

CURBING MENACE OF URBAN FIRE OUTBREAK IN RESIDENTIAL BUILDINGS:

A CASE STUDY OF GOMBE METROPOLIS.

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Abstract- Fire outbreak in urban areas of Nigeria has indeed assumed an alarming proportion as there is barely a day without occurrence of one incidence or the other leaving in its wake destruction of properties worth millions of naira, sometimes loss of lives, devastating impacts on human lives/livelihoods and infrastructural development. The study was concerned with curbing fire outbreak in residential buildings in Gombe metropolis and identifies some challenges faced by Inhabitants as well as the authority with respect to fire management. Both primary and secondary data were collected through 250 questionnaires which were administered on Inhabitants of the study area to access their opinions regarding fire outbreaks, key informant interviews, focus group discussions, direct observations, comprehensive literature review and from Gombe state fire service. Analysis of the questionnaires was done using ranking on five-point scale to measure a range of opinions from least causal factor to most causal factor. The findings have revealed that negligence on the part of Inhabitants either in the form of storing up adulterated fuel or leaving little children at home to fend for themselves is the most causal factor of fire outbreaks incidence in Gombe metropolis while kitchen appliances is the least causal factor of fire outbreak incidence; the inhabitants could use water and sand to quench fire; a high number of the residential buildings in the metropolis do not have fire extinguishers and those that have either do not know how to use them or the fire extinguishers are expired; the inadequacy of both firefighting gadgets and personnel as well as lack of access for fire tenders in most densely populated areas of the metropolis during a fire incidence was also identified. Relevant recommendations have been made for these Inhabitants and policy makers to strategize in order to curb and to have better protection against the menace of fire outbreaks.

Index Terms—Fire outbreaks, Gombe metropolis, Inhabitants, Residential buildings

I. INTRODUCTION

Fire is often described as the greatest servant but worst master; difficult to control when it turns into inferno- as it wrath on, burning and scorching everything in its path. It has no respect for man; rich and poor alike.

A fire requires an ignition source and a combination of oxygen and fuel to sustain the fire. Henderson and MacKay (2009). The fuel in this case is anything flammable or combustible stored or kept in a room or in a building or in an open space including furniture, curtains, clothing, beddings, paper, and inflammable liquid.

The more combustible these are and the more of them you have in the room or in an open space, the more severe the resulting fire. Ohemeng (2010).

In Nigeria, some possible causes of fire outbreak could be as a result of several factors to include frequent power outages, power surge, electrical sparks, illegal connection of electricity, improper electrical fittings, substandard materials, defective or indoor use of generators, and negligence of household leaving minors at home without supervision, storing up adulterated fuel at home, Arson and ignorance.

According to Anaglatey (2013), the rise in fire outbreak could be traced to intense harmattan, overloading of electrical appliance on the same fuse and improper electrical installation in homes and workplace. Anaglatey (2013) continues that illegal, improper and old wiring system as well as cooking in the home and workplace with naked fire is some of the major causes of frequent fire outbreaks.

Another cause of fire disasters is ignorance. Poor awareness of what fire is and how it can be prevented has led to a lot of fire outbreak. Pascal (2006). According to Pascal (2006), ignorant of firefighting gadgets will make you to ignore gadgets that can save your property during a fire outbreak. This is pertinent in Gombe metropolis where this study showed that most Inhabitants of residential buildings do not have fire extinguishers in their homes and are ignorant on how to use Fire-fighting gadgets to control fire outbreaks.

According to Schaeffer (2007), In the United Kingdom, the British Fire Service identified and implemented some best practices in fire prevention. The best practices were classified into eight major categories, namely, identifying and analyzing high risk households, increasing staffing and training on fire prevention programs, making home safety visits, conducting extensive

school and youth programs, directing programs to the high-risk elderly population, developing safer consumer products, increasing the use of fire stations for community fire safety programs, and coordinating national and local fire safety campaigns.

In the category of fire safety campaigns, the British Fire Service identified and used some selected local radio stations and newspapers to spread fire safety messages to ethnic populations who were the prime target for those media. The campaigns were intended to raise awareness of the fire problem, increase smoke alarm ownership, and change fire safety behaviors.

In this regard, ability to recognize the danger of fire outbreaks, ability to know what to do to prevent fire outbreaks as well as what action to take in case a fire outbreak occurs aids effective fire safety management.

All fire outbreak disaster preparedness is based on the knowledge about fire hazards, the likelihood of different causes of fire outbreaks and the likely effects on the built and natural environment. Comolotti (2004). Comolotti (2004) argue that people with knowledge about fire disasters will acquire equipments such as fire extinguishers, fire blankets and smoke detectors among others to support response activities. They also prepare their families and employees to take immediate action to prevent deaths, injuries and destruction of properties whenever fire disaster strikes.

According to Sime (2001), Safety regulations in United Kingdom impose mandatory fire safety trainings to all employees working within a building, a construction area or any other busy area which helps provide employees with crucial information, develop skills such as those used in operating fire extinguishers and proper escape behaviors. Unfortunately, this is not the practice in developing countries of the world like Nigeria where ignorance and poor awareness of what fire is and how it can be prevented is the order of the day.

Effective fire safety management requires recognizing all the potential risks associated with the premises and effectively carrying out an assessment of the adequacy of the measures provided or needed to combat the risk. Khan and Abbasi (1995).

According to Buchanan (2001), a risk analysis indicates the proneness to fire outbreak and spread of fire and thus decide what measures must be taken to provide suitable arrangements for protecting people in the premises from fire, and should ensure that the risk of fire occurring is reduced to the absolute minimum as well as the risk of fire spreading is minimized.

Oladokun and Ishola (2010), developed a risk analysis model as regards to fire risk reduction and found it most useful for evaluating the proneness of a commercial building to fire accident which is much needed for planning control strategies development by regulatory bodies, insurance companies, estate managements, users of the commercial complex, and other stake holders in arresting the reoccurrence of the unwanted fire disaster.

To ensure sustainable development, funds and resources must be directed towards plans and strategies to prevent a disaster rather than relief. Annan (1999)..

II. PROBLEM STATEMENT

Gombe metropolis is a confluence town of economic activities in North-Eastern Nigeria; by its position as the meeting point for business people from the surrounding states of Yobe to the north, Borno to the east, Taraba and Adamawa to the south, and Bauchi to the west.

As a result of the rural-urban migration experienced from the surrounding towns and villages, the core part of the metropolis is densely populated with 260 persons per square hectare (Gombe State Ministry of Land and Survey, 2003) and coincidentally, the most densely part of the metropolis in terms of residential buildings.

In recent years, fire outbreak has become a regular feature of the metropolis leaving in its wake negative impacts on human lives/livelihoods and infrastructural development. These impacts are sometimes attributed to the poor attitudes as well as perceptions of the Inhabitants towards fire management. In other instances, the impacts are attributed to the Gombe state fire service (i.e. the local Firefighting authority) due to their inadequacy in resources needed to combat as well as reduce the adverse effect of fire in case of an outbreak.

This study seeks to provide answers to the following research questions:

- (a).What is the perception of Inhabitants towards fire management?
- (b).What is some of the challenges faced with regards to fire management within Gombe metropolis?.

III. RESEARCH OBJECTIVES

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IV. THE STUDY AREA: GOMBE METROPOLIS

Gombe Metropolis is approximately located between latitude $9^{\circ} 30'$ and $12^{\circ} 30'$ North and longitude $8^{\circ} 45'$ and $11^{\circ} 45'$ East of the Greenwich meridian and has an area of 52 square kilometers. Gombe State Ministry of Land and Survey, Gombe (2008). It is a commercial, administrative town and capital of Gombe State popularly referred to as the "*Jewel in the Savanna*". The town is a confluence of economic activities by its position as the meeting point for business people from the surrounding states of Yobe to the north, Borno to the east, Taraba and Adamawa to the south, and Bauchi to the west. To support the vibrant commercial activities in Gombe Metropolis, there exist numerous banks, filling stations and hotels. Another factor that led to the growth of the town is rural-urban migration experienced from the surrounding towns and villages.

Gombe Metropolis is located within the sub-Saharan climatic zone and has two distinct climates of dry and rainy season: the dry season spans during the months of November-March and the rainy season, the months of April-October with an average rainfall of 850 mm. The mean annual temperature is about 32°C , the soil of Gombe Metropolis comprises of sandstones, clay and silt, while the vegetation is that of savanna woodland comprising scattered shrubs and trees.

According to National Population Commission (2006) and Mbaya (2013), the total population of Gombe Metropolis was 266,844 in 2006 and increased to almost double (400,000) in 2010. The literacy level in Gombe Metropolis is considerable good with virtually all residents having at least the basic education. It is a diverse multi-religious and multi-cultural society consisting of mainly Muslims and Christians with different ethnic groups of Tangale, Hausa, Tera, Fulani, Bolawa, Waja, Igbo, Yoruba, and Kanuri tribes.

The most densely populated area is the oldest core part of the metropolis with 260 persons per square hectare and coincidentally, the most densely part of the metropolis in terms of buildings. The urban growth around the oldest part of the town and the urban fringes together with visible poor town planning is causing a spontaneous development and in poor spatial order. Due to the shortage of housing and the desperate efforts of private developers, there is an emergence of the unplanned residential sectors, especially on places considered unsuitable for development. Gombe State Ministry of Land and Survey (2003).

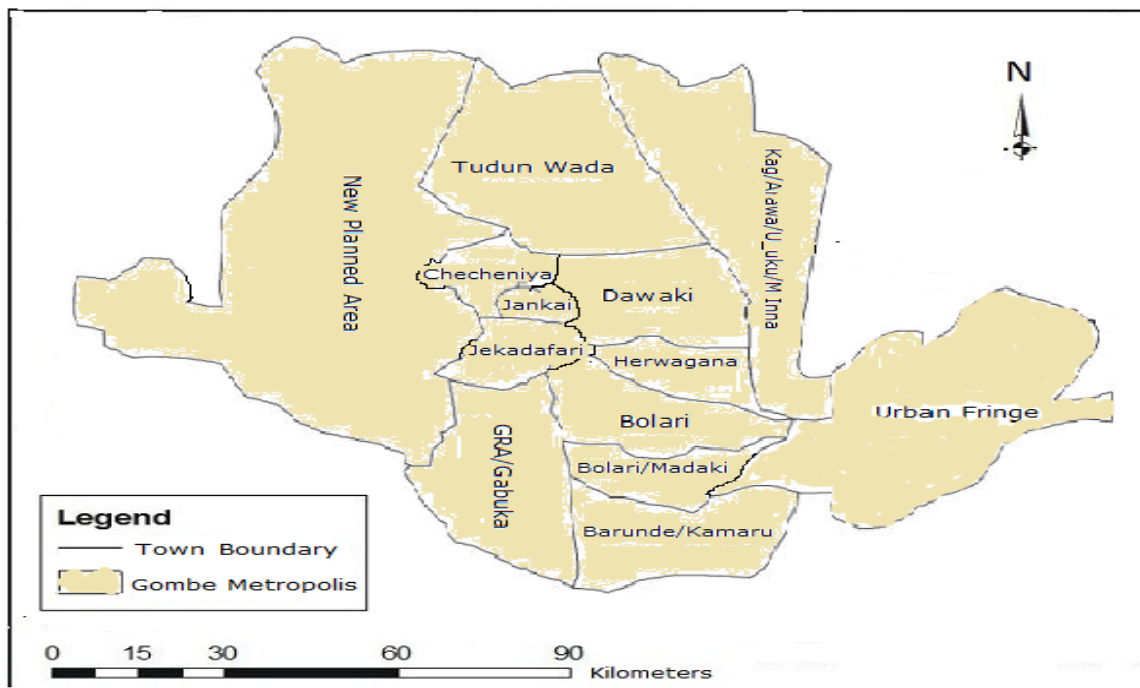


FIGURE 1: MAP OF GOMBE METROPOLIS

V. RESEARCH METHODOLOGY

Both primary and secondary data were obtained through key informant interviews, focus group discussions and direct observations so as to ascertain the perceptions of the inhabitants as well as to ensure that the output of the survey was reflective to

what was on the ground, comprehensive literature review and from office of Gombe state fire service in the metropolis. 250 questionnaires, well structured were also administered on Inhabitants of the study area to access their opinions regarding fire outbreaks.

Analysis of the questionnaires was done using ranking on five-point scale to measure a range of opinions from least causal factor to most causal factor. During the questionnaires analysis, where ties occurred, the mid rank method was used to resolve the problem by assigning the tied values the average of the ranks they would have been assigned had it not occurred.

VI. LIMITATIONS OF THE STUDY

Collection of primary data in Gombe metropolis is very difficult. Challenges such as secrecy and indifference on the part of respondents can affect results of the study. Moreover, the environmental (i.e. due to the recent unrests in parts of North-Eastern Nigeria to which the study area falls within) and traditional beliefs of most of the Inhabitants who formed larger part of the respondents were not helpful to the study as the heads of their homes (i.e. the men) usually frown against people having one-on-one interactive contacts with members of their households most especially the women and children. Studies during the course of the research indicated the primary alarm blowers of fire outbreaks to be mostly the females (women and children).

The tight work schedule of some respondents delayed the answering of the questionnaires and interviews most especially the officials of Gombe state fire service. Despite these limitations, the researchers were able to explore all avenues in securing the relevant and vital information needed for the study.

VII. RESULTS AND DISCUSSIONS

Duration of the study within which data collection was carried out was January 2016 to March 2017. The numbers of duly completed questionnaires retrieved from respondents were 230 representing 92%. The retrieved questionnaires were accepted for analysis on the basis that it was above the 50% benchmark. The data were then categorized according to the objectives of the study, displayed in tabular form and analyzed.

A. Demographic Characteristics:

The Inhabitants’ survey was conducted to capture the demographic profile of Gombe metropolis. It also provided a snapshot of the socio-demographic characteristics of respondents such as gender size, age distribution, ethnic group, education and religious affiliation which play a vital role in explaining some of the causes of fire outbreak at the household level.

a) Gender Distribution of Respondents:

The gender distribution of the sample population is presented in table 1. The data shows that about 21.7% of the total respondents were males while 78.3% of the total respondents were females. This representation was expected since females (adults and children) were often noticed to remain at home while most of the males engaged in trading (commercial) and farming activities.

Table 1: Gender Distribution of Respondents

GENDER	FREQUENCY	PERCENTAGE
MALE	50	21.7
FEMALE	180	78.3
TOTAL	230	100

Source: Field Work.

b) Age Distribution of Respondents:

The age distribution of the respondents is presented in table 2 and Fig. 1 below. It was revealed that 10.9% of the respondents were of age 15years and below; 36.9% were between the age bracket of 16years and 30years; 34.8% were between the age range of 31years to 45years; and 17.4% of the respondents were at least 46years and above. The response of the sample population is an indication of the diversified age distribution of Inhabitants of Gombe metropolis.

Table 2: Age Distribution of Respondents

AGE RANGE DISTRIBUTION	FREQUENCY	PERCENTAGE
46 and ABOVE	40	17.4
31-45	80	34.8
16-30	85	36.9

15-BELOW	25	10.9
TOTAL	230	100

Source: Field Work.

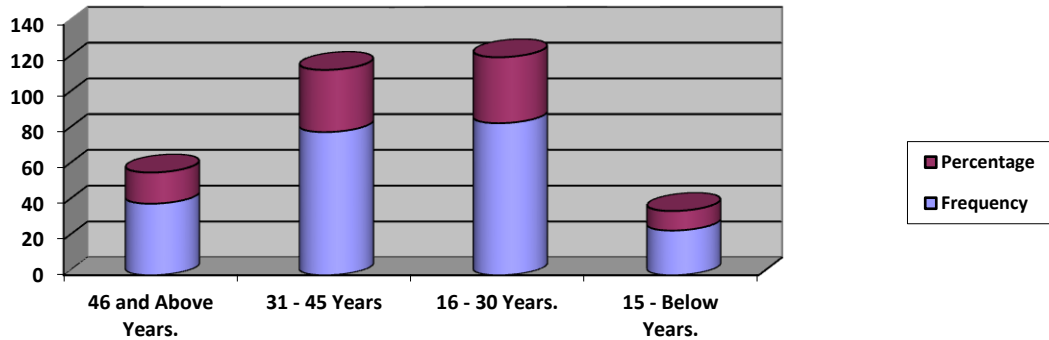


FIGURE 2: AGE DISTRIBUTION OF RESPONDENTS

c) Religious Affiliations of Respondents:

The study area is occupied by respondents of two distinctive religious groups of Christians and Islam as shown in Fig. 2 below. About 60% of respondents were Muslims while 40% were Christians.

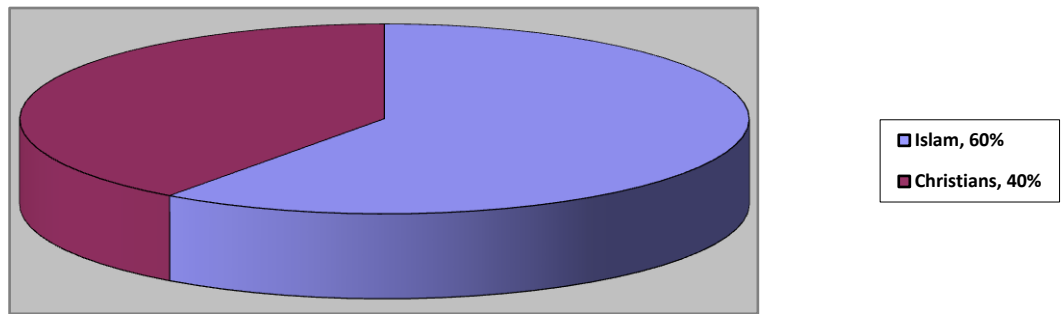


FIGURE 3: RELIGIOUS AFFILIATIONS OF RESPONDENTS

d) Level of Education of Respondents:

Education plays a vital and pivotal role in the smooth running of every society. In a related research by Comolotti, J. (2004), his findings revealed that the ability to understand and respond to fire safety messages is dependent on the level of education one has- low level of education is often associated with low literacy skills as it may inhibit the ability to read instruction manuals and warning labels for cooking and heating devices thereby increasing the risks of fire outbreaks.

The questionnaire feedback as shown in table 3 indicates that 45.7% of the respondents had no formal education; 30.4% of the respondents had attended primary/secondary school; 15.2% of the sample population had Islamic elementary school education while only 8.7% of the respondents had obtained tertiary education. This shows that most of the Inhabitants in the sample population possess low literacy level and hence more efforts needs to be put in place to educate the Inhabitants on the dangers of fire outbreaks, possible ways of avoiding its occurrence and ways of protecting themselves.

Table 3: Level of Education of Respondents

LEVEL OF EDUCATION	FREQUENCY	PERCENTAGE
NO FORMAL EDUCATION	105	45.7
ISLAMIC ELEMENTARY SCH.	35	15.2
PRIMARY/SECONDARY SCH.	70	30.4

TERTIARY EDUCATION	20	8.7
TOTAL	100	100

Source: Field Work.

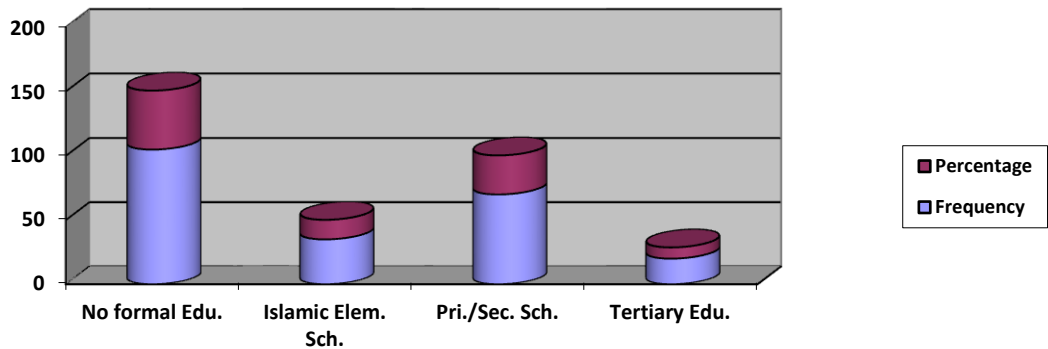


FIGURE 4: LEVEL OF EDUCATION OF RESPONDENTS

e) Ethnic Groups of Respondents:

From the questionnaire feedback, it was evident that the study area comprised of people with different ethnic background. Figure 5 presents the ethnic background of the respondents with each ethnic tribe of Tangele, Tera, Bolawa, Kanuri, Hausa, and Waja having about 10.9% of the total respondents; 19.6% of the respondents were Fulani; 8.7% were Yoruba while 6.5% represented Igbo.

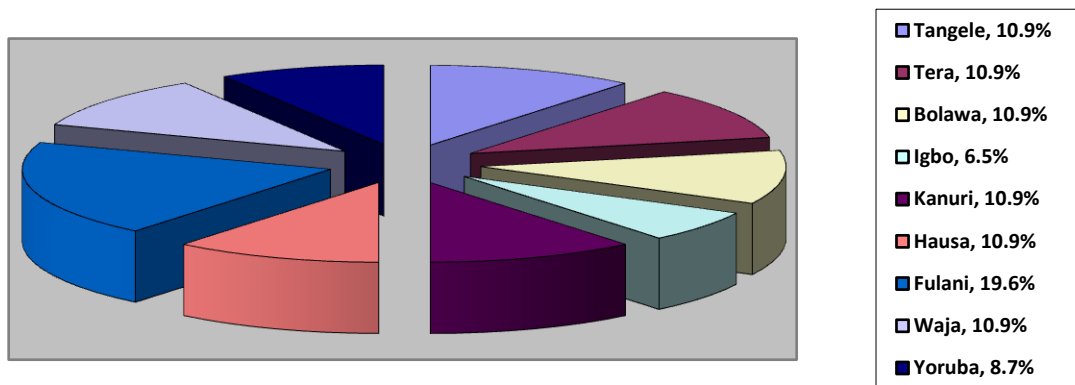


FIGURE 5: ETHNIC GROUPS OF RESPONDENTS

B. Availability of Fire fighting Gadgets and Equipments in Homes of Inhabitants:

The availability of Fire fighting gadgets and equipments in homes of Inhabitants is presented in Table 4. It was revealed that 207 respondents (90% of the total respondents) do not have any Fire fighting equipments in their homes while 23 respondents (10%) possessed only fire extinguishers; of this 23 respondents, it was observed that 65.2% of available extinguishers had expired while 34.8% were still valid. 100% of respondents stated that other Fire fighting equipments like Fire alarm, Foam cylinder, Fire blanket sprinkler/hose reel and Fire hydrants does not exist in their homes.

However through focus group discussions and direct observations, it was revealed that Inhabitants of the study area mainly rely on the traditional way of controlling fire by the use of water and sand as they have not been exposed to other Fire fighting tools.

Table 4: Availability of Firefighting Gadgets and Equipments in Homes of Inhabitants

FIRE FIGHTING EQUIPMENTS	FREQUENCY EXIST	FREQUENCY DO NOT EXIST	PERCENTAGE EXIST	PERCENTAGE DO NOT EXIST
FIRE BLANKET	0	230	0	100
FOAM CYLINDER	0	230	0	100

FIRE EXTINGUISHER	23	207	10	90
FIRE ALARM	0	230	0	100
SPRINKLER/HOSE REEL	0	230	0	100
FIRE HYDRANTS	0	230	0	100
ANY OTHER (SPECIFY)				

AVAILABLE FIRE FIGHTING EQUIPMENT	FREQUENCY EXPIRED	FREQUENCY VALID	PERCENTAGE EXPIRED	PERCENTAGE VALID
FIRE EXTINGUISHER	15	8	65.2	34.8

Source: Field Work.

C. Use of Fire Fighting Gadgets and Equipments:

The respondents exhibited that they have little or no knowledge on the usage of Fire fighting gadgets and equipments to control outbreak of fire in their homes. Apart from pouring water and sand into burning fire; they have little or no knowledge on how to use other Fire fighting equipments like Fire extinguishers, Fire alarm, Foam cylinder, Wet chemical, Fire blankets and Sprinklers/Hose reel to quench a burning fire. Table 5 presents the respondents' knowledge on fire control techniques.

Table 5: Use of Fire Fighting Gadgets and Equipments

FIRE FIGHTING GADGETS	ABLE TO OPERATE (%)	NOT ABLE TO OPERATE (%)	DO NOT KNOW (%)
FIRE EXTINGUISHER	10	87	3
FIRE BLANKETS	4.3	95.2	0.4
FIRE ALARM	1.3	98.3	0.4
WATER	100	0	0
SAND	100	0	0
FOAM CYLINDER	0	97.8	2.2
WET CHEMICAL	0	98.7	1.3
SPRINKLER/HOSE REEL	0.4	97.4	2.2

Source: Field Work.

From the above Table 5, all the respondents can use Water and Sand to quench a burning fire. 87% of the respondents cannot use Fire extinguisher, 95.2% cannot use Fire blanket, 98.3% cannot operate a Fire alarm, 98.7% cannot use Wet chemical, 97.8% were unable to use a Foam cylinder, neither can 97.4% use Sprinkler/Hose reel to quench fire outbreak. All indicating that apart from the traditional way of controlling fire by the use of Water and Sand, the Inhabitants has not been exposed to other Fire fighting tools. The results show that the Inhabitants by themselves can do little in case there is fire outbreak.

D. Fire Incidences Recorded in Gombe Metropolis during the Duration of Study:

The Table 6 and 7 below presents a clear picture of the various incidences of fire outbreaks/Rescue emergency calls responded to as experienced in Gombe metropolis during the duration of this research.

Table 6: Records of Fire/Rescue Emergency Calls Responded to from January to December 2016

S/N	MONTH	NUMBER OF CALLS	ESTIMATED PROPERTY LOSS (₦)	ESTIMATED PROPERTY SAVE (₦)	LIVES LOSS	LIVES SAVE	INJURIES
1	JANUARY	48	12,545,700	23,207,000	Nil	128	1
2	FEBRUARY	47	12,275,500	52,995,500	2	172	46
3	MARCH	19	5,615,000	24,820,000	Nil	63	30
4	APRIL	23	6,335,500	1,543,335,000	7	52	24
5	MAY	15	2,677,000	20,030,000	8	235	1

6	JUNE	13	4,384,000	14,797,000	Nil	42	6
7	JULY	5	2,350,000	12,500,000	Nil	37	Nil
8	AUGUST	10	3,350,000	15,795,000	Nil	45	5
9	SEPTEMBER	12	2,020,000	13,754,000	Nil	11	8
10	OCTOBER	22	8,335,000	38,210,000	Nil	149	5
11	NOVEMBER	23	8,125,000	60,850,000	Nil	108	2
12	DECEMBER	29	326,235,000	7,416,608,000	1	189	11
TOTAL		266	394,247,200	9,236,901,500	18	1,231	139

Source: Fire Service Directorate, Gombe state.

Table 7: First Quarter 2017 Records of Fire/Rescue Emergency Calls Responded to from January to March

S/N	MONTH	NUMBER OF CALLS	ESTIMATED PROPERTY LOSS (₦)	ESTIMATED PROPERTY SAVE (₦)	LIVES LOSS	LIVES SAVE	INJURIES
1	JANUARY	42	100,110,000	244,110,000	1	90	4
2	FEBRUARY	33	86,336,000	212,300,000	6	160	Nil
3	MARCH	65	111,290,000	2,603,890,000	2	722	29
TOTAL		140	297,736,000	3,060,735,000	9	972	33

Source: Fire Service Directorate, Gombe state.

From the table 6 and 7 above, it is noticed that during the first quarter report of 2016, a total number of **114** distressed calls (Rescue emergency calls responded to) on fire outbreaks were received by officials of the Gombe state fire service from Inhabitants of the study area which resulted to an **estimated property loss worth ₦30,436,200** and in which only **2 people** lost their lives. Comparing these statistics to that of the first quarter report of 2017, in which **140** distressed calls (Rescue emergency calls responded to) on fire outbreaks has already been received and which has resulted to an **estimated property loss worth ₦297,736,000** and in which **9 people** have lost their lives!. This shows a sharp increase in the adverse effects of fire outbreaks and calls for great concern by all stakeholders to curbing the menace of urban fire outbreaks and for the Inhabitants to better protect themselves.

Furthermore, it is also noticed that during the first quarter report of 2016, diligent rescue works by the Gombe state fire service and affected Inhabitants had resulted to an **estimated property save worth ₦101,022,500; 363 lives saved and 77 injuries**. However, in the first quarter report of 2017, an **estimated property save worth ₦3,060,735,000; 972 lives saved and only 33 injuries** had been recorded. Thus indicating more positive statistics on fire outbreak curbing and prevention can be achieved if all stakeholders imbibe international best practices.

E. Causes of Fire outbreaks in Gombe metropolis:

Five variables were identified as the causal factors of fire outbreaks in Gombe metropolis. These identified variables were included in the research questionnaires and the responses received from respondents were then analyzed and ranked thus indicating the frequencies of respondents’ opinions regarding the main causes of fire outbreaks in Gombe metropolis as shown in the table 8 below.

The identified variables include-

- i. All electricity related issues like electric sparks, power surge, illegal electricity connections, faulty sockets, substandard wires and electrification, etc.
- ii. Arson; described as a deliberate form of protest or vengeance against others or the government by individuals or a group of people.
- iii. Negligence of households to include leaving under-aged children at home without supervision, match sticks/lighters within the reach of children, lighted candles and lamps, hoarding and storing-up of adulterated fuel in homes, etc.
- iv. Kitchen Appliances like gas cookers, ovens, electric stove, gas cylinders, etc.
- v. Burning of debris/Bush burning.

Table 8: Causes of Fire Outbreaks in Gombe Metropolis

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VARIABLES	RESPONDENTS SCORE					TOTAL	MEAN	RELATIVE INDEX	RANK
	1	2	3	4	5				
ALL ELECTRICITY RELATED.	15	25	110	55	25	740	3.20	0.64	2
KITCHEN APPLIANCES.	65	60	40	45	20	585	2.50	0.51	5
ARSON.	35	60	50	40	45	690	3.00	0.60	3
BURNING DEBRIS/BUSH BURNING.	40	55	25	100	10	675	2.90	0.59	4
NEGLIGENCE OF HOUSEHOLDS.	10	65	40	35	80	800	3.50	0.70	1

Source: Field Work.

Negligence of households which includes leaving under-aged children at home without supervision, match sticks/lighters within the reach of children, lighted candles and lamps, hoarding and storing-up of adulterated fuel in homes, etc emerged as the number one cause of fire outbreaks in Gombe metropolis; All electricity related issues like electric sparks, power surge, illegal electricity connections, faulty sockets, substandard wires and electrification, etc was ranked the second casual factor of fire outbreaks in the study area; The third casual factor was Arson; Burning debris/Bush burning was ranked the fourth casual factor; The use of Kitchen appliances like gas cookers, ovens, electric stove, gas cylinders, etc then emerged the fifth ranked causal factor of fire outbreaks in Gombe metropolis.

F. The Problem of Hoarding, Storing-up and Sales of Adulterated Fuel in Gombe Metropolis:

This is one of the sub variables that make up the main variable adjudged to be the major cause of fire outbreak to residential buildings in Gombe metropolis from the questionnaire analysis.

According to NNPC (2008), Fuel adulteration is defined as the introduction of foreign substance into fuel illegally or unauthorized with the result that the product does not conform to the requirements and specifications of the product. In Nigeria the fuel that are majorly adulterated are Petrol, Kerosene, and Diesel.

The major fuel adulterated in Gombe metropolis is Premium Motor Spirit, PMS otherwise known as Petrol obviously due to its very high demand and supposed artificial scarcity created by petroleum oil marketers; and the sellers of these adulterated PMS are known as "**Black oil marketers**".

In Gombe metropolis, artificial fuel scarcity, hoarding and fuel adulteration is a daily occurrence and there is always arbitrary increase in fuel prices by petroleum oil marketers who are suppose not to sell above the approved government pump prices. The artificial scarcity has lead to rampant hoarding, storing-up and sale of adulterated fuel within the metropolis by these "**Black oil marketers**". The situation is so bad that one would find these "**Black oil marketers**" erecting shads right besides authorized fuel filling/gas stations openly displaying kegs of adulterated fuel for sale and the most disheartening thing is that they receive huge daily patronage from the public (consumers) while the various law enforcement agencies and government of the day look on without doing anything to stop them. (See Fig. 6 below):



Source: Field Work.

FIGURE 6: SCENES OF "BLACK OIL MARKETERS" ACTIVITIES WITHIN GOMBE METROPOLIS

Fuel adulteration, hoarding, storing-up and sale have become very rampant in Gombe metropolis, because the products of comparable quantities have different prices. The fuel dealers and "**Black oil marketers**" do this adulteration so as to make maximum profit from the product while neglecting the harmful effects it portends to human life. Some of these "**Black oil marketers**" hoard and store-up these adulterated fuel in their homes or places close to residential areas and in cases of any ignition, the result is fire outbreaks. For example, when kerosene is adulterated with petrol it can be very dangerous because it can be highly inflammable. Igbafe, A.I; and Ogbe, M.P. (2005).

G. Challenges of Fire Outbreak Management:

During the period of this research, some of the challenges of fire outbreak management in Gombe metropolis includes: Lack of water and fire hydrants, Lack of Fire-fighting gadgets and equipments, Lack of knowledge and orientation of Inhabitants, Improper addressing of residential buildings in a community and street names and Lack/Paucity of funds.

a) Lack of Water and Fire Hydrants:

Although the study revealed that all Inhabitants in the study area can use Water to fight fire outbreaks (see Table 5 above), the availability of Water in the study area remains a huge problem to both Inhabitants and Government of the day. Field survey revealed that the Inhabitants rely on purchasing Water for domestic use from water vendors who make use of motor water tankers for sales of water. Although there is also pipe-borne supply of Water to the study area by the Gombe state Water Board, broken down or damaged networks of water pipes makes it sometimes difficult for inhabitants to receive pipe-borne water supply to their homes or neighborhoods; further making it difficult for Water to be readily available for use by the Inhabitants (See Fig. 7 below):



Source: Field Work.

FIGURE 7: SCENES OF BROKEN DOWN/BADLY LAID NETWORKS OF WATER-BORNE PIPES WITHIN GOMBE METROPOLIS

b) Lack of Fire fighting Gadgets and Equipments:

Another problem with regards to Fire management is the lack of Fire fighting gadgets and equipments. Results from the field survey and as displayed in Table 4 above revealed that only 23 (representing just 10%) out of a possible 230 Fire extinguishers exists in homes of Inhabitants while there was not a single availability of the following- Fire blankets, Foam cylinder, Fire alarm, Sprinkler/Hose reel and Fire hydrants.

c) Lack of Knowledge and Orientation of Inhabitants:

Results from key informant interviews and focus group discussions revealed that a lot of Inhabitants of the study area exhibits poor attitudes as well as perceptions towards fire management; they lack adequate knowledge and orientation about ways of preventing fire outbreaks and curbing its adverse effects on human lives/livelihoods and infrastructural development. For example, Table 4 above reveals that out of the 23 Fire extinguishers indicated to exist in homes of Inhabitants surveyed, 15 of them had expired while only 8 were valid. If these 15 inhabitants had better knowledge and orientation about fire outbreaks, they would have taken replacement of their expired extinguishers more seriously so as to be better prepared in the event of any possible fire outbreak.

d) *Improper Addressing of Residential Buildings in a Community and Street names:*

Timely location and access of buildings where Fire/Rescue emergency calls are to be responded to by the local fire fighting authority in any community is very vital and key towards successfully checking the adverse effects of fire outbreaks.

Result findings of Focus group discussions and direct observations of the study area revealed that most of the communities with histories of severe and mostly uncontrolled fire outbreaks which resulted to negative impacts on human lives and huge property losses were communities without a well defined addressing pattern of residential buildings and street names. This unfortunate scenario will make it difficult for timely location and intervention to distress fire/rescue emergency calls by the Gombe state fire service.

e) *Lack/Paucity of Funds:*

Findings from Key informant interviews and focus group discussions revealed that aside from primary blames on possible causes of fire outbreaks in the first place being attributed to Inhabitants of the study area; in other instances, the impacts are attributed to the Gombe state fire service (i.e. the local fire fighting authority) due to their inadequacy in resources needed to combat as well as reduce the adverse effect of fires in case of an outbreak.

The deficiencies of the Gombe state fire service in effectively combating fire outbreaks and bring them under control is often attributed to paucity/lack of adequate funding by the Gombe state government.

On the other hand, due to the harsh economic downturn of Nigeria where most Inhabitants complain of finding it difficult to barely provide themselves and their families three square meals a day, purchasing Fire fighting gadgets and equipments in their homes to be better positioned in the event of any fire outbreak will be a difficult if not an impossible task. This obviously was responsible for the poor presence and non-availability of Fire fighting gadgets and equipments in homes of Inhabitants as shown in Table 4 above.

VIII. SUMMARY OF MAJOR FINDINGS

Investigating the perception of Inhabitants of the study area towards fire management was the first major objective of this research.

Data analysis and interpretation revealed that majority of the respondents identified negligence of households which includes leaving under-aged children at home without supervision, match sticks/lighters within the reach of children, lighted candles and lamps, hoarding and storing-up of adulterated fuel in homes, etc as the number one cause of fire outbreaks in Gombe metropolis.

It was revealed that out of 230 respondents surveyed, only 23 (representing 10%) Fire extinguishers exist while no other Fire fighting gadgets and equipments like Fire blankets, Foam cylinders, Fire alarms, sprinklers/Hose reels and Fire hydrants were found.

Of the 23 Fire extinguishers found to exist, 15 (representing 65.2%) had expired while only 8 (representing 34.8%) were still valid.

In addition it was also revealed that apart from Water and Sand, majority of the inhabitants cannot use other Fire fighting gadgets and equipments like Fire extinguishers, Fire blankets, Fire alarms, Foam cylinders, Wet Chemicals as well as Sprinklers/Hose reels to quench any possible fire outbreak.

Moreover the Inhabitants were not fully satisfied with the Fire/Rescue Emergency response rate of the Gombe state fire service due to their perceived inadequacies in resources needed to combat as well as reduce the adverse effects of fires in case of an outbreak.

The second objective of the study was to ascertain some of the challenges faced with regards to fire management within Gombe metropolis.

Key informant interviews, Focus group discussions and Direct observations revealed that Lack of Water and Fire hydrants, Lack of Fire fighting gadgets and equipments, Lack of knowledge and orientation of Inhabitants, Improper addressing of residential buildings in a community and street names and Lack/Paucity of funds were some of the challenges faced with regards to fire management within Gombe metropolis.

IX. CONCLUSION

This paper has discussed curbing menace of urban fire outbreak in residential buildings- a case study of Gombe metropolis. According to the results of this research, it is vividly clear that generally in Gombe Metropolis, Inhabitants are indeed vulnerable to fire outbreak in residential buildings as a result of poor fire management practices, lack of preparedness and lack of knowledge/orientation on curbing the adverse effects of fire outbreaks.

The vulnerability of Inhabitants to possible fire outbreaks is further aggravated by the continuous unchecked (by government of the day) activities of erring fraudulent fuel dealers and "**Black oil marketers**" who engage in hoarding, storing-up and sales of adulterated fuel in Gombe metropolis as they pose great threat to human lives and properties.

Furthermore, the limited educational campaign by the Gombe state fire Service on fire prevention and safety measures together with Inhabitants' deficiencies in caring for their own safety have all contributed to residential fire outbreaks in the study area.

It is therefore the responsibility of every Inhabitant to identify unsafe conditions and behaviors, and try to correct them so as to safeguard their lives and properties from fire outbreaks.

X. RECOMMENDATIONS

- 1) According to the surveyed results, hoarding and storing-up of adulterated fuel in homes was one of the sub-items which formed the number one cause of fire outbreak in residential buildings in the study area. To check this menace:
 - a) ***Effective credible monitoring and surveillance system:*** Any anti-adulteration program should be backed up by sound financial and legal framework. The fiscal framework should take into account-associated costs like monitoring & testing infrastructure. Policy for imposing severe penalty & exemplary punishment to the adulterators needs to be imbibed into legal framework to discourage adulteration.
 - b) ***The manner in which retail fuels are distributed in Nigeria has an important bearing on fuel adulteration:*** For example, having large numbers of small, independent transport trucks operators moving fuels from terminals to the point of sale as is the practice in Nigeria creates an environment conducive to adulteration. One effective "**market based**" approach is the practice in many industrialized countries whereby oil companies market at retail and assume responsibility throughout the supply chain to guarantee fuel quality in order to protect their public image and market share. Hence, this practice should be adopted and encouraged to work by the Nigerian government.
 - c) *To curb fuel adulteration, oil companies should carryout filter paper test, density checks, blue dyeing of kerosene. Oil companies and government agencies should carryout surprise and regular inspections of retail outlets with mobile laboratories. To this end, the Department of Petroleum Resources, DPR should employ more field personnel that would be monitoring fuel filling stations across the country on a daily basis against illegal increase in pump prices, adulteration, hoarding and other malpractices. Heavy penalty on sale of adulterated fuels should be enforced in order to discourage fuel adulteration.*
- 2) The Gombe state fire service should organize local fire safety campaigns by identifying and using some selected local radio/television stations and newspapers to spread messages to ethnic populations who are the prime targets for those media. The campaign will be intended to raise awareness about the problem of fire outbreaks and to change the fire safety behaviors of Inhabitants.

- 3) Government should assist and encourage local authorities to provide community based Fire fighting gadgets and equipments to help detect and facilitate the initial fighting of fires when they do break out before the arrival of fire personnel; Inhabitants/local authorities should also be educated on how to operate the provided community based Fire fighting gadgets and equipments.
- 4) There should be an increased usage of Fire stations for community fire safety programmes.
- 5) Funds and resources must be directed towards plans and strategies to prevent a fire outbreak disaster rather than relief as this will ensure sustainable development. To this end, there should be an increased and sustained funding of the Gombe state fire service.
- 6) Government should conduct extensive sensitization programmes for high risk elderly, youths and children populations. These sensitization programmes should be targeted at schools, markets, churches, mosques and motor parks: It should concentrate on basic “dos” and “don’ts” towards safe guarding one’s life and property against menace of fire outbreaks.
- 7) The Gombe state government should increase staffing of the Gombe state fire service and regular staff trainings on fire fighting and management programmes should be conducted. Also, facilities and equipments at the Gombe state fire service should be upgraded and modified to what is modernly obtainable and befitting of a modern metropolitan city.
- 8) A well defined addressing pattern of residential buildings and street names should be adopted and enforced by the Gombe state government as this will ensure timely location and access of buildings where Fire/Rescue emergency calls are to be responded to by the local Fire fighting authority (i.e. Gombe state fire service) towards successfully checking the adverse effects of fire outbreaks.
- 9) Inhabitants should be educated on the operation and necessity of providing at least Fire extinguishers in their homes or places of work; as a way of encouragement, the Gombe state government should subsidize the purchase of Fire extinguishers by Inhabitants.
- 10) The Gombe state government through relevant state agencies should make home safety visits within the metropolis towards identifying and analyzing high risk households for the purpose of sensitizing the Inhabitants on best safety practices towards preventing fire outbreaks and better equipping these Inhabitants on how to safeguard their lives and properties in the event of any fire outbreak.

ACKNOWLEDGMENT

The authors would like to thank Almighty God for the gift of life, good health and knowledge. Special thanks to Agbonkheso Onoyan-usina for leading this research group and to Yerima Abubakar Baba for providing a conducive platform.

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