

FIRE DISASTERS AND INFRASTRUCTURE SECURITY PROBLEMS IN URBAN AREAS: A CASE STUDY OF NIGER STATE

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ABSTRACT

The world is witnessing an increase in threats to urban security due to high rate of urbanization and the growing complexities of human development activities. Fire disaster, with a devastating effect on human life, property and urban infrastructure, is one of the major threats to urban security in many cities of the world. This paper considers the threat of fire disasters to urban infrastructure in Niger State, Nigeria. Amongst others it was found out that fire outbreaks in the study area are accounted for by careless dropping of combustive materials, careless handling of matches by children, sparks from electric fault and deliberate refuse or bush burning. Fire outbreak due to electrical fault in buildings accounted for 79.1 per cent of all cases recorded between year 2000 and 2007. The study also identified poor land use planning, slum development due to ineffective development control and lack of fire protection devices in buildings as major factors contributing to the spread of fire disasters in the area. Amongst others, it recommended effective land use planning and development control, urban renewal programme, creation of fire resistant city, the incorporation of fire safety measures into the building development process, capacity building for the State fire department, citizen education and community participation as means of preventing fire outbreak and mitigating the problems of fire disasters. The institution of these measures will ensure the safety and sustenance of urban infrastructure in the area.

Keywords: Disaster, Fire, Infrastructure and Urban areas

Introduction

Population growth and rapid rate of urban expansion are two basic realities of the modern world. The 20th century witnessed unprecedented urban agglomerations and by the year 2025, it is estimated that two-third of the world's population will live in urban areas. The progressive growth in the population of urban residents has resulted in the creation of large settlements and the number of cities with population of one million and above had increased from 13 in 1900 to 68 in 1950 and about 250 in the year 2000.

The cities of the 21st century are complex entities that emerged as products of urbanization and globalization. They are embodiments of the good and the bad aspects of urbanization and they reflect the hope and the fear of the modern world. While the cities offer opportunities for innovation and the creation

of wealth, they are also faced with the problems of disaster, poverty, crime and insecurity. Amongst others, urban insecurity is a major problem of concern in all nations.

Cities of the developing countries are the worst hit by the problems of urbanization. Today, the urban centres in Africa are faced with three main security problems. These include crime and urban violence, tenure insecurity and forced eviction as well as natural and man-made disasters. Amongst these, disaster occurrence is a major problem of global concern. Large and medium sized cities have been exposed to increasing danger of disasters with less resilience. In particular, fire disaster is seen as phenomenon which destroys critical urban infrastructure and which is capable of undermining development efforts for meeting the Millennium Development Goals. As it were, African countries are characterized by many informal settlements with a mixture of unplanned residential, commercial and industrial land uses that subject them to risks of fire. The growing incidence of slums in many parts of our cities is a major issue of concern as poor development pattern and the use of combustible materials (wood, zinc, polythene etc) have increased the chances of fire disaster. As a consequence, incidences of fire disaster have destroyed a great deal of urban infrastructure in our cities.

In Nigeria, and many other developing countries, fire disasters have destroyed properties worth several billions of Naira and have threatened the sustenance of urban infrastructure. Huge amounts of capital have been expended on fire control, emergency reliefs and the rehabilitation of infrastructure destroyed in fire disasters. While government's efforts in fire control and post fire disaster rehabilitation is recognized and appreciated, there is more to be done in the area of fire prevention and management. This paper considers the case of fire disaster in Niger State, Nigeria. The main objective is to examine the general causes of fire disaster and its impacts on urban infrastructure. The paper also isolated the human and physical development factors that contribute to fire outbreak and the occurrence of fire disaster in Niger State. It also makes recommendations on how to reduce the impact of fire disasters in the State so as to sustain urban infrastructure in the State.

Research Scope

The research is focused on the problems of fire disaster in Niger State (figure 1). It considered disaster cases from Minna, Bosso, Rijau, Bida, Kotangora, Kutigi, Suleja, Kagara, Lapai, Agaie and Kuta settlements. The study further narrowed down on four major towns as case studies. These include Minna, Bida, Kotangora, and Suleja towns. In all the towns, the study examined the types, causes and relative frequency of fire incidence. The impacts of fire disaster on properties and the infrastructure of the settlements were also considered.

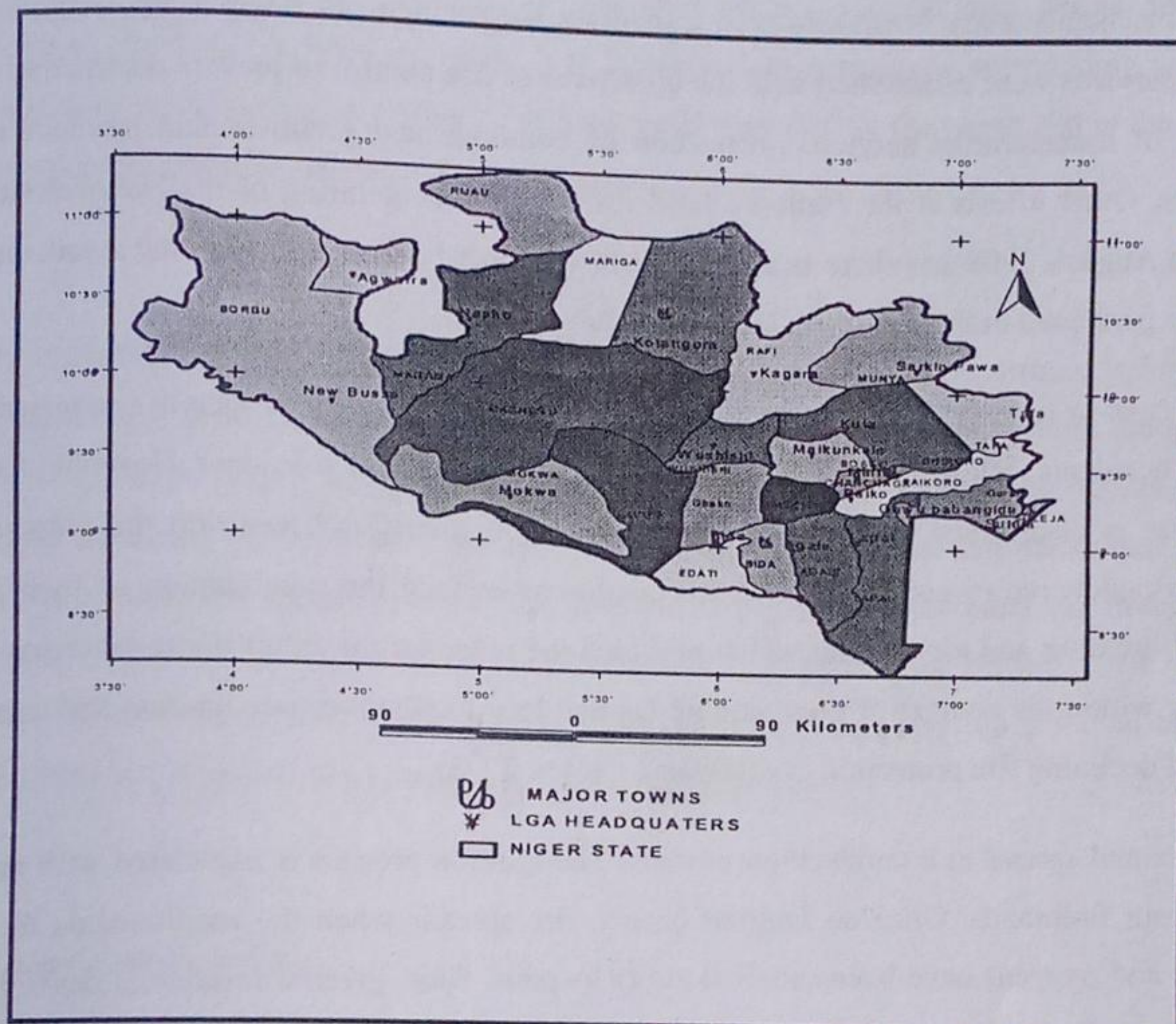


Figure 1: Niger State Showing Major Towns

Review on Fire Ignition, Spread and Disaster Prevention

Although the history of fire disaster dated as far back as the early period of human existence, the concern and response to the problem is relatively new in human history. The problem of fire disaster has become a major issue of global concern and has attracted international attention. As human settlements became more and more sophisticated, fire disasters have continued to destroy natural resources and the urban fabric. In the United States of America, residential fire destruction dated as far back as the 1870s and between 1870 and 1920, numerous towns were destroyed by fires and thousands of civilian fatalities were recorded (Cohen, 2005). With these and many other wild fire incidences across the globe, fire disaster prevention, control and management have become issues of concern in all nations. In the United States, for instance, interest in residential fire began after the 1985 fire session and this culminated into the launching of several National and State interagency Wildland – Urban interface fire programmes such as the National Fire Plan, the Ten-year Comprehensive Strategy, the President’s Healthy Forests Initiatives

etc. According to Cohen (2003), there is an increase in political attention to homes destruction and many communities have been evacuated during extreme wildland fires in the United States.

In Africa, governments across nations are becoming aware of the threat of fire disaster and various response mechanisms are being designed to address the problem. In Nigeria, for instance, Federal and State fire services were established with the objectives of fire control to prevent destruction of properties, rendering of humanitarian services, inspection of buildings and premises and issuance of fire safety certificates. Other efforts at the National level include the inauguration of the National Council of Fire Service in August, 2008 and there is a proposal to establish Federal Fire Fighting Academy to train and retrain fire personnel in the country (Daily Trust, July 2008).

Fire outbreaks in forests and urban areas are associated with a variety of factors connected with human activities, accidents and natural occurrences such as earthquakes and volcanoes. However, the potential of fire disaster is determined by the ignitability of residential\wildland area and the presence of certain conditions conducive to combustion. Such conditions include the combination of fuels (combustible materials), weather and topography which provided the potential for extreme fire behavior. Fire disaster thus occur within the context of these conditions that lead to simultaneous ignition and spread of fire in the face of declining fire protection capabilities (Cohen, 2005)

Fire ignites and spread in a combustion process. The ignition process is associated with flames or spot ignition from firebrands. Once an ignition occurs, fire spreads when the requirements for combustion (fuel, heat and oxygen) have been satisfied along its path. Thus, given a residential development that is prone to ignition, simultaneous home ignition occurs resulting in numerous home burning and fire spread as burning structures ignite adjacent ones.

Researches on home ignition potential have yielded many results in the past. An investigation of the Bel Air Fire in 1961 by Howard et. al. (1973) concluded that homes with nonflammable roof and 10 - 18 meter vegetation clearance had a 95% survival chance. In the study of the Painted Cave Fire, Foote (1994) also found that home with a nonflammable roof and 10 meters of clearance had 86% rate of survival. Using the above case studies, Cohen (2000) investigated the year 2000 Los Alamos Wildland-urban fire disaster and found that high intensity crown fire did not ignite homes directly, but that low intensity surface fires spread to contact homes as firebrands ignited the adjacent surface fuels or as firebrands ignite home directly.

Further researches on home ignition potentials have used different techniques to draw general conclusions. For instance, Cohen (2005) has used the modeling, experimental and field investigations approaches in the study of wildland - urban fire disasters. The author concluded that, given an extreme wildfire, a home's characteristics in relation to a home's surroundings within 30 meters principally determine the home ignition potential. The home and its immediate surrounding within 30 meters are regarded as the home ignition zone. Thus the fuels surrounding the home within the home ignition zone determine the potential for direct home ignition.

The foregoing discussions reveal that the probability of fire disasters occurrence is dependent on the level of ignition potential of structures and the presence of combustion fuels within the home ignition zone. Researches have shown that the use of wood and other highly combustible building materials increase disaster potentials in human settlements. Studies have also confirmed that, rather than its location, it is the home's exterior and material design that determine its ignition potentials from firebrands. Thus, for the purpose of fire disaster prevention, assessment of fire risks and the institution of mitigation measures should be done in relation to those factors that determine home ignition potential as well as those that contribute to the spread of fire within the home ignition zone.

Research Methodology

Data for the study were derived mainly from secondary sources. Relevant information on fire disaster cases between year 2000 and 2007 were collected from the records of the Niger State Fire Service. Oral interviews were also conducted on stakeholders in the study areas. The Nikon COOL PIX digital camera with 3x lens and 2.0 inch LUP was used to capture the scene of a residential slum in Minna. The data collected were analyzed using simple descriptive and inferential statistical methods. Location quotient was calculated to determine the relative share of disaster occurrence among four major towns. The information is presented in frequency tables and percentages.

The Formula for Location Quotient is:

$$LQ = \frac{Si/S}{Ni/N} \text{ Where:}$$

Si = the number of fire incidence in a particular settlement

S = the total number fire incidence for all settlements

N_i = population of the settlement
 N = total population of all settlements

Types and Causes of Fire Disasters in Urban Areas of Niger State

Fire disaster in all parts of the world occurs in different forms depending on the place and the circumstances of occurrence. An investigation into the types of fire disasters recorded in Niger State, Nigeria reveals that domestic, factory, public (i.e. those that occur in markets and public arenas), bush and vehicle fires are of common occurrence. Amongst all these, the statistics of fire incidence taken between year 2000 and 2007 show that domestic fire account for 74.5 per cent of the total occurrence (table 1). The situation in the four major towns of Niger State (Minna, Bida, kotangora and Suleja) attests to the predominance of domestic fire (see figure 1) with Minna accounting for 497 (89.5 per cent) of the total incidence of 555 recorded in seven years (table 2).

Table 1: Types and Frequencies of Fire Disaster in Niger State (2000 - 2007)

Incidence	2000	2001	2002	2003	2004	2005	2006	2007	TOTAL	(%)
Domestic fire	39	30	89	103	101	82	94	30	568	74.5
Factory fire	---	---	2	---	---	---	---	2	4	0.5
Public fire	17	34	13	3	2	---	---	44	113	14.8
Bush fire	2	9	4	1	---	1	---	8	25	3.3
Vehicle fire	14	9	9	1	2	3	4	10	52	6.8
Total	72	82	117	108	105	86	98	94	762	100

Source: Compiled from Niger State Fire Service Department, Minna; June 2008.

Table 3: Relative Share of Disaster Incidences in Four Major Towns

Towns	Total incidence	Population	Location quotient
Minna	630	348, 788	2.29
Bida	22	188, 181	0.14
Kotangora	39	151, 944	0.29
Suleja	32	216, 578	0.17
TOTAL	723	905, 491	-

Source: Authors' Analysis, 2008

It is observed that fire outbreak in forests and urban areas are associated with a variety of human factors, accidents and natural occurrences such as earthquakes and volcanoes. However, most fire incidences in urban areas are associated with overt and covert activities of residents. In Niger State, research findings show that the causes of fire outbreak include careless dropping of smoking materials; careless handling of matches by children; sparks from electric fault and deliberate refuse or bush burning amongst others. As shown in table 4, fire outbreak arising from electrical fault in buildings is the major cause as it accounts for 79.1 per cent of all cases recorded between year 2000 and 2007.

Table 4: Causes of Fire Disaster in Niger State (2000 - 2007)

Causes	2000	2001	2002	2003	2004	2005	2006	2007	TOTAL	(%)
Smoking materials	29	32	2	-	1	-	1	-	65	8.4
Children/ matches	2	3	4	8	3	-	1	12	33	4.3
Electrical fault	33	42	96	97	100	94	96	53	611	79.1
Rubbish /bush burning	7	3	15	2	1	2	-	23	53	6.9
Suspected arson	-	-	-	1	-	-	-	-	1	0.1
Gas fault	1	2	-	-	-	-	-	6	9	1.2
TOTAL	72	82	117	108	105	96	98	94	772	100

Source: Compiled from Niger State Fire Service Department, Minna; June 2008.

Apart from the immediate causes of fire outbreak identified, it is also found out that other factors contribute to the spread of fire and increase the risks of disasters in the State. For instance, it is observed that the pattern of development in the towns considered increase the scales and levels of risks of fire disasters. As it were, most parts of the urban landscapes of the four settlements considered are characterized by close proximity of residential, commercial and small scale industrial land uses which are mixed together in an unplanned manner. In Minna town, for instance, neighbourhoods like Jikpan in Bosso, Kpakungu, Saukakahuta and Maitunbi are characterized by slums developments that are highly

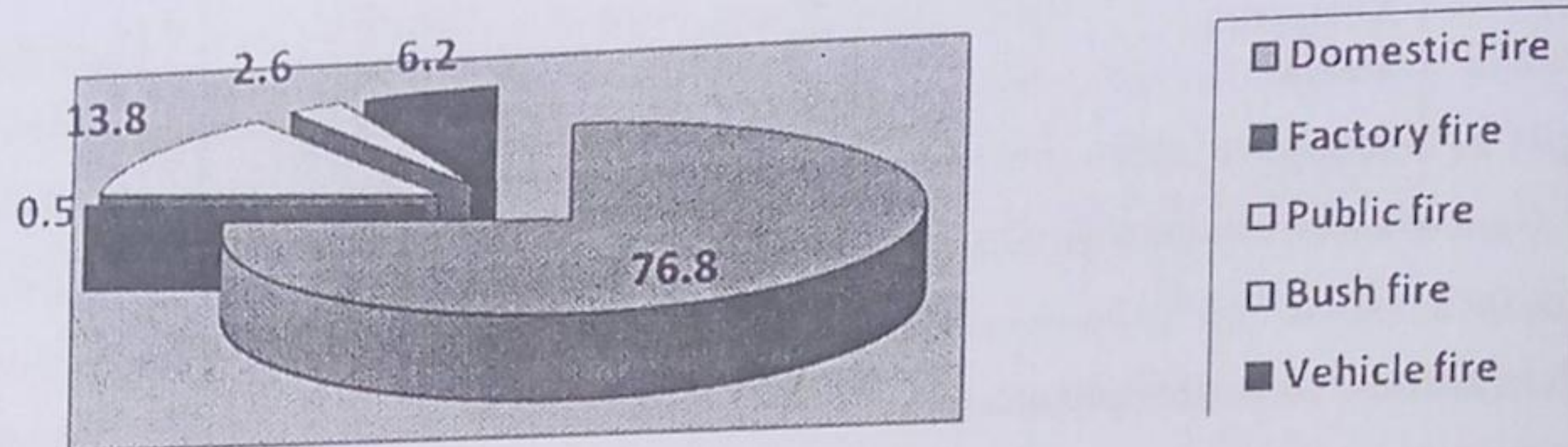


Figure 1: Types of Fire Disaster in Major Towns (2000 – 2007)

Source: Authors' Analysis, 2008

Table 2: Types and Frequencies of Fire Disaster in Major Towns in Niger State (2000 - 2007)

Incidence	Minna	Bida	Kontagora	Suleja	Total	%
Domestic fire	497 (89.5)	11(2.0)	23 (4.1)	24 (4.3)	555	76.8
Factory fire	2	---	---	2	4	0.5
Public fire	78	---	9	4	100	13.8
Bush fire	17	9	2	---	19	2.6
Vehicle fire	36	---	5	2	45	6.2
		2				
TOTAL	630	22	39	32	723	100

Source: Compiled from Niger State Fire Service Department, Minna; June 2008.

An examination of the spatial distribution of disaster incidence among the four major towns considered shows that Minna, with a location quotient value of 2.29 has more than fair share of all forms of fire disasters that occurred between year 2000 and 2007. On the other hand, Kotangora (0.29), Suleja (0.17) and Bida (0.14) recorded fewer share or incidences of disaster in the same period (see table 3).

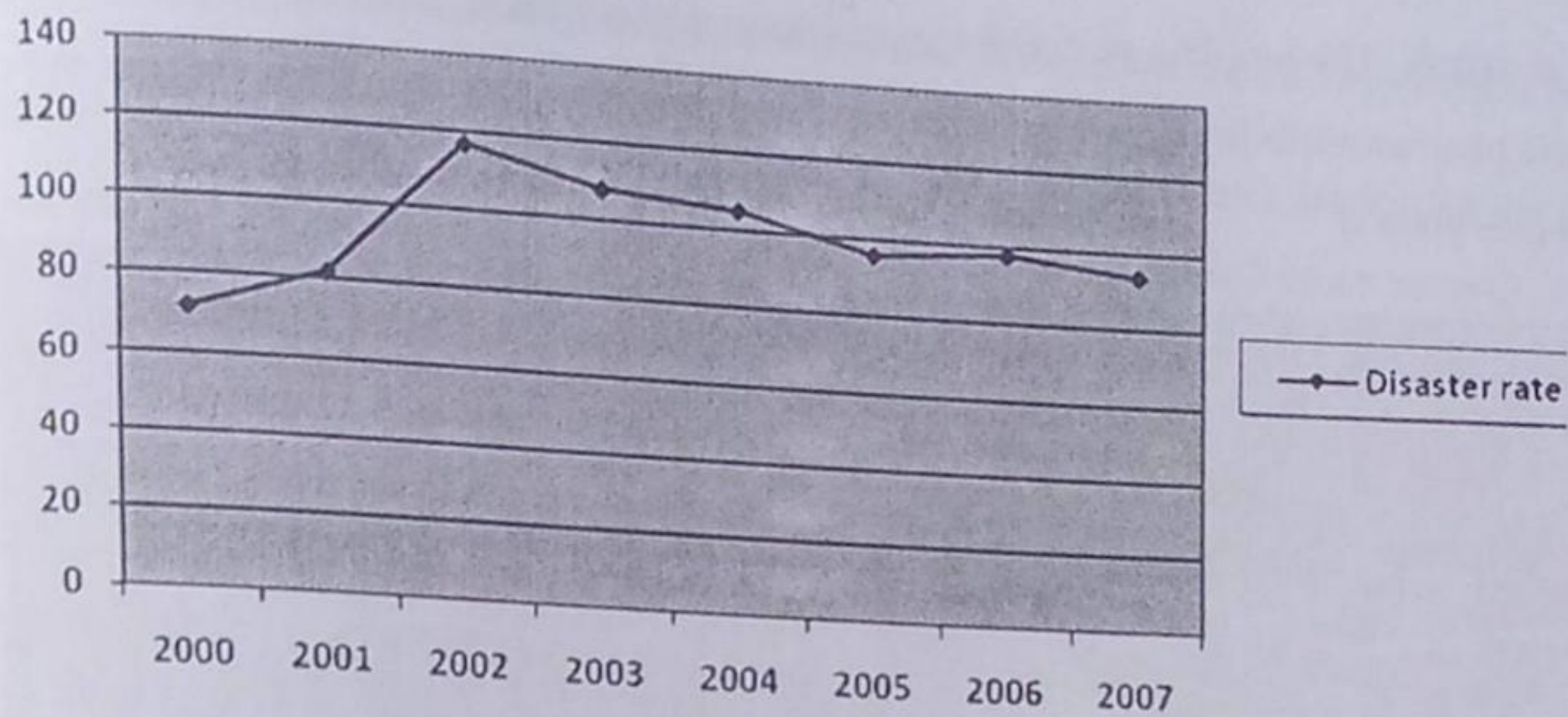


Figure 2: Trend in Fire Disaster Occurrences (2000 - 2007)

Source: Authors' Analysis, 2008

Impacts of Fire Disasters on Urban Infrastructure

Fire disasters have severe adverse impacts wherever they occur. Communities in different parts of the world have suffered huge economic losses and destruction by fire has threatened the economic survival of many low income residents of cities. In Niger State, the Fire Service Department estimated the total economic loss to fire disaster between year 2000 and 2007 at 586.002 million Naira with 53.7 per cent of the losses incurred in year 2004 alone (table 5). The huge economic loss is incurred from damages done mainly to urban infrastructure and personal properties.

Table 5: Estimated Loss to Fire Disaster (2000 – 2007)

YEAR	LOSS (IN NAIRA)	PERCENTAGE (%)
2000	₦17.258 m	2.9
2001	₦77.995 m	13.3
2002	₦ 2.306 b	0.4
2003	₦ 30.488 m	5.2
2004	₦ 314.470 m	53.7
2005	₦ 57.618 m	9.8
2006	₦ 48.786 m	8.3
2007	₦ 37.081m	6.3
TOTAL	₦ 586.002	100

Source: Source: Niger State Fire Service Department, Minna; June 2008.

prone to fire disasters. The problem of building congestion in these areas often aid the spread of fire when it occurs while poor accessibility has often times hindered smooth operation of fire fighters in combating fire disasters (see plate I).

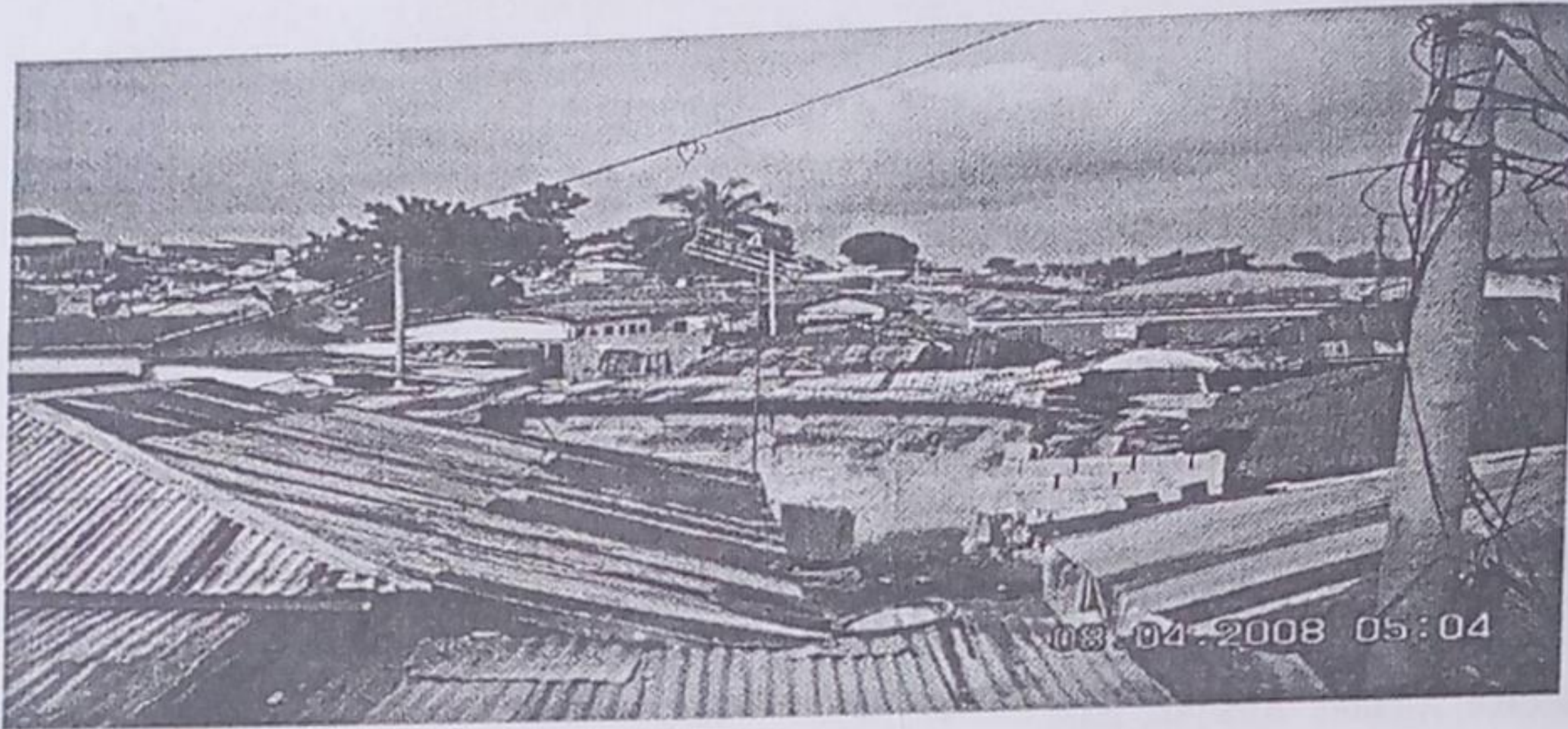


Plate I: Slum Residential Neighbourhood with Poor Access in Bosso, Minna

Source: Authors' Fieldwork, August, 2008

Fire disaster prevention is dependent on the availability of protective devices such as fire hydrants rather than access roads and nearness to fire station. Lack of fire protection devices in residential homes and their inadequacy in public buildings in the study area limits fire control ability, bringing about fire spread and the consequent damage to properties and urban infrastructure. Besides, the existence of sources of combustive fuels like saw mills, petrol stations; bakeries etc in many residential neighbourhoods are important factors that contribute to the risk of fire disaster in the area.

Arising from the different causes of fire disaster and the existing risk factors, Niger State has recorded a significant number of fire disasters over the year. The rate has fluctuated over the years with evidence of fall in the number of occurrence between year 2002 and 2007 (figure 2). However, the fall could not be entirely attributed to improvement in safety measures and control. Part of the reason could be due to poor reporting, inadequate coverage of fire services and poor data recoding\accounting system.

Recommendations on Fire Disaster Prevention and Mitigation for Infrastructure Safety

Disaster prevention and mitigation of the impacts of inevitable disasters are among the greatest challenges of the modern city. Fire disasters pose a great threat to urban infrastructure security and it is capable of undermining development efforts in developing countries. Thus, the need to safeguard and sustain urban infrastructure is a basic and emerging aspect of urban security in all parts of the world.

There are two basic categories of measures for addressing the problem of fire disasters in cities. These are the preventive and the mitigative measures. The preventive measures are the practical actions instituted to forestall fire disaster while the mitigative ones are those meant to reduce the negative impacts of inevitable fire disasters. These measures are as considered the subsequent sections of this paper.

1. Preventive Measures

Global efforts on urban security and safety issues are now focusing more on preventive measures. For instance, the UN- Habitat Safer Cities Programme launched in 1996 aims at reducing urban insecurity through the establishment of the culture of prevention. Some of the preventive physical planning measures for addressing the problem of fire disasters in our settlements include the following.

(i) Land use planning and development control :- Proper land use planning is an effective tool for fire disaster prevention. Land use zoning allows for the regulation of physical development in space and prevents the development of incompatible uses. Land use planning and control involves use zoning as well as the prevention and removal of land uses such as petrol stations which have high ignition potentials and saw mills, which provides fuel for fire disasters, from residential areas. Enforcement of development control in residential and commercial areas further reinforces compliance with the provisions of a land use plan. Development control measures should be instituted and made effective in all settlements to ensure adequate spacing of buildings, to prevent the conversion of residential buildings to commercial or light industrial use and ensure the use of buildings for the approved purposes. All these will reduce fire ignition potentials, prevent the spread of fire in case of any outbreak and reduce potential damage from fire disasters.

With respect to damage to urban fabrics, fire disasters have consumed, with ferocious veracity, a great deal of urban basic facilities and services and have threatened the sustenance of urban infrastructure in many cities of the world. In Niger State, statistics on selected cases of fire incidents show that many urban fabrics have been destroyed by fire disasters recorded in many settlements. As shown in table 5, damages to infrastructure like residential houses, markets, schools, hospital facilities and electrical installations (power transformers, cables and poles) have been recorded in Minna, Bida and Suleja towns. The economic losses recorded in the few cases selected run into millions of Naira (see table 6).

As it were, the cost of replacing the infrastructure destroyed imposes huge economic burden on the Municipal and State governments and this has negative implications for sustainable urban infrastructure development in the State. In fact, the problem of infrastructure destruction by fire disasters in the State can create a development paradox of 'build and destroy' if necessary measures are not taken to reduce the impacts of future events. The preventive and mitigative measures required for fire disaster control and management are considered in the next section of the paper.

Table 6: Selected Cases of Urban Infrastructure Damage by Fire Disasters (2006 – 2008)

Date of event	Place of occurrences	Types and scale of damage done	Estimated loss (₦)
18 th Nov., 2006	IBB market, Suleja	13 shops and goods	Unknown
27 th Dec., 2006	Bosso Low Cost, Minna	Four Bedroom flat, Properties	600,000.00
8 th Jan., 2007	Barikin Sale, Minna	12 Residential houses	2.5 Million
19 th Jan., 2007	Bosso market, Minna	35 residential\commercial rooms	1.5 million
23 rd Jan., 2007	Tunga, Minna	3 Bedroom flat	500,000.00
28 th Jan./ 2007	Shiroro road, Minna	6 Bedroom flat, properties	6.8 million
29 th Jan., 2007	Shiroro road, Minna	12 rooms, properties	800,000.00
1 st Jan., 2007	Hill Top Sch., Minna	4 Classrooms and toilets	100 million
10 th Jan., 2007	Army Barrack, Minna	1 PHCN Transformer	1.5 million
22 nd Jan., 2007	BCC junction, Bida	19 Shops	4.57 million
24 th Feb., 2007	Hassan. D road, Suleja	1 Hospital, equipments	800 million
17 th Oct., 2007	Shango, Minna	4-bedroom flat	1.5 million
17 th Dec., 2007	River Basin, Minna	Electric pole, houses	2 million
16 th Jan., 2008	Bosso road, Minna	1 PHCN Transformer	300,000.00
24 th Feb., 2008	Army barrack, Minna	6 residential rooms	250,000.00
4 th April, 2008	Old Airport Qts., Minna	Electric poles	Unknown
20 th Mar., 2008	Kwamba, Suleja	Petrol station, electric cable	75 million

Source: Compiled from the Records of Niger State Fire Service Department, August 2008

(ii) Urban renewal programmes: - Intensive urban renewal through slum improvement should be instituted and promoted to prevent fire spread and disasters in residential neighbourhoods. This will help improve residential quality, remove combustible fuels (e.g. inflammable building materials) and provide access roads in high density, low income neighbourhoods. Improved road network in slum areas will provide easy access to buildings and facilitate rapid response to fire outbreak by the fire department to prevent large scale disasters.

(iii) Promotion of the creation of fire resistant city:- A fire resistant city is that which take necessary measures and precautions to forestall fire ignition and spread. In Tokyo, Japan, the "Promotional Plan for a Disaster-Resistant City" was formulated in March, 1997. The plan designated key disaster resistant districts and encouraged the design and use of fire resistant buildings in the areas. Creation of fire resistant city involves the institution of fire safety requirements into the building plan approval and development process. Necessary guidelines should therefore be set up for builders to design and build fire resistant structures in order to make developments fire smart.

(iv) Mandatory and routine building maintenance: - Regular renovation and maintenance works on buildings is required to prevent fire disaster in our cities. This should include maintenance of electrical systems such as cords, switches, lighting fixtures and lamps to make sure that they are in good and safe operation condition.

(v) Provision of fire control devices and alarm system in buildings: - One of the major causes of fire spread in human settlements is the lack of fire control equipment in buildings. The law should therefore make it mandatory for the provision of fire extinguishing and fire alarm systems in buildings. Routine inspection and maintenance of the fire protection and fire fighting equipments in buildings should also be carried out regularly to make sure that they are functioning very well.

(vi) Planning for the informal sector: - The urban landscape in many of our settlement is characterized by numerous informal sector activities. These activities are often not organized and they use ramshackle and combustible materials to construct temporary sheds. The sheds are, in most cases, attached to residential and commercial buildings and they become ready fuel in case of fire

outbreaks. There is the need to plan for these activities in our urban centres. More organized spaces should be provided for the informal sector activities to prevent attachments of make shift combustive materials to buildings and to prevent the spread of fire disasters when they occur.

(vii) **Planning, provision and management of refuse depots:-** Research findings on the causes of fire in Niger State show that refuse\bush burning accounted for 6.9 per cent of the total fire incidences recorded between year 2000 and 2007. Proper designation of refuse disposal spots and prompt evacuation solid wastes from residential areas are therefore necessary to prevent refuse burning which is a major cause of fire in residential neighbourhoods.

(viii) **Proper fuel management in frontier areas:-** Home ignition by firebrands from nearby burning vegetation is another cause of fire disaster. There is the need for proper fuel management in the rural-urban interface through the maintenance of vegetation clearance of at least 3 meters around buildings. Residential homes in the rural – urban interface should be kept safe by thinning, pruning and removal of tree branches and dead falls that can fuel a fire and cause fire disasters.

(ix) **Public education and awareness raising:** - Community preparedness need be ensured through public education and awareness raising on the different fire risks and hazards in present in all neighbourhoods. The awareness programme should be part of the general fire management process and residents should be given routine education on the necessary precautions to take to prevent fire disaster.

2. Mitigative Measures

Researches have shown that fire outbreak is sometimes inevitable as there can not be total prevention of fire disasters. Some mitigative measures are therefore required to reduce the impacts of disasters when they occur. Some of these measures are as considered below.

(i) **Capacity building for the State fire departments:-** Fire fighting is the most popular and widely used method of fire control and management. Most fire outbreaks get out of control and become a disaster because of the limited fire fighting capacity and capability of the fire departments.

Capacity building in terms of adequate equipments and manpower training is required to cope with the challenges of fire disaster in Niger State.

(ii) Establishment of disaster management outfit in the State: - Disaster mitigation

involve the institution of certain structural and non-structural measures to limit the impact of potential disasters while disaster response is the sum total of actions taken by people and institutions in the face of disasters (Jinadu, 2007). The State Emergency Management Agency (SEMA) should make adequate provisions for dealing with fire disasters by establishing rapid response units to deal with emergencies in the various districts of major towns. Part of the preparedness and response activities of the agency should involve putting in place plans, strategies (early warning, search and rescue operations, relief supplies etc.), procedures and resources to assist disaster victims to overcome impacts of disasters.

(iii) Open space management: - Disaster impact mitigation requires safety bases for victims

during emergencies. Large scale metropolitan and small scale town refuge or shelter bases should be established in residential neighbourhoods. The existing open spaces such as parks, garden tracts and roads should be secured and maintained while new ones should be provided to act as fire breaks and refuge or disaster recovery bases in times of fire disaster.

(iv) Citizen and community participation in fire disaster management:- Fire disaster is a community problem which requires community solutions. Since residents can not rely solely of firefighters to safe their lives and properties, individuals must play active roles in fire disaster control and management. In order to ensure community participation, individuals, community groups and youth organizations should be trained to fight and control fire in their areas. The fire department should move the preparedness activities to the neighbourhood level and encourage the formation of fire control clubs/associations that can take preemptive measures to control fire spread when it occurs. The community clubs/associations should serve as 'fire watch' for early detection and control of fire disasters in their areas.

Conclusion

Researches carried out, both in the urban areas and the rural urban interface, have shown that fire disaster is a common occurrence in human settlements and that extreme fire behaviours have often times overwhelmed our fire protection and management capacity. Fire disasters in all parts of the world have wrecked serious havoc on the fabrics of our cities and have threatened the sustenance of infrastructure and services. The findings of this research show that although fire outbreaks in residential neighbourhoods of major towns in Niger State are caused by some primary anthropogenic factors, some physical planning related problems are responsible for fire spread and eventual disaster. The different fire disasters recorded in the State have destroyed a great deal of urban infrastructure and threatened their sustainability. There is the need to address the problem of fire disasters in order to ensure the security of urban infrastructure and to sustain the livability of our settlements. In doing this, the institutional capacity measures recommended should be combined with the physical planning solutions proffered to ensure the safety of urban infrastructure in Niger State.

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