to teach. The researcher went on to recommend that the management of schools should consider increasing the firefighting equipment for them to be adequate and ensure that they are regularly inspected.

4.2 Lack of Training on Disaster Preparedness and Safety Standards

To establish if the respondents were equipped with knowledge on disaster preparedness and safety standards, they were asked if they had training on the same. Table 3 shows the results.

Table 3

Training on Disaster Preparedness and Safety Standards in Public Secondary Schools in Nairobi County, Kenya

Response	Frequency	Percent
Yes	93	24.22
No	291	75.78
Total	**384**	**100**

When asked when asked whether they had training on disaster preparedness and safety standards, majority of the respondents (75.78%) lacked training. Only 24.22% of the students admitted to have been trained on disaster preparedness and safety standards.

This corresponds with Gatua (2015) findings where most of the research participants lacked adequate knowledge on safety standard manual for schools and were yet to receive adequate training on disaster preparedness and safety. According to Ng'ang'a (2013), inadequate training of students on safety was a bad predictor of compliance with the safety standards manual by schools. She recommended that teachers be trained on safety with an aim of improving their capacity to teach learners on the same.

Ayonga (2016) in his study on "An Investigation of Fire Emergency Preparedness in Kenyan Schools: A Case Study of Public Secondary Schools in Nairobi" proposed that teaching staff, workers and students be trained in Fire Emergency response. This is after findings indicating that even though most schools had the Fire Fighting Equipment, they are not adequately prepared for Fire Emergencies due to lack of proper training of teachers, staff and students and inaccessibility of these equipment.

4.2.1 Availability of School Dispensary

The respondents were asked if their schools had a school dispensary. This was to establish the availability of school dispensary to offer emergency medical services in case of a disaster. The findings are as shown in Figure 2.

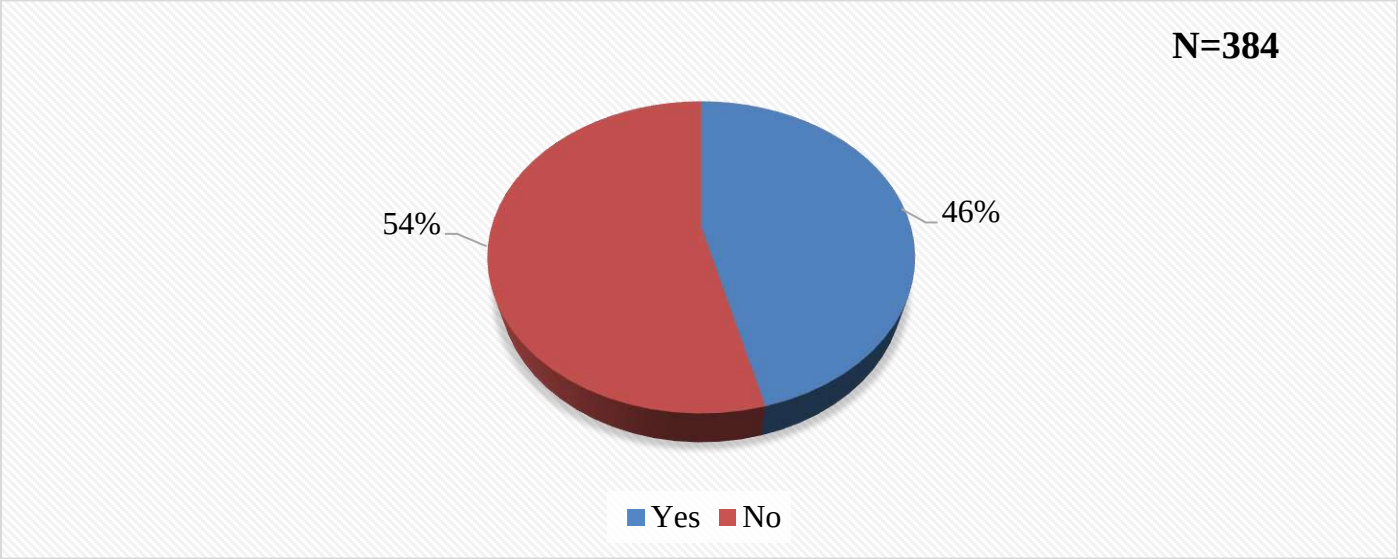

Figure 2
Availability of School Dispensary in Public Secondary Schools in Nairobi County, Kenya

The findings in figure 2 show that only 46.02% of the schools had a school dispensary. Majority of the respondents' schools did not have school dispensaries. For those that had a dispensary, the researcher observed that they had only one medic. This means that majority of the schools lacked personnel trained to handle medical emergencies. Also, some did not have the necessary equipment to handle emergencies. One of the teachers suggested that the school should acquire appropriate medical equipment for them to be able to offer basic medical emergencies and treatment.

4.2.2 Emergency Exit Routes in School Buildings

The study sought to establish if the school building had emergency exit routes. The respondents were asked if buildings in their schools had exits built for emergencies. The results are in table 4.

Table 4
Presence of Emergency Exit Routes in School Buildings in Public Secondary Schools in Nairobi County, Kenya

Response	Frequency	Percent
Yes	191	49.74
No	193	50.26
Total	**384**	**100**

Table 4 shows that 50.26% of the school buildings lack emergency exit routes. Only 49.74% of the buildings had emergency exit routes. In making observations on the existence of emergency exit routes, the researcher considered the escape of persons from building in the event of an emergency. It included checking for the presence of exit door/ corridor, emergency escape route and labelled exit. With most of the school buildings lacking emergency exit routes, it hinders meaningful evacuation and response in case of a disaster.

4.2.3 Presence of Assembly Points

In an aim to establish the existence of emergency assembly points in schools, the students were asked whether assembly points were present in their schools. Table 5 shows the findings.

Table 5
Presence of Assembly Points in Public Secondary Schools in Nairobi County, Kenya

Response	Frequency	Percent
Yes	183	47.66
No	201	52.34
Total	**384**	**100**

When asked on the availability of assembly points in case of an emergency, 47.66% of the students responded positively while 52.34% responded with a no. These findings are in table 6.4 This corresponded with the researcher's

observation which was that most of the schools lacked well labeled assembly points. This implies that the students have no idea on where to go in case of an emergency.

Kihila (2017) had similar findings where most learning institutions had no identifiable fire assembly points; Further results indicated that more than half of the respondents were unable to operate the installed firefighting facilities and a higher number had never received any firefighting and prevention training. These results let to the conclusion that higher learning institutions are not well prepared to manage fire outbreaks hence recommending plans to rectify the situation.

4.2.4 Water and Electrical Facilities

Water and electricity were available in all the schools. However, the study sought to find out the reliability of water supply in the school and also if electrical appliances and installation can be the leading cause of fire in schools. For water, the respondents' if the water supply was reliable. The findings were as shown in Table 6.

Table 6

Responses on the Reliability of Water in Schools in Public Secondary Schools in Nairobi County, Kenya

Response	Frequency	Percent
Strongly agree	14	3.6
Agree	24	6.3
Undecided	49	12.8
Disagree	132	34.4
Strongly disagree	165	43.0
Total	**384**	**100.0**

The finding in Table 6 shows majority of the schools did not have water problems since the water was reliable since 165 (43.0%) strongly disagreed, 132 (34.4%) disagreed, 49 (12.8%) were undecided, 24 (6.3%) agreed while 14 (3.4%) strongly agreed that water was reliable. The principals informed the study during the interview that the school rely on Nairobi County water for supply where in some case they also face water rationing. Some heads were in agreement that in some cases they are forced to by water from water boozers in order to cater for the deficit. This was in agreement with all the FGDs who informed the study that some schools have been forced to dig boreholes just to ensure that schools have water. When asked on water treatment most principals were skeptical and could not clearly indicate the frequency of water treatment.

On electrical facilities and if they are the cause of fires in schools the responses were as shown in Figure 3.

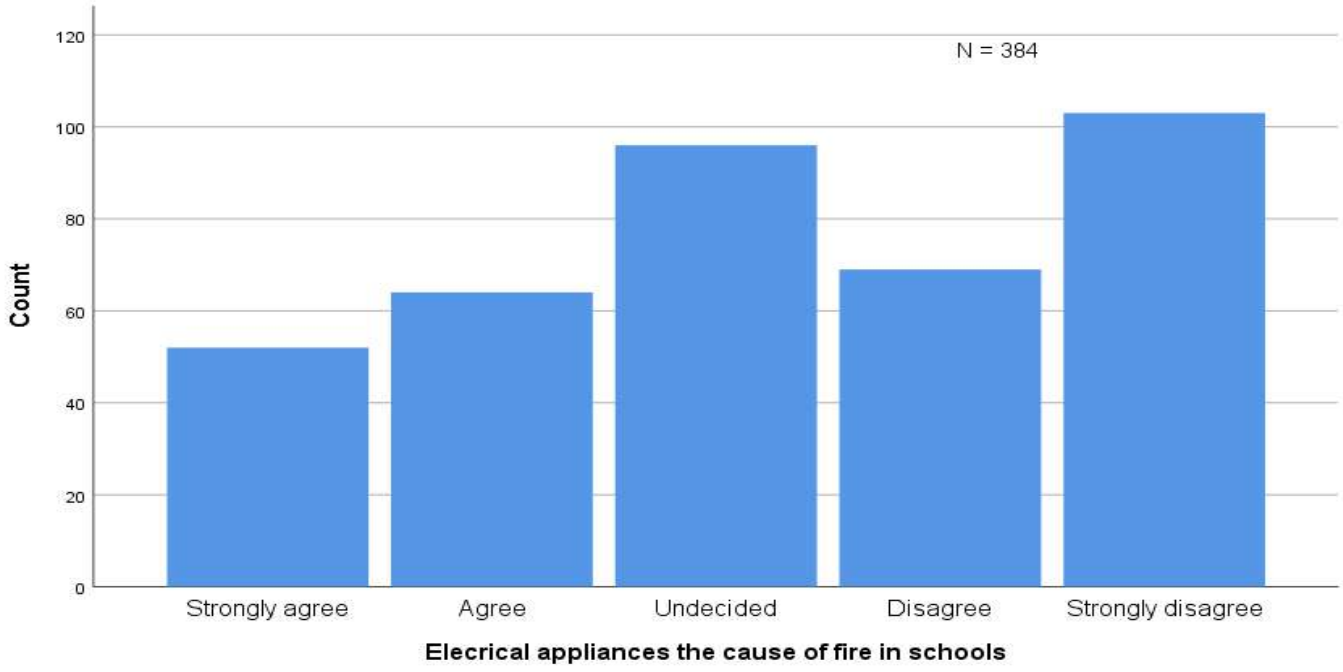

Figure 3

Electrical Appliances and Installations are the Causes of Fires in in Public Secondary Schools in Nairobi County, Kenya

The finding in Figure 3 shows that majority of the respondents 103(26.8%) disagreed that electrical appliances and installations are the cause of fires in schools, 69 (18.0%) disagreed, 96 (25.0%) were undecided, 64 (16.7%) were in agreement while 52 (13.5%) strongly agreed. This was in agreement with the interview schedules. From the interviews, the study was informed that most school fires were not caused by electrical installations and appliances. However, while visiting one of the classes the study established that electrical switches in some classes near the door were exposing students to dangers since they were not well fixed. See plates 1 and 2 electrical switches at the door of the classes.

Plates 1
Electrical Switch in a Class Plate 2: Electrical Switch in a Class

4.2.5 Emergency Facilities in the Dormitories and Classes

Classes and dormitories are the major places where students spend most of their time in school. Therefore, the study sought to establish if the classes and dormitories have emergency facilities for students in case of a disaster. On observation the study noted that dormitories and classes had doors they open outside. On emergency doors the study noted that the dormitories had extra doors but they are permanently closed. The study sought to establish if the respondents had ever used the extra doors in their dormitories and the responses captured are as shown in Figure 4.

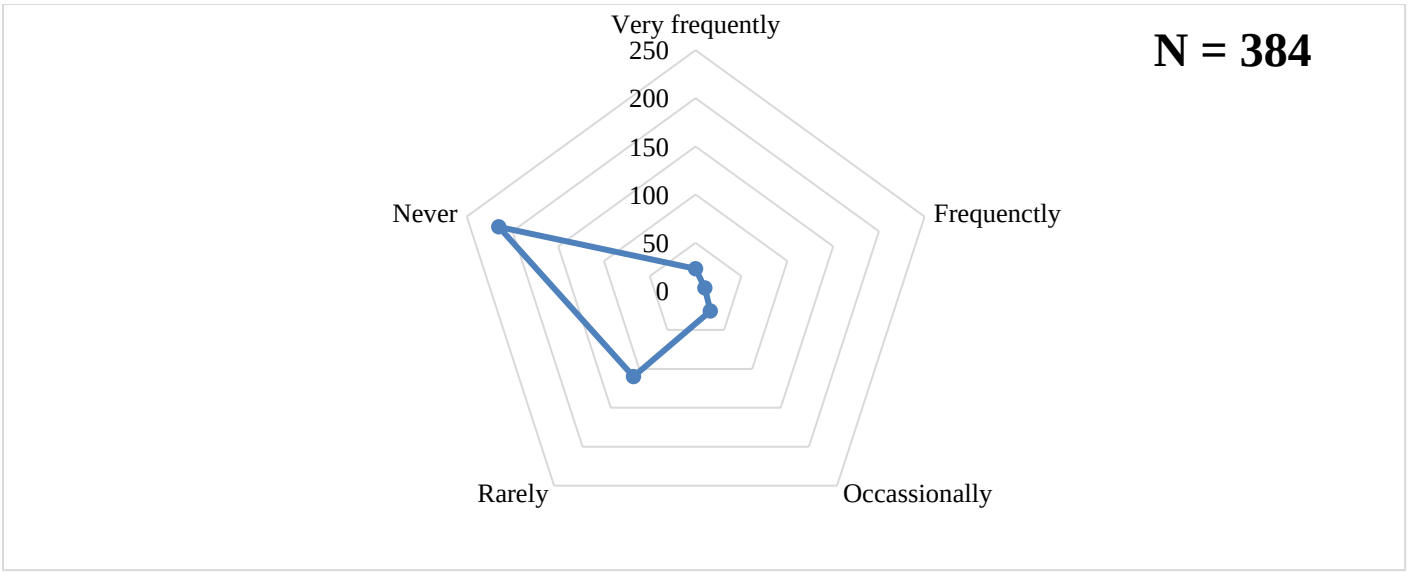

Figure 4
The Usage of Emergency Doors in the Dormitories by Students in Public Secondary Schools in Nairobi County, Kenya

From the findings in figure 4, majority of the students 215 (56.0%) indicated that they had never used the emergency door, 110 (28.6%) indicated rarely, 26 (6.8%) occasionally, 23 (6.0%) very frequently while 10 (6.0%) indicated frequently. For those that indicated never said that they had never seen those doors being opened. When asked

why the emergency doors are never opened some of the boarding teachers informed the study that this was to control theft cases in the dorm areas while others said that they don't know.

The study also observed that some classes had grills on windows which are against the set safety standards in schools. Plate 3 shows a window with a broken glass and a grill that makes students vulnerable in case of an emergency.

Plate 3
Showing a Window with a Grill and a Broken Glass in one of the in Public Secondary Schools in Nairobi County, Kenya

4.2.6 Security Personnel in the School

The study established that all the schools had security personnel where some schools had procured from security companies while others were just hired by the school. The study sought to establish the competence of the security personnel in emergency management and if they had undertaken a course in emergency response or management. The study established that none of the schools had security personnel who were competent in handling emergency. On doing a spot check in the schools in Nairobi County the study established an emergency control room where one could get contacts for fire brigades or ambulance services. None of the security personnel had the contacts for fire brigades or ambulance services. One of the security personnel said:

> *Namba za wazima moto na watu wa ambulansi sisi hatawahi pewa. Hiyo ni kazi ya boarding teacher ama principal. Kazi yetu ni kulinda shule pekee. Kama kuna kitu sisi hupigia tuu mwalimu wa boarding simu ama deputi ama headmaster [We have never been given the contact details for the fire fighters and ambulance. Our work is to guard the school. If there is an issue, we usually call the boarding master, deputy Principal or the Principal]* (FGD respondent, 2023).

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusion

In determining the causes of vulnerability to disasters in public secondary schools in Nairobi County, the study concluded that factors causing the schools to be vulnerable included: high population density, inadequate resources, organization structure, lack of training on disaster preparedness and safety and lack of or inadequate facilities necessary

for emergency response. Inadequate funds and lack of clear policies in the schools were sighted as some of the reasons for the unpreparedness. To avert the disaster, emphasis should be on the availability of funds, training staff on disaster preparedness and evacuation procedures, and taking cognizance of the factors that create vulnerability with a focus on school facilities. The lack of staff and funds limits the capacity of the institution to fully develop its facilities. Most of these institutions rely on external sources for funding which cause delays in implementing development projects. Allocation of funds to the schools to create more disaster-durable structures, quality training for school staff and students, and systematic management from the governing authorities should be put in place to avoid poor administration, which is another important cause for vulnerabilities. The study concludes by urging authorities to create policies that will promote vulnerable areas such as schools because this helps support development in the communities.

5.2 Recommendations

The researcher recommends that stakeholders consider the resources and demographics of each school when establishing and implementing disaster preparedness programs and safety standards. Since schools vary in capacity and capability, applying the same programs and standards universally may not effectively achieve the desired objectives. Furthermore, each school should conduct a vulnerability assessment and create a school vulnerability map, which would aid in enhancing disaster preparedness.

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