VULNERABILITY OF KENYAN SCHOOLS TO DISASTER: A CASE OF NAIROBI PUBLIC SECONDARY SCHOOLS, KENYA

BY
JOYCE THAARA NDIANG'UI
C/50/P/8242/2000

A Research Project submitted in partial fulfilment of the requirements for a Master of Arts Degree in Sociology, University Of Nairobi.

JULY 2006

DECLARATION

This project report is my original work and has not been presented for a degree in any other University.

Signed:..... Date: 15-08-2006

This Research Project report has been submitted for examination with our approval as University Supervisors.

1. Signed:..... Date: 15.08.06

Dr. Robinson M. Ocharo
(University Supervisor)
Department of Sociology
University of Nairobi
P.o Bo 30197
Nairobi.

2. Signed:..... Date: 31-08-06

Mr. John M. Njoka
(University Supervisor)
Department of Sociology
University of Nairobi
P.o Box 30197
Nairobi.

DEDICATION

Dedicated to my two sons and friends, the Late Kevin Waithaka and Ken Njiru for their unwavering moral support and encouragement.

ACKNOWLEDGMENTS

I would like to express my sincere thanks to the many people without whose support this project would not have been a success. While I can only mention a few of them, I feel greatly indebted to: -

Dr. Robinson Ocharo and Mr. John Njoka for their tireless counsel, encouragement and insightful criticism during the write up of this project.

Mr. Njiru Mbogo, a colleague and friend for his unwavering support, tireless guidance and encouragement and for making all the necessary resources for typing and printing this project.

Brenda Murugi of Njiru Mbogo & Co. Advocates and Agnes Nyambura for their tireless efforts in ensuring that the contents of this project were properly typed.

My entire family and friends, for their encouragement.

ABSTRACT

This is an exploratory study on the vulnerability of Kenyan Schools to disasters.

As we enter a new century, our schools are likely to face formidable challenges not previously encountered in our history as a nation. Technological and societal conditions exist today, which pose significant risks to the safety of our schools. In the recent past, the number of disaster situations in schools have escalated in both number and complexity.

The general expectation by the parents, guardians and the society at large is that the schools have both moral and legal obligations to provide a safe and secure learning environment to those placed under their care. To meet the obligations, the schools must be prepared to respond to any emergency situation that may arise. Consequently, this exploratory study had the following objectives: -

a) To identify and classify the types of hazards found in the schools in Nairobi.

b) To study the extent to which secondary schools in Nairobi are vulnerable to disaster.

c) To explore the relationship between the schools' administrative structures and disasters.

d) To demonstrate the recovery strategies put in place in our schools to cope with disaster situations.

The data was collected by use of structured questionnaires designed for teachers in public secondary schools; in-depth interviews with school principals

or their deputies and where possible, an observation checklist. The questionnaires were administered on a "drop – and– pick – later" basis.

According to the findings of this study, it was evident that: -

1. There are various types of hazards existing within the school set up in different proportions that expose them to disaster situations. In some schools the magnitude of the hazards is higher than in others, implying that some schools are more vulnerable than others.

2. Other factors, other than trust in expert systems, make schools vulnerable to disasters. For example, lack of safety assessment on buildings, exposed electricity wires, overcrowding in dormitories, prefabricated buildings etc, all make schools vulnerable to disasters.

3. To some extent, the degree of exposure to disasters in schools is influenced by the administrative framework of the school. For example, lack of early warning systems to help control fire in its early stages; lack of disaster preparedness plans; lack of fire drills and First Aid Kits; lack of basic training on security; lack of fire extinguishers in key areas or lack of emergency exits etc, expose schools to disasters.

4. Adequate strategies have not been put in place to cope with disaster situations and schools are not prepared at all for disasters. To achieve reasonable levels of minimization, it is necessary to reduce the adverse effects of disasters through effective precautionary measures.

The study thus recommends that there be a national policy, formulated by all the stakeholders, that has clear strategies on how to prevent and control disasters. This would be best achieved through joint workshops and seminars of parents, school administrators, relevant NGOs and the government. Further, the government should adequately fund this effort, to enable schools purchase the required equipments,

materials and other facilities that would ensure disaster preparedness. The schools should also employ security staff with comprehensive safety training capable of dealing with any emergencies. It also recommends that every school should have an emergency preparedness plan that is communicated to all the members of the school community. It is also recommended that safety courses such as First Aid and fire-fighting training, be made part of the school curriculum. Frequent courses, in-service and refresher courses on safety assessment should be availed to the school principals and teachers. Finally, it is recommended that the ministry of works performs safety assessment on school buildings at least once every three years.

In addition, the study recommends that further research should be undertaken mainly on those schools that have experienced major disasters in each province. The findings would give invaluable insight on the specific causes of schools disasters. Such a comparative study would help shed light on whether the causes of disasters in schools are similar. The study further recommends that there is need to compare vulnerability of public and private schools to disasters. This would help understand why there aren't many cases of disasters in private schools. The study also proposes the need for action research to enable the schools acquire the much required equipments, materials and facilities that would ensure disaster preparedness.

TABLE OF CONTENTS

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

LIST OF TABLES.

Secondly, within specific schools, and therein the pre-disposing factors identified, the researcher seeks to examine to what extent the very factors expose individual schools to disaster situations. The study does not however look at any extraneous factors i.e. factors geminating outside the school.

Finally, disaster situations may be dealt with using various administrative and technological frame work put in place within individual institutions. In this study, the researcher ventures to examine the various coping strategies or abilities put in place by various school administrations to deal with any eventuality of a disaster situation.

CHAPTER ONE

INTRODUCTION

1.1 Background

According to Turner B.A (1978:1), "Mankind lives with the knowledge that its plans and intentions may be thwarted by disaster. Even when it thinks itself safest, it cannot wholly discount the possibility that some unforeseen and destructive event may subject men to danger or disrupt their orderly everyday affairs". Even with science and technology that have given man greater understanding of the nature and scope of disasters, still disaster renders man powerless.

It must however be noted that a disaster happens when and only when a hazard impacts on vulnerability. According to the disaster Crunch Model, Davis and Wall (1979), a natural phenomenon is not in itself a disaster but an earthquake, a flood or a draught. A community may be vulnerable to a disaster for many years, yet without the trigger event, there is no disaster. In this case, when a hazard impacts on a people, who are vulnerable to that hazard; then it becomes a disaster with a wide scale loss of life and property. The unsafe condition is the condition, which makes the population vulnerable to that particular hazard. The argument is that although trigger events (the hazards) are often blamed for the disaster, in many situations, the underlying cause is actually the unsafe conditions which made people vulnerable.

According to WHO (1999), vulnerability to emergencies and disasters is a function of the degree of exposure to hazards and of people's capacity to cope with hazards and their consequences.

Vulnerability therefore is the potential for negative outcomes or consequences. It is the predisposition to suffer damage due to external events and the long-term factors that affect the ability of the victims to respond to events or which make them susceptible to calamities. It is important for the community to be concerned with vulnerability because it contributes to the severity of a disaster and it impedes effective disaster response.

Foreman and Parhad (1997:6) outlines several factors that cause vulnerability. These include:-

a) Negligence of officials (as was the case in April 1997, when Sunbeam Supermarket in Nairobi collapsed killing several people.)

b) Irresponsibility, especially where there is failure to exchange technical information between disasters.

c) Centralization of decision-making where action has to wait for decisions to be made at the centre.

d) Corruption and bureaucratic incompetence, which leads to lack of supervision and adequate training of workers.

These factors clearly indicate that vulnerability is often created by human error, and if the aforementioned factors were put under control, disasters would be greatly reduced as well as the destruction they cause.

Disaster has been defined as "overwhelming events and circumstances that test the adaptation responses of a community or individuals beyond their capability, and lead, at least temporarily, to a massive disruption function for the community or individual, Raphael 1986:3). In other words, a disaster can be said to be the relatively sudden and widespread disturbance of the social system and life of a community by some agent or event over which those involved have little or no control. According to Turner (1978:1), disasters cause disruption in the normal pattern of life, generating misfortune, helplessness, and suffering effects on the socio-economic structure of a region or country and, or the modification of the environment, to such an extent that there is need for assistance and for immediate outside intervention.

The risk factor in the world has increased a great deal; part of the consequences of modernity, as propounded by Giddens (1991).The complexity of technological development has led to the potential for new disasters, especially through collapse of technical systems. For instance, sources of energy which men control and which possess the potential for the

creation of man-made disasters are increasingly vulnerable to misuse, if major errors are made at the centre.

Second, the kinds of energy which man makes use of are inherently much more destructive than those which he has traditionally controlled. For example, fire as a destructive force is still with us although it has now been supplemented by the potentially damaging properties of modern explosives and a range of other materials in chemical plants etc.

Third, man has continued to intervene more frequently in the environment which supports him, so that the possibility that he may upset some balance of natural forces to provoke a disaster becomes a very real one (Turner 1978:2). Disasters have frequently resulted from human actions, such as uncontrolled human settlements, lack of basic infrastructure, outright occupation of disaster-prone areas, etc.

In recent years, the world has seen a massive increase in disasters and with modernity, there is the propensity of them increasing even more. Statistics gathered since 1969, show a rise in the number of people affected by disasters. Consequently, disaster management has become an issue of concern in many countries. Efforts are therefore needed to halt emergencies and disasters by tackling their sources, i.e. the vulnerabilities that expose the communities to the said hazards. More often than not, disasters strike without warning and it is therefore imperative to find out whether a community has the ability to respond to events positively to make it avoid or lessen disaster effects. This in a way would be asking the question; how vulnerable is a community that is hit by a disaster? This then leads to the pertinent question; how vulnerable are the Kenyan schools to disasters?

While in session, our schools are themselves communities, like any other. We urgently need therefore to identify the hazards to which our schools are vulnerable to, considering that our society places moral and legal responsibility on schools to provide a safe and secure learning environment for the Youth. Disasters in schools seem to be jolting parents and Education authorities to attention the world over. For instance in Erfurt, Germany, a student bent on a revenge for being expelled from school shot dead 14 teachers, two pupils, a police officer and

himself, in one of the worst mass murders since world war two (Daily Nation correspondent, 29th April 2002).

In another incident, an armed student stormed into Columbine School in Denver, Colorado, and shot dead 14 students and teachers. The killer student went into a firing spree killing several students and injuring others seriously (Daily Nation Correspondent, 20 April 1999). According to Brannigan F. L. and Carter Hary, in September 1998 issue of Firehouse Magazine; "Schools have never been immune to fire tragedy". The two writers note: "It's a shame that so many children have had to pay the penalty for the sins of adults who did not know or care about fire safety."

Like the rest of the world, Kenya has had its share of school disasters. In 2001, school strikes/riots dominated the education scene, for most of the year. At one time, it looked as if the menace was getting out of hand and the sector was becoming ungovernable. A total of 118, schools were hit by students' unrests during the second term alone (Daily Nation 24th December 2001).

On the night of March 25th 1998, 22 students perished in a horrendous fire that engulfed the only dormitory at Bombolulu Girls Secondary School in Mazeras, Mombasa. Four other survivors succumbed to their burns later in hospital (The People, Tuesday, March 27, 2001)

In Nyeri High School, four school prefects were doused in petrol and set on fire (Daily Nation 10th June 2000). On the 14/6/2002, thirteen Kangaru students in Embu appeared before an Embu Juvenile court charged with attempted arson, conspiracy to commit felony and malicious damage to property (Standard 15th June 2002). St. Kizito is another example where innocent lives were lost when boy-students invaded a girls' dormitory at night. At 1.40 am on March 26, 2001 a fire swept through a dormitory at Kyanguli Secondary School in Machakos, 65 km from Nairobi, killing 67 male students. Every month at least two schools suffer a fire outbreak. In 2002 alone, there were at least 15 fire incidents in various schools in the country (East African Standard, Friday, June 6 2003).

The dust has settled in Kyanguli but the real tragedy for us would be that death should become so routine as though Kyanguli, Bombolulu, St. Kizito and all those who lost their lives never were. All these innocent lives would have died in vain if no steps are taken to establish the vulnerabilities our schools are exposed to ensuring that they are well equipped to cope with disasters. This then raises some very crucial questions; could all these tragedies in our schools, which resulted in tremendous loss of lives, have been avoided? Could they be as a result of our failure to provide our school community members with special training in disaster preparedness and mitigation? Could negligence and carelessness be costing us the lives of our children? Do the school administrators have an emergency preparedness plan that is communicated to students, staff, parents and workers on procedures to be followed in the event of an emergency? Do our schools hold any disaster preparedness drills?

After the Bombolulu and the Kyanguli tragedies, the government formed various committees to address the issues, but according to an East African correspondent, the government failed to make public the recommendations (Daily Nation, 14th August 2001). According to another correspondent, the task force under Mrs. Wangai, which was established by the Education Minister, Henry Kosgey failed to address the issue at hand (Daily Nation, 24th December 2001).

From the mentioned cases of disasters, it is apparent that our schools just like other institutions in the country have not been spared by disasters. The question however is whether the disasters have triggered spirited efforts towards improving on the preventive and control measures.

It is against this background that this exploratory study seeks to establish some of the factors that could be making our schools vulnerable to disasters.

1.2 Problem Statement

Without vulnerability assessment, communities will not know in what ways they are vulnerable and how hazards may affect them. Without emergency preparedness and response mechanisms, an emergency can easily escalate into a disaster. Vulnerability reduction, like

development, empowers communities to take control of their destinies, WHO (1999) and it must be integrated at every sector of a country at every level.

The rise in the number of disasters, points towards an increase in vulnerabilities. In the recent times, the numbers of disaster situations in schools have increased. The disaster situations range from natural disasters such as roofs being blown off by wind, floods, fires and other related forms of disaster to man-made disasters, whereby organizational and technical processes interact, resulting in the phenomena.

It is therefore imperative to examine the factors that make our schools Vulnerable to disasters, given that School facilities, in addition to their role as learning centres, are important infrastructural components of any community. The school houses children and their teachers. The community also uses them for various functions; so when a school is vulnerable to disasters, the entire community is at risk.

Turner B. A. (1978:4) notes, "Many disasters arise solely from administrative causes or from a combination of technical and administrative causes. Those in positions of power, those concerned with management and decision-making and those who control administrative machinery, may well find that some of their actions contribute inadvertently to causes of disaster."

Taking schools in Nairobi as the object of interest, this research seeks to identify some of the factors that make schools in Kenya vulnerable to disaster situations and the kinds of mechanisms that have been put in place to cope with disasters. The study is guided by the following questions: -

a. What is the extent of vulnerability to disaster situations in the schools in Nairobi?

b. What is the typology of hazards found in the schools in Nairobi?

c. To what extent do the administrator's lack of due care and diligence in the schools management make them vulnerable to disaster?

d. How well are the schools equipped to cope with disasters so as to lessen or avoid their effects?

1.3 Study Objectives

The study objectives are divided into broad and specific objectives;

1.3.1 Broad Objectives

The broad goal of this study is to investigate the nature, causes and magnitude of vulnerabilities that expose schools to disaster in Nairobi.

2 Specific Objectives

This study seeks to fulfil the following four specific objectives: -

a) To study the extent to which secondary schools in Nairobi are vulnerable to disasters.

b) To identify and classify the types of hazards found in the schools in Nairobi.

c) To explore the relationship between the schools, administrative structures and disasters.

d) To analyse the recovery strategies put in place in schools to cope with disaster situations.

1.4 Justification of the study:

As mentioned earlier, this is an exploratory study that seeks to determine the vulnerability of Kenyan schools to disaster situations. Frequently, media houses have reported disaster situations in schools such as those mentioned in the introductory section.

As a discourse of study, the topic of disaster and specifically vulnerability of institutions such as schools to disaster situations has been tackled from a wider perspective, for example strikes in Kenyan schools, which to some extent could be seen as a form of disaster. Previous research done by Karagu N. M. (1982), Kinyanjui, K. (1997), and Nyaga, J. W. (2000), have concentrated more on the causes, nature and effects of riots in Kenyan schools. There are also several reports on topics related to student indiscipline in institutions of learning i.e.

a) Report on Presidential committee on student unrest and indiscipline in Kenyan secondary schools, chaired by Dr. L.G. Sagani, EGH.

b) Report of The Task Force on Student Discipline, chaired by Naomi W. Wangai.

These Researches have not exhaustively captured the causes of school disasters. There seems therefore to be an academic lacuna to discourses such as vulnerability of such institutions or individual institutions to disaster, thus justifying the nature of this study.

With the advent of Modernity and subsequent time space distanciation (Giddens 1991), disaster situations are evidently unavoidable and are on the increase. As alluded earlier in the introductory section, disaster situations are on the increase, a situation that was not common in the pre-modern times. This makes it complex for places such as third world countries where every other individual/institution is being pulled into global circles within limited preparedness. As such, disasters almost always get individuals and institutions unprepared. This therefore justifies why a study of this nature should be carried out to identify and document specific areas to which our institutions (schools) are exposed to disaster situations.

Related to identifying and documenting spots of vulnerability to disaster in our schools, the demand for perceived remedies to such spots are bound to arise. The remedies cannot be easily enumerated unless identified from the areas from which vulnerability is evident. In other words, this research is important in the sense that besides identifying factors leading to vulnerability; it will come up with ways in which vulnerability will be addressed.

Again schools are an important resource and an investment in vulnerability reduction is therefore paramount. Communities identify with schools because they are key institutions to development. To protect the students/schools is therefore to protect one of the most important resources in the community. Schools reflect the ideals of a society and when they are struck by disasters it leads to loss of life, property and disruption of the social life of the people. A Sociological analysis of disasters in schools is therefore very important, because when schools are vulnerable to a hazard, the entire community is at risk.

Finally, research carried in the discourse of disaster in Kenya is evidently limited. For example, research done on this discourse of disasters by Ocharo (2003), Mwende (2002) and the Red Cross left out schools. Disaster research in schools and as such, vulnerability of schools to disaster is inadequate, thus justifying the importance of this study. The study also generates information that could contribute positively to the reduction of school disaster in this nation.

1.5 Scope of the study

This is an exploratory study of schools' vulnerability to disasters in Nairobi. In this section, the researcher ventures to explain how this research was conducted within the limitations of the above named specific objectives.

The first limitation is that the study covers factors that expose schools to disaster related situations within the secondary schools only. However the school system is an institution that involves bodies like the Ministry of Education, which gives guidelines to schools. Other learning institutions will not be of concern to this study.

Secondly, within specific schools, and therein the pre-disposing factors identified, the researcher seeks to examine to what extent the very factors expose individual schools to disaster situations. The study does not however look at any extraneous factors i.e. factors geminating outside the school.

Finally, disaster situations may be dealt with using various administrative and technological frame work put in place within individual institutions. In this study, the researcher ventures to examine the various coping strategies or abilities put in place by various school administrations to deal with any eventuality of a disaster situation.

CHAPTER TWO

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

Calhoun Craig et al (1994) observes that good researchers look to see what is already known about a subject so as to familiarize themselves with existing theories, test those theories and fill in important gaps.

Babbie (1995) on his part argues that every research should be placed in the context of the general body of specific knowledge and that it is important to indicate where the research fits in the picture. He notes that having introduced the reader to the general purpose of the study one should then bring the reader up to date on the previous research on the area, pointing to the general agreements among the previous researchers. It is on this basis that literature will be reviewed in this chapter.

The chapter is divided into the following sections: -

a. Definitions of vulnerability, hazard and disaster and their relationship,

b. Vulnerability of schools to disasters,

c. Vulnerability reduction and assessment, particularly in school communities,

d. Categories of disaster and disaster reduction.

2.2 Definitions of Vulnerability, Disaster and Hazard, and their relationship

This section endeavours to explain the concepts of disaster and hazard and to bring out their relationship.

2.2.1 Definition of Vulnerability

Vulnerability is the potential for negative outcomes or consequences. However, although many scholars agree on this broad definition, the use of the term would vary among disciplines and research topics.

Vulnerability to disaster according to International Strategy for Disaster reduction (ISDR) is a function of human actions and behaviour. It describes the degree to which a socio-economic system is either susceptible or resilient to the impact of natural hazards and related technological and environmental disasters.

The White Paper on disaster management (2002) defines vulnerability as the degree to which an individual family, community or region is at risk of experiencing misfortune following extreme events.

Cutter (1996) on his part defines vulnerability as the likelihood that an individual or group will be exposed to and adversely affected by a hazard. He argues that vulnerability is the interaction of the hazards of place (risk and mitigation) with the social profile of communities.

According to WHO (1999) vulnerability to emergencies and disasters is a function of the degree of exposure to hazards and of people's capacity to cope with hazards and their consequences.

Maskrey A. (1989) observes that vulnerability of any physical, structural or socio-economic element to a natural hazard is its probability of being damaged, destroyed, or lost.

Davis and Wall (1979) on their part argue that vulnerability refers to the long-term factors that affect the ability of the victims to respond to events or which make them susceptible to calamities.

From the definitions cited above, vulnerability can be said to be the degree to which individuals, groups of individuals, communities, or regions are at risk of suffering damage following extreme events. In its simplest denotative sense, vulnerability means the capacity to be harmed. Vulnerability may also be looked at as the degree of exposure to hazard. This is what makes one community suffer disaster while another community, exposed to the same conditions, remains intact. The degree of vulnerability among communities therefore differs depending on the disaster in question.

2.2.2 Definition of Disasters

Disasters are as old as mankind. The bible records numerous plagues, floods, famines and destruction of cities. According to Benthal (1993) in 79 BC, the city of Pompeii in Southern Italy was buried in volcanic ash. Earthquakes have killed hundreds of thousands of people at a time and destroyed whole cities. Millions of people have died at various times as a result of flooding in China.

Several definitions are frequently applied to disaster. A disaster can be an event that causes extensive destruction, death, or injury and that produces widespread community disruption and individual trauma (Hartsough and Myers (1987).

Raphael (1986) quoting the Oxford English Dictionary defines disaster as "anything ruinous or distressing that befalls, a sudden or great misfortune or mishap, a calamity". Perrin P (not dated) on his part defines disaster as an event that occurs in most cases suddenly and unexpectedly, causing severe disturbance to people or objects affected by it and resulting in loss of life and harm to the health of the population, the destruction of loss of community property and/or severe damage to the environment. Perrin observes that such a situation causes disruption in the normal pattern of life, generating misfortune, helplessness, and suffering, affects on the socio-economic structure of a region or a country and/or the

modification of the environment, to such an extent that there is need for assistance and for immediate outside intervention.

Wilches Chaux (1989) argues that a disaster is a crisis resulting from a failure in human interactions with the physical and social environment. WHO (1999) on its part asserts: "a disaster can be defined as an occurrence that causes damage, ecological disruption, loss of human life or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area. Davis L. and Wall M. (1979) define it as the impact of a natural or man-made phenomena, happening on a vulnerable population to cause disruption, damage and casualties. In short then, a disaster can be said to be any extraordinary event that causes great destruction of property and may result in a massive disruption of function for the community, causes widespread human suffering and physical loss or damage and stretches the community's normal coping mechanisms to breaking point. It is an event with a negative impact in a significant way. It changes a way of life, sometimes temporarily or permanently.

Disasters may be occurrences of nature such as a hurricane, tornado, storm, flood, high water, tidal wave, earthquake, volcanic eruption, drought, blizzard, pestilence, or fire, American Red Cross (1991). They may also have a technological cause such as hazardous waste contamination or nuclear accident or they may be the result of human error or equipment failure such as transportation accidents, industrial accidents, dam breaks or building collapse. In addition, acts of terrorism, riots, kidnapping, and random acts of violence may be viewed as disasters. The disaster may be either sudden or slow and insidious over several months; it may be unexpected or have some degree of predictability.

Perrin Pierre (not dated) notes that in all definitions of disaster, three factors stand out: -

a) The idea of a phenomenon or event which constitutes a trauma for a population or an environment;

b) The idea of a vulnerable point which will bear the brunt of the traumatising event;

c) The idea of the failure of local resources to cope with the problems created by the phenomenon.

2.2.3 Definition of Hazard

A hazard is a natural or human-made event e.g. earthquake, fire, storm, landslide e.t.c. A hazard according to WHO (1999) is a threat, which has the potential to cause damage. Hazards cause disasters only when they affect people, human life, property or human activities.

.4 Relationship between Vulnerability, Hazard and Disaster

As alluded in the introduction, man has a role to play in vulnerability and disaster. The Disaster Crunch Model, Davis and Wall (1979) points out that a disaster happens only when a hazard impacts on Vulnerability. For example, the vulnerability in case of a mudslide in an urban area may include many long-term trends and factors (like crowding, sitting of homes on unstable land and use of poor housing materials), which directly contributes to suffering caused by mudslide. It could also be due to lack of Government enforcement of building codes.

Foreman and Parhard (1997) argue that the hazard (trigger event) is not responsible for instigating disaster, but more so, the unsafe conditions which make people vulnerable. A careful assessment however reveals that dynamic pressures within the society cause the trigger events and unsafe conditions. These include lack of local institutions such as lack of education, lack of ethical standards in public life, lack of preparedness and mitigation measures, etc. Beneath the dynamic pressures are the underlying causes, which are in form of limited access to resources, corruption, weak institutions etc.

The argument then is that for a disaster to happen there has to be vulnerability that is impacted by the hazard. This then would mean that the reason we have had several disasters in our Kenyan schools is because of the presence of vulnerable conditions that could have predisposed our schools to these disasters.

WHO (1999) notes that vulnerability is the result of a number of factors that increase the chance that a community will be unable to deal with an emergency. ISDR (1999) asserts that the degree of vulnerability is determined by a combination of several factors including hazard awareness, the condition of human settlements and infrastructure, public policy and administration and organised abilities in all fields of disaster management.

Vulnerability comprises of two aspects: susceptibility and resilience. According to WHO/PTC (1999) susceptibility is the degree to which a community is exposed to disaster. It concerns the factors operating in a community that allows hazard to cause an emergency i.e. the community's location, level of development etc. Resilience on the other hand is the community's capacity to adapt or cope with hazards to which it is exposed. It is the community's ability to withstand the damage caused by emergencies and disasters. It is a function of the various factors that allow a community to respond to and recover from emergencies. ISDR (1999) observes that resilience is determined by the internal strengths and weaknesses of a given society. This then brings us back to our schools. Do our schools have low or high susceptibility and resilience? If our schools have well-developed 'safety' programs, then it would mean their resilience is high. If not, then it would mean their susceptibility is high.

According to WHO (1999), the difference in resilience among different communities can be due to: -

a) Different abilities of buildings and various elements of the infrastructure to withstand the loads.

b) Differences in emergency preparedness (i.e. degree to which a community is organized to cope with emergencies.

c) The extent of the resources that can be applied to an emergency.

d) The degree to which the community can sustain economic and social damage.

A community can have either low or high susceptibility or resilience. The level of vulnerability results from the combination of the levels of susceptibility and resilience. According to WHO (1996) if susceptibility is very low and resilience very high, one has minimum vulnerability e.g. in a displaced population: in an emergency settlement the susceptibility to measles is very high. If all children are immunized resilience is high and vulnerability is low. If the children are not immunized, resilience is low and vulnerability is high. This is what makes one community suffer disaster, while another community exposed to the same conditions remains intact.

When a disaster strikes, the community where it strikes bears the full brand of the disaster. The disaster interferes with the community's development, sometimes taking it back economically by many years. For example, the dormitories at both Bombolulu and Kyanguli Secondary Schools were totally destroyed, together with all the student's property. It is important therefore for any community to have in place an appropriate emergency preparedness programmes.

2.5 Vulnerability of Schools to Disaster

In modern society, the school is the primary agent for weaning children from home and introducing them to the larger society (Calhoun Craig et al (1989). The school socializes young people into basic values of society. Durkheim asserts that the school serves a function which cannot be provided either by the family or the peer group. He maintains, "society can only survive if there exists among its members a sufficient degree of homogeneity; education perpetuates and reinforces this homogeneity by fixing in the child from the beginning the essential similarities which collective life demands." Haralambos (1980). Schools are therefore an integral part of the society, that equips the learners with the capabilities they need for effective Participation in modern societies. Owing to the importance of the school in providing a link between the individual and the society, the school acts as a second home to children and the young people in any society.

Childhood is a time when groups of children collectively build their own meaningful worlds, worlds in which they attempt to gain control of their lives. They are prone to experimental life, a life that could easily precipitate disaster. This is more so when they get into adolescence.

According to Erik Erickson, adolescents face the challenge of identity versus role confusion. It is a stage period characterized by storm and stress, when teenagers experiment and explore various roles available to them.

As we enter a new century, our society faces formidable challenges not previously encountered in our history as a Nation. Technological and societal conditions exist today, which pose significant risks to the safety of our community. Critical situations can develop from the use of hazardous materials in our communities, social unrest, gang conflicts violence, terrorism, unsafe conditions i.e. fragile physical environment, dangerous buildings, dangerous locations, poor infrastructure e.t.c.

Natural disasters just like technological disasters are commonplace in our schools today. Disasters like fires, floods, shootings, building collapsing landslides, etc have occurred in schools in various parts of the world. Although various countries have tried to deal with these disasters, they still remain a challenge. With the threat of terrorist attacks, at our backyards, the safety of our schools is bothering the minds of educators, parents and students than ever before. It simply means that school facilities, personnel and students are all vulnerable to a variety of natural and technological hazards. When a school is vulnerable to natural hazards, the entire community is at risk.

In the West, schools have witnessed one tragedy after another. For example, fire, which is the greatest single destroyer of property, has not spared schools there. According to Brannigan F. L. and Carter Hary in the September 1998 issue of Firehouse Magazine three fires of great historical interest in the schools included: -

a) Lakeview Grammar School in Collinwood, OH (176 dead)

b) The New London Consolidated School in Texas (294 dead)

c) Our Lady of the Angels in Chicago (96 dead).

In a very recent incident, early Thursday, May 1, 2003 an earthquake struck the Eastern province of Bingol, killing at least 167 across the mountainous region including 84 boys and one teacher at the state-run school. (Daily Nation 5/5/2003.)

It is therefore very important that schools manage 'safety' programs for emergencies like fire and also for the natural disasters. The risks could either be internal or external, but what is important is that schools are well prepared to cope with either of the two.

According to Ronald E. Timm, in 'Tips for School Security, a school without risk is unobtainable. What schools need to do is reduce the risk with a disciplined program of management-deterrence-detection-delay-response-mitigation that is measured, tested and drilled. In the state of California in the United States for example, schools have come up with emergency preparedness plans where by every teacher is thoroughly familiar with the contents of this emergency action guide and students are instructed in the procedures. Ronald E. Timm notes that in Claremont Unified School, for example, the safety and welfare of students during and emergency is the responsibility of the school administrator and the school staff. They have emergency procedures to be followed in the event of major disasters such as floods, bomb threat, chemical accident, severe windstorm, explosion, fire etc.

Kenya is becoming increasingly susceptible to both man-made and natural disasters. Drought is becoming more common along with a higher incidence of flooding. Lucy Oriang, in the (Daily Nation, Wednesday, April 4, 2001) notes, "Excluding airline crashes and road accident statistics, the toll in major disasters in Kenya reads chillingly like a telephone number."

In the run-up to multi-party elections in 1992 and 1997, the country was rocked by tribal clashes. In April 1994, 200 people drowned when the Mtongwe ferry capsized. There was in 1993 the infamous "Ngai Ndethya" River bridge train accident, where 65 lives were lost, several Nthi bridge road crashes, the Sabaki River bridge crash, the 1998 terrorist attack where more than 240 people died, Athi River train disaster, to mention just a few.

An article in Disaster Relief by Cynthia Long (1997) working with the Kenya Red Cross, during the tribal clashes states: "in the heated tribal conflicts that are rampant in rural Kenya, schools

are targeted in a sinister form of ethnic cleansing. To muscle the opposing tribe out of an area, battling factions attack each other's schools which are considered 'soft targets' unable to mount a defence. By the late 1990's raging tribal battles had destroyed most of the schools in the highlands and education there came to a grinding halt.

A project carried out for Kenya on impacts of El Nino 1997 – 98 states; "Education sector was hit, with schools being inaccessible due to flooding, leading to closures or low attendance rates. The end-of-year examinations were adversely interfered with." In other occasions roofs have been blown off from school buildings during storms, shoot-outs between gangsters and the police spilling-over to schools; in other occasions schools have failed to operate for several months due to floods, students have been struck by lightening, not to forget the horrendous fire tragedies that have hit out schools in the recent past.

WHO (1999) shows a rise in the number of people affected by various kinds of disasters. From examples given in the study on our schools in Kenya, it can only be concluded that vulnerability in our schools is growing. The most important thing is for us to try and find out the factors that predispose our schools to these disasters and also find out how well the schools are equipped to lessen the effects of the disasters. The risks have to be accurately identified, their degree clearly well analysed and then, a well drilled safety program put in place so that all members of the school community are familiar with their roles.

2.6 Vulnerability Reduction and Assessment, particularly in School Communities

According to WHO/PTC (1998) vulnerability reduction can be said to be the coordinated efforts needed to halt emergencies and disasters by tackling their source i.e. the deteriorating environment and the hazards that bring harm to the communities and the vulnerability of communities. It involves analysing the community's social, infrastructural, economic and demographic composition.

Raphael (1986) observes that vulnerability reduction requires a number of co-ordinated activities, including: - Policy development, vulnerability assessment, emergency prevention and mitigation (to reduce susceptibility) and emergency preparedness.

WHO (1999) notes that no single sector can manage vulnerability. Vulnerability reduction must be integrated into every sector of a country at every level of government, the private sector and non-governmental organisations. Policy and standards for vulnerability should come from the national level but implementing the various measures should begin at the community level.

WHO/PTC (1996) defines vulnerability assessment as a procedure of identifying hazards and determining their possible effects on a community.

The purpose of vulnerability assessment according to WHO (1999) is to describe the interaction between hazards the community and the environment so as to develop programmes and strategies for protecting the community. Vulnerability assessment therefore provides information for: -

a) Emergency prevention, mitigation and preparedness.

b) Emergency response.

c) Emergency recovery

d) Sustainable development.

The Australian emergency manual (1992) observes that without vulnerability assessment a community would not know in what way it is vulnerable and how hazards may affect it.

According to Healey (1997) a vulnerability assessment is essential before the actual planning begins in order to determine the damage – causing factors to which a community may be exposed. This vulnerability can usually be divided into two parts:

a) Internal vulnerability

This results from activities and conditions within the community. For instance the use of a highly inflammable material may result in an emergency situation in a community at any time.

Maskrey A (1989) observes that internal vulnerability can also be seen in building structures. The building materials used for shelter can lead to increased vulnerability to or protection against hazards. He notes that in buildings, the materials used, the structure, the height and the levels of deterioration are all important variables."

When assessing internal vulnerability therefore, people living in an earthquake prone area would be advised to use lightweight materials for building, while those living in a flood or in a wind prone area would be advised to use heavy building materials. Maskrey (1989) also points out that overuse of a building, coupled with lack of maintenance render people vulnerable to disaster.

b) External vulnerability

This is usually determined by making an analysis of the area in which the installation is located. According to Healy R. (1969), the location of a facility in an area prone to hazards will obviously make it vulnerable to damage. Another good example would be the bomb attacks that come with the modern day terrorism. This has been made easy by technological advancement that enable operations across the globe.

Perrin also notes that sometimes different types of vulnerability may interact ending up with a very complex situation. These may create a real chain reaction.

Healey (1969) observes that one type of emergency situation may trigger others so that there is a chain reaction of different incidents. For example the impact of an earthquake might result in serious fires, which could be as a result of ruptures of gas lines, which in turn might cause explosions that threaten the facility.

The recent fire tragedies in our schools do not need commissions of enquiries. What is needed is a through assessment of the vulnerabilities that our schools are exposed to. These could be internal or external. The causes of vulnerabilities need to be tackled, whether it is the deteriorating environment, or whether it is lack of due care and diligence in the schools'

management on the part of the administrators etc. Programs that have been put in place to lessen the effects of disasters also need to be assessed, to ensure that more lives are not lost.

2.7 Different categories of Disasters and Disaster reduction

In society, there are those changes that take place as a result of man's deliberate actions, which are generally classified as developments. At the same time, there are those changes that take place as a result of changes in nature and which are classified as natural changes. These changes are said to expose man to both natural and technological risks. As a result, man in exposed to both natural and technological disasters.

According to Piper (1991:1) disaster is typically divided into three types: technological, natural and complex emergencies. Technological disasters are consequences of technological failures such as nuclear leak or toxic release and misdirected technological events like bombing. Natural disasters are those caused by acts of nature, such as floods, earthquakes, tornadoes etc. Complex emergencies are armed conflicts.

Raphael (1986) in a simple distinction between natural and technological disasters or man made disasters states that a natural disaster is a consequence of the forces of nature, whereas a man made disaster is as a result of the forces of man. Benthall J (1993) on his part states that natural disasters are those disasters, which do not result primarily from human actions yet their effects can greatly be mitigated with proper foresight and preparedness.

The White paper on Disaster Management (2002) on its part defines man-made disasters as "disasters or emergency situations that are caused directly or indirectly by identifiable human actions, deliberate or otherwise". According to Giddens (1990) modern individuals are faced with "manufacture" uncertainties. He observes that "modernity is a 'risk culture". The manufactured risk is created by the very progression of human development especially science and technology. Luhmann (1979) asserts that risks do not arise automatically. "Risks are components of decisions and actions".

Healey (1969) argues that the modern society is becoming increasingly complex, with added hazards to natural ones, resulting from modern items as radiation sources, exotic fuels and materials, as well as our modern mode of transportation. Also our present social order in which riots and civil disturbances have added another dimension to the problem.

As the world moves towards globalisation, we cannot help experiencing what Giddens (1990) calls "the consequences of modernity" and time-space distanciation. The complexity of technological development has therefore led to the potential for new disasters through failure or collapse of technical systems. These "manmade" disasters that result from failure of technical systems include: collapse of transport systems, like plane crashes, train derailing etc chemical or nuclear pollution, fires in buildings etc.

Raphael (1986) observes that there are some manmade disasters that seem to result to a greater or lesser extent from the nature of humankind itself. Good examples are the great wars that have devastated the world throughout history, culminating in the genocide of the holocaust, and the atomic warfare or Hiroshima and Nagasaki. Again the consequences of man's pollution and destructive use of the environment have led to disasters of death and famine. The consequences of human actions on areas such as pollution, global warming etc have introduced new sources of risk and uncertainty.

Raphael (1986:17) asserts that natural disasters reflect some of the powerful forces that operate when the environment reaches extremes and the very elements that usually nurture man seem to turn against him. He also argues "the greatest death and destruction, loss and grief, dislocation and relocation are associated with the man-made disasters.

From the outlined observations, its clear that several factors play major roles to the harmonious link between man and nature as far as disasters are concerned. Consequently, man is exposed to both natural and technological disasters both of which have far reaching repercussions on the communities of the world. Accordingly, each type of disaster calls for a specific action, without which the impact of the disaster can be disastrous. Acting before a disaster strikes is the most cost-effective way of reducing a community's vulnerability and long-term losses.

Disaster mitigation measures, policies and actions taken before a disaster minimises the extent of damage when a disaster does occur.

2.8 Disaster Reduction

Disaster reduction according to ISDR (1999), narrowly interpreted implies the measures that would be adopted to reduce or limit the severity of disasters. In its broader sense the expression disaster reduction includes disaster prevention.

The Geneva mandate on disaster reduction (July 1999) reaffirms the necessity for disaster reduction and risk management as essential elements of government policies. Disaster reduction starts from the understanding of the elements of risk: hazard vulnerability and resilience. ISDR (1999) on disaster reduction emphasizes on four objectives: - Increasing public awareness, obtaining commitment from public authorities, stimulating interdisciplinary and inter-sectoral partnership and expanding risk reduction networking at all levels and improving further the scientific knowledge of the causes of natural disasters and the effects of natural hazards and related technological and environmental disasters on societies.

i) **Public awareness** – the objective here is to increase public awareness of the risks that natural hazards and related technological and environmental disasters pose to societies. Also increase awareness of existing solutions to reduce vulnerability to hazards. Issues to be addressed here include: - Developing sustained programmes for public information, including disaster prevention in educational programme and curricula and institutionalising training pertaining to hazards and their impact, risk management and disaster prevention practices for all age groups.

ii) **Commitment by public authorities** – the objective is to obtain commitment by public authorities to reduce risks to people, their livelihoods, social and economic infrastructures, and their environment. Building commitment for disaster reduction policies include joint scenario, planning and economic incentives for local mitigation.

Once concretised at the local level such initiatives can be consolidated at the national and global level.

iii) **Multidisciplinary and inter-sectoral partnerships and networking** – the objective is to stimulate multidisciplinary and inter-sectoral partnerships and expand risk reduction networks.

iv) **Scientific knowledge** – the objective is to further improve the scientific knowledge of the causes of natural disasters and the effects of natural hazards and related technological and environmental disasters on societies and facilitate its wider application to reducing vulnerability of disaster prone communities.

ISDR (1999) further argues that appropriate disaster reduction strategies and initiatives at the national and international levels can strengthen the likelihood of reducing or mitigating the human, economic and social losses caused by disaster and thereby facilitate sustained growth. The participation of communities has proved to be an essential element for successful disaster policy practice. Vulnerable communities, especially in developing counties are forced by circumstances to adopt measures based on experience to limit losses from disasters.
In order to create disaster resilient societies and prevent human economic and social losses, it is of paramount importance to engage public participation at all levels of implementation of the strategy for disaster reduction.

According to Healy (1969), it is of paramount importance for a community to put some emergency response measures in place. He argues that if properly drilled, the community is able to absorb the shock of the disaster much easily. It would also have some resources in place or be able to source for them with less difficulty.

Disasters are not welcome events and usually when they occur, every effort is made to reduce the impact of such events. Awareness of disasters and of one's vulnerability to such events can reduce the impact of such events. According to the American Red Cross, awareness and mitigations can reduce disaster impact.

Schools are in themselves small communities that need to be actively involved in disaster reduction. The question then is; do our schools have programmes for public awareness? Do they have multidisciplinary and inter-sectoral partnerships in risk reduction with relevant institutions? Do they keep abreast with the rest of the world on the most recent scientific knowledge on the causes of disaster?

2.2.9 Disaster Management.

Man is exposed to both natural and technological disasters, events that are not welcome and usually when they occur, every effort is made to reduce their impact. The main aim of disaster management is to ensure prompt and appropriate action in an event of disaster and to reduce the potential losses. The four main aspects of disaster management include: -

a) **Mitigation:**

This means to reduce the severity of the human and material damage caused by the disaster. It could also be termed as a permanent reduction of the risk of disaster WHO/EHA (2000). It ensures that human action or natural phenomena do not result in disaster or emergency. According to WHO/EHA (2002), there are two types of mitigation mainly: -

i) **Primary mitigation: -** first it deals with reduction of the hazard and secondly, the reduction of Vulnerability. The purpose of primary Mitigation is therefore to reduce –avoid-avert the risk of the event occurring, by getting rid of the hazard or vulnerability e.g. avoiding overcrowding, deforestation, immunizing people against small pox etc.

ii) **Secondary Mitigation: -** deals with the effects of the Hazard. It involves, prompt recognition of the disaster and to reduce its effects e.g. by staying alert to possible displacement of the population, being ready to provide immunization, food, clean water, healthcare etc. All these help reduce the impact of the hazard.

b) **Disaster preparedness**:

This includes all the measures that can ensure an effective relief. Preparedness mainly involves early warning systems and institutional disaster management policies. According to Walter Hays(1998),disaster preparedness includes measures, range of policies and legislative mandates used to anticipate and to plan for emergency response immediately after a disaster strikes and also to anticipate the needs for recovery and reconstruction thereafter.

Disaster preparedness is based on a very comprehensive and continuous assessment of vulnerabilities. It aims at equipping the people so as to cope with disaster and also to lessen its impact, reduce the losses and damages that may occur. The people have to be prepared both materially and mentally. According to Raphael (1986) ,information regarding the potential for disaster, if communicated adequately to relevant persons, may lead to general and or specific responses of preparedness. Such responses are generally aimed at Vulnerability reduction and possibly for disaster prevention or at planning for post impact response.

c) **Disaster Response:**

Response includes all activities that can tackle an emergency. Disaster response is activated once a disaster strikes. It includes policies, legislative mandates, and professional practices aimed at providing services immediately after disaster. The main aim is to assist individuals, save and protect lives, allocate resources, tasks and time to establish continuity in their structures and procedures. It also comprises emergency relief and management, rehabilitation and general recovery.

d) **Reconstruction.**

This entails helping the affected to resume normalcy or restoring to full resumption. Reconstruction is a kind of social adjustment that endeavours to restore essential services and to rebuild structures preceding the period of disaster. It also introduces new modes of organising a community and reducing its Vulnerability to hazards, It

incorporates mitigation measures in the process as a means of cutting future losses and preventing recurrence of a disaster.

Disaster Management is very crucial in this study as the study will be trying to find out how well the schools are equipped to cope with disasters so as to lessen or avoid their effects.

2.2.9 Summary of Literature review

The Literature review above indicates that disasters have through out the years continued to be a challenge to man. With modernity and more scientific inventions, disasters have become even more complex resulting in enormous loss of life and property. With their massive increase, disaster management has become an issue, with man trying by all ways and means to mitigate against them. Man can only achieve this by ensuring that disasters are tackled from their source or by ensuring that there is vulnerability reduction. Vulnerability assessment provides emergency prevention, mitigation, preparedness, response and recovery. It is in recognition of this that this research sought to investigate the vulnerability of Kenyan schools to disasters.

2.3 Theoretical Framework

A theory can be described as a body of knowledge that attempts to explain a given social reality. It can be seen as the axis around which research revolves. This study on vulnerability of Kenyan Schools to Disasters is based on Gidden's Expert Systems Theory on one part and the other part examines the Chaos Theory. The school is a community like any other and is hence dominated by scientific advantage of the modern society. It is therefore reliant on expert systems. On the other hand, as alluded in the introduction, even with science and technology that have given man greater understanding of the nature and scope of disasters, disasters still renders man powerless. Disasters cause disruption in the normal pattern of life, generating misfortune, helplessness and suffering and there is need for man to be prepared to cope with them when they strike so as to lessen their effects.

2.3.1 Expert Systems

Giddens (1999) propounded the Expert Systems Theory. According to Giddens, our modern society is one where scientific advances rather than nature dominate our lives. The traditional society was such that social relations were "embedded" in time and space. Expert systems which is one of the two dis-embedding mechanisms of modernisation and which has been speeded up by globalisation, arises as a result of scientific revolutions and the increase in technical knowledge and the consequent increase in specialisation. Because of their claim to 'universal' and scientific forms of knowledge, these Expert Systems are not context dependent and can therefore establish social relations across vast expanses of time and space. Equally, as these Expert Systems develop their 'expertise' and 'experts' a social distance is created and increases between the 'professionalism' of the practitioners and their client groups.

According to Giddens, modern societies have become reliant on these Expert Systems. This then means that 'trust' is increasingly the key relationship between the individual and these Expert Systems. Giddens argues much like the Functionalist, Talcott Parsons, that this 'trust' is the cement, which holds modern society together. Where 'trust' is undermined, individuals experience insecurity.

The theory then recognises that everyday we live by trust. For example; you trust the expert who built the house you live in, the one who made the cooker you use, the technician who installed your electricity, the expert who made the car you drive, the experts that made the medicine you take, the expert who made the aeroplanes you fly in etc. The key principle in this theory is that today individuals live by 'trust' in the experts. The trust is such that individuals do not bother to check on the safety of things made by experts.

No wonder then 'risk' society is the term used to describe modern society. It means that manufactured risk is created by the very progression of human development, especially science and technology.

Our schools consequently are part of this society that is dominated by scientific advances. They also have a lot of 'trust' in the expert systems i.e. in the laboratories, kitchens, classrooms, dormitories etc. All these are unforeseen consequences of expert systems. The

question raised in this study pertains to whether or not trust on experts in schools creates vulnerability to disaster.

It is from this background that this study endeavours to find out factors related to "expert systems" which make our schools vulnerable to disaster. As clearly stated elsewhere in this study, even when mankind thinks itself safest, it cannot discount the possibility that unforeseen and destructive events may subject man to danger. It is therefore important for man to be prepared to cope with disasters so as to lessen their effects when they strike.

However when it comes to disasters, absolute safety cannot be achieved due too unforeseen and unavoidable intervening and disruption factors. This then is the essence of Chaos Theory.

2.3.2 Chaos Theory.

According to Bower B (1988) chaos is the irregular, uncertain discontinuous aspect of change within the confines of a patterned whole. This means that there are those events we cannot predict in an organizational life and even in our desire to create order and control of the situation, events often seem one step ahead of us. Bower further notes that as a qualitative study, chaos theory investigates a system by asking about the general characters of its long-term behaviour, rather than seeking to arrive at numerical predictions about its exact future state. This means that Disaster and emergency situations epitomize the unpredictability or the non linearity of human events. There are many events that we can predict in organizational life, but not disaster. Chaotic behaviour appears extremely disorderly and a symbol of orderliness does not exist.

Man therefore cannot predict when a disaster will occur, the number of fatalities or the amount of resources and personnel required to bring order to chaos. Factors to be considered in disaster safety cannot be accurately defined, quantified or even understood at anytime. This then leaves man with the only option of continuously improving the effectiveness of safety measures undertaken and having a successful disaster response–plan within his organization to effectively stop or respond to any eventuality.

Man must match instability of his environment with management practices and organization strategies that are dynamic and fluid. The theory then emphasizes the need to take precaution and do sensitivity analysis because one mistake on our side can lead to enormous loss of life and property. Preparedness to disasters addresses the consequences of their impact in terms of eliminating or reducing the vulnerability levels. If vulnerability is high consequences are generally severe.

It is imperative for schools therefore to be prepared to tackle disaster when they occur since they cannot be predicted. This they can only do by effectively ensuring there is vulnerability reduction in the institutions which requires a number of co-ordinated activities i.e. Vulnerability assessment, emergency prevention, mitigation and emergency preparedness.

2.3.3 Guiding Assumption.

Arising from the literature review and the Theoretical framework, this work is guided by the assumption that lack of definite systems to respond to and/or to lessen the impact of disaster should they occur, makes the elements around each specific site vulnerable to hazards. Therefore the study seeks to identify the hazards and the related mitigation, recovery and preparedness measures, put in place in schools to cope with disaster situations.

2.3.4 Definition of key concepts.

Hazards- In this study hazards will be defined as any predisposing features within the school that could expose the school population to disaster.

Vulnerability factors- Refers to all environmental, social, administrative and any other related factors that could expose a school to disaster. The presence or absence of such factors are used to measure this variable.

Expert Systems- as propounded by Giddens (1999) this refers to all the technological innovations and scientific advances in the schools. This includes the man-made structures and all the technical installations in the schools. Due to technological innovations their propensity of malfunction leads to disaster.

This variable is measured by the number of times there has been a malfunction in the last one year.

Disaster- According to this study, disaster refers to any overwhelming events and/or circumstances that test the adaptational response of the schools beyond their capacity and that might lead to massive disruption of the functions in a school.

Extent of Exposure- The degree to which a school is predisposed to disaster. This is measured by the magnitude of predisposing factors within the schools that exposes it to disaster.

Administrative framework-This refers to the organisational structure of the school which influences decision making patterns. It is measured by the presence or absence of the following constituents.

- Lack of due care and diligence, which is determined by the presence or absence of emergency preparedness plans i.e. procedures to be followed in the event of a disaster, educational programmes, fire drills, talks, etc.

- Decision making – whether or not an administrator can make a quick decision in times of an emergency without consulting other concerned parties e.g. the Board of Governors (BOG), the Parents Teachers Association (PTA) etc.

- Management of school facilities – this is determined by how often repairs and check-ups on school facilities are conducted.

- Preparedness – is determined by the recovery strategies put in place

Recovery strategies - This includes disaster preparedness, mitigation, response and reconstruction measures put in place. These are in terms of: -

- How many drills are conducted etc?

- Facilities – for example, First Aid Kits, fire extinguishers, alarm systems, warning systems etc.

Disaster.-According to this study, disaster refers to any overwhelming events and/or circumstances that test the adaptational response of the schools beyond their capacity and that might lead to massive disruption of the functions in a school.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used in the study. The chapter is organised under the following sub – headings: -

a) The Research Setting,
b) The Target Population,
c) Sample Size and Sampling Designs,
d) Sources of Data Collection and Data Collection Instruments
e) Procedures and Techniques of Data Analysis.

3.2 Research Setting

i) The study is conducted in Nairobi, one of the eight administrative provinces of Kenya. The study site was purposively selected for several reasons: Nairobi being the capital and the largest city in the country attracts a very large population. Benthal (1993:12) observes that disasters nearly always include a human element and may occur in vulnerable populated areas, where human beings have created conditions of vulnerability.

ii) Nairobi Province has got a total of 144 secondary schools. These include National, Provincial, District and Private Secondary Schools, which is an appropriate representation of the country. Out of the 144 schools, 96 (Ninety six) are Private Schools while 48 (forty eight) are Public Secondary Schools. Public schools were selected for this study because they are owned by the Kenya Government while the private schools are owned by various groups or entities. Depending on their background, the private schools have different facilities, with some boasting of ultra modern facilities while others are worse off than many

public schools. One would therefore have to study private schools on their own but not alongside public schools, on the issue of vulnerability to disasters. In addition, Nairobi being the capital city is greatly impacted by advances in information and communication technology, courtesy of globalisation. As propounded by Giddens (1991) this then means the risk factor in Nairobi has increased a great deal, part of the consequences of modernity. The choice of Nairobi therefore as the area to be covered by the study was convenient in terms of accessibility, time schedule and financial resources available to the researcher and at the same time it was believed it would yield very representative data.

Target population

The target population in this study consists of Public Secondary Schools in Nairobi. According to a sampling frame obtained from the Provincial Director of education, there are 48 Public Secondary Schools in the province, with 11 Day Secondary Schools for boys, 9 Day Secondary Schools for girls, 5 Boarding Secondary Schools for boys, 6 Boarding Secondary Schools for girls, 15 Mixed Day Secondary Schools and 2 Mixed Boarding Secondary Schools for boys and girls. This gives a total of 48 (forty eight) Public Secondary Schools.

Vulnerability of Public Secondary Schools to disaster is treated as the unit of analysis in this study, while the administration in the public secondary schools and the teachers are treated as observation units.

Sample size and sampling design

In this study, 35.4% of the total numbers of Public Secondary Schools in Nairobi are covered. Accordingly, 17 out of 48 (35.4%) secondary schools constitute the sample of the study. A sample of 35.4% of the target population is considered large enough to provide a proportional representation of secondary schools in Nairobi Province.

The study used probability sampling. Singleton (1988) observes that probability sampling involves random selection. The main characteristic of probability sampling is that all cases in the population have a known probability of being included in the sample. Specifically, stratified

random sampling was used. To obtain a sample for the study, a list of public secondary schools in Nairobi Province from the Provincial Director of Education was used. From the sampling frame, the 48 schools were put into six exclusive segments based on categories of schools. These were mainly: -

a) Boys Boarding Schools

b) Boys Day Schools.

c) Girls Boarding Schools.

d) Boys Boarding Schools.

e) Mixed Boarding Schools

f) Mixed Day Schools

Schools in each of the six segments were further categorized into three strata, mainly large, medium and small schools. This was done using the student enrolment statistics in the Nairobi schools, obtained from the Provincial Director of Educations' office.

Names of all the schools were then written on pieces of paper, and a piece of paper was randomly selected from each of the three strata, in all the six categories but in the mixed Boarding category, both schools were included in the sample.

The three sub-samples from each of the category were then combined to form one complete stratified sample of 17 Public schools i.e. 3 boys boarding schools, 3 boys day schools, 3 girls boarding schools, 3 girls day schools, 3 mixed day school and 2 mixed boarding schools.

Two teachers in each of the 17 schools were also randomly selected from the list of teachers availed by the administration. The researcher ensured that a man and a lady were selected in each of the school.

Category of school	Number of Schools	Total Number of Teachers
1. Boys Boarding School	3	6
2. Boys Day Schools	3	6
3. Girls Boarding Schools	3	6
4. Girls Day Schools	3	6
5. Mixed Boarding School	2	4
6. Mixed Day Schools	3	6
Total (n)	**17**	**34**

Twelve (12) school principals agreed to an in-depth interview while five (5) others directed the researcher to their deputy heads. All the principals allowed their teachers to participate in filling the questionnaires, so the participants in the study also included 17 Principals or Deputy Principals from the 48 Public Secondary Schools in Nairobi Province. This gave 35.4% coverage of principals in Nairobi Province.

Sources of data and data collection methods

This being an exploratory study, primary data forms the core database. However, the researcher reviewed other literature including, newspaper articles, books, journals, reports etc especially on topics of emergency preparedness, prevention and mitigation.

The study used three methods of data collection, mainly structured interviews using a questionnaire, in-depth interviews with public school principals and observation, which was done through a checklist. The data collected through the last two methods was used to supplement the data collected through use of questionnaires.

The following techniques were used for primary data collection: -

3.5.1 In-depth interviews

This method involved in-depth discussions that took the form of unstructured interviews on specific topics with 17 public school Principals or their Deputy's in Nairobi. According to Singleton, et al (1988) unstructured interviews entails general objective, wide ranging discussions and individual questions that are developed spontaneously in the course of the interview.

This method of data collection was favoured for several reasons: -

a. The method provided individualised opinion, perceptions and feelings on the topic of study –This was very important when it came to examining the emergency preparedness, prevention and mitigation measures by individual institutions.

b. The method also allowed for the discovery because the researcher was able to investigate in detail some responses given by the Principals. The method therefore gave further understanding of the study variables.

The technique was also used to gather data on what the school administration perceives as disasters and the factors that expose their schools to the same.

3.5.2 Structured Interviews

The study also used primary data collected using a questionnaire. The questionnaires were administered on Public Secondary School teachers in the 17 schools that were covered in the study. They were applied as follows: -

This category of respondents was preferred because they are not involved in decision making in the schools and are therefore in a position to give unbiased information concerning their respective institutions. The questionnaires had mostly closed questions and a few open ended ones. Ordinal scale was used to rate most of the variables. The questionnaires were

administered on a " drop and pick later basis". This method was used together with the other two methods of data collection used. It was also very useful especially where the school principals were reluctant to release some information.

3.5.3 Observation

This mainly involved watching and noting down the presence of or absence of any factor that can lead to school vulnerabilities, hazards, etc. It included noting down the presence or absence of emergency preparedness, prevention and mitigation measures that had been put in place. A checklist was used as a tool for this method.

Data Analysis

Data analysis is the process of bringing order, structure and interpretation to the mass of collected data.

3.6.1 Qualitative data analysis

The bulk of the data for this study was qualitative data. Qualitative data analysis, according to Marshal and Rossman (1999) seeks to make general statements on how categories or themes of data are related.

The data collected in the study went through several processes including data reduction, clustering, interpretation and conclusion.

- **Data reduction** – entailed 'cleaning' up of data, by selecting, simplifying and transforming the data that was in form of written field notes. This was done through the processes such as selection, summaries or paraphrasing. This ensured that data was reduced to a comprehensible and manageable size.

- **Data clustering** – The data collected was categorised into themes that emerge.

- **Interpretation and conclusion** – this was included drawing meaning from the data collected and making conclusions and verification, data regularities, explanations, causal flows and propositions were discussed.

Sociological theories were used to make sense of all the findings and generalisations were then arrived at.

3.6.2 Quantitative data analysis.

The data analysis sought to establish the extent schools in Nairobi have established coping strategies to deal with any eventuality of disaster (situation and the extent of their exposure to disasters).

Before processing the responses, the completed questionnaires were edited for completeness and consistency. The data was then coded to enable the responses to be grouped into categories.

Descriptive statistics were used to summarize the data. This was done through formulation of tables, percentages, etc.

These are summarising measures that are used to condense raw data into forms that supply useful information efficiently.

Open-ended questions were content analysed, and used to explain responses to close-ended questions to which they apply.

CHAPTER FOUR

4.0 VULNERABILITY AND MANAGEMENT OF DISASTERS IN NAIROBI SCHOOLS

4.1 Introduction

In this chapter, the findings have been discussed in relation to the study objectives and research questions. The findings have been summarized using descriptive statistics such as tables and percentages.

4.2 Student population and physical facilities.

Schools in Nairobi have fairly a large population of students. Table 4.2 indicates that in every school, there is a kitchen and a Laboratory hence the risk of a fire explosion or food poisoning cannot be ruled out. The table also shows that boarding schools have relatively many dormitories and most schools also have many classrooms. Therefore in case of a fire, there would be substantive loss of property. Again a lot of fire fighting equipment and water would be required to effectively control the fires. One school with only two dormitories has a total of 650 students meaning that there are over 300 students per dormitory. When asked whether it is not risky to put so many students in one dormitory, the Deputy Principal in the school retorted, "but the dormitory is large enough to accommodate the students!" This implies that incase of a fire, there would be enormous losses in terms of life and property. There are also schools with many laboratories, which means that there is an increased risk as far as fire is concerned. Again the presence of relatively easily combustible materials/chemicals in the laboratories increases their relative vulnerability to fire.

4.2:

School Code	No. of Students	Location of School	No. Of Dorms	No. Of classrooms	No. Of kitchens	No. Of laboratories	Oth Roon
001	650	Southlands	2	16	1	4	
002	700	Westlands	11	16	1	4	
003	928	Westlands	12	24	2	4	
004	920	Eastlands	Nil	24	1	6	
005	320	Eastlands	Nil	8	1	1	
006	408	Eastlands	Nil	11	1	1	
007	458	Eastlands	Nil	12	1	1	
008	318	Westlands	Nil	8	1	1	
009	298	Eastlands	Nil	8	1	1	
010	1100	Eastlands	12	24	1	5	
011	478	Eastland	6	12	1	2	
012	758	Eastlands	7	20	1	3	
013	176	Westlands	8	8	1	1	
014	200	Southlands	9	9	1	2	
015	183	Eastlands	5	5	1	1	
016	180	Westlands	6	8	1	2	
017	178	Eastlands	6	8	1	1	

4.2.1 Day Schools (All Categories inclusive)

All the 9 Day Schools have a relatively large population. The school with the highest number of students has while the one with the least has 283. The table further shows that the schools have a wide variety of physical facilities like laboratories, classrooms, dining halls etc. These are high risk areas and very vulnerable to fire disasters. On average, a classroom accommodates 41 students.

4.2.2 Boarding Schools (All Categories inclusive)

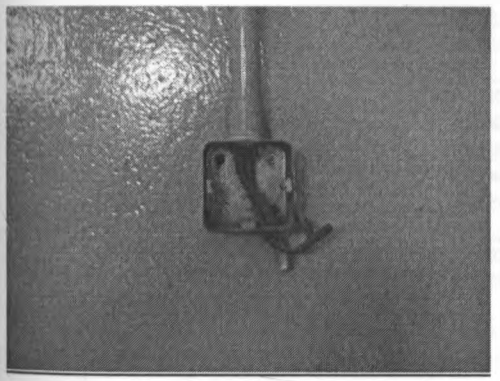
Majority of the boarding schools have a fairly large student population. The school with the largest number has 1100, while the one with the lowest has 338. The schools have

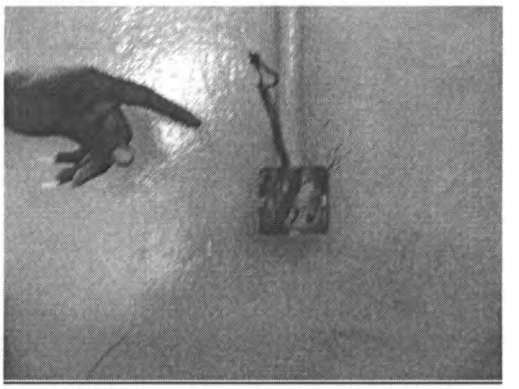
very many physical facilities. Again the wide variety of physical facilities, including laboratories, kitchen, dormitories etc mean that these are risk-prone areas and very vulnerable to disasters like fire.

4.3 Water and electrical facilities

Water and electricity are available in all the schools. The water available is piped city council water which means that in times of water shortage the schools experience a water crisis. This was confirmed by the Principals and the teachers. Only one school out of the 17 has an alternative source of water. Incase of a fire emergency at a time of water shortage, the schools would have no water at all for fire control. Asked how the school would deal with a fire emergency in a time of water shortage, one principal said the researcher was being a pessimist. All water is treated, which reduces the risk for infections. Only one school out of the 17 has a fire hydrant facility – implying that incase of a fire, it would be next to impossible to put it out. The table indicates that a fairly large number of schools have some open sockets with exposed life wires, a very high risk taken for granted by the school administration. Electrical installations and appliances are known to be leading the list of common major causes of fire.

Open sockets with visible electricity wires in some Schools.





4.3

School code	School Category	Kind of water supply	Whether water is treated.	Type of Electricity.	Water/fire hydrant facilities	Electricity safety measures
001	Boys Boarding	Piped city council Water and Borehole	Yes	Kenya power supplied	Nil	No open sockets
002	Boys Boarding	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
003	Boys Boarding	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
004	Boys Day	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets/open wires
005	Boys Day	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
006	Boys Day	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
007	Girls Day	Piped city council Water.	Yes	Kenya power supplied	Nil	No open sockets
008	Girls Day	Piped city council Water.	Yes	Kenya power supplied	Nil	No open sockets
009	Girls Day	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
010	Girls Boarding	Piped city council Water.	Yes	Kenya power supplied	Yes	No open sockets
012	Girls Boarding	Piped city council Water.	Yes	Kenya power supplied	Nil	Some open sockets With visible wires
013	Mixed Day	Piped city council water	Yes.	Kenya power supplied	Nil	Some open sockets With visible wires.
014	Mixed Day	Piped city council Water.	Yes.	Kenya power supplied	Nil	No open sockets
015	Mixed Day	Piped City Council Water.	Yes.	Kenya power supplied	Nil	Some open sockets With visible wires
016	Mixed Boarding	Piped city council water	Yes	Kenya power supplied	Nil	No open sockets
017	Mixed Boarding	Piped city council Water.	Yes	Kenya power Supplied	Nil	Some open sockets With visible wires

4.3.1 Day Schools (All Categories inclusive)

The table indicates that all the Day Schools use piped city council treated water, which is never treated again in the schools. There is no other source of water available to the

schools. According to in-depth interviews, when there is water shortage, the schools also experience the shortage, a factor that exposes them to disease out breaks. Again incase of an emergency i.e. fire outbreak, it would pose a danger to life and property. All schools lack fire fighting hydrant facilities to back up water supply during fire fighting, which would make it very difficult to put out a fire incase of a fire outbreak. Fire fighting engines carry only a limited capacity of water, so refilling in the process of fighting a fire would be mandatory. Even basic water distribution and storage systems with a hose piping that would be handy in the event of a fire outbreak are non existent. The schools also use Kenya Power supplied electricity for lighting. Six (6) out of the nine (9) schools had some open sockets with visible life wires in some of the buildings especially in the classrooms, a factor considered very dangerous for the students. One of the head teachers said that covering the open sockets becomes expensive because the students keep on removing the socket covers. As stated elsewhere in this paper, electrical installations and apparatus are at the top of the most common causes of major fires in the world today.

4.3.2 Boarding Schools (All Categories Inclusive)

The Table indicates that the 8 Boarding Schools use piped city council treated water. Only 1 school has a borehole out of the 8 schools. In times of water shortage, the schools experience a shortage since there is no other source and this could expose the students to disease outbreaks. When asked why they don't have boreholes in schools, the Principals said that they operate on very tight budgets and bore holes are not a priority. This means that in the 7 Boarding Schools without boreholes, in case of a fire outbreak, the schools would have no alternative source of water. Only 1 school out of the 8 has a fire hydrant facility to backup water supply during fire fighting, meaning that incase of a fire, the schools would find it very difficult to fight it out. Basic fire control and prevention measures like water storage systems, with hose piping to act as first aid utilities in the event of a fire outbreak are non existent. The Principal of the school with the hydrant facility on his part admitted that he was not sure whether the hydrant system was in good working condition. All schools use Kenya Power supplied electricity for lighting and have no alternative source of lighting other than pressure lamps, according in-depth interviews. Pressure lamps themselves, especially in the dormitories

are very risky and expose the students to further danger incase of an explosion. Five (5) out of 8 Boarding Schools have a few open sockets with visible life wires in some buildings, a factor considered very dangerous when it comes to fire outbreaks.

From the in- depth interviews, the head teachers and their deputies disclosed that having bore holes in schools would solve the problem of water shortage, but the public schools, according to the respondents, run on a shoe-string budget and there are other more urgent needs to cater for. It then means that in total, 100% of all the schools use city council piped water and only 5.8% of the schools have an alternative source of water. This then means that 94.1% of the schools do not have an alternative source of water. The table further indicates that only 5.8% of the total numbers of schools have fire hydrant facilities. Incase of a fire outbreak, then the schools would not be in a position to put it off effectively.

4.4 Alarms and emergency facilities available in labs, classrooms, dinning and kitchen.

Table 4.4 points out that 11 schools out of 17 have a manual bell as the only alarm system available in the schools. An alarm is an important early warning system in an emergency. In the event like a fire explosion, an alarm like a manual bell would be completely inefficient. Discovery of a fire cannot be considered early if the warning systems are not efficient. The 6 schools with electric bells have them in the classrooms only. In the event of a fire in the dormitories at night such an alarm would not assist. The importance of a fire alarm is to give people in the building available warning that fire has been discovered so that they run for safety. Fire controlled in its early stages of growth leads to lower losses. This is only possible through an effective early warning system which lacks in the school dormitories. A fire needs to be fought when its size is small.

Fire extinguishers are available in the labs and the kitchens in all the schools, however they are missing in some classrooms which is another risk prone area. Labs and Kitchens are high risk areas and a fire extinguisher is a first strike weapon in the war against accidental fires. They are invaluable in all buildings. Data from past school disasters point out that mixed boarding schools fall under a risk category i.e. St. Kizito related disasters. First Aid Kits are completely

lacking in 6 schools, while in schools where they are available they are in selected areas, like the labs the Kitchens, the Administration block etc. First Aid Kits are mandatory in a place like a dormitory yet majority of the schools don't seem to think it is necessary to put them there. When asked why First Aid Kits are not a priority in the dormitories, one principal said he did not see their use i.e. in the Dormitories.

E 4.4

School Code.	School Category.	Where fire extinguishers Are available.	Where first aid kits are Available.	Type of alarm available in		
				Classrooms	Labs	Dinning/kitchen
001	Boys boarding	Laboratories, Kitchen and Adm. Block.	Deputy's Office	Electric Bell	Manual bell	Manual bell
002	Boys boarding	Laboratories Kitchen	Nil	Manual bell	Manual bell	Manual bell
003	Boys boarding	Laboratories Kitchen.	Nil	Electric bell	Manual bell	Manual bell
004	Boys day	Laboratories Kitchen	Deputy's office and Kitchen	Electric bell	Manual bell	Manual bell
005	Boys day	Laboratories Kitchen	Nil	Manual bell	Manual bell	Manual bell
006	Boys Day.	Laboratories Kitchen Laboratories	Nil	Manual bell	Manual bell	Manual bell
007	Girls Day	Laboratories Kitchen.	Nil	Electric bell	Manual bell	Manual bell
008	Girls Day	Laboratories Kitchen.	Kitchen	Manual bell	Manual bell	Manual bell
009	Girls Day	Laboratories Kitchen.	Nil	Manual bell	Manual bell	Manual bell
010	Girls Boarding	Laboratories Kitchen.	Kitchen	Electric bell	Manual bell	Manual bell
011	Girls Boarding	Laboratories Kitchen.	Kitchen	Manual bell	Manual bell	Manual bell
012	Girls Boarding.	Laboratories Kitchen	Kitchen	Manual bell	Manual bell	Manual bell
013	Mixed Day.	Laboratories Kitchen.	Nil	Manual bell	Manual bell	Manual bell
014	Mixed Day.	Laboratories Kitchen.	Laboratories	Manual bell	Manual bell	Manual bell
015	Mixed Day.	Laboratories	Nil	Manual bell	Manual bell	Manual bell
016	Mixed Boarding.	Laboratories Kitchen.	Laboratories Kitchen	Electric bell	Manual bell	Manual bell
017	Mixed Boarding.	Laboratories Kitchen	Kitchen	Manual bell	Manual bell	Manual bell

4.4.1 Day schools (All Categories Inclusive)

It is evident that in 8 of the 9 Day Schools, only one school has an electric bell, which is in the administration office, according to observation checklist by the researcher. All the other schools rely on manual bells as the only alarm facility in the school. In an emergency, a manual bell would be completely ineffective, just like an electric bell

located in an office, which is closed the whole night and over the weekend. It was noted that there are no fire-alarms in all these facilities. Fire alarms are invaluable because, prompt audible warning of a fire on premises is the first step in preventing the trapping, suffocation and roasting of people inside the building. As alluded elsewhere, fire needs to be controlled or responded to in the early stages to ensure lower losses, and this can only be achieved through effective early warning.

The table further indicates that the Day Schools have fire extinguishers in the laboratories and kitchens except for two schools which have no fire extinguishers in the kitchen areas. This is commendable because the laboratories and the kitchen are high-risk areas. The Principals in the two schools said the extinguishers would be bought when "funds are available"

First Aid Kits are completely lacking in six out of nine schools. These are crucial in the event of an injury or emergency and they are cheap and easy to provide. In the 3 schools, first aid kits are only provided in laboratories and kitchens of the two schools respectively. All the other places are not provided for. Again the Head teachers cited lack of funds. The question then is, what would the cash strapped schools do in the face of a disaster of the Kyanguli scale?

4.4.2 Boarding schools (all Categories Inclusive)

Table 4.4 indicates that in 5 out of 8 Boarding Schools, manual bells are the only alarm facility available. In the other 3 Boarding Schools, the electric bell is available, but only in the classroom area; but again according to observation checklist, they are located in the Administration office, which are locked at night over the weekends and public holidays. The students and the Security Personnel cannot access offices at night incase of an emergency. It was also noted that no fire alarms/ or fire detectors are installed in any of the facilities. It must be emphasised that fire alarms are very simple to provide and extremely valuable in saving life. Fire detectors are also invaluable as they prevent a fire from getting out-of-control, as it can be controlled in its early stages of growth. A

principal in one of the schools said that fire detectors "are a luxury to be found in the high cost private schools"

The table further indicates that the schools have fire extinguishers in key area i.e. laboratories and kitchens. However, according to the table, it is evident that only 1 school out of the 8 has fire extinguishers in the classrooms. Does it mean fire cannot breakout in the classrooms? The principals didn't think its likely to have a fire in the classrooms except during riots. It is however important to note that in Kenya, school riots and fires are a common phenomena and ineffective fire responses and control processes have resulted in heavy losses.

4.5 Emergency facilities in the dormitories

The table 4.5 shows that an electric bell is available in the dormitory of 1 school out of the 8 Boarding schools. In all the others, the manual bell is used which, incase of a fire at night would be a very ineffective early warning system. (This points out to a situation that could have taken place at Kyanguli School, where 67 students died when a fire swept through a dormitory in March 2001). With an effective early warning, combined with the presence of a thoroughly exercised response plan, lower losses than otherwise would be achieved.

Fire extinguishers are found in all the 8 schools, which is commendable because dormitories are risk prone area. First Aid Kits are not available in any of the dormitories, which is again a risk prone area. First Aid has an enormous impact on the survival rate of the wounded after a disaster.

4.5

SCHOOL CODE	SCHOOL CATEGORY	TYPE OF ALARM AVAILABLE	FIRE EXTINGUISHERS	FIRST AID KIT
001	Boys Boarding	Manual Bell	Yes	Nil
002	Boys Boarding	Manual Bell	Yes	Nil
003	Boys Boarding	Manual Bell	Yes	Nil
010	Girls Boarding	Electric Bell	Yes	Nil
011	Girls Boarding	Manual Bell	Yes	Nil
012	Girls Boarding	Manual Bell	Yes	Nil
016	Mixed Boarding	Manual Bell	Yes	Nil
017	Mixed Boarding	Manual Bell	Yes	Nil

4.5.1 Boarding schools (All Categories Inclusive)

The table shows that in all the Boarding Schools, only manual bells are available in the dormitories. Incase of an emergency, this would not be the best early warning facility as far as alerting all the students of the danger at hand. As alluded earlier, prompt audible warning of fire on the premises is the first step in preventing the trapping, suffocation and roasting of people inside a building. Hence fire detectors and fire alarms are very important in a building.

In all the schools there was at least one fire extinguisher per dormitory. This is very handy incase of a fire. From the table, it is also evident that First Aid Kits are missing in all the dormitories. Incase they are needed in an emergency; students would have to look for them elsewhere in the school compound.

4.6 General security in the schools.

It clearly emerges that only 2 schools out of the 17 have a stone perimeter fence. Majority of the schools have Kie-apple and barbed wire for a fence, which is not efficient for general security. One can easily access the schools. Apart from one school, all the others have metal gates, which is commendable because a metal gate wards off intruders from the school compound. The table further indicates that eleven schools have 24 hours manning of the school main gate. The others have the gates manned either, day only or nights only. It is clear

that none of the schools conducts searches on visitor's vehicles. This can be dangerous especially because somebody might want to smuggle bombs weapons/ guns etc, to the school. It would also be easy to have a terrorist kind of an attack. Bomb attacks have become common place and Kenya has had its share of these attacks following the 1998 Nairobi Bomb Blast. Apart from one school, visitors are not required to identify themselves at the gate, which is again dangerous for the schools.

E 4.6:

School Code.	School Category.	Type of fence	Type of gate	Nature of manning gate.	Visitors Vehicle Search.	I.D. Identification
001	Boys boarding.	Stone Wall	Metal gate.	24 hours	Nil	Identification
002	Boys boarding	Barbed wire	Metal gate.	Night only	Nil	Nil
003	Boys Boarding.	Kie-apple Barbed wire	Metal gate.	24 hours	Nil	Nil
004	Boy's Day.	Barbed wire Kie-apple	Metal gate.	24 hours	Nil	Nil
005	Boys day	Barbed wire.	Metal gate.	Night only.	Nil	Nil
006	Boys day	Kie-apple barbed wire	Metal gate.	24 hours.	Nil	Nil
007	Girl's Day.	Stone Wall	Metal gate.	24 hours	Nil	nil
008	Girl's Day.	Kie-apple barbed wire	Metal gate.	24 hours.	Nil	Nil
009	Girl's Day.	Kie-apple barbed wire	Metal gate.	Night only.	Nil	Nil
010	Girls Boarding.	Stone Wall.	Metal gate.	24 hours	Nil	Nil
011	Girls boarding	Stone Wall	Metal gate.	24 hours	Nil	Nil
012	Girls Boarding	Stone Wall.	Metal gate.	24 hours	Nil	Nil
013	Mixed Day	Kie-apple barbed wire	Metal gate.	Night only	Nil	Nil
014	Mixed Day.	Kie-apple barbed wire	Metal gate.	Night only	Nil	Nil
015	Mixed Day	Kie-apple barbed wire	Metal gate.	24 hours.	Nil	Nil
016	Mixed Boarding.	Kie-apple barbed wire	Metal gate.	24 hours.	Nil	Nil
017	Mixed Boarding.	Kie-apple barbed wire	Metal gate.	Night only.	Nil	Nil

4.6.1 Day Schools (All Categories Inclusive)

The table indicates that 8 out of the 9 Day Schools have barbed wire and kie-apple or cider around the school perimeter fence. This is good but not strong enough to keep off unwanted people form the school compound.

The table further indicates that all the 9 schools have a metal gate. Again this is good for general security. Of the 9 schools, 5 have 24 hours gate manning. According to the table, none of the school conducts visitor vehicle searches, which means an attack like a terrorist bomb attack would be very easy. Evidence from the tables again indicates that none of the schools demands for any ID identification at the gate. This again is dangerous incase of a terrorist attack or gun attacks. Kenya having experienced a terrorist attack twice, cannot rule out such an attack in our schools. One head teacher when asked why this is not done said that nobody would be interested in attacking a school, "he would gain nothing".

4.6.2 Boarding Schools (All Categories Inclusive)

The table further shows that 5 Boarding Schools out of the 8 have barbed wire around the school compound. Only 3 out of the 8 have a stone perimeter fence. All the 8 schools have a metal gate, which is good for general security. Six (6) of the 8 eight schools have 24 hours manning. However only one school demands an ID identification at the gate, which is again dangerous incase of a terrorist attack. None of the 8 schools conducts a visitors vehicle search – which is dangerous incase of an attack. The head teachers felt a vehicle search would be tedious and a waste of invaluable time.

4.7 Security personel in the schools.

Table 4.7 indicates that 2 schools out of 17 have Security Officers in charge of security. All the other schools have watchmen in charge of security. It further shows that except one security officer who has training from a security firm, all other personnnel in charge of security in the schools have no relevant training in security. Further it's evident that the people in charge of

security have no telephone facilities at night. The head teachers felt that buying cell phones for them would be very expensive. The table also indicates that incase of an emergency, the principal is to be contacted first –yet the watchmen have no telephone facilities at night.

E 4.7:

School Code.	School Category.	Person in charge Of security.	Relevant training for Security Personnel	Telephone facilities at night for Security Personnel.	Person to contact in an Emergency.
001	Boys Boarding	Security Officers	Security Firm	Nil	Principal
002	Boys Boarding	Watchmen	Nil	Nil	Principal
003	Boys Boarding	Watchmen	Nil	Nil	Principal
004	Boys Day	Watchmen	Nil	Nil	Principal
005	Boys Day	Watchmen	Nil	Nil	Principal
006	Boys Day	Watchmen	Nil	Nil	Principal
007	Girls Day	Watchmen	Nil	Nil	Principal
008	Girls Day.	Watchmen	Nil	Nil	Principal
009	Girls Day	Watchmen	Nil	Nil	Principal
010	Girls Boarding	Security Officers	Nil	Nil	Principal
011	Girls Boarding	Watchmen	Nil	Nil	Principal
012	Girls Boarding	Watchmen	Nil	Nil	Principal
013	Mixed Day	Watchmen	Nil	Nil	Principal
014	Mixed Day	Watchmen	Nil	Nil	Principal
015	Mixed Day	Watchmen	Nil	Nil	Principal
016	Mixed Boarding	Watchmen	Nil	Nil	Principal
017	Mixed Boarding	Watchmen	Nil	Nil	principal

4.7.1 Day Schools (All Categories Inclusive)

The table indicates that all the 9 Day Schools have watchmen in charge of security. At the same time the data shows that the said watchmen have no relevant security training at all. The table also shows that none of the watchmen have access to telephone facilities at night. This then raises the question, incase of an emergency at night, how would they contact

the relevant authorities? In the nine schools the person to be contacted first in case of an emergency is the principal. From the in-depth interviews none of the principals in these day schools stays in the school compound. This poses a paradoxical question, how can the watchmen, with no telephone facilities at night, contact the principals promptly when they do not stay in the school compounds, incase of an emergency?

4.7.2 Boarding schools (All Categories Inclusive)

From the table it clearly emerges that 6 out of the 8 Boarding Schools have watchmen as the people in charge of security. At the same time, the table shows that the six watchmen have no relevant security training. The table further points out that 7 out of the 8 watchmen have no access to telephone facilities at night. Incase of an emergency, prompt action would not be possible. The person to be contacted incase of an emergency according to the tables is the principal. Again the question is, without telephone facilities, how do they act in an emergency?

4.8 Cooking and lighting facilities, their maintenance and building checks.

All the schools use electricity for lighting. Table 4.8 indicates that all the schools use firewood and gas for cooking. According to the table, only two of the schools using gas for cooking had one check-up on the gas system in the last five years. It further shows that none of the schools has had electricity-wiring check-ups in the last five years, although they use electricity all the time. This makes them vulnerable to fire disasters. The table also indicates that the buildings in all the schools have not been assessed by the relevant ministry in the last five years, another aspect of vulnerability. The Principals confirmed that school inspectors hardly perform safety assessment on buildings during their routine checks.

E 4.8:

School Code.	School Category.	Fuel Used For Lighting	Fuel Used For Cooking	Times extinguishers have been checked in the last five years.	Gas system checks in the last five years.	Electrical wiring checks in the last five years.	Building checks in the last five Years.
001	Boys boarding.	Electricity.	Firewood / gas	Nil.	Once	Nil	Nil
002	Boys boarding.	Electricity.	Firewood	Nil	Nil	Nil	Nil
003	Boys Boarding.	Electricity.	Firewood.	Nil	Nil	Nil	Nil
004	Boys Day.	Electricity.	Firewood/ gas.	Nil	Nil	Nil	Nil
005	Boys Day.	Electricity.	Firewood.	Nil	Nil	Nil	Nil
006	Boys. Day.	Electricity.	Firewood.	Nil	Nil	Nil	Nil
007	Girls. Day.	Electricity.	Firewood/ gas.	Nil	Nil	Nil	Nil
008	Girls. Day.	Electricity.	Firewood/ Gas.	Nil	Nil	Nil	Nil
009	Girls. Day.	Electricity.	Firewood/ Gas.	Nil	Nil	Nil	Nil
010	Girls. Boarding.	Electricity.	Firewood/ Gas.	Nil	Nil	Nil	Nil
011	Girls. Boarding.	Electricity.	Firewood/ Gas.	Nil	Nil	Nil	Nil
012	Girls. Boarding.	Electricity.	Firewood/ Gas.	Nil	Nil	Nil	Nil
013	Mixed Day	Electricity.	Firewood	Nil	Nil	Nil	Nil
014	Mixed Day.	Electricity.	Firewood.	Nil	Nil	Nil	Nil
015	Mixed Day.	Electricity.	Firewood/ Gas.	Nil	Once	Nil	Nil
016	Mixed Boarding.	Electricity.	Firewood.	Nil	Nil	Nil	Nil
017	Mixed Boarding.	Electricity.	Firewood.	Nil	Nil	Nil	Nil

4.8.1 Day Schools (All Categories Inclusive)

The table indicates that all the 9 Day Schools use electricity for lighting purposes. The table at the same time shows that in the last five years, none of the schools has conducted any wiring checks.

The same table further indicates that 5 out of the 9 schools use both firewood and gas for cooking purposes. Out of these, only 1 school has had one check-up in the last 5 years on the

gas system. From the table, it is also clearly evident that none of the schools has had a safety assessment on buildings by the relevant ministry in the last 5 years.

4.8.2 Boarding Schools (All Categories Inclusive)

The Table shows that all the 8 Boarding Schools use electricity for lighting. The table further shows that none of the schools has conducted any wiring checks in the last 5 years. The table at the same time indicates that all the schools use both firewood and gas for cooking purposes. However all the 8 schools have not conducted any gas system checks in the last 5 years. The head teachers felt that the gas systems were properly installed and therefore no need for constant check-ups.

The table further indicates that in the 8 schools, in the last 5 years, the relevant ministries have not conducted safety assessment on the buildings. It must be noted here that some of these schools were built during the colonial era and so some of the buildings are fairly old. In some schools, prefabricated materials are common, meaning that some of the buildings are quite old, and combustible.

.9 Hazardous events experienced in the schools.

The table 4.9 indicates that only two schools have experienced any form of a hazardous event; one in form of a shoot out (no one was injured) while in the other 1 student drowned in a swimming pool.

4.9:

School Code.	School Category.	Any hazardous event experienced in the school.	Kind experienced.	Number injured.	Loss of property	Deaths.
001	Boys Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
002	Boys Boarding	Nil.	Nil.	Nil.	Nil.	Nil.
003	Boys Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
004	Boys Day.	yes	Drowning in the swimming pool.	one	Nil.	One.
005	Boys Day.	Nil.	Nil.	Nil.	Nil.	Nil.
006	Boys Day.	Nil.	Nil.	Nil.	Nil.	Nil.
007	Girls Day	Nil.	Nil.	Nil.	Nil.	Nil.
008	Girls Day	Nil.	Nil.	Nil.	Nil.	Nil.
009	Girls Day.	Nil.	Nil.	Nil.	Nil.	Nil.
010	Girls Day.	Yes.	Shoot out/ robbery	Nil.	Yes.	Nil.
011	Girls Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
012	Girls Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
013	Girls Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
014	Mixed Day.	Nil.	Nil.	Nil.	Nil.	Nil.
015	Mixed Day.	Nil.	Nil.	Nil.	Nil.	Nil.
016	Mixed Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.
017	Mixed Boarding.	Nil.	Nil.	Nil.	Nil.	Nil.

4.9.1 Day Schools (All Categories Inclusive)

According to the table, the 9 Day Schools have not experienced any major hazardous event yet. Only 1 school has had a student drowning in the school swimming pool.

4.9.2 Boarding Schools (All Categories Inclusive)

The table indicates that none of the 8 Boarding Schools has experienced any hazardous event to date.

4.10 Disaster preparedness; measures put in place

Table 4.10 shows that 16 schools out of the 17 have not had any talks or educational programmes on disaster preparedness or mitigation. The table further indicates that no

demonstrations on the use of fire extinguishers have been conducted to the students in the 16 schools. The table also indicates that none of the schools has conducted a fire drill or disaster preparedness drill in the school or given its members any form of fire fighting training. Basic fire control techniques could go along way in ensuring life safety precautions. According to the data, the only students who might have skills on disaster response are the Scouts and members of First Aid Club. Further, the table shows that there is no disaster preparedness plan put in place in any of the schools, so in an emergency there would be total chaos. Preparedness to fire disasters addresses the consequences of the impact of fire in terms of reducing vulnerability levels.

4.10:

	School category	Talks/lectures on disaster In schools.	Demonstration on the use of fire extinguishers.	Participants in the demonstration	No. of emergency drills conducted in school.	Disaster preparedness plan for the school.	Clubs in the school with skills to respond to emergencies.
1	Boys Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	First aid club/scouts
2	Boys Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	First aid club/scouts
3	Boys Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	First aid club/scouts
4	Boys Day	Nil.	Nil.	Nil.	Nil.	Nil.	First aid club/scouts
5	Boys Day	Nil.	Nil.	Nil.	Nil.	Nil.	Scouts
6	Boys Day	Nil.	Nil.	Nil.	Nil.	Nil.	Scouts
7	Girls Day	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides
8	Girls Day	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides
9	Girls Day	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides
0	Girls Boarding	Once	Once	Students	Nil.	Nil.	First aid club/Girl Guide
1	Girls Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides
2	Girls Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides
3	Mixed Day	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides/scouts
4	Mixed Day	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides/scouts
5	Mixed Day	Nil.	Nil.	Nil.	Nil.	Nil.	/Girl Guides/scouts
6	Mixed Boarding	Nil.	Nil.	Nil.	Nil.	Nil.	Girl Guides/scouts
7	Mixed Boarding	Nil	Nil	Nil	Nil	Nil	Girl Guides/scouts

4.10.1 Day schools (All Categories Inclusive)

The Table specifically shows that in all the schools, no talks or educational programmes on disasters have been conducted. The same table further reveals that no demonstrations on the use of fire extinguishers have been conducted in schools. James Derek (1986) maintains that people have to be trained on how to use fire extinguishers effectively. He points out that one can be instructed on how to use a fire extinguisher to the point where he can recite the words of wisdom in his sleep. But unless one has picked one up, carried it to the fire ground, set it off and actually put out a stack of blazing wood, then he is not trained. The table further indicates that no fire drills have ever been conducted in the schools. From the table it is also evident that none of the 9 schools has any disaster preparedness plan for the school.

4.10.2 Boarding schools (All Categories Inclusive)

The Table indicates that only one school out of the 8 has had a talk or educational programme on disaster. At the same time, the table indicates that only 1 school has conducted a demonstration to the students on the use of fire extinguishers.

However the table reveals that none of the schools has conducted a fire drill and none has any disaster preparedness plan for the school. The findings reveal that there's hardly any training given to members of the school community on what to do and how to act incase of an emergency.

The schools have clubs whose members might have skills to respond to emergencies like Scouts, Girl Guides and First Aid Clubs. According to in-depth interviews, the membership in these clubs is very low, they lack facilities and specialized resource people to give them training. Some principals admitted that they would love to have the clubs equipped with the necessary skills and knowledge but they lack resources to do so. From the same discussion it was noted that some schools have a few students in St. John Ambulance, where training in First Aid is given.

4.10.3 Discussion on the guiding assumption.

The guiding assumption of the study was that lack of definite systems to respond to and/or to lessen the impact of disasters should they occur makes the elements around each specific site vulnerable to hazards. The study sought to identify the hazards and the related mitigations, recovery and preparedness measures put in place in schools to cope with disasters. From the findings, it can be seen that there are various types of hazards existing within the school set-up in different proportions. Lack of early warning systems, lack of basic fire prevention and control techniques, untrained security personnel, prefabricated buildings, combustible property in laboratories and other buildings, electricity, gas, old buildings, lack of a perimeter fence etc. all expose schools to disasters. From the findings, it can also be generated that the proportion of hazards within a school is directly related to the degree to which the school is vulnerable to disasters.

Some schools have a higher magnitude of the predisposing factors than others, meaning that some schools are more vulnerable than others. It can then be concluded that there are various types of hazards existing within the school set up, in different proportions that expose schools to disasters. It can also be generated that the higher the number of hazards, the higher the degree of vulnerability.

From the findings, it can also be implied that man, not the expert systems, expose schools to disaster situations. Data from the study established that only 7.6% of the school administrators conduct check-ups on school facilities. The ministry of education on its part does not send engineers to schools to conduct checks on buildings. When an expert installs wires for electricity, he does not intend to have them exposed in open sockets. With proper electrification, prevention of careless ignition, ensuring that nobody tampers with the wires and constant checks, would go a long way in preventing fires.

When a contractor puts up a dormitory, he does not intend to have it misused by overcrowding it or by not having it assessed for safety many years later. He cannot also force the administration to have adequate fire escapes/evacuation routes, fire prevention and control measures that could act as first aid utilities in the event of a fire. From the findings it can thus

be generated that other factors, not the expert systems, make schools vulnerable to disasters. The expert systems Theory in the Theoretical framework consequently does not apply here.

The study established that 94.1% of the schools have not conducted any talks on disaster preparedness or held education programmes on disaster; that none of the schools has had a fire drill; that only 7.6% of the administrators conduct check-ups on school facilities and that none of the schools has a disaster preparedness plan put in place, nor any recovery strategies to be followed in an event of disaster. Although absolute safety cannot be achieved due to unforeseen and unavoidable intervening and disrupting factors, basic fire control techniques could go along way in ensuring life safety precautions are inbuilt into the students' minds. Installation of a fire fighting equipment, without teaching the students on how to use it does not help. Mitigation and preparedness against disasters is paramount. Preparedness to fire disasters would address the consequences of the impact of fire in terms of eliminating or reducing the vulnerability levels. If vulnerability is high, then consequences are severe. It is therefore important to reduce the adverse effects of the fire as a hazard through effective precautionary measures. It can therefore be concluded that lack of definite systems to respond to and or to lessen the impact of disasters should they occur make schools vulnerable to hazards.

From the findings, it can be seen that none of the schools has trained its members on what to do incase of a disaster; that 94.1% of the schools have never conducted demonstrations on use of fire extinguishers in the last five years; no school has conducted fire drills with the school community members in the last five years so as to be ready incase of a fire; no school has First Aid Kits in dormitories; fire extinguishers have not been serviced or checked for readiness for use in an emergency and that majority of the schools use manual bells as the only early warning (only 23.5% of the schools have electric bells). Fire extinguishers are known as first aid fire control efforts, so ensuring that everybody is well versed on how to use them is very important. Again programming mandatory regular checks to ensure they are in optimal working condition is paramount. James Derek (1986) on fire fighting equipments says; they should be well maintained, routinely inspected and everybody in the building must be educated and trained on how to use them. Preparedness in case of a fire disaster counters panic and disorientation. Early warning also sets systems in motion, with response, evacuation, fire

fighting, first aid etc. From the findings it can be implied that adequate strategies have not been put in place in schools to cope with disaster situations.

A dormitory in one of the Kenyan schools destroyed by a fire outbreak

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

In this chapter, a summary of the entire study is given, the main findings of the study are summarized and salient conclusions drawn. Areas for further research and recommendations are also pin-pointed.

5.1 Summary of the study

The main purpose of this study was to study vulnerability of Kenyan schools to disaster. Although disasters in schools seem to have jolted parents and education authorities to attention for some time, the frequency of fire outbreaks in schools and the consequent deaths is still generating a lot of interest. The question that still nags every parent in Kenya is how safe are our children in schools, especially those in boarding schools. In some parts of the world, they have managed to come up with vulnerability reduction programmes for the education sector, which promotes the design and implementation of policies, plans, projects and preparedness for disaster reduction. Vulnerability reduction workshops in the education sector are held whereby the ministry of education discusses with all the stake holders on the best vulnerability reduction programmes. As a result, all the stake holders support the programmes of disaster preparedness and information of the same is disseminated to the education community with a view to prepare plans for emergency response. As a result, disasters in schools, though not completely won, have greatly reduced.

The purpose of the study was therefore to establish some of the factors that are making schools in Kenya vulnerable to disaster situations. The study sought to establish the type of hazards found in schools that expose schools to disasters; whether the unforeseen consequences of the experts systems are to be blamed for the frequent disasters in schools, whether the exposure to disaster is influenced by the administrative framework of the school

and whether there are adequate strategies put in place in schools to cope with disaster situations.

The study attempted to investigate the nature, causes and magnitude of vulnerabilities that expose schools to disasters and the related mitigation and preparedness measures put in place. The study had an assumption that, lack of definite systems to respond to and/or to lessen the impact of disasters should they occur makes the element around each specific site vulnerable to hazards.

The study was conducted in Nairobi Province. Nairobi was selected as the site of the study because it's one of the administrative provinces in Kenya with National, Provincial and Private schools, which the researcher felt is an appropriate representation of the country.

All the Public Secondary Schools in the province constituted the target population. A questionnaire was designed for teachers, in-depth interviews were conducted with school principals or their deputies and where possible, an observation checklist was used.

The studys' questionnaires were administered through individual visits to the schools by the researcher. Where possible, the in-depth interviews were conducted the same day and where not possible, booking of an appointment for the in-depth interviews with the principal was done for another day. In total, twelve principals were interviewed and five deputies. The questionnaires were administered on a "drop and pick-up later" basis.

Data analysis was done, first by editing the questionnaires for completeness and consistency. Data was then coded to enable the responses be grouped in categories. Descriptive statistics was used to summarise the data.

5.2 Summary of the research findings

5.2.1 Population and Physical Facilities

The research findings showed that the secondary school with the least number of students has 283 while the one with the highest has 1100. It was also evident that boarding schools have

more students than the day schools. The day school with the highest number of students has 920 and the one with the least has 283. The boarding schools on the other hand have students ranging from 1100 to 338. On average, a classroom in all the schools has 41 students. The school that houses the highest number of students in one dormitory has 325 students, while the one with the least has 57.

From these findings it is evident that in an event of disaster in a dormitory or classroom, there would be tremendous loss of life. Bishop Lawi Imathiu who chaired the commission of inquiry that probed the Bombolulu Disaster proposes that the school managers should avoid crowding of the dormitories (East Africa Standard June 6, 2003).
In the Kyanguli case where 67 students died, the dormitory housed 130 students (The People, Tuesday, March 27, 2001). The salient question here is, if 67 students died out of 130, how many students would die in a dormitory housing 325 students?

5.2.2 Water and fire Fighting Facilities

From the findings it is evident that all the schools, that is (100%), use Nairobi City Council piped water. Again it is evident that there is only one school with an alternative source of water i.e. borehole. The study also found that only one school (5.8%) has fire hydrant facilities. Fire engines carry only a limited capacity of water and a hydrant system acts as back up. This then points out that those schools in the sample are not just ill prepared to fight fire but are completely unprepared. It is common knowledge that Nairobi City Council experiences water shortages. What if a fire broke out at such a time when there is water shortage? Again without fire hydrant facilities or alternative source of water to be used in cases of an emergency, our schools will remain vulnerable to fire disasters.

The study further established that schools have installed fire extinguishers in laboratories, dormitories and a few other fire-prone spots. In total 15 out of the 17 schools in the sample (88.2%) have installed the fire extinguishers. Though this is a very commendable move, the study further established that in all the schools in the sample, the fire extinguishers have not been serviced in the last 5 years or checked for readiness incase of an emergency. James Derek (1986) argues that fire extinguishers should not become merely a cosmetic feature in a workplace. They must be checked frequently and maintained on a regular basis. A routine

check ensures that: a) The extinguishers are where they are supposed to be; b) They are not damaged, corroded, empty or otherwise unfit for duty; c) Access to them is not obstructed by anything. The study further established that none of the schools has conducted demonstrations on the use off fire extinguishers to any of the members of the school community in the last five years. James Derek (1986), further argues that basic fire prevention includes three things:-

a) Maintenance programmes – This should be applied to all the equipments that generates heat and also the fire fighting equipment on site.

b) Routine inspection – This ensures that equipment and premises are periodically checked.

c) Education and training -training of everybody in the premises on causes and prevention of fire.

The question then is, how do school administrators expect members of the school community to effectively put of a fire if they have not been drilled on how to operate the fire equipments? Levels of education i.e. sensitization of the members, dictates the relative levels of preparedness. Preparedness also counters panic and disorientation in case of fire emergency. Apart from fire extinguishers, other fire fighting systems like water hose-reels; internal hydrants; sprinklers etc. should be considered since they are handy, cheap and easy to use.

The study further revealed that 11 schools out of the 17, that means (64.7%) of the schools in the sample have some open sockets with life wires in some buildings. One deputy Principal when asked to comment on this retorted, "You cannot control these boys..." The issue is, can the irresponsibility of a few students be allowed to risk the lives of the entire school, exposing them to electrocution, electric shocks or fire related disasters, resulting from short circuiting? What about the 6 schools in the sample (35.2%) where cases of open sockets were not recorded? How do they control their students? Is the problem with the students or could it be a case of negligence and irresponsibility on the part of the administrators? As alluded elsewhere in this study, a survey carried out by the Fire Protection Association indicates that the most common causes of major fires in order of precedence were found to be electrical installations

and appliances, followed by malicious intent and smoking materials. The three factors account for about 75% of the total damage costs. James Derek (1986).

5.2.3 Early Warning Systems

The study undoubtedly established that the alarm facilities available in the schools in the sample are electric and manual bells. Data points out that only 4 schools out of the 17 in the sample (32.5%) have electric bells, which are located in rooms near the classroom areas. The observation checklist revealed that only one school has a fire alarm fitted in the dormitory, which is currently out of order. In all the 8 boarding schools in the sample, therefore, the only early warning facility available in the dormitories is the manual bell. One would expect that with the growing frequency of school fires, head teachers would be falling over each other to install early warning facilities like fire alarms in all fire-prone areas to ensure reduced loss of life incase of a disaster. Fire detectors, fire alarms and a reliable fire extinguisher should be a must in any building. James Derek (1986) observes that people must be instructed in how to respond to an alarm. As alluded elsewhere in the study, fire controlled in its early stages of growth through effective early warning and thoroughly exercised response plans leads to much lower losses.

5.2.4 School Perimeter Fence/Gate Management

Research findings showed that 13 schools out of the 17 in the sample (76.4%) have a barbed wire and kie-apple perimeter fence. Only 3 schools from the sample (17.6%) have a stone perimeter fence. The study also established that all the 17 schools (100%) of the schools in the sample had metal gates. It further established that 11 of these schools (64.7%) have 24hrs gate manning. This is a very positive move, which is commendable. However studies revealed that only one out of the 17 schools (5.8%) demands for an Identification Card at the gate. The observation checklist revealed that the guards only demand to know the name of the member being visited. They also don't give any kind of gate-pass to be signed by the member of the school community being visited. This then indicates that one can easily walk into a school and pretend to be visiting a member. The studies further revealed that none of the 17 schools conducts vehicle searches on the visitors to the school. Lack of a stone perimeter fence in 13 schools out of the 17 in the sample, points to a propensity to external -source disasters.

Some schools are in slum area or very risky neighbourhoods and could be prone to evils like theft, burglary, mob justice, invasions etc. Looking back at St. Kizito incident in 1990 where 19 girls died in Meru District after boys invaded a girls' dormitory, chances are that had there been a stone perimeter wall around the dormitory, the tragedy would have been avoided.

5.2.5 General Precautions and Security

Evidence from the observation checklist revealed that dormitories in all 8 boarding schools in the sample are fitted with two doors at each end, but it also revealed that only 2 schools (25%) have an additional emergency exit door at the middle of the dormitory labelled "Emergency Exit". Two doors at each end are vital in an emergency, but having an emergency exit is key in an emergency. Chances are that if Kyanguli secondary school had taken these precautions, many innocent lives would have been saved.

The research findings further revealed that 15 schools of the 17 in the sample, (88.2%), watchmen are in charge of security. The data also points out that it is only in 1 school out of the 17 schools (5.8%) where the watchman has relevant security training. In all the other 16 schools in the sample (94.1%) although the watchmen are in charge of security, they have no relevant training. The salient question then is, how safe are our students, especially those in boarding schools, if their security at night depends on watchmen who have no relevant security training, no training at all on first aid and on the use of fire fighting equipments? From the findings, it is evident that 16 watchmen in the 17 schools in the sample (94.1%), have no access to telephone facilities at night. In all the schools in the sample, the principals are to be contacted first incase of an emergency. The question is, how can this be done promptly if the security personnel have no access to telephone facilities?

5.2.6 Routine Facility Check-ups

The research findings established that none of the 17 schools in the sample has had any electricity wiring check-ups in the last 5 years. It further established that 13 out of the 17 schools use both firewood and gas for cooking. However only one out of the 13 schools (7.6%) has had one (1) check-up on the gas system in the last five years. The question is; is this lack

of check-ups as a result of lack of undue care and diligence on the part of the administration or is it because the administration trusts the experts who installed the facilities?
Evidence further points out that in all the schools in the sample, the relevant ministry has not conducted any safety assessment on buildings in the last five years. Its good to note here that some of the schools in the sample were built in the colonial times, meaning that some of the buildings are very old.

5.2.7 History of Disasters in schools

The study found out that schools in Nairobi have not recorded any major disasters. It was found out that the only school that has ever experienced a major disaster is 1 out of the 17, in form of drowning in the swimming pool where one person died. This could then explain why there is the laxity on the side of Head Teachers to take precautions as far as disaster is concerned. One head teacher during an in-depth interview, said, "We don't have disasters in Nairobi! Why panic?"

5.2.8 Preparedness for Disasters

From the findings, it is evident that 16 schools out of the 17 in the sample (94.1%) have not had any talks or educational programmes on disaster. According to one head teacher, "Disasters are not a problem in the province" The studies show that only one school has organised a talk on disaster management (5.8%). During the in-depth interviews, it was evident that this was immediately after the Kyanguli incident in 2001. As alluded elsewhere in this section, although head teachers have fitted fire extinguishers in some fire-prone areas, the facilities have not been serviced, repaired, tested or checked for readiness or inspected in the last 5 years. The study further indicates that only 1 out of the 17 schools in the sample (5.8%) has held a demonstration for the students on the use of fire extinguishers. This means then in the other 16 schools in the sample, students would have to learn to use the equipment during the actual emergency.

The study further established that none of the schools in the sample has ever conducted fire drills or given its members any form of fire fighting training. James Derek (1986) observes that fire drills must become a way of life in a place with many people. The drills often throw up

anomalies and interesting difficulties. Improvement on them and progress can then be recorded as time passes.

During the in-depth interviews, 10 out of the 15 administrators interviewed (66.6%), when asked whether the school has any emergency preparedness plan for students, workers, teachers etc asked the researcher "What do you mean" This implies that they have never even thought about such a plan or they might not know what it is. The study further established that none of the schools keep a first aid kit in the dormitories. Mostly the Kit is either in the kitchen or the laboratories or in both places.

During the in-depth interviews it was discovered that in 2 boarding schools, the Kit is kept by the School Nurse. In other schools, the kit was either with the Deputy Principal, in the kitchen or in the laboratories. How then would students give First Aid to their colleagues in an emergency in the dormitories at night if the Kit was in the above places? The study however established during in-depth interviews with the administration that in an emergency, they can make a quick decision without consulting either the Chairman of Board of Governors or Parents Teachers Association. The principals also did point out that this would be in very rare occasions when time is of essence.

5.3 Conclusion of the study

From the study, the following conclusions were arrived at: -

1. There are various types of hazards in different proportions that expose schools to disaster situations. Some of these include: Electricity, gas, buildings, lack of perimeter fence, lack of early warning systems, untrained security personnel e.t.c. In some schools the number of these hazards is higher than in others, implying that some schools are more vulnerable than others.

2. Schools are vulnerable to disasters, not due to unforeseen consequences of the expert system but more so due to the administrative framework in these schools. The expert for example when installing electricity does not intend that life wires be left exposed,

that buildings are not assessed for safety after years, or that buildings are misused by over crowding, etc. This is then more a case of lack of undue care and diligence on the part of the administrators. How would one explain: 64.4% of the schools having open sockets with life wires, 76.4% of the schools without a secure perimeter fence, 88.2% of the schools with watchmen as people in charge of security yet they have no relevant security training, no telephone facilities at night, no check-up on facilities like fire extinguishers, gas systems, no fire drills, no training on the use of fire extinguishers, no talks on disaster and disaster preparedness plan, no disaster preparedness plan to mention just a few.

3. A lot still needs to be done to prepare schools for fire disasters. Fire is known as an enthusiastic wanton destroyer of life, jobs, property and profits and because of this, people should be prepared on how to prevent them or fight them when they occur. The study established that although most schools (88.2%) have attempted to install fire extinguishers in most fire-prone areas (except in the classrooms), the following has not been done: Fire extinguishers have not been serviced or examined in the last five years in all the schools or checked for readiness for use in an emergency, that 94.1% of the schools have never conducted any demonstrations on the use of fire extinguishers and neither have fire drills been conducted.

4. Schools are not equipped to cope with disasters or to lessen its impact. For example no school has First Aid Kits in the dormitories which is very vital in reducing loss of life in an emergency, no talks or educational programmes on disasters have been conducted in most schools, except in 5.8% of the schools, schools lack effective early warning systems like fire alarms, etc. This then clearly points out that schools are not prepared both mentally and physically for disasters. There are no recovery strategies put in place in any of the schools.

5. Exposure to disasters in schools is caused by lack of due care and diligence on the part of the administrators. They do not need money to have an emergency preparedness plan put in place, or to conduct talks on disasters, to conduct demonstrations on use of

fire extinguishers or to hold fire drills etc. Data shows that only 7.6. % of the schools has conducted check-ups on school facilities in the last five years.

6. Secondary schools have not adhered to the Ministry of Education's Health and safety standards of April 2001. The guidelines specified to schools the classroom sizes, design, construction and equipment of laboratories, libraries dormitories and general health and safety of the students. The guidelines emphasised on serviceable first aid boxes in all key areas, emergency exits, windows, fire extinguishers etc. It is apparent that most schools have not adhered to most of the requirements.

5.4 Recommendations of the study

In view of the foregoing discussion, the following recommendations arose from the study:

1. The problem of secondary school disasters is now more than before a national problem in Kenya, as alluded in the introduction of this study. If no steps are taken to establish the vulnerabilities that expose schools to disasters, then all those innocent students who have lost their lives in school disasters will have done so in vain. Time is ripe for national consolidated efforts to come up with strategies that should be put in place to prevent and control the problem. According to a newspaper correspondent, every month, at least two schools suffer a fire outbreak in Kenya (East African Standard Friday, June 6, 2003). Such consolidated efforts would bring an end to school disaster.

2. The Ministry of Education should hold workshops with all stakeholders i.e. school administrators, Parents Ngo's etc on the best vulnerability reduction programmes. This would ensure that all stakeholders support the programmes of disasters preparedness and information would thus be disseminated to all.

3. The ministry of education should take the initiative and assist our public cash strapped schools with funds to implement the projects that ensure all schools are well prepared for disasters. It should not be left to individual schools since most of them are run on shoestring budgets and cannot afford the luxury of some of these life saving facilities.

4. There is need for all schools to be provided with a working hydrant system, to back up water supply during fire disasters.

5. It is recommended that schools employ security personnel with some comprehensive safety training i.e. those trained at the polytechnics. This would mean that our children's safety at night is well taken care of.

6. It is recommended that the ministry of works perform safety assessment on buildings in schools at least once every three years. The Ministry should also strengthen school inspection teams to check fire safety in schools.

7. Deliberate attempts should be made to ensure that every school has an emergency preparedness plan that is communicated to students, staff, parents and workers. The ministry would have to literally check on its existence.

8. It is recommended that fire fighting training, First Aid and general safety courses be made part of the school curriculum and be compulsory for all students.

9. It is recommended that frequent workshops, in –service and refreshes courses on school safety be availed to school principals

5.5 Suggestions for further Research

The following suggestions for further research, arising from the findings and conclusions of the study need to be looked into:

1. A specific study should be undertaken focusing on those schools that have had major disasters in each province. Such a study would shed light on the specific causes of such disasters and a comparative study on the same would help reveal whether the causes are similar. In addition the study would help reveal the strategies that are best suited to curb this menace that is killing our children.

2. There is need for an extensive study to compare disasters in public and private schools to help understand why there aren't many such cases in private schools.

3. This study needs to be replicated in one of the provinces, like Eastern Province, that has had several of these disasters.

4. There is need for action research especially in rural schools by the key stakeholders in Education, on the topic of vulnerability of Kenyan schools to disaster, so as to implement some of the recommendations the study generates.

BIBLIOGRAPHY

1 Babbie E. (1995) The Practice of Social Research, Wordsworth Publishing Company, New York.

2 Benthal J. (1993) Disasters, relief and the Media. London: Taurus.

3 Bower B. (1988) Chaotic Connections in Science News.

4 Calhoun G, Light D and Keller S (1989) Sociology, 6th Edition, Mc Graw Hill, Inc.

5 Carriveau Raymond (1999) The Australian Journal of Emergency Management, Vol 13 No. 4, Emergency Management Australia.

6 Davis, L. and Wall, M. (1979) Christian Perspectives on Disaster Management: Tear Fund

7 .Disasters Magazine, Volume 2 February 2004.

8 .Disasters Magazine, Volume 5 May 2004.

9 .Disasters Magazine, Volume 9, September 2004.

10 James Derek (1986) Fire Prevention Handbook, Butterworths, London.

11 FEMA: Multi-hazard safety program for schools.

12 FIREHOUSE Magazine, September 1998.

13 Forman, S. and Rita, P. 1997, Resources for Humanitarian Assistance, A Paper presented at the pocanticol conference centre in New York.

14 Gelles J. Richard J. and Levine Ann (1995) Sociology. An Introduction, 5th Edition McGraw Hill, Inc.

15 Giddens, A (1991) The Consequencies of Modernity, Polity Press, Cambridge, UK.

16 Giddens, A, (1999) Runaway World: How Globalization is reshaping our lives. London.

17 Hale, Sylvia M (1990) Contraversies in Sociology: A Canadian Introduction Copp Clark Pitman Limited. A Longman Company, Toronto.

18 Haralambos, M and Heald R M (1980) Sociology Themes and Perspectives, 2nd Edition, Bell & Hyman Limited.

19 Healey, R,

20 (1969) Emergency and Disaster Planning, John Wiley & Sons Inc. New York.

21 International Strategy for Disaster Reduction (ISDR) Geneva Mandate adopted at Programme Forum, July 1999.

22 Ken Wesgrate, Disaster Management Centre, Granfield University UK. A Programme for the Execution of a National Disaster Management Programme in Kenya. Government of Kenya Draft, 2000.

23 Long, Cynthia (03.07.2000) Disaster Relief Organisation, Managing Editor.

24 Marshall, C and Rossman G, B (1999) Designing Quantitative Research, 3rd Edition, Sage Publications.

25 Maskery, A(ed)(19993) . Los desastros NO SO Naturales, La Red; Colombia: Terler Mundo.

26 Miles B Matthew and Huberman M A (1994) Qualitative Data Analysis (2nd Edition) Sage Publications, Inc.

27 Mugenda O. and Mugenda, A (1999) Research Methods: Quantitative and Qualitative Approaches, Acts Press, Nairobi.

28 Nigg M. Joanne (1996) Policy Issues for Post Disaster Mitigation, The Need for a Process. USA University of Delaware.

29 Nyaga J. W. (2000) Students' Participation in Decision Making: A Study of Public Secondary Schools Strikes in Nairobi Province

30 Perrin Pierre Dr. Handbook on War and Public Health, International Committee of the Red Cross, Geneva.

31 Raphael, Beverly (1986) When Disaster Strikes How Individual and Communities Cope with Catastrophe. Basic Books, Inc. Publishers, New York

32 Ritzer, G (1992) Sociological Theory, 3rd Edition, McGraw Hill, New York.

33 Singleton, J et al (1998) Approaches to Social Research, Oxford Univerity Press.

34 The Australian Journal of Emergency Management. Vol 13 NO. 4, 1999.

35 The Nairobi Bomb Blast Report, 1998

36 Turner B A (1978) Man-Made Disasters Wykham Publications (London) Ltd.

37 WHO, Health action in crises: Draught, technical Hazard sheet and Natural Disaster Profiles, Geneva, 2000.

38 WHO, Community Emergency Preparedness: A Manual for managers and Policy Makers, World Health Organisation, Geneva, 1999

39 WHO, Emergency Health Training Programme Trainers Guide, Pan African Emergency Training Centre, Addis Ababa, July 1998.

40 WHO, (1998) Vulnerabilities and Emergency Health Priorities in Africa.

41 WHO/PTC (1996) Risk Assessment, Vulnerability and Hazard Analysis.

42 Who,(1981) Global Strategy for Health for all by the year 2000.

43 Newspaper articles;

Daily Nation, 5 May 2003.
Daily Nation, 27 April 2002
Daily Nation, 9 April 2001
Daily Nation, 14 August 2001.
Daily Nation, 24 December 2001.
Daily Nation, 10 June 2000
Daily Nation, 20 April 1999.
The People, 27 March 2001.
Standard, 15 June 2002.

QUESTIONNAIRE

BACKGROUND INFORMATION

1. Please indicate the position you hold in the school

   a. Principal/Head Teacher ☐

   b. Teacher ☐

   c. Student ☐

   d. Other ☐ Please specify _____

2. Indicate your sex

   a. Male ☐ b. Female ☐

3. For how long have you been in the current station?

   a. Less than one year ☐

   b. 1 - 2 years ☐

   c. 2 - 4 years ☐

   d. More than 4 years ☐

4. What is the category of your school?

   a. Boys Day ☐ Girls Day ☐

   b. Boys Boarding ☐ Girls Boarding ☐

c. Mixed Day ☐ Mixed Boarding ☐

5. . If a mixed school, what is the number of

a. Girls ☐ b. Boys ☐

6. Indicate the total number of:

a. Students ☐ b. Streams per form ☐

7. Where is your school located in Nairobi?

i. East Lands ☐

ii. West Lands ☐

iii. South Lands ☐

iv. North Lands ☐

v. Others ☐ Please specify _____

8. Indicate the total numbers of the physical facilities listed below that are available in your school. (i.e. classrooms [12] etc)

a. Class rooms ☐

b. Dormitories ☐

c. Laboratories ☐

d. Dining Hall ☐

e. Kitchen(s) ☐

f. Lecture Theatre(s) ☐

g. Workshop(s) ☐

h. Music labs ☐

i. Fine Art Room(s) ☐

j. Home Science Rooms ☐

k. Other(s) ☐ Specify

i. _____

ii. _____

PART ONE

9. What water provisions/facilities are available in your institution?

a. No Water at all ☐

b. Bore Hole Water ☐

c. Piped City Council Water ☐

d. Treated Water ☐

e. Not Treated Water ☐

f. Fire Water ☐

g. Others ☐ please specify _____

10. What lighting facilities are available in your institution?

a. Kenya Power Provided ☐
b. Generator Provided ☐
c. Both Kenya Power/Generator ☐
d. None ☐
e. Others ☐ please specify _____

11. What kind of alarm system is available in the school?

a. None ☐
b. Security firm provided ☐
c. Electric Bell ☐
d. Manual Bell ☐
e. Fire alarm ☐
f. Fire detectors ☐
g. Others ☐

12. Tick the facilities that are available in the places listed below:

a. <u>Dormitories</u>

i. First Aid Kit ☐
ii. Fire Extinguishers ☐
iii. Alarm/Warning Systems ☐
iv. None at all ☐
v. Others ☐ please specify _____

b. Laboratories

i. First Aid Kit ☐

ii. Fire Extinguishers ☐

iii. Alarm/Warning Systems ☐

iv. None at all ☐

v. Others ☐ please specify _____

c. Kitchen/Dinning Hall

i. First Aid Kit ☐

ii. Fire Extinguishers ☐

iii. Alarm/Warning Systems ☐

iv. None at all ☐

v. Others ☐ please specify _____

d. **Class Rooms**

i. First Aid Kit ☐

ii. Fire Extinguishers ☐

iii. Alarm/Warning Systems ☐

iv. None at all ☐

v. Others ☐ please specify _____

PART TWO

13. What type of perimeter fence is around the school compound?

    a. Stone Wall ☐
    b. Cider/Bougainvillea etc ☐
    c. Bamboo Fence ☐
    d. Barbed wire/Chain link ☐
    e. None ☐
    f. Other ☐ Please specify _____

14. Indicate whether the facilities listed below are available at the school's main entrance.

    a. Gate ☐ No Gate ☐ Type of the Gate: 1.Wooden ☐
    2. Metal ☐
    3. Others ☐
    b. Lighting System ☐
    c. Alarm Extension ☐
    d. Telephone ☐
    e. Other Communication Equipment ☐
    f. 24 hour Manning ☐ Day Manning Only ☐ Night Manning Only ☐
    g. Visitors Vehicle Search ☐ No Vehicle Search ☐
    h. Others ☐ Please Specify _____

15. How many security personnel are employed during the:

    a. Day ☐

b. Night ☐

16. Who is in charge of the security in the school?

a. Watch Men ☐

b. A security Officer ☐

c. A security Firm ☐

d. None ☐

e. Others ☐ please specify _____

17. What relevant security training does your security personnel have?

(a) Ex-policemen ☐

(b) Ex-army/military ☐

(c) From a security firm ☐

(d) None ☐

(e) Other ☐

18. Incase of an emergency at night, who is contacted first by the security personnel?

(f) The police ☐

(g) The head teacher ☐

(h) The head teacher and the local police ☐

(i) Teacher on duty ☐

(j) The students ☐

(k) PTA chairman ☐

(l) Other ☐ Please specify _____

19. Are telephone facilities available to the person(s) listed below in the event of need at night?

(a) Teacher on duty ☐

(b) Watch men ☐

(c) Prefects ☐

(d) None at all ☐

20. Approximately how old is the oldest building in the school compound?

(a) 1-10 years ☐

(b) 10-20 years ☐

(c) 20-30 years ☐

(d) 30- 40 years ☐

(e) 40-50 years ☐

(f) Over 50 years ☐

21. When was the last check on physical facilities by the Ministry of works?

a. Less than five years ago ☐

b. Between five and ten years ago ☐

c. Over ten years ago ☐

d. None at all ☐

(ii)If none at all, why

_____

_____

(iii)If yes, how frequent are the checks

_____

_____

22. Indicate what the school uses for cooking

(a) Fire wood ☐

(b) Electricity ☐

(c) Gas ☐

(d) Charcoal ☐

(e) Fire wood ☐

(f) Other(s) ☐

(g) No Cooking is dones ☐

23. Has your gas system failed in the last one year?

(a) Yes ☐

(b) No ☐

24. In the last five years, how often has the gas system been checked?

(a) Once ☐

(b) Twice ☐

(c) Thrice ☐

(d) Not at all

25. Has your electric wiring broken down in the last one year?

(a) Yes ☐

(b) No ☐

26. In the last five years, how often has wiring check ups been done?

(a) Once ☐

(b) Twice ☐

(c) Thrice ☐

☐

(d) Not at all

PART FOUR

27. Has the school ever experienced any hazardous event?

(a) Yes ☐

(b) No. ☐

28. If yes, indicate which one(s) have been experienced.

(c) Fire ☐

(d) Flood ☐

(e) Mud/land slide ☐

(f) Collapse of building ☐

(g) Food poisoning ☐

(h) Roof blown by wind ☐

(i) Bomb attack ☐

(j) Shootings ☐

(k) Robbery ☐

(l) Other ☐

29. Was any one injured?

(a) Yes ☐

(b) No ☐

30. If yes, how many?

(a) One ☐

(b) Between 2-5 ☐

(c) Between 5-10 ☐

(d) Over 10 ☐

31. How many deaths?

(a) One ☐

(b) Between 2- 5 ☐

(c) Over 5 ☐

32. Was there any loss of property

(a) Yes ☐

(b) No ☐

33. Which of the items listed below does the school check for from the students in the dormitories/classrooms etc?

(a) Match boxes/cigarette lighters ☐

(b) Alcohol/Drugs ☐

(c) Potable gas/electric cookers ☐

(d) Toasters ☐

(e) Guns ☐

(f) Others ☐

34. How frequent are the above searches?

(a) Once a term ☐

(b) Between 2-5 times a term ☐

(c) Over 5 times a term ☐

(d) None at all ☐

35. Does the matron or teacher in charge of a house/dormitory live within the dormitory with students?

(a) Yes ☐

(b) No ☐

36. Have you had any talk/ lecture or any educational programmes on disaster in schools?

(a) Yes ☐

(b) No ☐

(ii). If yes, how often

a). Once a year ☐

b). Twice a year ☐

c). Others ☐

37. How many demonstrations on the use of fire extinguishers have been held in the last two years in the school?

a. None ☐

b. One ☐

c. Between 2-3 ☐

d. Over 4 ☐

(ii) If so, which group below took part in the demonstration?

a. Students ☐

b. Teachers ☐

c. Supportive staff ☐

d. All the above ☐

38. How many fire drills have been conducted in the school in the last two years?

a. None ☐

b. One ☐

c. Between 2 to 3 ☐

d. Over 4 ☐

(ii) If so, which group below took part in the drills?

a. Students ☐

b. Teachers ☐

c. Supportive staff ☐

d. All the above ☐

39. Is there a disaster/ emergency preparedness plan in the school?

(a) Yes ☐

(b) No ☐

(ii) If yes, why

_____

_____

(iii) If no, why

_____

_____

_____

_____

_____

40. Please identify any clubs I your school with skills to respond to emergencies

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____