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PATTERN AND CAUSES OF FIRE INCIDENTS IN LAGOS STATE, NIGERIA

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Abstract

Lagos state has recently experienced an amplified rate of fire occurrences and this has resulted in the loss of lives and properties, disruption of economic activities and increases the health burdens of the state. The objectives set out in the study were to: (i) identify the pattern of fire service stations in Lagos; (ii) examine the major causes of fire outbreaks; and (iii) assess the trend of fire incidents in the study area. Primary and secondary data were employed in the study. The secondary data were gotten from Lagos State Fire Service, National Population Commission while primary data was derived through the administration of structured questionnaire to respondents. A multi-stage sampling technique was employed. A sample size of 400 respondents was selected in different locations including fire stations, markets, hospitals and settlements. Descriptive statistics including percentages, charts and tables were used to analyze the socio-economic characteristics of the respondents and the causes of fire outbreaks while Arc-GIS tool was used to depict the pattern of fire stations in the state. Trend analysis was employed to show the rate of fire occurrences in the study area. The results of the findings revealed that the leading causes of fire incidents are gas leakages (39%) and electrical failure (44%) and candle (14%). Also, a total of 2342, 1774, 1499 and 1627 fire incidents call were recorded in 2012, 2013, 2104 and 2015 respectively. The study recommends that enlightenment programmes should be embarked upon and that fire prevention and fighting must be mutually pursued by governments and the citizens.

Introduction

Fire has been a part of the learning process since mankind began building structures out of wood rather than stone. Fires do not just break out, some pre-conditions must have been made readily available and in the right proportions before they do. These basic elements include fuel, heat and oxidizer (Shittu, 2009; Oyeyode, 2003, Payne; 1982). The slightest contact of highly inflammable liquid contents such as gasoline (petrol), paraffin (kerosene) or gas with fire brings explosive services of destruction, inferno and loss of lives and properties (Adeleke, 1993). Fire disasters can occur above the ground (as in tall buildings and planes), on the ground, and below the ground (as in mines).

Sometimes, they occur in circumstances that are unexpected or unpredictable. All fire incidents can be divided into many ways depending on the cause of fire outbreak, but there are broadly two categories of fires and these are: natural and man-made. Fires are considered natural when they result from the forces of nature such as earthquake (Kyushu and Japan, 2016), volcanic eruption (Wahong and Myanmar, 2015) and lightning (The Great Ocean Road and Australia, 2015). Man-made fires result from human and technological errors including industrial fires (the 32-storey Cocoa House in Ibadan; January 8, 1985); incendiary bombing (as in Tokyo, Japan during World War II and the Four Courts Fire and bombing, Dublin, 1922), accidental fire (Ijegun Pipeline Explosion, 2008), terrorism (the 9/11 attacks on the World Trade Centre, 2001, the L'Innovation Departmental Store Fire, Brussels, and the Nigerian Police Force Headquarters in Abuja, 2011) among others. In Nigeria, there have been serious disasters confronting the homes, lives and property of people. The most common ones are flood, building collapse and fire. A lot has been written on flood and building collapse, but the incidence of urban fire is still lax in literature even in the academia. Lagos has had a fair share of urban conflagrations

at have led to colossal amount of irreparable loss. However, in recent times, there has been an amplified rate of fire incidences across the length and breadth of the entire state. At the ignition of fire in an uncontrollable manner, documents and assets are lost, people get burned beyond recognition, emotionally traumatized, permanently disabled, internally displaced or rendered homeless and livelihoods are lost. The major causes of fire outbreak are electrical and gas faults, resulting into financial and non-financial losses. The incidences of fire outbreak and losses resulting from them increase annually.

According to the Lagos State Fire Service, the worth of properties lost to fire disasters in the state within three years (2012- 2014) is estimated to be 54 billion Naira (Vanguard, 2015). This is equivalent 3.67% of the state's annual budget for the three years. Further statistics from the agency revealed that there were a total of 2,342 fire outbreaks in the state in 2012, 1,774 in 2013 and 1,449 incidents between January and November, 2014. Among the affected were residential, markets, industries, corporate organizations and government offices and agencies among others. Therefore, this indicates the unprecedented rate of fire incidences in Lagos. While rapid urbanization is fast-changing the susceptibility of the state to disasters, the ability to prevent, mitigate, control, manage and respond to these have been lagging despite various efforts by the government and other stakeholders (State of the Environment Report-Lagos, 2010).

However, the causes, effects and problems created by fire incidents are of great concerns to academicians, scholars, policy makers and governments. Therefore, this study seeks to examine the spatial and temporal trends of fire incidents in Lagos state. The specific objectives are to: identify the pattern of fire service stations in Lagos state; examine the major causes of fire outbreaks in the study area; and examine the trend of fire incidents in Lagos state.

Study Area

Lagos state is located in the South western part of Nigeria between longitudes $2°\ 42'$ E and $3°\ 42'$ E and latitudes $6°\ 22'$ N and $6°\ 52'$ N of the equator. It has an area landmass of 3,577 square kilometres of which 22% are lagoons and creeks. Its landmass is the smallest of all thirty six states in the federation. It is bounded by the Republic of Benin in the West, and Ogun state, on the northern and eastern parts. The southern boundary of the state is defined entirely by the Atlantic Ocean. Lagos has about 180 kilometres long shoreline along the Bight of Benin (See Figure 1).

The population of Lagos state has been growing at a very fast rate over the years. Recent estimates suggest that about 1.4 million persons migrate to

Legend
METROPOLITAN
NON-METROPOLITAN
Atlantic Ocean

Area of Main Map

NIGERIA POLITICAL
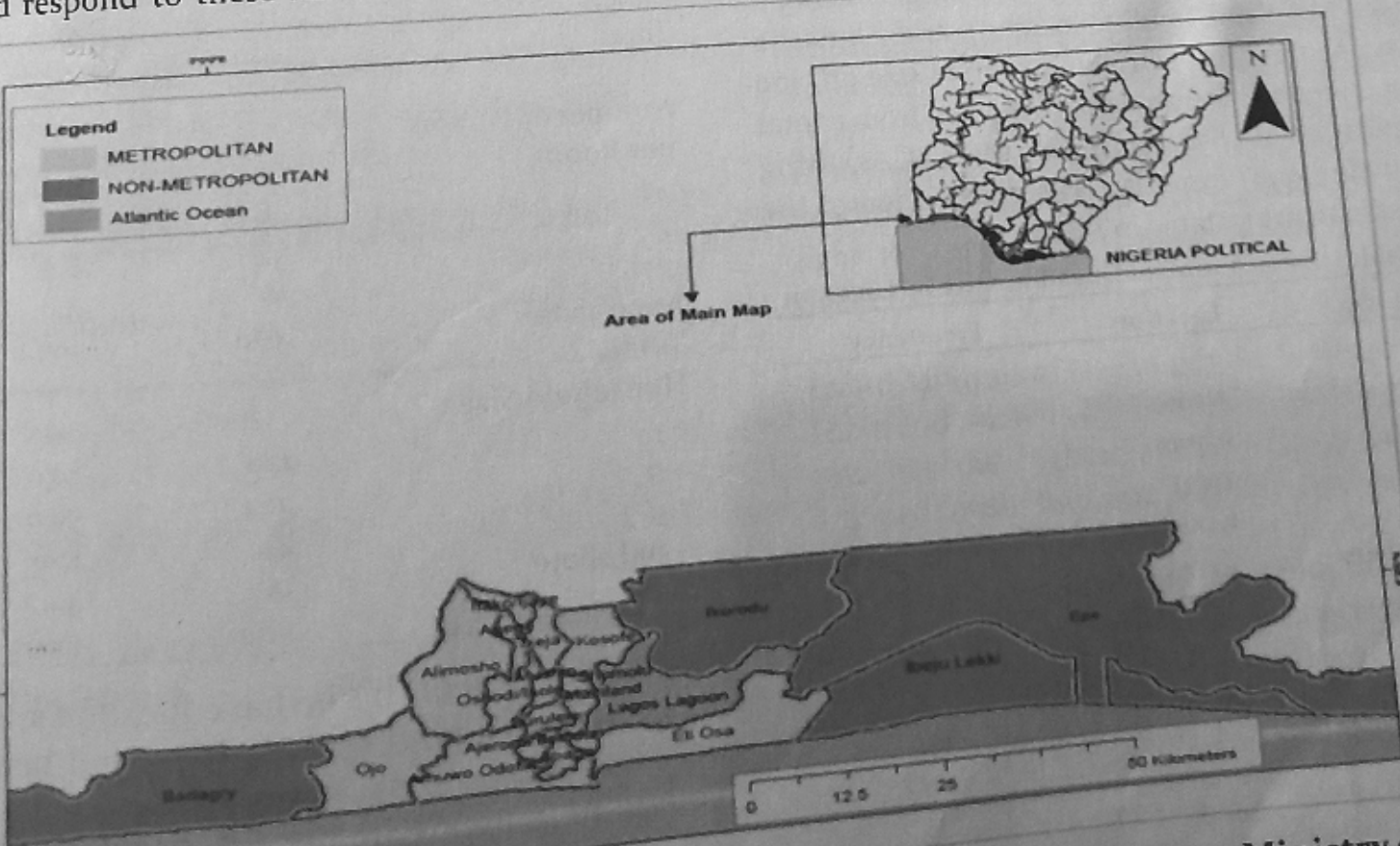
Lagos annually (State of the Environment Report-Lagos State, 2010). The average population density for Nigeria is about 85 person per square kilometre. Lagos State has a population density of over fifteen (15) times as great as the nation as a whole with 1,308 person per square kilometre. In the built-up urban areas of metropolitan Lagos, the average density is 20,000 persons per square kilometre.

Materials And Methods

Data used for this study were collected from primary and secondary sources. The primary data include: reconnaissance survey, field observation and administration of questionnaire. The secondary data include map of Lagos state which was source from relevant agency, population data of Lagos from National Population Commission. Others include Lagos State Fire Service' archives, journals, textbooks and the internet. A multi-stage sampling technique was adopted. The first step involves the target population being stratified into victims of fire (at the Burn sections of Lagos State University Teaching Hospital, Gbagada and Lagos University Teaching Hospital, Idi-Araba), market traders, residents of settlements and fire service' workers.

The respondents were further clustered into residents of high, middle and low-income areas. Three (3) Local Government Areas from twenty in Lagos state representing 15% were randomly selected. These are: Lagos Island (high income), Lagos Mainland (middle income), and Alimosho (low income) respectively. A sample size off 400 respondents was purposively selected from a total population of 1,858,971 (for the three LGAs) using Yamane (1999) formula. The distribution of the questionnaire is stated in Table 1.

Table 1: Distribution of Questionnaire by Location

Respondents	Location	Frequency
Fire stations	Ikeja	10
	Alausa	10
	Ikotun	10
	Total	30
Markets	Iyana Ipaja	40
	Oyingbo	40
	Balogun	40
	Total	120
Settlements	Lagos Island	80
	Oyingbo	80
	Iyana Ipaja	80
	Total	240
Fire Victims	LASUTH	10
	Total	10

Both descriptive and inferential statistics were used in the analysis of the collected data. The descriptive statistics including tables, percentages and charts were used to organize the socio-economic characteristics of the respondents, major causes of fire and sources of respondents' household energy. Arc-GIS tool was used to depict the distributional pattern of fire stations in Lagos State. Trend Analysis was used to show the rate of fire incidents in Lagos state.

Table 1: Socio Demographic Characteristics of Respondents

Characteristics	Frequency	Percentage
Age		
18-27	104	26.0
28-37	104	26.0
38-47	100	25.0
48 and above	92	23.0
Total	400	100.0
Education		
No formal education	40	10.0
Informal	16	4.0
Primary	64	16.0
Secondary	192	48.0
Tertiary	88	22.0
Total	400	100.0
Occupation		
Civil servant	124	31.0
Trading	148	37.0
Business	88	22.0
Others	40	10.0
Total	400	100.0
Number of Person per Room		
0-1	68	17.0
2-4	284	71.0
5-7	32	8.0
8 and above	16	4.0
Total	400	100.0
Household Size		
1-3	120	30.0
4-6	224	56.0
7-9	40	10.0
8 and above	16	4.0
Total	400	100.

The implication of this is that education raises an individual's level of awareness and better decision making as opposed to illiteracy. Therefore, enlightenment programmes being organized by governments and stakeholders to combat or reduce fire incidents can yield possible results if only the citizenry are

educationally sophisticated. This also suggests that income is linked with the level of education and that explains the findings of Munson and Wallace (1983) that linked incomes to greater likelihood of maintaining safety equipment. This also supports Murrey et al (1987) findings that the less educated populations have strong association with greater number of fires.

Table 1 further showed that majority of the respondents' (56%) household size is between 4-6 persons, while 30(%) of the respondents' household size is between 1 to 3 persons. The implication is that when household size is high, there are chances of congestion which increases respondents' exposure to risks in cases of fire outbreaks. The number of person per room indicated that 83% of the respondents live in rooms of greater than one person. Only 17% of them live in rooms of just a person. It can therefore be deduced that overcrowding of rooms can impede the safe evacuation of occupants and limit access for the fire-fighters due to placement of belongings indiscriminately in the room. This supports Wallace (2001) findings that linked overcrowding to heightening the incidence of fires.

Pattern of Fire Stations and Causes of Fire Incidents in the Study Area

Lagos state currently has a total of thirteen state-owned fire stations in addition to Federal fire stations and other private and public-private fire stations (See Table 2).

Table 2: Existing Fire Stations in Lagos State

Organization	Number of Fire Stations
Federal Fire Service	4
Lagos State Fire Service	13
Public-Enterprise Fire services	6
Private-Firm Fire services	6

Source: Adapted from Records of Fire Service, 2016

distribution of fire stations is not efficient to handle fire outbreaks and related emergencies in the state. Therefore, it is deduced that to reduce the susceptibility of the people to fire, more fire stations will be required to complement the efforts of the existing thirteen state-owned stations with greater emphasis placed on their locations for optimization. While other stations exist in the state, they have limited roles to play in fighting in public places.

The major causes of fire in order of magnitude are electrical failure (44%); gas leakage (39%); candle (14%); and others (3%) which include arson, explosives and mosquito coils among others (see figure 2). This is line with the causes of fire as suggested by Pyne (1982) research findings. This implies that such accidents are preventable if adequate measures had been put in place (Gunther, 1981; Munson and Oates, 1983). Electrical failure is the leading cause of fire in the study area. This cannot be unconnected with overloading of extension or sockets, faulty connection, leaving homes without switching off appliances.

This is common in the low- income groups with high room occupancy ratio as pointed out Chhetri et al (2009) finding which showed that areas with low socio-economic status had higher incidence of fires. Gas leakage can result to fire when fuels are being stored in the homes during periods of scarcity or when the use of liquefied gas is embarked upon by people who have no adequate knowledge but took advantage of its affordability. When candle starts a fire, it cannot be separated from the socio economic status of the people. Such candles do not have lamp stand and when kept to light the room when residents are fast asleep, danger beckons.

Trend Analysis of Fire Incidents in Lagos State

The trend analysis of fire incidents revealed that 2012 has the highest annual average and then dropped in 2013 and 2014. The rate increased again in year 2015 (See Figure 3).

The reasons for the downward trends in years 2013 and 2014 can be attributed to the concerted efforts of the government in combating fire outbreaks as well as funding and intensified publi enlightenment. These paid off as more state of t art fire-fighting equipment were purchas thereby improving the ability of the fire-fighte combat fire.
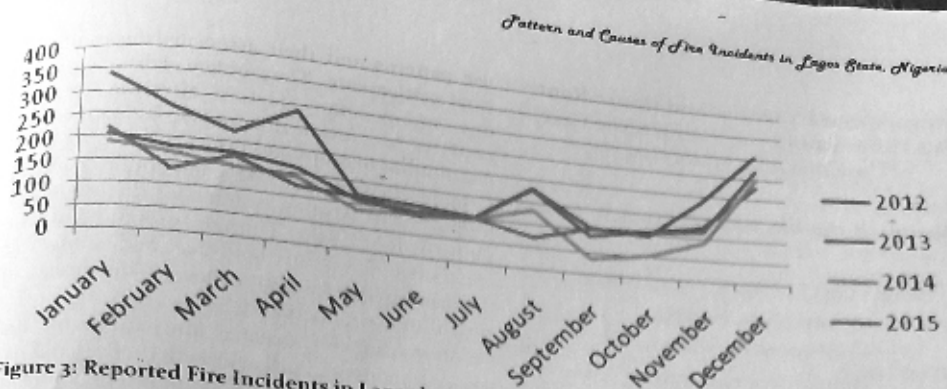
Figure 3: Reported Fire Incidents in Lagos between 2012 and 2015 (Source: Lagos State Fire Service, 2016)

Conclusion

The amplified rates of fire occurrences in the state have been source of major concern to governments, stakeholders and the citizenry alike. Fire accidents and their consequent economic losses, loss of lives and properties, injuries, and disruption in economic activities are way beyond quantification. The best form of fire-fight is fire prevention. The spatial distribution of fire stations shows that more is needed to enhance the efficiency of the Fire Service with respect to response time while citizens are ill-prepared to combat fire accidents. The months of January to March and October to December are heightened time of fire occurrences.

Therefore, this study has shown the direction for further research studies as it relates to fire incidents in Lagos state. This will enhance government intervention towards areas that require reformation in terms of policy guidelines to reduce or combat fire incidents.

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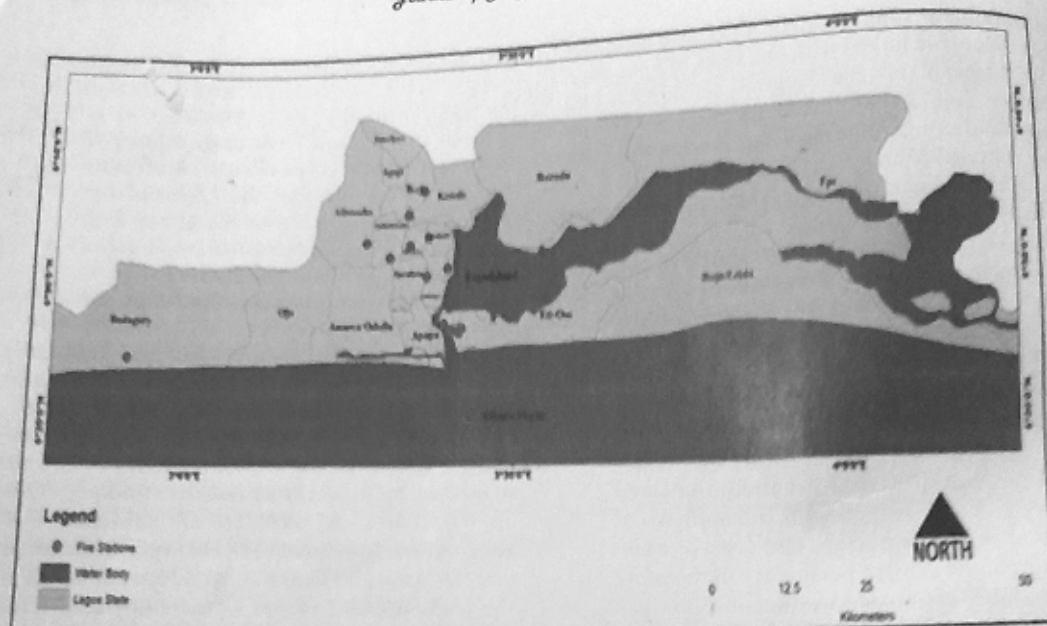
Figure 1: Pattern of Fire Stations in Lagos State

Also, the Fire Prevention Department of the Fire Service took its campaigns to markets, residential areas and public places and the ban placed on the use of fireworks during festive periods. However, a sudden rise in 2015 can be due to elongated dry season, increase in fires due to petrol-carrying tankers, the storage of petroleum products during scarcity and the vandalization of oil pipelines which lasted all through the year. It further revealed that most fires occur between the first and last quarters of the year. 41% of the respondents experienced fire between January and March;

13% between April and June; 11% between July and September; and 35% between October and December. This showed that fire starts and ends with the year. There is a reduction in the incidents of fire with the onset of the rainy season which starts by April through November with a break in August. The harmattan season extends from late November through January which makes fire a potential risk at its highest. Also, festivities are on the high side during this time and the use of fireworks by jubilant society increases the chances of fire.
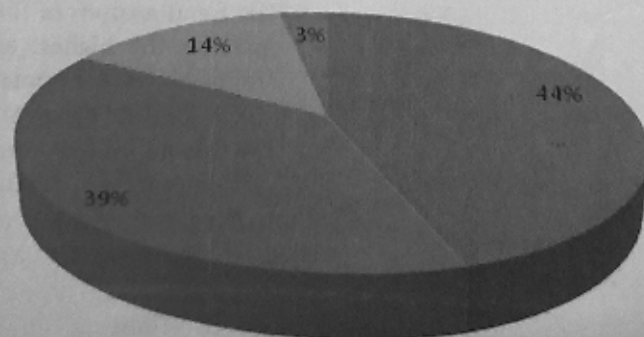

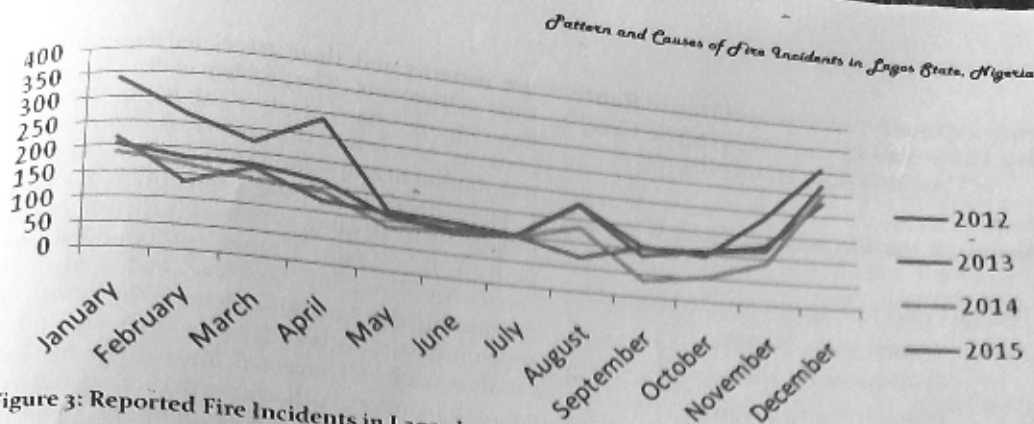**Figure 2: Major Causes of Fire Incidents in the Study Area**

Figure 3: Reported Fire Incidents in Lagos between 2012 and 2015 (Source: Lagos State Fire Service, 2016)

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