

Causes of Fire Disasters in Secondary Schools in Kenya

Pamela Imisa Shibutse Dr Omuterema S. Prf. China S.
Masinde Muliro University of science and Technology
pamelasikuku@yahoo.com

Abstract

Over the recent years, lives and property worth millions of shillings have been destroyed in fire disasters in secondary schools in the world. Cases of fire disasters in Kenyan secondary schools have been experienced in the last decade with increasing frequency and severity. It was therefore necessary to determine the causes of fire disasters in secondary schools. The main objective of this study was to assess causes of fire disasters in secondary schools in Kenya. An evaluation research design was used. Stratified simple random sampling was used to select the schools and the respondents. The study population was composed of secondary school principals, teachers, laboratory technicians, students and the District Quality Assurance and Standards Officers (DQASO) in Vihiga County. Data was collected by use of structured questionnaires designed for teachers, students and laboratory technicians, in-depth interviews with school principals and the DQASOs and an observation checklist. Statistical Package for Social Sciences version 11.5 was used in the analysis of data with Chi-square being used to test independence and variation of responses. A spearman's rank order correlation was run to determine the relationship between teachers' and students' responses. According to the findings of this study, Faulty electrical appliances, arson, flammable materials, gas leakages, waste burning, students unrest and lighting were cited as main hazards that lead to fire disasters in secondary schools. It was also established that: five out of the thirty five schools that participated in the study had experienced fire disasters in the last 10 years; in all the schools that had experienced fire disasters causes were clearly known; It was concluded that: fire disasters in Vihiga are frequent and severe; that the trends as to the causes of fire disasters in the county are dynamic; most of the administrators and even teachers were not trained in fire fighting skills; most of the schools dint have safety committees and were not practicing fire drills and that most of the general requirements for fire disaster preparedness were not in place. The findings of the study will enable schools to be aware of fire hazards and empower them to reduce their vulnerability to fire disasters. It will also be important to education policy makers who will use this information in formulating and implementing policies on fire safety in schools.

Keywords : Secondary schools, Fires, Hazards, Disasters, Preparedness

Introduction

The U.S.F.A. (2007) reports that hotels, boarding houses and boarding schools are susceptible to higher incidences of fire because of carelessness, smoking, candles, and simple ordinary home life activities that are not appropriate for a boarding/hotel type atmosphere. Cooking in electric appliances such as toaster ovens or electric plates, discarding flammable materials such as cigarettes, storing towels and sheets where cleaning supplies are kept are just a few of the causes of fires in secondary schools.

Secondary schools are susceptible to high incidents of fire because of carelessness, faulty electrical installation and even Arson. The Kenya Red Cross Society (KRCS) observes that secondary schools are vulnerable to disasters because of lack of specialized training such as fire drills, lack of appropriate firefighting equipment, lack of adequate resources, lack of systematic disaster mitigation and response mechanisms (GOK, 2008). According to USFADC (2007), fire drills are the largest contributing factor to the safety of the students in school.

Most fires in schools result from faulty electrical installations (USFADC, 2007). This could be blamed on failure to use qualified electrical Engineers, lack of inspection on the part of the ministry of education and failure on part of the school management to take inspection recommendation seriously regarding the investigated incidence (GOK, 2001, Otieno, 2010 and Muzungu, 2008). A study carried out in Siaya district Kenya, on fire disaster preparedness and Risk factors in boarding schools indicate that fires in 40 boarding schools in 2008 were caused by faulty electrical installations, misuse of electrical appliances and arson (Kukali and Kabuka, 2009).

When Students go on rampage they have been known to set their institutions ablaze. This has been a cause of fire disasters in secondary schools in the whole world. In Africa, students' activism started being witnessed in the 1960s. Most of the students' riots were centered along political issues particularly nationalism and the struggle for independence (Levy, 1991). In Kenya students' riots have been on the increase. In 2001, 240 cases of strikes were recorded while 360 cases were recorded in 2008. In these cases young people were obsessed with burning, vandalism and destruction of their own institutions (Mwenda, 2008).

In 2008 a form three student at Upper hill school in Nairobi died in a fire believed to have been sparked by students' unrest in the institution (Aluanga, 2008). Other incidents involving students' unrest include the October 25, 2003 classroom fires at Kinyui Boys Secondary School and the July 19, 2004 incident at Mbiuni High

School in Machakos where a student died after colleagues’ torched dormitories and classrooms and looted the food store. Whereas, the government of Kenya has always put efforts to stem out the culture of students unrest in schools, the very nature of the unrests have taken a turn for the worse. Such incidences occurring in secondary schools raise doubts on the safety of children in school.

Hazards that lead to fire disasters in secondary schools are factors that facilitate or increase the risk of occurrence of fire disasters but do not on their own cause the fires. They include policy formulation complexities and implementation hiccups (Kukali and Kabuka, 2009). For instance lack of national fire policy in Kenya has significantly contributed to poor fire safety planning in institutions. According to (GOK, 2004) destructive fires experienced in Kenya have been either accidental or deliberate but nevertheless preventable if negligence is minimized and regulatory and institutional weaknesses addressed to this end.

Poor management skills are partly to blame for cases of indiscipline that are rising sharply in secondary schools, which in some cases has led to several deaths and injuries. This has resulted to students’ unrest being a hazard in issues of fire disasters. Brazil in implementing performance based approach to fire safety code lacked specialist in fire safety engineering to give guidance on implementation (Tavres, 2008).

The absence of firefighting equipment and emergency exits led to the high death toll during the Kyanguli Secondary School fire. Sixty eight boys lost their lives in this incident. According to the safety standards manual dormitories are the single most physical infrastructure, where learners spend the longest continuous period of time in a day. It is therefore important to keep them clean and well ventilated. The manual gives the following specifications for dormitories; 1.2 meters wide space between beds, 2 meters wide corridor, admission to be based on bed capacity, doors to be at each end, be 5 meters wide and open outwards among others (GOK, 2008). Whether these specifications have been observed in secondary schools in Vihiga County is not documented.

Lack of knowledge and awareness of the risk factors reduce the level of fire disaster preparedness in institutions. Omuterema (2009) study on ‘Mega stores fire preparedness, response and mitigation’ found that ignorance and lack of appropriate training for staff on fire safety and response is a major contribution to fire tragedies. Ignorance about scale of negative impact once fire disaster occurs is also contributory to negligent or casual approach to fire disasters. This ignorance has led to fire disasters in schools.

Purpose and objective of the study

The main objective of this study was to assess causes of fire disasters in secondary schools in Kenya. It established the hazards that lead to fire disasters in secondary schools.

Conceptual Framework

The study was conceptualized basing on the General Systems Theory propounded by Ludwig Bertalanffy in 1936. The theory states that a system is characterized by interaction of its components and nonlinearity of those interactions, (Gillies, 1982). In this conceptual framework the school is made up of various components which must interact to form a whole.

The component fire disaster preparedness was influenced by fire hazards in the school setting and vulnerability of the schools to fire disasters. The dependent variable (fire disaster preparedness) was influenced by the capacities to handle fire disasters and implementation of fire safety standards (intervening variables). The conceptual model 2.1 shows the relationship.

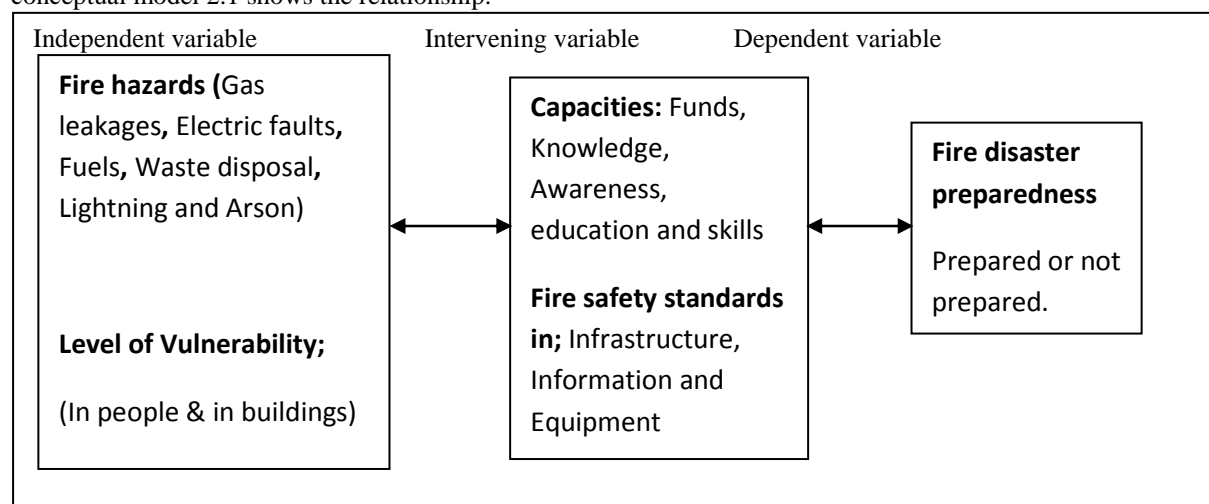


Figure 1: Conceptual Model: Interaction between independent variables (Hazards and Vulnerability) and dependent variable (Fire disaster preparedness).

Source: Author, (2013).

METHODOLOGY

Research Design

The study adopted an evaluation research design. The study mainly carried out assessment on causes of fire disasters to evaluate its effectiveness and efficiency. The researcher prepared instruments for data collection to assess the level of fire disaster preparedness. The dependent variable was fire disaster preparedness. The independent variables were fire hazards and vulnerability. The intervening variables were capacities and fire safety standards.

Sampling Strategy

To realize the right sample population, more than one approach was used. A combination of stratified simple random sampling and purposive sampling techniques were used. The researcher grouped the population into four strata and took a simple random sample in each subgroup (Kombo and Tromp, 2006). The four strata were the four districts i.e. Emuhaya, Vihiga, Sabatia and Hamisi. This was to help minimize differences among sampling units within the strata and maximize difference among the strata (Gupta, 2002). The unit of sampling was the school. The method of proportional allocation was followed to ensure the sizes of the samples from different strata are kept proportional to the sizes of the strata respectively (Kothari, 2004). Thus, purposive sampling enabled the researcher to sample out specific secondary schools which had experienced fire disasters, specific teachers who had stayed in the sampled schools longest and the DQASOs.

Sample size

30% of the 116 schools were sampled giving a sample size of 35 schools. The sampled schools had 350 teachers 10% of teachers from the sampled schools were sampled giving a sample size of 35 teachers (Mugenda, 2008). The sample size for the lab technicians was determined by taking 30% of the 120 lab technicians giving a sample size of 36 lab technicians. The sample size for students was calculated using the formula as recommended by Mbweza (2006). Since the proportion of the study population having the requisite characteristics is estimated at 50% ($p = 0.5$).

Causes of fire disasters in secondary schools

The study sought to identify causes of fire disasters in Vihiga County. This was done by establishing factors that have led to fire disasters in secondary schools in the County. The study involved teachers and students. The results are shown in table 1.

Table1: Percentage Responses of Teachers and Students Affirmative on factors that have led to Fire Disasters

Factor	Teachers %	Students %	Average %
Burning of rubbish	33	32	32.5
Students' unrest	17	26	21.5
Arson	42	42	42
Gas leakage	8	—	4
Total	100	100	100

Running a Mann-Whitney U-test statistics to examine the independence of teachers' choices as compared with students' claims on causes of fire disasters in Vihiga County it was found that the $p = 0.317$ was higher than the significant level of 0.05. The assumption that the teachers' thoughts were independent of the students' thoughts was accepted.

The study showed that in all of the schools that had experienced fire disasters, causes were clearly known. The main causes were noted as arson 42% burning of rubbish 32% and students' unrest 21%. It was reported that in most cases of arson burning of rubbish usually availed the source of the fire. In one incident a student got fire from the burning rubbish used it to light fire on a hanging net in a window of a dormitory. This set the dormitory a blaze while students were in for preps. Arson has been a leading cause in the county for both the responses of both students and staff positively correlated and averaged 41%. Student unrest was strongly thought to be a factor by students more than teachers though on average was lower than arson. It further can be noted that teachers' views were in proximity with those of the students. This confirms to the reliability of the study. It is however observed that, students could not associate earlier fire disasters to gas leakage. An equally serious cause as identified by a study carried out in Pakistan on 'Causes of Fire Emergencies'. 50% of fire disasters are caused by electric faults while 5% are caused by gas leakages (Navid, 2011).

Hazards leading to Fire Disasters in Secondary Schools

The study further sought prioritization of the hazards that lead to fire disasters in secondary schools. Table 4.5 shows the results.

Table 2 Ranked Percentage Scores by Teachers and Students on hazards that lead to Fire Disasters

Hazard	% affirmative	teachers	% affirmative	students	Rank of teachers	Rank of students
Faulty electrical appliances	90		78		7	7
Arson	90		43		6	5
Flammable materials	89		30		5	4
Gas leakage	84		2		4	1
Waste burning	73		16		3	3
Student unrest	68		63		2	6
Lightning	60		5		1	3

A spearman's rank order correlation was run to determine the relationship between teachers and students responses on hazards that lead to fire disasters in secondary school. There was a correlation between the two which was statistically insignificant $r_{s5} = 0.500$ at $p = 0.253$. Thus the overall percentage of teachers who were in agreement on hazards that lead to fire disasters was higher than the overall percentage of students. The teachers were strongly in support of the projections partly due to wider experience and exposure. This can be seen in situations where students consider lightning as a possible cause of fires in their schools (5%) compared with their teachers (60%). Gas leakage was not even in the minds and scored insignificantly from the students (< 1%) compared with 84% of the teachers who strongly agreed that it was a hazard.

Teachers and students were however in agreement on some of the hazards like students' unrest which scored 63% by students and 68% by teachers. Faulty electrical appliances as a fire hazard received significantly the same support of 78% and 90% by students and teachers respectively. In another incident in Vihiga County, a student connected electric wires wrongly to charge his mobile phone. This led to a whole dormitory being razed down during daytime while students were in class. These findings agree with Navid (2011) who established that 50% of fire disasters in schools are caused by electric faults.

Summary of Findings, Conclusions, Recommendations and suggestions for further research

The study showed that in all of the schools that had experienced fire disasters, causes were clearly known. The main causes were noted as arson 42% burning of rubbish 32% and students' unrest 21%. It was reported that in most cases of arson burning of rubbish usually availed the source of the fire. In one incident a student got fire from the burning rubbish and used it to light fire on a hanging net in a window of a dormitory. This set the dormitory a blaze while students were in for preps. Arson has been a leading cause in the county for both the responses of both students and staff positively correlated and averaged 41%. Student unrest was strongly thought to be a factor by students more than teachers though on average was lower than arson. It further can be noted that teachers' views were in proximity with those of the students. This confirms to the reliability of the study. It is however observed that, students could not associate earlier fire disasters to gas leakage. An equally serious cause as identified by a study carried out in Pakistan on 'Causes of Fire Emergencies' found that 50% of fire disasters are caused by electric faults while 5% are caused by gas leakages (Navid, 2011).

The following suggestions for further research were made; A study is recommended to establish the training needs of educational stakeholders in the area of fire disaster preparedness; More studies be carried out to address certain social vices such as arson and students unrest which were observed to adversely cause fire disasters

References

- Akali, N, Khabamba I. and Muyinga, G. (2011). "Fire sources, disaster impacts and mitigation in Kenyan secondary schools" *International Journal of Disaster Management and Risk Reduction*, Volume 3. Issue 3.
- Aluanga, L. (2008). What is ailing schools? *Saturday standard* 26th June, page 10.
- Earl, B. (2001). *The Practice of Social Research*. Oxford university press Johannesburg, South Africa.
- Fire Administration National Fire Data Center, (2007). *Safety issues, Safety articles products, Safety tips, safety issues community and forums*. www.safety issues.com accessed 5/6/2008
- Federation Emergency Management Agency, (2001). *Dormitory fires*, Tropical Fire Research Series Vol 1 issue 1.
- Government of Kenya (2008). *Safety standards' Manual for schools in Kenya.(1st Edition)*. Ministry of Education, Government Printers, Nairobi.
- Gupta, S.P. (2002). *Statistical methods*, thirty-first revised edition. Published by Sultan Chand and Sons 23, Daryaganj, New Delhi- 110002.
- Kipng'eno, R. R. and Kyalo W. B. (2009). Safety awareness and preparedness in secondary schools in Kenya. *Educational Research and Review* Vol. (8), pg. 379-384
- Kothari, C.R. (2004). *Research Methodology: Methodology and Techniques*. New Delhi: New Age International (P) Limited Publishers.
- Kombo, D. and Tromp, D. (2006). *Proposal and Thesis Writing. An introduction*. Paulines Publications Africa. Nairobi GPO, Kenya.

- Kukali, A. N. and Kabuka, E. K.(2009). Fire Disasters in Secondary Boarding Schools in Kenya. *International Journal of Disaster Management and Risk Reduction*, Volume 3. Issue 3.
- Levy, D.C. (1991). “*Student Activism in Latin America: Explaining the Decline*”. *Higher Education*, 22(2), 145-155.
- Mbwesa, J. K. (2006). *Introduction to management research, a student’s handbook. Basic Modern Management Consultants*, Nairobi, Kenya.
- Mugenda, A. (2008) *Social science Research: Quantitative and Qualitative Approaches*. Applied Research and Training Services Press. Nairobi
- Muzungu, M. (2008). School fire, Deaths but real culprits still at large. *The Sunday Standard*. 25th May
- Navid, T. (2011). Causes of Fire Emergencies managed by Rescue 1122 in Punjab, Pakistan, published 31/5/2011.
- Omuterema, S. (2009). *Mega stores fire preparedness, response and mitigation, Case of Nakumatt fire disaster* Proceedings of a workshop on urban fires. Masinde Muliro University of Science and Technology, Kakamega, Kenya.
- Tavares, R. M. (2008). Prescriptive codes verses performance based codes: Which one is the best fire safety Code for the Brazilian context? *Safety science monitor*. Volume 12, issue 1, article 3. Accessed 7/9/2009 www.optseg.com

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

