Frequency and Severity of Fire Disasters in Secondary Schools in Kenya

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ABSTRACT: The issue of fire disasters in schools will no doubt continue being a major problem in the management of education all over the world. The government of Kenya through the Ministry of Education (M.O.E) recognizes that student's safety is indispensable to effective learning in schools. Cases of fire disasters in Kenyan secondary schools have been experienced in the last decade with increasing frequency and severity. Over the recent years, lives and property worth millions of shillings have been destroyed in these fire disasters. This study assessed the frequency and severity of fire disasters in secondary schools in Vihiga county, Kenya. The main objective of this study was to assess the frequency and severity of fire disasters in secondary schools in the area of study. 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 DQASOs 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, it was established that: five out of the thirty five schools that participated in the study had experienced fire disasters in the last 10 years; most of the general requirements for fire disaster preparedness were not in place; most of the schools did not have trained personnel in handling fire disasters and Limited funds was a strong barrier to fire disaster preparedness in secondary schools. It was concluded that: fire disasters in Vihiga are frequent and severe; most of the administrators and even teachers were not trained in fire fighting skills; The findings of the study are to empower schools to reduce their vulnerability to fire disasters. Policy makers will also use this information in formulating and implementing policies on fire safety in secondary schools.

KEY WORDS: Fire, Disasters, preparedness, Frequency and Severity.

I. INTRODUCTION

Fire disasters in schools have become a source of concern in all parts of the world. They cause enormous losses of lives, property, development initiatives and threaten students' safety. The Fire Administration National Data Centre (FANDC) in the USA reported that Africa, Asia and South America have recorded large death tolls related to school fires because of their lack of inspection units (FANDC, 2007). In the USA it is estimated that 4,000 Americans die and 20, 000 more get injured in fire disasters each year (USFA, 2006). In 1998 a kerosene lantern overturned in a dormitory in Nigeria causing a fire disaster which killed 23 girls and injured scores of others (The Independent, 2001). In April 2008, a fire ripped through a dormitory of Budo junior boarding school in Uganda killing 19 girls and 2 adults in suspected arson (Muzungu, 2008). Following the Budo Junior, fire the GOU set up several measures to promote safety in schools. Such measures included fixing a fire extinguisher on every school block, training students in fire-fighting and creating an emergency exit on every building (The new vision, 2012).

The situation is not different in Kenya. Kenyan secondary schools have had frequent fire occurrences in dormitories, administration blocks and laboratories. The Bombolulu and the Kyanguli fire disasters pushed the issue of school safety into public debate whereby the GOK issued a circular on school safety addressing the issue of fire safety

deterioration in schools (GOK, 2001). Two years later, the GOK entered into a partnership programme called 'School Safe Zones' with Church World Service (CWS). This action was meant to promote safety for learners in schools. Despite all these efforts fire disasters have continued to occur with greater. Fire disasters are by far the most common disasters in learning institutions in Kenya. These cases are a pointer to how insecure schools have become (GOK, 2007).

II.   OBJECTIVE

The overall objective of this study was to determine the frequency and severity of fire disasters in secondary schools in Vihiga County, Kenya.

III.   FREQUENCY AND SEVERITY OF FIRE DISASTERS IN SECONDARY SCHOOLS

Each year, more than 1,300 schools in the UK suffer fires large enough to be attended by fire and rescue services. Fifty-six per cent of these are classified as non-accidental. Fire related deaths in secondary schools are a global experience as in the case of United States, Canada and European schools with large death tolls in Africa, Asia and South America (NFDC, 2007). Each year in the United States, an average of 5,500 structure fires occur in educational institutions these include public, private, and parochial schools where students attend during the day only. These fires are responsible for approximately 125 injuries and $50.1 million in fire loss (USFA, 2002).

Fire disasters are by far the most common disasters in learning institutions in Kenya (Kirui, 2009). According to Otieno (2010), Kenyan schools are ill equipped in the face of a fire disaster. Most of them have no capacity to handle emergencies, and are yet to even implement safety standards manual. The most dreaded incidents of Bombolulu girls on 25th March 1998 where 27 girls died and the Kyanguli Secondary School in Machakos on March 26, 2001 where 59 boys is still fresh in the minds of many. The Kyanguli fire disaster occurred exactly three years after the Bombolulu one and was more severe since many more students died and property worth millions of shillings was destroyed. In 2005 fifteen fire incidents were reported countrywide in various schools. Two boys were burnt to death in their sleeping quarters at Endarasha Boys Secondary School dormitory in Nyeri County, Kenya after some students torched their dormitory (Otieno, 2010). Two students were injured and property worth thousands of shillings reduced to ashes after students from Naivasha High School set one of their dormitories on fire. Others were left nursing minor injuries while others could not be accounted for during the incident (Gitonga, 2010).

In the year 2010 several fire disasters took place in Kenyan secondary schools leading to destruction of life and property. These include the following: January 2010, Bungoma and St Stephenes Kisilu; February 2010, Kerugoya and Kolanya boys High schools; March 2010 Waa Girls High school in Kwale and Purpose driven school in Kitale; May 2010 Emusire High school; July 2010 Malindi High school; October 2010 Endarasha High school in Nyeri. Other reported cases were: February 2011 Twiga High school in Kitale and Nakuru high school. It is true that every month at least two schools in Kenya suffer fire disasters (Otieno, 2010).

Vihiga County has had its share of fire disasters in its secondary schools. Ebunangwe High school experienced a fire disaster where a dormitory was set ablaze in 2001. Nyang'ori High school experienced two fire disasters in one week in 2004. In 2008 Ebunangwe High school experienced another fire disaster. In May 2010 Emusire High school in the same county experienced a fire disaster where a dormitory was destroyed. In May 2011 a food store was also destroyed by fire in the same Emusire high school (GOK, 2011).

IV.   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).

V. STUDY AREA AND POPULATION

The study was undertaken in Vihiga County. The county lies between longitude 34º 30'E and 35º 0'E East and Latitude 0º1'S and 0º15'N (Figure 3.1). It is on the southernmost tip of western province. It was curved out of Kakamega County in 1991. It occupies an area of 563sq km within the Lake Victoria basin. The county is located in western province bordering Kakamega in the north, Kisumu in the south, Siaya in the west and Nandi in the east. It is divided into four sub counties. These are Emuhaya, Vihiga, Sabatia and Hamisi.

The county has 116 secondary schools headed by 116 principals with an estimated population of 40,000 students, 2,300 teachers and 120 laboratory technicians and 4 DQASO of the four districts (GOK, 2011). This gives a total of 42,540 individuals as the study population. Each of the schools is expected to fall into one of the following categories: BBS, GBS, MDS and MDBS. All these categories were proportionately represented in the sample.

VI. RESEARCH DESIGN

The study adopted an evaluation research design. The study mainly carried out assessment on frequency and severity of fire disasters in secondary schools. The researcher prepared instruments for data collection to assess the frequency and severity of fire disasters.

VII. 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 sub-counties 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). Thus, purposive sampling enabled the researcher to sample out schools which had experienced fire disasters, teachers who had stayed in the sampled schools longest and the DQASOs.

VIII. 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 Mbwesa (2006). Since the proportion of the study population having the requisite characteristics is estimated at 50% ($p = 0.5$)

IX. INSTRUMENTS OF DATA COLLECTION

Tools for data collection were based on the indicators to be assessed, the objectives of evaluation and the evaluation questions. Such tools included Questionnaires, Interview schedules and Observation checklist. The study relied on both primary and secondary sources of data.

X. FINDINGS

This study comprised thirty five (100%) secondary schools. 20% of the schools were girls' boarding schools, 17% were boys' boarding schools, 29% mixed day and boarding schools and 34% mixed day schools. Table 4.1 shows the percentage of the sampled schools in the study.

Table 1. Distribution of Schools Visited to Assess Fire Disaster preparedness in secondary schools in Vihiga County

District	Mixed D&B	Mixed Day	Boys' Boarding	Girls' Boarding	Total
Emuhaya	3	3	2	2	**10**
Vihiga	2	3	1	2	**8**
Sabatia	2	3	1	1	**7**
Hamisi	3	3	2	2	**10**
Total	**10**	**12**	**6**	**7**	**35**

A chi-square test assuming equal distribution was done obtaining $X^2_{3,\,0.05} = 8.040$. At p=0.05 a chi square value of 8.04 is slightly above the critical value at 3df of 7.815. This annulled equal distribution of school types. Friedman's test revealed a mean rank order from the highest as mixed day schools 3.63, mixed day and boarding 2.63, girls boarding 2.00 and boys' boarding 1.75. This implied that there are more mixed schools in the county than any other type.

XI. NUMBER OF STREAMS

The study undertook to record the number of streams in the sampled schools. The results are shown in table 2.

Table 2. Percentage Distribution of Streams across Schools in Vihiga County

No. of streams	1	2	3	4 and above
Percentage of schools	12	22	29	37

Over 50% of the schools in Vihiga county had three and above streams. This implies that most of the schools have high population necessitating this study. A classroom in an ideal Kenyan school is expected to have 45 students (GOK, 2008). The study revealed that only 31% of the sampled schools adhered to this regulation. The 69% of the schools had over-enrolled students in their schools.

XII. FREQUENCY OF FIRE DISASTERS IN VIHIGA COUNTY SECONDARY SCHOOLS

The study sought to establish the frequency of fire disasters from students, teachers and lab technicians. Table 4.5 shows the results.

Table 3. Frequency of Fire Disasters in Vihiga County Secondary Schools

District	No. of schools that have experienced fire disaster	No. of schools not experienced fire disaster
Emuhaya	3	7
Vhiga	0	8
Sabatia	1	6
Hamisi	1	9
Total	**5**	**30**

A chi-square test of independent variables (teachers and students) was done to test the independence on having experienced fire disasters in the schools. The Mann-Witney U test of statistics revealed p = 0.317 which was more than the significance level of 0.05. This indicated that there was no relationship between those students, teachers and principals who had had fire disasters in their schools and those who had not. The results reveal that there was no significant difference between the three sets of interviewees for students, teachers and principals. This expressed reliability of the answers given by the three parties.

The results reveal that five out of the thirty five schools that participated in the study had experienced fire disasters in the last ten years. Vihiga district had not experienced any fire disaster in its schools. Table 4 shows the results. Some of the schools had had more than one fire disaster in the last ten years as shown in Table 4.6 below. These results conforms with Otieno (2010) who argues that, on average, every month at least two schools experience a fire disaster.

Table 4. Frequency of fires in the schools that had experienced fire disasters

Name of school	District	Frequency	Time frame
Nyango'ri Boys	Hamisi	Two times	One week in 2004
		Once	In 2011
Bunyore Girls	Emuhaya	Once	In March 2012
Ebunangwe Boys	Emuhaya	Once	In May 2011
Emusire Boys	Emuhaya	Twice	May 2010 and May 2011
Shaloam Girls Academy Senior	Sabatia	Once	March 2012

The study revealed that five out of the thirty five schools that participated in the study had experienced fire disasters in the last 10 years. Some of the schools had experienced more than one disaster. The most prevalent facilities where the fires occurred were the dormitories, kitchen and food stores. The fire disasters were severe since property worth millions of shillings was destroyed.

The study revealed that most of the general requirements for fire disaster preparedness were not in place in most schools. On personnel, the study revealed that most of the schools did not have trained personnel in handling fire disasters or advice on prevention. The minimal inclusion of fire disaster matters in lessons signifies how unprepared schools in the country are, in case of fire disaster. Most of the teachers had not been trained in fire fighting skills.

XIV. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the findings the study concluded that fire disasters in Vihiga County were frequent and severe. Schools have to put the general requirements for fire safety in place to reduce on impact of fire disasters. The study revealed that fire disasters are frequent in schools. It therefore recommends that the MOE and the school administrators put a strategic plan in place to curb this menace. The following suggestions for further research were made;
1)   There is need to carry out an in-depth study on disaster preparedness in secondary schools with additional variables to include all other disasters other than fires.
2)   A study is recommended to establish the training needs of educational stakeholders in the area of fire disaster preparedness.

REFERENCES

1. Disaster Management and Mitigation Unit and Partners. The severity and extent of fire disasters –Zambia's Technical Capabilities. Republic of Zambia, Office of the President, Lusaka. (2008)
2. Fire Administration National Fire Data Center. Safety issues, Safety articles, products, Safety tips, safety issues community and forums.   www.safety issues.com accessed 5/6/2008. ((2007).
3. Gillies, D. A. Nursing management a systems approach. W. B. Saunders Company, 56-74. Philadelphia. ((1982).
4. Gitonga, A. Students on a mission to raze down schools http://www.standardmedia.co.ke. Accessed on 20th December 2010.(2010).
5. Government of Kenya. Ministry of Education, Kenya Education Staff Institute (KESI), Education Management Module, A training Mannual for Board of Governors for Secondary Schools. Nairobi.((2007))
6. Government of Kenya. District Education Office Report. Vihiga District.(2011)
7. Gupta, S.P. Statistical methods, thirty-first revised edition. Published by Sultan Chand and Sons 23, Daryaganj, New Delhi- 110002. (2002))
8. Kirui, J. M.. 'Security and safety standards in schools' Unpublished presentation of Proceedings of secondary schools Heads of Departments' workshop in Western province in January and February 2009.
9. Mbwesa. J. K. Introduction to management research, a student's handbook. Basic Modern Management Consultants, Nairobi, Kenya. (2006).
10. Mugenda, A. Social science Research: Quantitative and Qualitative Approaches. Applied Research and Training Services Press. Nairobi. ((2008).
    Muzungu, M. School fire, Deaths but real culprits still at large. The Sunday Standard. 25th May 2008.
11. Ndiang'ui, J. T.Vulnerability of Kenyan schools to Disasters: A case of Nairobi Public secondary schools, Kenya, Unpublished Thesis, UON. (2006).
12. 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.
13. Otieno, S. Schools ill equipped in the face of a disaster. ICT news on out of Africa project http://www.standardmedia.co.ke. Accessed 20/3/2011. (2012).
14. The New Vision, (2012).Ugandan daily newspaper.
15. United States Fire Association, (2002) Topical fire research series Volume 2, issue 9th October 2001.