

## **Student Working Paper No.1**

# Vulnerability of Urban Primary and Secondary Schools to Fire Hazards: A Qualitative Study in Ibadan, Nigeria

Oduduabasi Ebong Inyang

April 2018



## LIST OF ABBREVIATIONS

- BCP BUSINESS CONTINUITY PLAN
- FME FEDERAL MINISTRY OF EDUCATION
- ICRC INTERNATIONAL COMMITTEE OF THE RED CROSS
- IDI IN-DEPTH INTERVIEW GUIDE
- JCCE JOINT COMMISSION COMMITTEE ON EDUCATION
- NCE NATIONAL COUNCIL OF EDUCATION
- NGO NON-GOVERNMENTAL ORGANIZATION
- NPES NATIONAL PRIMARY EDUCATION COMMISSION
- RVAM RISK AND VULNERABILITY ASSESSMENT MATRIX
- UBE UNIVERSAL BASIC EDUCATION
- UNESCO UNITED NATION EDUCATIONAL SCIENTIFIC AND CULTURAL ORGANIZATION
- UNISDR UNITED NATION INTERNATIONAL STRATEGY FOR DISASTER RISK REDUCTION
- URBAN ARK URBAN AFRICA: RISK KNOWLEDGE

Table of Contents

1.0	ABSTRACT	5
1.1	INTRODUCTION	7
1.2	OBJECTIVES OF THE STUDY	9
2.0	LITERATURE REVIEW	.10
2.1	PRIMARY /SECONDARY EDUCATION SYSTEM IN IBADAN	.10
2.2	INTERNATIONAL AGENDA ON SAFER SCHOOLS	.11
2 P	2.1 THE UNISDR WORLDWIDE INITIATIVE FOR SAFE SCHOOLS ROGRAM (WISS)	.11
2	2.2 ROCKEFELLER 100 RESILIENT CITIES	.13
2.3	SCHOOL STRUCTURE IN IBADAN	.13
2.4	PRIMARY AND SECONDARY SCHOOL OWNERSHIP AND MANAGEMEN	Г
2.5	GOVERNMENT OWNED SCHOOLS	.15
2.6	PRIVATELY OWNED SCHOOLS	.16
2.7	INFORMAL SCHOOLS MANAGEMENT IN IBADAN	.17
2.8	SCHOOL FIRE HAZARD VULNERABILITY FACTORS	.17
2.9	FREQUENCY AND IMPACTS OF SCHOOL FIRES	. 18
2.10	EMPIRICAL REVIEW OF SCHOOLS VULNERABILITY TO FIRE HAZARDS	. 19
3.0	METHODOLOGY	.20
3.1	STUDY AREA	.21
3.2	CLIMATE OF IBADAN	.22
4.0	RESULTS AND DISCUSSION	.23
4.1	TYPE OF FIRE DISCUSSED WITH RESPONDENTS	.23
4.2 SCł	DIRECT VULNERABILITY FACTORS TO FIRE HAZARDS IN IBADAN OOLS	.24
4	2.1 BULDING MATERIALS	.24
4	2.2 BUIDING DESIGN AND ENVIRONMENT	.27
4.3	GENERAL PREPAREDNESS MEASURES	.42
4.4	RECOVERY FACTORS	.47
4.5 ON	CHALLENGES FACED BY ADMINISTRATORS AND HEADS OF SCHOOLS	} .50

5.0	CONCLUSION AND RECOMMENDATIONS	51
5.1 ADN	RECOMMENDATIONS TO THE SCHOOLS MANAGERS AND MINISTRATORS	52
5.2	TO THE GOVERNMENT AND REGULATORY AGENCIES	53
6.0	LESSONS LEARNED	53
7.0	REFERENCES	54
8.0	BIBLIOGRAPHY	57
9.0	APPENDIX	59

## LIST OF TABLES

TABLE 4.1.DIRECT VULNERABILITY FACTORS	41
TABLE 4.2. FIRE HAZARD PREPAREDNESS MEASURES	47
TABLE 4.4. RECOVERY/RISK SHARING MEASURES	50

## LIST OF FIGURES

FIGURE 4-1: PICTURE SHOWING SCHOOL BARRED WINDOWS	27
FIGURE 4-2:PICTURE SHOWING CLASSES WITH IRON PROTECTORS	27
FIGURE 4-3: PICTURE SHOWING OLD STRUCTURE	29
Figure 4-4 Picture showing multiple storey school building	30
FIGURE 4-6: ELECTRICAL WIRING ON THE WALL AND ROOF	32
FIGURE 4-7: POOR ACCESS ROAD TO ONE OF THE PUBLIC SCHOOLS	34
FIGURE 4-8: SCHOOL BUILDING DIRECTLY UNDER HIGH TENSION CABLE	35
FIGURE 4-9: A PRIVATE SCHOOL LOCATED DIRECTLY OPPOSITE A FILLING	
STATION	36
FIGURE 4-10. A PRIVATE SCHOOL WITH FIRE EXTINGUISHER	44
FIGURE 4-11. CHALLENGES TO SCHOOL FIRE SAFETY	51

#### 1.0 ABSTRACT

In recent years, lives and property worth millions of dollars have been destroyed in fire disasters in secondary schools around the world. Cases of fire disasters in Nigerian secondary schools have been experienced in the last decade with increasing frequency and severity. It is therefore necessary to assess the level of vulnerability to fire hazards among urban schools (primary and secondary) in Ibadan, Nigeria. The objectives of this study are to identify direct vulnerability factors to fire hazards in selected schools in Ibidan, determine preparedness levels against fire hazards, compare fire hazard vulnerability levels between public and private schools in the study area, determine risk recovery strategies, and examine the likely challenges of ensuring fire safety among school managers and administrators.

Qualitative methods of data collection were adopted for this study. In-depth Interview (IDI) guides and observation checklists were used as the major instruments for eliciting data from respondents. A total of 8 schools were selected for the study; 4 public schools and 4 private schools. In each of these schools, 2 respondents were engaged in IDIs. These respondents were chosen to reflect school managers including, where available, proprietors and principals in secondary schools and head teachers in primary schools, as well as class teachers and non-teaching staff. 16 respondents were interviewed in total. It is important to note that this is not a representative sample, therefore results cannot be generalised. It is an indicative study where the results highlight important issues for consideration in policy formulation by concerned authorities, or a pointer for further systematic study.

Findings were discussed in three major headings including direct vulnerability factors, preparedness factors and recovery measures. Based on the findings, it was concluded that public schools in the study area were more vulnerable to fire hazard compared to private schools. The immediate implication is that fire

5

incidents in these schools would most likely account for high casuality figures in terms of lives and property. It is important to state that although private schools are less vulnerable to fire hazards compared to public schools, fire incidents in private schools can still have major adverse impact on lives and property. The findings of the study have the potential to create awareness among schools on fire hazards and empower them to reduce their vulnerability to fire hazards. Secondary education policy makers can also use the findings to inform policy formulation.

#### ACKNOWLEDGEMENTS

This report was produced under the Urban ARK Elijah Agevi Fellowship. Mr Inyang's research was supervised by Dr Ezebunwa Nwokocha from the University of Ibadan, Nigeria. The report was edited by Talar Bogosyan from King's College London.

#### 1.1 INTRODUCTION

The threat of fire hazards in primary and secondary schools in developing countries is of increasing concern. The occurrence of fire hazards could be a result of multiple inter-related factors including a poor and/or inadequate safety culture. It is therefore important to increase the awareness and understanding of people's vulnerability to fire hazards to enable them to better manage such threats if and when they occur in order to reduce loss of lives and property.

Vulnerability, a key factor in this study, can be seen as a situation where communities are affected by impacts of hazard or exposed to the possibility of being affected or harmed (Bankoff et al, 2004). Fire hazard is often cited among the most common devastating disasters (Mohammed Shaluf, 2007). This brings to the fore how important adequate school fire safety mechanisms are to ensure the safety of lives of primary and secondary school students as well as to guarantee a safe environment for learning. Studies have indicated an increase in the wave of fire incidents in schools in Ibidan, Nigeria in recent times (Akali et al, 2009; Artim, 1999; Gitonga, 2010; Mangoa, 2012)

Large scale fires, for example those that burndown large parts of or entire school buildings, present the most severe threat and draw the immediate attention of stakeholders. These incidents cause the greatest loss of life and property in a single event. For example, in the Omitowoju area in Ibadan, the capital of Oyo State, officials of the National Emergency Management Agency (NEMA) stated that 70 buildings including shops and four schools were gutted by fire and goods worth N500 million destroyed when the spilled contents of a fallen petrol tanker caught fire. Similarly, it was reported by Premium Time newspaper that a fire ravaged the Sanyo missionary school also in Ibadan city.

Other cities around Nigeria have also experienced forms of school fire incident. According to NEMA officials, in 2015 there were 12 fire incidents in Lagos involving schools. In one incident, a block of two female hostels at the Federal Government College, Keffi, Nasarawa State was burned down. The fire, which started at around 7:45p.m., reduced the entire structure to ashes. It was reported by News Breakers (2017) that students were in the dining hall when the fire started destroying books and other valuable properties. In another incident, fires caused by petrol explosions and vehicles carrying industrial chemicals affected multiple schools in Umuahia, Abia State, including the destruction of a missionary school. Additionally, the hostel block of Chude Girls Model Secondary School, Sapele, Delta State, was destroyed by a fire in the middle of the night. Though, in this incident there were no fatalities, the students did suffer from a loss of property (Eze, 2017). In Kano State, fire gutted four student hostels at the Government Secondary School, Gwarzo, on January, 2015 (Ilorin, 2016).

The impacts of smaller fire incidents, for example those that might happen in a corner of a classroom or in the roof, are also important to recognise. Incidents like these could make a classroom unusable for some time thereby adversely impacting on the education students receive. Smaller scale fires also cause loss of property and may have the greatest cumulative impact due to their higher frequency.

Interventions to curb fires have brought to light the living conditions of students and the inadequacy or disregard of government policies in school operations. In 1998, 26 girls perished in a secondary school in Lagos when their dormitory caught fire. A report from the International Committee of the Red Cross revealed malpractices including dormitory overcrowding, doors that were too narrow and locked from the outside, and windows that were barred. Notably, the report also revealed that there were no fire extuingishers on the premises. (Mangoa, 2012)

8

Increasing frequency of fire disasters in educational institutions continues to account for loss of lives, destruction of property and the needless disruption of education programs. As such, fire hazards in schools have become a major public issue. Whilst schools are facing other problems like strikes and indiscipline, these rarely result in deaths as can happen in fire disasters (Mangoa, 2012). According to Artim (1999), the most worrying aspect is that society has adopted a reactive rather than proactive approach to the problem of fire hazard in schools. Most times, preventive measures are not put in place, instead funds are mobilized for the reconstruction of destroyed facilities. Little psychosocial support, if any, is offered to those affected after major fire disasters. This presents a clear justification for the focus on school fire risks and the need, not only to enhance risk response, but also to move towards a preparedness and prevention approach.

#### 1.2 OBJECTIVES OF THE STUDY

In line with the Urban ARK project goal in Ibadan, which focuses on vulnerability assessment to multiple risk factors, the following specific objectives were examined, to:

- i) Identify direct vulnerability factors to fire hazards in selected schools
- ii) Determine school level of preparedness against fire hazards
- iii) Compare fire hazard vulnerability level between public and private schools in the study area.
- iv) Determine risk recovery capacity of the schools and
- v) Examine the likely challenges of ensuring fire safety among school managers and administrators

#### 2.0 LITERATURE REVIEW

#### 2.1 PRIMARY /SECONDARY EDUCATION SYSTEM IN IBADAN

Ibadan, as in all cities in Nigeria, operates Universal Basic Education (UBE), popularly known as the 9-3-4, system. As observed by Omovo (2006), this system of education came into being in 2006 following the abolition of the 6-3-3-4 system. The new UBE system of education has nine years of basic and compulsory education up to the JSSIII level, three years in senior-secondary school, and four years in tertiary institutions. It was designed to combat the over-crowded nature of subjects offered at the basic education level. At its 52<sup>nd</sup> meeting in Ibadan, the NCE has approved the new 9-year basic education curriculum (Omovo 2006) developed by the National Educational Research and Development Council (NERDC). In this system, the role of government is to provide support in terms of infrastructure, provision of instructional materials and ensuring that competent teachers and caregivers are engaged in the management of the school (Federal Republic of Nigeria, 2004).

There are three components of the UBE system as documented by the Federal Ministry of Education, These are: (a) formal basic education encompassing the first nine years of schooling (primary and junior-secondary education) for all children; (b) nomadic education for school age children, pastoral nomads and migrant fishermen; and (c) literacy and non-formal education for out-of-school-children, youth and adults. In the UBE system, primary education for children between ages of 6 to 11 years provides the foundation upon which further education is built. It therefore determines the success or failure of the whole system (Abdul 2002).

10

UNESCO added that education is the most efficient way through which a society can face the challenges of tomorrow (Delors, 1996). Therefore efforts have been geared up in Nigeria towards achieving universal access to basic education. This is done through the effective promotion of the nine-year compulsory primary and junior-secondary education, improving literacy and adult education, emphasising education in the sciences and providing vocational training.

#### 2.2 INTERNATIONAL AGENDA ON SAFER SCHOOLS

Whilst Nigeria is one of the 21 countries designated as a "Safe School Leader" to implement school safety on the ground (UNISDR, n.d), the Nigerian education system does not have specific policies on schools safety. At this stage, it is important to consider the international agenda on safer schools including the United Nation Office for Disaster Risk Reduction (UNISDR), Worldwide Initiative for Safe School (WISS) program and the Rockefeller 100 resilient cities.

## 2.2.1 THE UNISDR WORLDWIDE INITIATIVE FOR SAFE SCHOOLS PROGRAM (WISS)

The WISS was facilitated by UNISDR and the Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector (GAD3RES) to promote coherent and coordinated action on school safety globally. This is a global umbrella partnership programme for school safety implementation that encompasses key safe school initiatives. It supports resilient educational facilities, school disaster management and disaster risk reduction and resilience education. The WISS was endorsed by GAD3RES members and resulted in the political commitment of 21 "Safe School Leader" countries to implement school safety on the ground. The 21 Safe School Leader countries committed to supporting the implementation of WISS are:Algeria, Brazil, Costa Rica, Croatia, Ecuador, Finland, Honduras, Indonesia, Iran, Italy, Kyrgyzstan, Lao PDR, Lebanon, Mexico, Mongolia, Nepal, Nigeria, Philippines, Saint Vincent and Grenadines, Tunisia, Turkey. (UNISDR, n.d.).

WISS is a government-led global partnership for advancing safe school initiatives at the national level. WISS is coordinated by UNISDR and was developed in collaboration with key partners from GAD3RES as a response to the High Level Dialogue Communiqué at the 2013 Global Platform for Disaster Risk Reduction. WISS focuses on motivating and supporting Governments to develop national strategies and implement school safety. The initiative builds on the Comprehensive School Safety Framework and defines a safe school as a school combining all of the following elements:

- Safe Learning Facilities (disaster-resilient infrastructure);
- School Disaster Management; and
- Disaster Risk Reduction and Resilience Education.

WISS also promotes good practices and achievements in safe school implementation in other countries and regions, helps identify challenges and offers technical assistance and particular expertise around the three pillars to support interested governments in implementing school safety at the national level.

The main objectives of the WISS programme are:

- To promote good government practices, expertise and achievements in safe school implementation for possible replication in other countries and regions;
- To identify remaining challenges to effectively implement safer schools;
- To support governments in developing national strategies for school safety as part of existing national disaster risk reduction or education plans; and

• To offer technical assistance and particular expertise, as required by Governments, around the three pillars of safe schools. (UNISDR, n.d.).

#### 2.2.2 ROCKEFELLER 100 RESILIENT CITIES

The 100 Resilient Cities pioneered by the Rockefeller Foundation (100RC) is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. 100RC supports the adoption and incorporation of a view of resilience that includes the shocks—earthquakes, fires, floods, etc.—and stresses that weaken the fabric of a city on a day to day or cyclical basis. By addressing both the shocks and the stresses, it is believed that a city can become better able to respond to adverse events and to deliver basic functions in both good times and bad. (100 Resilient Cities, 2018)

The development of these programmes indicate that the international community is committed to making sure students learn in a safe environment. Therefore, fire hazards in schools should be given adequate attention in terms of assessment of vulnerability and risk exposure, especially in the African context where smaller local risks (like fire) are the biggest overall challenge to development gains. This research will help to raise awareness about fire risk in school and city plans and contribute to the achievement of the international agendas described above.

#### 2.3 SCHOOL STRUCTURE IN IBADAN

The Nigerian school structure consists of primary and secondary education

Primary school structure in Ibadan includes pre-primary and primary education. Pre-primary education is for children between the ages of 3 and 5 years or above, it lasts two to three years and attendance is not compulsory. Primary education lasts six years and caters to children aged 6-11. Secondary education is divided into two three-year cycles: junior-secondary, culminating in the Junior School Certificate examination; and senior-secondary, leading to the Senior School Certificate examination. The 6-year primary level and 3-year junior-secondary level make up the 9 years of compulsory education in the UBE system, the remaining school years are optional. The school year extends over ten months, divided into three terms of ten to twelve weeks each. In technical schools, the school year lasts nine months (Federal Republic of Nigeria, 2004).

Whilst primary and junior-secondary education is supposed to be compulsory, casual observations from many of the states in Nigeria, including Ibadan, show that many students of this age are still not getting the required compulsory education they need. Many of them can be seen on the street, sometimes selling one commodity or the other during schools hours. Though exploring the reasons for this would be beneficial, it is beyond the scope of this research project.

## 2.4 PRIMARY AND SECONDARY SCHOOL OWNERSHIP AND MANAGEMENT

The ownership and management of primary and secondary education in Nigeria, vis-à-vis Ibadan, is dictated by the country's political structure based on federalism. As a result, the administrative mechanism devolves some power to state and local governments. A 1993 law which resuscitated the National Primary Education Commission (NPEC, now the Universal Basic Education Commission) portrays responsibility for the management of primary education as shared among the federal government, state government, local government, community committees and school committees (Uwaifo and Uddin, 2009). This reiterates that measures have been introduced in the past few years that encourage the active participation of local communities in the running of schools.

They further stressed that the basic policy of education with regards to structure, curriculum and school year is centrally determined. Other areas of educational delivery are modified to suit local requirements.

Uwaifo and Uddin (2009) observed the duties of anagement as follows: The Federal Ministry of Educationis charged with the responsibility of harmonizing educational policies and procedures of all the states of the Federation through the NCE. The NCE is the highest policy-making body for education in the country and consists of the Federal Minister of Education and all the state commissioners for education. It is assisted by the Joint Consultative Committee (JCC) on Education, which is composed of all the federal and state directors of education, chief executives of education parastatals and directors of university institutes of education. The committee is headed by the Director of the Federal Ministry of Education and it advises the NCE on a wide variety of educational matters.

Ownership of schools in Ibadan can broadly be categorized into two major groups; government owned and privately owned.

#### 2.5 GOVERNMENT OWNED SCHOOLS

The Federal Ministry of Education owns and funds a number of secondary schools which are evenly located in each state in the country including Ibadan. Other secondary schools are owned and funded by state governments, communities and private organizations. Kusamotu (2007) observed that state governments own a large proportion of secondary schools in the country. With regard to state secondary schools, administration and management fall within the purview of the Ministries of Education and their proprietors, but they have to comply with minimum standards which are prescribed by state laws. The administration of public primary schools is the responsibility of local education authorities, while pre-primary

schools are essentially maintained and administered by their proprietors. Federal and state governments maintain quality control through inspections of schools.

There are networks of non-governmental organizations (NGOs) who collaborate with the federal and state ministries of education in the management of the non-formal education system. They operate private primary schools and offer literacy and other educational programmes. Women's education centres have been established in most of the states that are involved in mobilization and advocacy for the education of women and girls (Kusamotu, 2007). At the time of writing, there are 2,004 public primary and nursery schools and 969 public secondary schools in Ibadan (Wikipedia, n.d.).

#### 2.6 PRIVATELY OWNED SCHOOLS

Private education in Nigeria is the responsibility of entrepreneurs, agencies or groups such as religious bodies, communities, universities and corporate bodies. There are also schools which are run by foreign communities (Fafunwa, 1982)

The majority of private secondary institutions offer the junior and senior secondary programme. Decree No. 16, 1985 of the Federal Republic of Nigeria prescribes minimum conditions for the establishment of institutions at primary and secondary levels. The monitoring and supervision of private primary and secondary schools is secured by the federal and state ministries of education.

The structure and content of private primary and secondary education comply with the requirements of the National Policy on Education. Private schools use curricula which are designed by the federal government for the national system, with modifications to meet special needs and interests (Fafunwa, 1982).

At the time of writing this work, there are 971 private nursery and primary schools and 57 private secondary schools in Ibadan (Wikipedia, n.d.).

#### 2.7 INFORMAL SCHOOLS MANAGEMENT IN IBADAN

Apart from the registered or formal public and private schools system discussed above, there is also the informal school system which is mostly located in slum areas scattered around Ibadan. These are not serviced by government and are not registered at all. These informal schools provide education to the poorest within society, many are very small in size and have few students, some may be sharing a living room of a residential house. These schools are situated in crowded locations where emergency services could be difficult to access. Also, government regulatory agencies may find it difficult to access the majority of these schools for operational checks which gives them the freedom to operate below expected standards with regards to fire safety. In this regard, these schools may have the most vulnerability to fire. Although this study did not obtain direct data on informal schools, newspapers have reported incidents of fire in this type of school before. According to the Nation newspaper of 20th June, 2010, an informal secondary school in the Ajegunle area of Lagos, a popular slum area, caught fire destroying the school and many other buildings that were in close proximity to it. Though there were no fatalities, properties of an unquantifiable amount were destroyed by the fire incident.

#### 2.8 SCHOOL FIRE HAZARD VULNERABILITY FACTORS

The factors that expose schools to fire incident are varied. According to United State Fire Association (USFA, 2007), hotels, boarding houses and boarding schools are susceptible to higher incidences of fire because of carelessness, smoking, candles, and simple ordinary home life activities that are not appropriate for a boarding or hotel type atmosphere. Electric appliances such as toaster ovens or electric plates, incorrectly discarding flammable materials such as cigarettes,

and storing towels and sheets where cleaning supplies are kept are just a few of the causes of fires in secondary and primary schools.

The Kenya Red Cross Society and the Government of Kenya (GOK, 2008) observed that secondary schools are susceptible to high incidents of fire because of carelessness, faulty electrical installation and even arson. Other factors that make schools vulnerable to fire disasters include; lack of specialized training such as fire drills, lack of appropriate fire fighting equipment, lack of adequate resources and lack of systematic disaster mitigation and response mechanisms among others (GOK, 2008).

The USFA (2007) argue that adequate fire drills are the largest contributing factor to safety of students in schools. The report finds that most school fires result from faulty electrical installations which could be blamed on failure to use qualified Electrical Engineers, lack of inspection from the Ministry of Education and failure on the part of school management to take inspection recommendations seriously.

#### 2.9 FREQUENCY AND IMPACTS OF SCHOOL FIRES

A lack of preparedness measures in schools in developing countries have led to fire disasters becoming an increasingly frequent phenomenon in the school environment. In contrast, the availability of preparedness measures in most schools in developed countries has tremendously reduced the impact of fire incidences (USFA, 2007). Physical, financial and emotional devastation caused by closure of schools, damage of school property, death, injuries and trauma are some of the common impacts of school fires (Blackaby, 2007). In Nigeria, the proliferation of examples of school fires, as mentioned above, illustrate that fire hazards in schools is a cause of concern.

## 2.10 EMPIRICAL REVIEW OF SCHOOLS VULNERABILITY TO FIRE HAZARDS

Studies carried out in Siaya district of Kenya by Muzungu (2008) and Kukali and Kabuka (2009) on fire disaster preparedness and Risk factors in boarding schools indicate that fires in 40 boarding schools in 2008 were caused by faulty electrical installations, misuse of electrical appliances and arson. These studies reported that when students riot, they have been known to set their institutions ablaze. This has been a cause of fire disasters in secondary schools around the world. In Africa, students' activism began being witnessed in the1960s. Most of the students' riots were centered on political issues, particularly nationalism and the struggle for independence. In Kenya, students' riots have been on the increase. In 2001, 240 cases of strikes were recorded, the number of incidents increased to 360 in 2008. In these cases young people were burning, vandalising and destroying property of their own institutions (Mwenda,2008).

There are also indirect factors that can increase vulnerability to fire disasters in primary and secondary schools that facilitate risk but do not directly cause fires. According to Kukali and Kabuka (2009), they include complexities in policy formulation and implementation hiccups. For example, the lack of a national fire policy could have significantly contributed to poor fire safety planning in institutions. Tavares (2008) reported that the absence of fire fighting equipment and emergency exits contributed to the high death toll during the Kyanguli Secondary School fire in Kenya where sixty-eight boys lost their lives. Accordingly, destructive fires can occur either accidentally or deliberately but nevertheless are preventable if negligence is minimized and regulatory and institutional weaknesses addressed.

Furthermore, lack of knowledge and awareness of the risk factors faced by institutions reduces the level of fire disaster preparedness, thereby increasing the level of vulnerability. Omuterema (2009) argues that ignorance and a lack of

19

appropriate training for staff on fire safety and response is a major contributor to vulnerability. Ignorance about the scale of the negative impact of fire disaster also contributes to a negligent or casual approach to fire disaster in primary and secondary schools.

It is clear from the literature above that vulnerability of schools to fire hazards are a result of many contributory factors. These include direct vulnerability factors such as poor electrical wiring and fire prone building materials like wood and nylon. Poor fire safety preparedness including fire drills, inadequate or lack of fire fighting equipment and evacuation plans and procedures. As well as human actions such as arson, strikes and protests, accidents, student riots and poor policies on fire safety from appropriate authorities.

#### 3.0 METHODOLOGY

A qualitative method of data collection was adopted for this study. An IDI Guide and observation checklist were used as the major instruments for eliciting data from respondents. A total of 8 schools were selected for the study, 4 public schools and 4 private schools.

To take into account spatial variations, at least one secondary and one primary school were selected from high income areas and low income areas of the city. These areas included the affluent, low density -high income areas of University of Ibadan, Bodija Estate, Ring Road, IITA, Jericho, Agodi, GRA, and the high density - low income areas of the city including Beere, Oje, Oja Igbo, Aremo, Labo and Mapo.

In each school, 2 respondents were engaged in IDIs. These respondents were chosen to reflect school managers including, where available, proprietors and principals in secondary schools, head teachers in primary schools and class teachers and an administrative staff. Most of these respondents were also parents or guardians, having children in the schools. Also, the directorate of emergency response from the Ibadan Fire Safety department was interviewed to obtain information regarding their services to schools in the city.

In total, 16 respondents were interviewed. It is important to note that this is not a representative sample, therefore results cannot be generalised. It is an indicative study with the results highlighting important issues to be considered by concerned authorities when formulating policy or to be used as a guide for further systematic study.

#### 3.1 STUDY AREA

Ibadan is located in south-western Nigeria in the south-eastern part of Oyo State, about 119 kilometres (74 miles) northeast of Lagos and 120 kilometres (75 miles) east of the Nigerian border with the Republic of Benin. It lies completely within the tropical forest zone but close to the boundary between the forest and the derived savannah. The city ranges in elevation from 150 m in the valley area, to 275 m above sea level on the major north-south ridge which crosses the central part of the city. The city covers a total area of 3,080 square kilometres (1,190 sq mi), making it the largest in Nigeria (Latlong, n.d.). There are four rivers, in the city of Ibadan with many tributaries: Ona River in the North and West; Ogbere River towards the East; Ogunpa River flowing through the city and Kudeti River in the Central part of the metropolis. Ogunpa River is a third-order stream with a channel length of 12.76 km and a catchment area of 54.92 km<sup>2</sup>. Lake Eleyele is located at the north-western part of the city, while the Osun River and the Asejire Lakeborder the city to the east. Ibadan lies between latitude 7.401962, and longitude 3.917313. Placed categorically with the GPS coordinates of 7° 24' 7.0632" N and 3° 55' 2.3268" E (Latlong, n.d.)

The map below shows the local government areas of Oyo state and Ibadan north and south, the study area is shown in blue at the bottom center of the map near Ido.



(Nigerian Muse, 2010)

## 3.2 CLIMATE OF IBADAN

Ibadan has a tropical wet and dry climate (Köppen climate classification *Aw*), with a lengthy wet season and relatively constant temperatures throughout the course of the year. The wet season runs from March through October, with a lull in precipitation in August that nearly divides the wet season into two. November to February forms the city's dry season, during which Ibadan experiences the typical

West African harmattan. The mean annual total rainfall for Ibadan is 1420.06 mm, which falls in approximately 109 days. There are two rainfall peaks in June and September. The mean maximum temperature is 26.46 C, minimum 21.42 C and the relative humidity is 74.55% (Wiki, n.d. (b)

#### **4.0 RESULTS AND DISCUSSION**

Before discussing the findings of this study, it is important to briefly look at the types of fire that were considered in the study.

#### 4.1 TYPE OF FIRE DISCUSSED WITH RESPONDENTS

Below are the types of fire considered in the study;

- Class A: Fire involving solid materials such as wood, paper or textiles. These were common materials found in abundance in these school environments. This type of fire can be put out with a water extinguisher.
- Class B: Fire involving flammable liquids such as petrol, diesel or oils. These fires can be put out with foam extinguishers as well as fire blankets in some circumstances. Petrol and diesel etc. were stored in most of the schools visited.
- iii. Class C: Fire involving gases which can be put out with powder extinguisher. Powder extinguishers are a multi-purpose fire extinguisher because they can be used on Class A, B and C fires.
- iv. Fire involving electrical apparatus are not officially classified but will be called Class E here for convenience. This is the most important category in school fires. This fire can be put out with carbon dioxide extinguishers (CO2). (Fire Equipment Manufacturers Association, n.d.)

Fires involving cooking oils such as in deep-fat fryers, and fires involving metals, which are a rare source of fire in school environments, were not directly considered in the study.

## 4.2 DIRECT VULNERABILITY FACTORS TO FIRE HAZARDS IN IBADAN SCHOOLS

At school level, the vulnerability factors considered include:

### 4.2.1 BULDING MATERIALS

The types of building material used in the schools were considered. These were divided into 3 categories; wall material, roofing materials and door and window materials. This was completed in order to assess the types of materials used in major parts of school buildings against their vulnerability to fire hazard risk.

## 4.2.1.1 WALL MATERIALS

The materials used in building a structure can determine to a large extent how vulnerable the structure could be to fire hazard. In this study, three types of building materials namely: blocks, wood and glass were considered. It was found that the majority of public schools were built with blocks which have become quite old with little or no maintenance. This could reduce the structures fire resistant capacity thereby rendering the buildings vulnerable to fire hazard. One of the interview respondents stated:

This building as you can see is very old. It was built before 1960 and has been in use since then without much of maintenance or renovation. We hope that someday the government will build us better structures. These structures were built with strong blocks, that is why there can still stand today. (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria).

The above submission reveals how old some of the public schools are. On the other hand, most of the private schools were built with blocks and some glass walls. From observation, these schools were relatively new compared to public schools. In some of the private schools, however, there were wooden structures that were a fire hazard. These structures were located close to some of the main classroom structures and were used for storing fuel (petrol and diesel) products and generators.

#### 4.2.1.2 ROOFING MATERIAL

Three types of roofing materials commonly used in Ibadan were considered. These were aluminium and iron roofing material, local mats as well as nylon material. Local mats are material souced from palm trees and grasses while nylon includes all water proof and tapoline materials. In rating these materials with regard to vulnerability to fire hazard, nylon and local mats were identified by the researcher to be most vulnerable to fire disaster, followed by aluminium roofing sheet and then iron based on their fire resistant ability.

Observation and interview responses indicated that most public schools were built with iron while in a few instances newer structures were roofed with aluminium materials. Another important finding on roofing materials focused on condition of

25

the roofs. It was found that many of the roofs in public schools were very old and worn out.

#### 4.2.1.3 DOOR/WINDOW

Doors and windows in school buildings play a very important role in term of safety given their role as an exit channel during emergencies (Ndiang'ui, 2006). The main focus was on the number and sizes of doors and windows in classrooms in order to ascertain the extent to which students could escape from fire disasters without experiencing stampedes or injuries. Additionally, to identify items or structures that could obstruct movement from these exit doors.

From observation, doors in most of the public and private schools were very narrow accommodating only two people at a time and therefore inadequate for a structure such as a school. Almost all these doors were barred with iron protectors which could become an obstruction to a quick escape during emergencies. It was also found that the windows of most of the classes in these schools were barred with either iron or wooden protectors. Although some of the school managers understood the constraint imposed by window bars and protectors on movement during emergencies, they preferred those restrictions to prevent burglary which is considered more of a challenge than fire hazards.

Three types of materials used to build windows and doors were identified during the study, the main material was wood with some made from iron and glass.

Though one reason cited by the respondent for this was to minimise cost. It has been noted that wooden materials are more vulnerable to fire hazards than iron and glass materials, (Ndiang'ui, J, 2006).

26





FIGURE 4-1: PICTURE SHOWING SCHOOL BARRED WINDOWS

FIGURE 4-2:PICTURE SHOWING CLASSES WITH IRON PROTECTORS

## 4.2.2 BUIDING DESIGN AND ENVIRONMENT

Under building design and environment, design factors that could expose schools to fire hazard were assessed and also the general condition of the environment of the schools.

#### 4.2.2.1 AGE OF THE BUILDING

The study revealed that most of the public schools were built in the 1950s, and are therefore more than 60 years old at the time of this research. Consequently, the structures appear very old and weak. As one of the respondents stated:

Some of our school buildings are very old. This is one of those built in 1953 and has not been renovated since then. (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria)

The implication of the above statement is that school buildings are poorly maintained. It also means that most of the building materials like doors, windows and roofs are weak and unable to withstand pressure. It has been noted that weak and dried wooden materials are not only susceptible to fire hazards but also bolster the spread of fire. (Nakitto and Lett, 2012)



FIGURE 4-3: PICTURE SHOWING OLD STRUCTURE

### 4.2.2.2 TYPES OF BUILDING

The type of building or structure could determine to what extent the building is vulnerability to fire hazard. Multi-storey buildings could present difficulties for students trying to escape during a fire incident. For example if a fire occurs on the ground floor, students could be trapped in the upper floors and if fires start in the upper floors, the evacuation time for students to escape to the ground floor are increased.

In the study it was found that many of the private schools, in an effort to manage land, were forced to build 2 to 4 floors, while many of the public schools were mostly single-storey. Some new structures from the public schools were of 1 to 2 floors, but these were relatively minimal in number, which reduces their vulnerability level in this regards.



FIGURE 4-4 PICTURE SHOWING MULTIPLE STOREY SCHOOL BUILDING

### 4.2.2.3 SIZE OF CLASS

The size of classrooms could have a significant effect on fire risk. Small classes that crowd students makes it very difficult for them to move freely and quickly out of the classes in emergency situations. (Mwenga, 2008)

It was revealed in the study that both public and private schools have medium sized (12cm by 12cm) classrooms where students numbering about 50 sit very close to each other and do not have enough space to move freely. This could become an obstruction for students when there is a fire emergency.

### 4.2.2.4 ELECTRICAL WIRING

The type of electrical wiring in a school building can determine how vulnerable the building is to fire hazards. Open wiring systems where electricity cables are run-

on wall surfaces and ceilings present a direct hazard to students. This is because these cables attract students to attempt illegal connections or charge their appliances. This could be a source of fire outbreak, particularly when connections have been tampered with overtime with wires crisscrossing through classrooms and joined together dangerously.

To understand this further, a respondent said the following:

Some of our students come to school with their phones and rechargeable lamp to charge. Since there are few charging points, some students start cutting the wires to connect directly and charge their phone. We have put a surveillance system in place to detect and confisticate any such gadgets as well as get the offenders punished (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria).

The above statement indicate how vulnerable and risky open surface wiring could be in schools. Though it was pointed out that checks have been put in place to discourage this practice, students always find a means to evade such measures. Most of the private schools visited during fieldwork seemed to have a better wiring system with the majority of them having the conduit piping wiring design.



FIGURE 4-5: ELECTRICAL WIRING ON THE WALL AND ROOF

### 4.2.2.5 WASTE DUMP SITE

Solid waste dumps in schools, which for the most part are burned as a means of reducing accumulated thrash in the school environment, if not properly managed could become a source of concern for fire safety. When discussing how schools manage their waste, a respondent from one of the public schools stated:

We have a place that we collect our waste which are mostly papers and dead woods outside and burn them. The waste management (waste collectors) from the city do not come here to collect wastes, so we have no option than to burn them ourselves. (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria)

It was observed that the waste dumps in most of the schools were located just behind school blocks. This was a common practice in public schools. Conversely, in the private schools visited wastes were disposed by the city waste management disposal unit. Thus, unlike public schools, private schools did not burn their waste openly and were therefore less vulnerable to fire disasters arising from solid waste dumps.

### 4.2.2.6 ACCESS/ MOTORABLE ROAD

Observations revealed that some of the schools in the study area did not have paved roads to aid the access of emergency response during fire outbreaks. The situation is worsened during rainy seasons when these roads become marshy. Again, public schools are affected more than private schools.

The implication of this in the event of a fire hazard is that there may not be quick evacuation means, which may lead to a higher number of casualties than if the roads were more accessible.



FIGURE 4-6: POOR ACCESS ROAD TO ONE OF THE PUBLIC SCHOOLS

### 4.2.2.7 LOCATION OF BUILDING

The location of school buildings was observed and their proximity to high tension cables, solid waste dumps, transformesr, petrol filling stations, industries and motor parks which are potential sources of fire outbreak (Omuterema, 2009). were identified

It was observed that the majority of both public and private schools were located close to high tension cables. This presents a high risk of fire hazard given that high tension cables can drop onto the roofs of school buildings and ignite fires.



FIGURE 4-7: SCHOOL BUILDING DIRECTLY UNDER HIGH TENSION CABLE

Other schools were located very close to waste dumps. This is also a risk because these sites are frequently set on fire, especially during the dry season, and on occasion the fires may burn throughout the night. This can result in the fire spreading, especially at night when most of these schools are deserted. Some of the schools were also discovered to be located very close to electric transformers which in Nigeria, have a history of causing electrical sparks that lead to fire hazards. Filling stations are a source of fire hazards to schools that are in close proximity (Omuterema, 2009). It was found that a number of schools, mostly private, were located directly opposite or behind filling stations.

There was just one school located close to an industry or motor park. Though this may not be high in number but it is still a concern for any school to be located close to these high risk fire locations.



FIGURE 4-8: A PRIVATE SCHOOL LOCATED DIRECTLY OPPOSITE A FILLING STATION

## 4.2.2.8 ELECTRICAL APPLIANCES/EQUIPMENT

The following issues were considered under electrical appliances and equipment

- 1. Not turning lights off after work and on weekends
- 2. Functionality of fans
- 3. Operation of computers by trained personnel
- 4. Periodic assessment of appliances in libraries, dormitories and laboratories
- 5. Types of sitting and writing material (whether iron or wooden)
- 6. Use of generators and how they are operated in terms of refuelling
- 7. And where generators are stored

The study revealed that most of the public schools do not turn off their lights after close of work and weekends. This was because no specific person was assigned to make sure that llight bulbs are turned off after official work hours. The private schools, again, were different since many of them have assigned personel to ensure that all bulbs and appliances are turned off after work.

Electrical appliances not turned off during off-work hours can cause a fire incident from unexpected high voltage or a power surge which are common occurrences in Nigeria (White, 2011). This could cause sparks and the melting of electrical cables causing fire.

It was discovered that most of the fans in the public schools were not functioning at all or had developed a fault. According to one of the respondents:

Some of our fans are not working, they have been bad for a long time and the government is not doing anything about it even after we have made complaints on it many times (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria).

The above statement reveals how bad the condition is and the danger it poses when it comes to fire hazard. A malfunctioning fan could be a source of fire hazard, especially when currents continue to pass through the cable connecting the fan. (White 2011)

There was not much different with the operation of computers. Some of these schools have computer laboratories for students. The study sought to find out whether there were trained computer operators in charge of those laboratories. It was gathered that most of the public schools do not have a trained computer operator. The private schools, on the other hand, have some trained computer operators who were in charge of computer operations in the school.

When there are no trained personels to operate computers, it increases the chance for errors that may lead to fire incidents.

Furthermore, it was also found that public schools do not carry out periodic assessment in their library, laboratories and dormitories. This can lead to cases where electrical appliances malfunction and are not changed or repaired in a reasonable time. The private schools were different, at most locations visited there were people assigned to do the checks once a month.

Again, most of the public and private schools make use of a gasoline generator to power the school due to unreliable electricity supply from the national grid. This practice exposes the schools to a higher risk of fire hazard because gasoline products like petrol and diesel are highly flammable.

Below is a Fire hazards vulnerability level and risk assessment matrix of the schools, produced using the above factors. Numbers are used to represent level of vulnerability to assessed hazards, the higher the number the higher the risk and level of vulnerability. (Kolluru et al, 1996). Absolute scale was chosen for each variable as described in the example below;

Building materials: walls, doors, windows, electrical, etc

- 1= fire proof, frequently inspected, well maintained;
- 2= fire proof, inspected but not maintained;
- 3 = fire proof but not inspected or maintained;
- 4 = non-fire proof but maintained;
- 5 = non-fire proof not maintained or inspected

5 and 4 represent a very high risk and vulnerability level and is interpreted as unacceptable risk. Advice is given for such activities to be discontinued while measures are put in place to reduce the risk and vulnerability to as low as possible. Equally, 3 represents moderate risk and vulnerability, therefore, while activities can continue, measures should be taken to reduce the risk and vulnerability and conditions continuously monitored. While 2 and 1 represent very low risk and vulnerability and, in this case, can be ignored as tolerable risk. Colours are used to indicate level of vulnerability as assessed. Red shows a high level of vulnerability, blue shows medium level vulnerability and green shows low level vulnerability.

1 DIRECT	T VULNERABILITY FACTORS				
Items Considered	SCHOOLS	6	VULNERABILITY		
			RATING		
	PUBLIC	PRIVATE	PUBLIC	PRIVATE	
Building Materials	/				
Walls Materials			MEDIUM	MEDIUM	
Blocks	3	3	-		
Wooden					
Glass					
Roof Materials			MEDIUM	MEDIUM	
Aluminuim Zinc	3	3			
Local Matt					
Nylon					
Doors/Windows Materials					

	5	3	HIGH	MEDIUM
Wooden				
• Iron				
Glass				
Building Design/School				
Environment				
Old buildings	4	2	HIGH	LOW
Single storey	2	2	LOW	LOW
2 – 4 storey	1	4	LOW	HIGH
Narrow width of entry and exit	3	3	MEDIUM	MEDIUM
Small size of class room	3	3	MEDIUM	MEDIUM
Open wiring	5	2	HIGH	LOW
Conduits wiring	3	1	MEDIUM	LOW
Presence of dumpsite	5	2	HIGH	LOW
Motor access	4	2	HIGH	LOW
Wooden writing materials	3	3	MEDIUM	MEDIUM
Location Of Buildings				
Nearness to high	4	5	HIGH	HIGH
tension cable				
Nearness to waste dump	4	3	HIGH	MEDIUM

Nearness to transformer	4	4	HIGH	HIGH
Nearness to filling station	3	5	MEDIUM	HIGH
	3	3	LOW	HIGH
Nearness to industry				
Nearness to motor park	3	3	HIGH	HIGH
Electrical Appliances/				
Equipment				
Light bulbs on overnight and	5	2	HIGH	LOW
throughout weekends				
Trained computer operator	4	2	HIGH	LOW
Periodic assessment of electrical appliances in library, laboratory, And dormitory	5	3	HIGH	MEDIUM
Use of gasoline generator	5	5	HIGH	HIGH
Storing of generator and fuel	5	5	HIGH	HIGH
(petrol and diesel) inside school				
building				
Average	4.0	3.0		
Aggregate	85	67		

TABLE 4.1.DIRECT VULNERABILITY FACTORS

## 4.3 GENERAL PREPAREDNESS MEASURES

Fire safety preparedness is seen as all measures put in place to prevent, mitigate and respond to any fire incident (UNISDR, 2007). In terms of school fire hazard preparedness the following factors were assessed

- Awareness of fire safety procedures
- Fire evacuation plan
- Fire fighting equipment including;
  - Fire extinguishers
  - o Sand bucket
  - Water tank and nozzle
  - Fire blanket
- Fire alarm
- Presence of muster point
- Fire smoke detector
- Contact of city fire department
- Contact of medical emergency or presence of an ambulance
- Existence of fire safety unit and competency of fire department staff
- Periodic student and staff training on fire safety
- Periodic assessment of electrical installations.

- Availability of first aid box and first aider.

Consequently, based on the above factors, it was found that public schools were usually not prepared and more vulnerable to fire disasters. The schools lacked capacity to respond quickly and did not have recovery plans in place. Private schools fared better in all the elements identified above and were therefore less vulnerable.

For instance, although it was discovered that both public and private schools lacked fire evacuation plans, there was fire fighting equipment present at a number of the private schools visited. The public schools had a total lack of equipment like extinguishers, sand buckets, water nozzless, fire blankets, fire alarms and fire smoke detectors.

The public schools also did not have the contact deails of the city fire service department and medical emergency whilst the private schools were found to have some of these. Both public and private schools had no fire safety unit and no ambulance for emergency service. Additionally, neither had periodic training of students and staff on fire safety.

In terms of early warning systems for fire hazard, it was discovered that proper early warning systems, like smoke detectors, fire alarms and sprinklers, were lacking in both public and private schools, except for a local bell used generally for gathering students for information. Also, neither public or private schools had a muster point.

Assessment of electrical installations is carried out once a month in private schools and a first aid box was available. The public schools visited lacked these two measures.



FIGURE 4-9. A PRIVATE SCHOOL WITH FIRE EXTINGUISHER

Below is a risk assessment and vulnerability matrix that summarises the above preparedness conditions of the schools.

Again, absolute scale was chosen for each variable as described in the example below; Awareness of fire safety procedures, Fire evacuation plan, Fire fighting equipment etc.

- 1= present, frequently inspected, well maintained and in good condition;
- 2= present, inspected but not maintained and in good condition;
- 3 = present but not inspected or maintained and fair condition;
- 4 = present but not inspected or maintained and in bad condition;
- 5 = not present

As previous, 5 and 4 represent a very high risk and vulnerability level and is interpreted as unacceptable risk. Advice is given for such activities to be discontinued while measures are put in place to reduce the risk and vulnerability to as low as reasonable possible. 3 represents moderate risk and vulnerability, while activities can continue measures should be taken to reduce the risk and vulnerability to as low as reasonably possible and conditions continuously monitored. While 2 and 1 represent very low risk and vulnerability and, in this case, can be ignored as tolerable risk.

Colours are used to indicate level of vulnerability as assessed. Red shows a high level of vulnerability, blue shows medium level vulnerability and green shows low level vulnerability.

2	PREPARED	NE	SS MEASU	REMENT		
ITEMS CONSI	DERED		TYPE OF	SCHOOLS	VULNERABILITY	
					RATING	
			PUBLIC	PRIVATE	PUBLIC	PRIVATE
			SCORES	SCORES		
Awareness c	of fire safe	ety	5	3	HIGH	MEDIUM
procedures						
Fire evacuation	plan		5	4	HIGH	HIGH
Firefightingequ	ipmentincludir	ng;			HIGH	HIGH
			5	3		

Fire extinguishers	5	3	HIGH	MEDIUM
Sand bucket	5	4	HIGH	HIGH
Water tank and nozzle	4	4	HIGH	HIGH
Fire blanket	5	5	HIGH	HIGH
Fire alarm	5	5	HIGH	HIGH
Fire smoke detector	5	5	HIGH	HIGH
Communication with city fire department	5	3	HIGH	MEDIUM
Contact of city fire department	5	3	HIGH	MEDIUM
Contact of medical emergency	5	3	HIGH	MEDIUM
Existence of fire safety unit	5	3	HIGH	MEDIUM

Present of muster point	5	5	HIGH	HIGH
Periodic students and staff	5	3	MEDIUM	MEDIUM
training on fire safety				
Periodic firesafety Drills	5	5	HIGH	HIGH
Periodic assessment of	5	3	HIGH	MEDIUM
electrical installations				
Competency of fire department staff	5	3	HIGH	MEDIUM
Present of first aid box and first aider	5	2	High	LOW
Average	4.5	3.2		
Aggregate	94	69		

TABLE 4.2. FIRE HAZARD PREPAREDNESS MEASURES

## 4.4 RECOVERY FACTORS

Insurance has been one of the oldest means of risk sharing and when it is available vulnerability levels tend to be reduced (White, 2011).

On recovery and fire risk sharing measures assessed, it was discovered that both public and private schools were highly vulnerable, a respondent made the following observations on insurance as a means of recovery from fire hazard:

> We do not have anything like insurance policy here and even continuity plan is a strange thing to us. In fact, I have never heard of it except now. (Interview:teacher, school administratoror any other stakeholder. Ibadan, Nigeria, Ibadan, Nigeria)

The above observation revealed that there were no insurance policies either for the school structures, infrastructures and equipments or students and staff.

The risk and vulnerability assessment matrix (RVAM) below summarises the condition of recovery and risk sharing level of the schools. An absolute number of 1 and 5 were chosen to represent either the presence or absence of the conditions respectively. From the table below, both the private and public schools score an average of 5 and 25 as aggregate.

3	RECOVERY/ RISK SHARING MEASUREMENT							
ITEMS	I	TYPE OF SCH	IOOLS	VULNER	ABILITY			
CONSIDERED				RATING				
		PUBLIC	PRIVATE	PUBLIC	PRIVATE			
			SCORES					

	SCORES			
Insurance for school building	5	5	HIGH	HIGH
Insurance for students	5	5	HIGH	HIGH
Insurance for staff	5	5	HIGH	HIGH
Insurance for equipment	5	5	HIGH	HIGH
Business continuity plan	5	5	HIGH	HIGH

Average	5	5		
Aggregate	25	25	 	

TABLE 4.3. RECOVERY/RISK SHARING MEASURES

## 4.5 CHALLENGES FACED BY ADMINISTRATORS AND HEADS OF SCHOOLS ON FIRE SAFETY

The administrators and heads of schools face many challenges when it comes to school fire safety. Both the public and private school administrators admitted that funding and a lack of policies on school fire safety as well as ignorance about safety measures were their major challenges. One of the respondents observed:

> Governments does not give money to do safety things in schools. We manage a little that we have for other things (Interview: teacher, school administratoror any other stakeholder. Ibadan, Nigeria)

This statement reveals that funding for certain safety measures like training and provision of fire fighting equipments and other materials is lacking in schools. Also, policies that make it compulsory for schools to provide fire safety are not there. Furthermore, ignorance was also a challenge as many public schools did not know of any safety procedures and measures they could take in order to make schools safer.

50

Other factors included culture and cooperation of students and parents or guardians were not considered as major issues. This is represented in the diagram below.



FIGURE 4-10. CHALLENGES TO SCHOOL FIRE SAFETY

It should also be noted that there are some safety concerns on the part of the school administrators. They complained that they have to bar the doors and windows to prevent thieves coming into the schools after schools hours and in the night to steal or destroy school property. Large double iron doors and windows would be better for security and fire safety, but there are no funds available to install these leaving the schools with barred, narrow doors and windows.

### **5.0 CONCLUSION AND RECOMMENDATIONS**

This study concludes that public schools in the study area are highly vulnerable to fire hazard. Should there be a fire incident in these schools, there is potential for huge loss of life and property. Whilst private schools were less vulnerable to fire hazards, they still displayed high vulnerability in many factors and can suffer major adverse impacts on lives and properties in the case of a fire incident.

The following recommendations are made and divided into two sections, first to the schools managers and administrators and second to the government and regulatory agencies.

## 5.1 RECOMMENDATIONS TO THE SCHOOLS MANAGERS AND ADMINISTRATORS

a. Comprehensive, periodic (once in a month) training on fire safety for students and staff to create awareness and built a culture of safety in the schools.

b. Periodic assessment (once in a month) of electrical installations by a trained person.

c. Creation of a general safety unit to take care of fire safety and other safety issues in the schools.

d. Removal of bars on doors and windows.

e. Replacing wooden doors and windows with iron.

f. Replacing wooden sitting material with iron.

g. Gasoline generators kept away from the main school structures in a generator house where fuel can also be stored.

## 5.2 TO THE GOVERNMENT AND REGULATORY AGENCIES

a. Provision of fund for the renovation and maintenance of old school buildings or demolition of old structures that have outlived their life span to replace with new ones.

b. Comprehensive site selection and analysis completed before approval is given for schools establishment. This is to ensure schools are not located close to high risk areas like filling stations, high tension cables, transformers etc.

c. Schools should be provided with motorable access or located where there is good access.

d. Laws and policies on schools safety should be enacted.

### 6.0 LESSONS LEARNED

The following lessons were learned from the studies;

- 1. Vulnerability could result from the lack of commitment of appropriate authorities as seen in public schools in the study area
- Long term neglect of standards could become normal acceptable practice.
  Fire safety standards have not been followed for many years in these schools and they now have no fire safety consciousness
- 3. Competition for acquiring students could improve fire safety standards as was seen in some of the private schools who provided fire safety equipment in order to gain the upper hand in parents choices of their wards admission.

#### 7.0 REFERENCES

100 Resilient Cities. 2018. Retrieved at: http://www.100resilientcities.org/

- Abdul, B.B., 2002. Issues in Nigeria educational system. *Journal of Educational Studies, Calabar*, *7*(3), pp.15-17.
- Akali, M.N., Khabamba, I. and Muyinga, G.A., 2009. Fire Sources, Disaster Impacts and Mitigation in Kenyan Secondary Schools. In *Proceedings of the workshop on institutional fires*.

Artim, N. 1999. Fire Safety network. Middlebury: Unpublished paper

- Bankoff, G., Frerks, G. and Hilhorst, D. eds., 2004. *Mapping vulnerability: disasters, development, and people*. Routledge.
- Blackaby, S. (2007). *Fire safety education school* [Online] Retrieved from <u>http://www.esfrs.org/community\_safety/Schools/schools.htm#secondary</u>
- Delors, J., 1996. Learning: The Treasure Within: Highlights: Report to UNESCO of the International Commission on Education for the Twenty-first Century. UNESCO.
- Eze, J. 2017. *Secondary school hostel razed by fire*. Premium Times, Nigeria. Retrieved from: <u>https://www.premiumtimesng.com/regional/ssouth-east/222645-secondary-school-hostel-razed-by-fire.html</u>
- Fafunwa, A.1982. History of Education in Nigeria. *Journal of Educational Studies*, Calabar, 7(3): 45-50.
- Federal Republic of Nigeria (2004). *National Policy on Education.* 4<sup>th</sup> Edition. Retrieved at:

http://wbgfiles.worldbank.org/documents/hdn/ed/saber/supporting\_doc/AFR/Nige ria/TCH/National%20Policy%20on%20Education.pdf

- Fire Equipment Manufacturers Associate. N.d. *Types of Fire.* Retrieved at: <u>http://www.femalifesafety.org/types-of-fires.html</u>
- Gitonga, A. 2010. *Students on a mission to raze down schools*. Standard Media. Retrieved from:

https://www.standardmedia.co.ke/business/article/2000022108/students-on-amission-to-raze-down-schools Government of Kenya (GOK), 2008. Safety standards' Manual for schools in Kenya.(1st Edition). *Ministry of education*, Kenya

Ilorin. 2016. Fire, fire everywhere. *Ilorin.* Retrieved at: <u>https://www.ilorin.info/fullnews.php?id=16302</u>.

- Kolluru, R.; Bartell, S.; Pitblado, S. and Stricoff, S. 1999. Risk assessment management handbook for environment and safety professional, 2<sup>nd</sup> edition. *MaGraw-Hill publication New York, USA*. p13-45.
- Kukali, A.N. and Kabuka, E.K., 2009. Fire disasters in secondary boarding schools in Kenya. *Journal of Disaster Management and Risk Reduction*, *3*, pp.60-71.

Kusamotu, W.2007. Obstacles to new education system: *Daily Times* 19th September 2007, p.3.

Latlong. N.d. Ibadan, Nigeria. *Latlong*. Retrieved at: https://www.latlong.net/place/ibadan-nigeria-1748.html

- Mangoa, M. 2012. Maranda High closed after fire tragedy. *The East African Standard*. Nairobi. Standard Newspapers.
- Mohamed Shaluf, I., 2007. Disaster types. Disaster Prevention and Management: An International Journal, 16(5), pp.704-717.
- Muzungu, M. 2008. School fire, Deaths but real culprits still at large. *The Sunday Standard. 25th May*
- Mwenga, S. 2008.Safety preparedness of secondary schools in Kyuso District, Kenya.M.Ed thesis, K.U

Nakitto, M., Lett, R. 2012. The preparedness of Ugandan schools for fires. *Makerere: Makerere Medical School* 

Ndiang'ui, J.T., 2006. Vulnerability of Kenyan schools to disaster (Doctoral dissertation).

News Breakers. 2017. FIRE RAZES 2 FEMALE HOSTELS AT FGC KEFFI. News Breakers. Retrieved at: <u>https://newsbreakers.ng/fire-razes-2-female-hostels-fgc-keffi/</u>

Nigerian Muse. 2010. *Maps of Various States and their Local Governments in Nigeria.* Nigerian Muse. Retrieved at: www.nigerianmuse.com/20100527092749zg/sections/pictures-mapscartoons/maps-of-various-states-and-their-local-governments-in-nigeria/

Omovo, B.C., 2006. History of 6-3-3-4 system of Education in Nigeria. Daily Sketch.

- Omuterema, S. 2009. Mega stores fire preparedness, response and mitigation, Case of Nakumatt fire disaster. *Proceedings of a workshop on urban fires*. MasindeMuliro University of Science and Technology, Kakamega,Kenya.
- Tavares, R. M. 2008. Prescriptive codes verses performance based codes: Which one is the best fire safety code for the Brazilian context? *Safety science monitor*. Volume 12, issue 1, article 3.
- UNISDR. 2007.Disaster Preparedness Education in Schools: Recommendations for New Zealand and the United States.*New Zealand: Fulbright*
- UNISDR. n.d. Worldwide Initiative for Safe Schools. UNISDR. Retrieved at: https://www.unisdr.org/we/campaign/wiss

United States Fire Administration (USFA), 2007. Tropical fire research series. Volume 2, issue 9<sup>th</sup>

- Uwaifo, V.O. and Uddin, P.S.O., 2009. *Transition from the 6-3-3-4 to the 9-3-4 system of education in Nigeria: An assessment of its implementation on technology subjects*. Studies on Home and Community Science, *3*(2), pp.81-86.
- White, J. 2011. Fire Safety Systems. New York: Peter Li Education group

Wikipedia, N.d. Oyo State. Wikipedia. Retrieved at:

https://en.wikipedia.org/wiki/Oyo State#Education

Wikipedia, N.d. (b). Ibadan. *Wikipedia.* Retrieved at: <u>https://en.wikipedia.org/wiki/Ibadan</u>

#### 8.0 BIBLIOGRAPHY

Aluanga, L. 2008. What is ailing schools? Saturday standard 26th June, page 10.

- Areola, O., 1994. The spatial growth of Ibadan city and its impact on the rural hinterland. *Rex Charles publication, Ibadan*.page 99.
- Federation Emergency Management Agency, 2001. Dormitory fires, Tropical Fire Research Series Vol 1
- Fourchard, L. 2003.Urban Slums Reports: The case of Ibadan, Nigeria. In UN-Habitat Global Report on Human Settlements 2003, The Challenge of Slums, Earthscan, London; Part IV: 'Summary of City Case Studies' Retrieved from http://www.ucl.ac.uk/dpu-projects/Global\_Report/pdfs/Ibadan.pdf

Litcaf. N.d. Ibadan History. *Litcaf*. Retrieved athttps://litcaf.com/ibadan-history/

- Richard, R. and Wambua, K., 2009. Safety Awareness and preparedness in secondary schools in Kenya: A case of Turkana district. *Educational Research and Reviews*, *4*(8), p.379.
- Kirui J., Oboka W., Buchere B., Ndiku M., & 3Lutomia G. 2007. Fire Disasters in Education Institutions; an Indication of Gaps in Institutional Security Management.Proceedings of the workshop on institutional fires.*MasindeMuliro University of Science and Technology, Kakamega.*
- Levy, D.C., 1991. Student Activism in Latin America: Explaining the Decline. *Higher Education*, *22*(2), pp.145-155.
- Lloyd, P.C., Awe, B. and Mabogunje, A.L. eds., 1967. The city of Ibadan. *Cambridge University Press*

- Martin Lynn, 'Hinderer, Anna (1827–1870)', Oxford Dictionary of National Biography, Oxford University Press, 2004 accessed 18 March 2017
- National Population Commission (NPC), 2007: Population census and household data survey for Nigeria, Abuja: *Federal Government of Nigeria*.
- Tahir, N., Macassa, G., Naseer, R., Durani, M. and Hashmi, W., 2011. Causes of Fire Emergencies managed by Rescue 1122 in Punjab, Pakistan.
- Vaughan, O., 2006. Nigerian Chiefs: traditional power in modern politics, 1890s-1990s (Vol. 7). *University Rochester Press.*
- Shaw, M. 2002. Promoting safety in schools: International experiences and actions. *Washington, DC: United States Department of Justice*.
- Tomori, M.A., 2008. Ibadan metropolitan area and the challenges to sustainable development. *MACOS Urban Management Consultancy*.
- United Nations International Strategy for Disaster Reduction, *Hyogo Framework for* Action
- Uwaifo, O., Unwin M, 2004, Federal Republic of Nigeria National Policy on Education (Revised): Lagos: NERDC.

## 9.0 APPENDIX

# IN-DEPTH INTERVIEW GUIDE (IDI) FOR THE STUDY ON VULNERABILITY OF PRIMARY AND SECONDARY SCHOOLS TO FIRE HAZARD IN IBADAN, NIGERIA

- A. DIRECT VULNERABILITY FACTORS
- 1. BULDING MATERIALS

Walls- Wooden

Blocks

Glass

Roof – Aluminum

Local Matt

Nylon

### Doors/ Windows

Wood

Iron

Glass

## 2 BULDING DESIGN/ SCHOOL ENVIRONMENT

- Age of the building
- Types of building (bungalow or storey)
- Number of floors
- Size of entry/exit door
- Size of class
- Types of electrical wiring (open surface or Conduit)
- Whether school has a dumpsite for burning of papers
- Access/ motorable road in case of emergency

## **3 LOCATION OF BUILDING**

- Nearness to high tension cable
- Nearness to waste dump
- Nearness to transformer
- Nearness to filling station
- Nearness to industry
- Nearness to motor pack

## 4 ELECTRICAL APPLIANCES / EQUIPMENT

- Bulbs on overnight and throughout weekends
- Functionality of fans
- Use of computer (appropriately operated by trained users)

- Periodic assessment of appliances in library and /or science laboratory
- Types of sitting and writing material
- Using gasoline (fuel) generators (how it is operated in terms of refueling)
- Where generators are kept during use and for safe-keeping afterwards
- **B** PREPAREDNESS MEASUREMENT
  - Awareness of fire safety procedures
  - Fire evacuation plan
  - Firefightingequipment including;
  - Fire extinguishers
  - Sand bucket
  - Water tank and nozzle
  - Fire blanket
  - Fire alarm
  - Fire smoke detector
  - Communication with city fire department
  - Contact of city fire department
  - Contact of medical emergency
  - Existence of fire safety unit
  - Periodic students and staff training on fire safety
  - Periodic assessment of electrical installations
  - Competency of fire department staff

- First aid

## C CHALLENGES MEASUREMENT

- Funding
- Policies
- Cultural
- Ignorance
- -

## D RECOVERY MEASUREMENT

- Insurance for school building
- Insurance for students
- Insurance for staff
- Insurance for equipment
- Present of Business Continuity Plan (BCP)



The contents of this Working Paper reflect the views of the author only and not those of the UK Department for International Development or the Economic and Social Research Council. The author was awarded an Urban ARK Fellowship to undertake this study.