

Characterization of Fire Incidences in Lagos Island, Nigeria

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Abstract:- The frequency of fire outbreaks and its attendant negative impacts in Nigeria is perpetually on the increase. In 2018, Lagos State Government declared that property worth N12.8bn was lost to fire tragedies within a period of one calendar year - May 2017 and April 2018. This study therefore investigates the characteristics of fire incidences in Lagos Island, Nigeria. A total of 136 structured questionnaires was administered on household heads covering: socio-economic characteristics of respondents; incidences of fire outbreaks; land use characteristics of fire incidences; time dimension characteristics and causes of fire outbreaks among others. Empirical analysis reveals that: year 2015 had the highest record of fire incidences within the study period; the cause of these incidents also vary from electric surge, inappropriate storage of chemicals and petroleum products spillage among others; 29% of all fire occurrences were mostly in residential buildings; and over 70% of fire incidences occurred during dry seasons. This paper therefore recommends constant and continuous sensitization of the public by government at both state and local levels on the prevention of fire outbreaks among others.

Keywords: Fire, Fire incidences, Lagos Island, Lagos State, Nigeria

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1 Introduction

Instances of fire outbreaks in Nigeria and especially in Lagos State abound. For instance, fire gutted the 22-storey Great Nigeria House along Martin Street on Lagos Island (Fig. 1) on November 4, 2013 [1]. Properties worth millions of naira in the early hours of Monday, January, 12, 2015 were destroyed as fire razed about 100 shops at the popular Balogun Market, Lagos Island [2]. Fire also gutted a shopping plaza on Broad Street on Tuesday, 15th September, 2016 [3].

Textile materials and accessories estimated at millions of naira were destroyed in the inferno. A week prior to this incident, there was also a fire outbreak reported at the popular Balogun market [3]. Earlier in the year, the famous Mamman Kontagora House situated on Marina, Lagos Island was also engulfed in fire [4]. The NITEL building also on the Lagos Island (Fig. 2) was gutted by fire on the 8th of December, 2015 [1]. Vanguard newspaper reported that a part of the popular Balogun market went up in flames on Wednesday, 1st February, 2017 shortly after traders resumed for their daily trading [5]. A fire outbreak believed to have started in the early hours of January 12th, 2018 destroyed four houses, five plazas and a bank building in the Balogun market area of the

Lagos Island [6]. The list of the devastating havoc wrecked by fire on the island is endless. Though there is no official estimate of the worth of properties lost to this continuously raging inferno on the island, statistics from the National Fire Collation Centre Abuja indicate that estimated properties valued at 5.18 billion Naira were lost to fire incidents between January to December, 2017 [7].



Fig. 1. The Great Nigeria House gutted by fire

Fig. 2. Smoke Billowing from the NITEL Building

Source: Vanguard (2013) [1]

As a result of the incessant occurrences of fire outbreaks in the study area, this paper will assess the spatial spread of fire incidences across Lagos Island; examine the existing fire emergency management plans; investigate the extent of GIS application in the fire emergency management and; analyze the GIS model best fit for fire emergency response in the study area.

2 Review of Literature

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products [8]. Fire is hot because the conversion of the weak double bond in molecular oxygen, O_2 , to the stronger bonds in the combustion products carbon dioxide and water releases energy (418kJ per 32g of O_2); the bond energies of the fuel play only a minor role [9].

At a certain point in the combustion reaction, called the ignition point, flames are produced. The flame is the visible portion of the fire. Flames consists primarily of carbon dioxide, water vapour, oxygen and nitrogen. If hot enough, the gases may become ionized to produce plasma [10].

Jimoh identified smoking as a leading cause of fire outbreaks in homes, offices and public domains stating that several disastrous fire occurrences have resulted from reignited discarded cigarettes that are not properly extinguished [11]. He also stated that electrical appliances are also another cause of fire outbreaks [11]. (Srinvas Katta, 2011 in Ogunlere

2012) buttressed that damaged electrical conductors, overloaded sockets and extension cords, faulty wirings, blown fuses, low quality electrical equipment, malfunction of electrical devices, loose electrical connections and lack of clearance between electrical heating devices and combustible materials can pose fire threats [12].

Literatures abound recounting the occurrence, spate, spread, causes and curbing the incidence of fire outbreaks within the Nigerian Academic landscape. However, not much has been said about improving the response capability of the Fire Service and other first responders to the scene of a fire incidence.

Oloke et al recommended the upgrade of community road networks, provision of firefighting system and enlightenment of residents on fire safety precautions. in curbing menace of urban fire outbreak in residential buildings [13]. Agbonkhese et'al 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 [14], while kitchen appliances is the least causal factor of fire outbreak incidence in cities of developing nations and Gombe (Nigeria) metropolis in particular. Isa et'al noted that location of adequate fire service stations, proximity of the stations to population and markets should be considered in achieving better safety situations in urban areas [15].

3 Data and Methods

3.1 Research Locale

Lagos Island Local Government Area is the focus of this study. Lagos Island (Isale Eko) is the principal and central Local Government Area (LGA) in Lagos, Lagos State. Going by the preliminary 2006 Nigerian census, the LGA had a population of 209,665 in an area of 8.7 km². The LGA only covers the Western half of Lagos Island; the eastern half is under the jurisdiction of Eti-Osa LGA. It lies between 6° 27' N 3° 24' E / 6.450° N 3.400° E (Fig. 1).

Lying on Lagos Lagoon, a large protected harbour on the coast of Africa, the island was home to the Yoruba fishing village of Eko, which grew into the modern city of Lagos. The city has now spread out to cover the neighbouring Islands as well as the adjoining Mainland [15]. Lagos Island is connected to the mainland by three large bridges which cross Lagos Lagoon to the district of Ebute Metta. It is also linked to the neighbouring island of Ikoyi and to Victoria Island. The Lagos harbour district of Apapa faces the western side of the island forming the main commercial district of Lagos, Lagos Island plays host

to the main government buildings, shops and offices. The Catholic and Anglican Cathedrals as well as the Central Mosque are located here [15].

Historically, Lagos Island (Isale Eko) was home to the Brazilian Quarter of Lagos where the majority of the slave trade returnees from Brazil settled.

The presence of huge economic infrastructure abound in the study area. For instance, most Nigerian banks' head offices are located on Lagos Island, these include First Bank of Nigeria and the United Bank for Africa (UBA). Other medium and large-scale businesses such as real estates, consultancy firms,

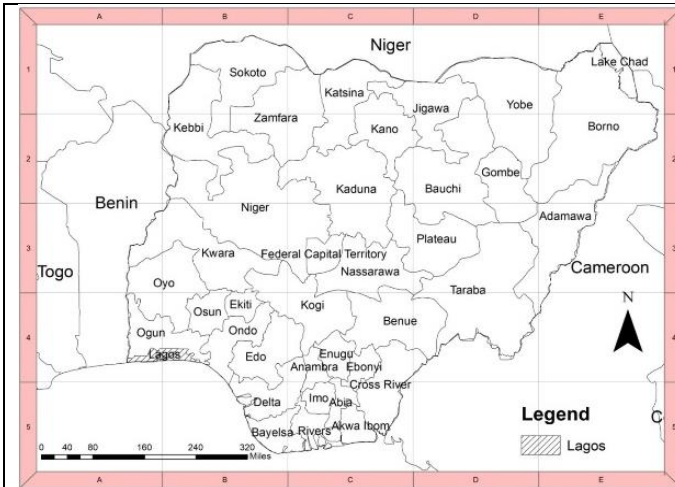


Fig. 3. Map of Nigeria showing Lagos State
 Source: Adapted from ESRI Data, 2018.

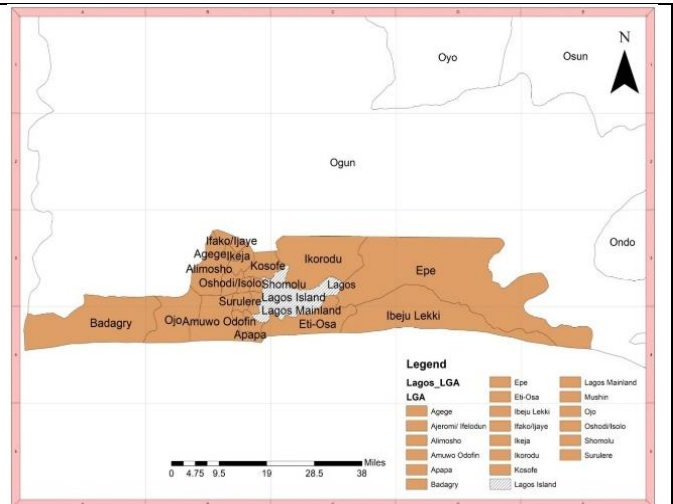


Fig. 4. Map of Lagos State showing Lagos Island Local Government Area
 Source: Adapted from ESRI Data, 2018.



Fig. 5. Online Map of the Study Area
 Source: U.S Army Corps of Engineers (2014)

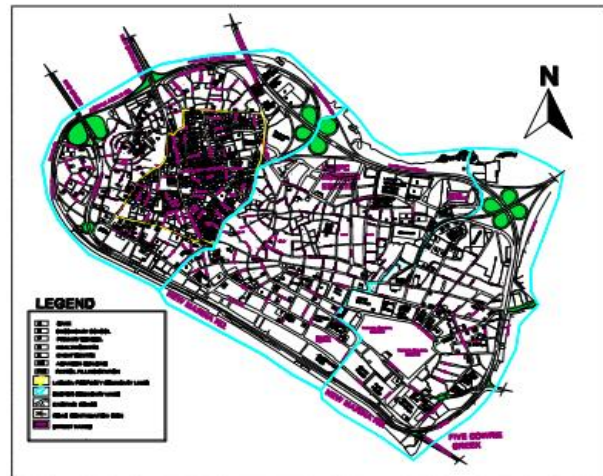


Fig. 6. Digitized Map of the Study Area
 Source: Lagos Island Local Planning Authority (2018)

The predominantly low-income eastern side of the Island contains the main markets and the high density housing. The Island is extremely crowded and congested and attempts have been made to build new roads out over the lagoon in order to improve traffic flows. It is the part of Lagos where the Oba (or king) of Lagos resides. It is also believed that the Eyo festival can only be held in this part of Lagos.

electrical appliances manufacturers and retail stores are based in Marina, Lagos Island.

3.2 Data Base

Data was collected through structured questionnaire which was administered on household heads in Lagos Island community. The questionnaire contained close-ended questions with pre-coded alternatives

meant to ascertain: the socio-economic characteristics of respondents; building and environmental condition in the community; as well as sustainable residential living. A total of one hundred and thirty-six (136) questionnaires were administered representing 5% of the total population due to homogeneity characterizing the study area. Other relevant data were gathered from texts, seminars, reports, internet and observation made at the study site in terms of nature of the environment, transportation and general living condition in the study area. Photographs of scenic sites were captured and presented. Data from questionnaire administration was processed using Statistical Package for Social Sciences (SPSS). Univariate data analytical tool was employed for data analysis of the phenomena investigated.

4 Discussion of Results

4.1 Socio-economic Characteristics of Respondents

The selected socio-economic variables for this research are: age, gender, level of education, occupation and monthly income. These were analyzed and the results are presented below:

The age of respondents were categorized into four (Table 1). The three dominating age groups in the study area are 18-30 years, 31-40 years, and 41-50 years with a proportion of 46.3%, 26.5% and 20.6% respectively. Respondents above the age of 50 accounted for just a paltry 6.6% of the population. This suggests that persons between the ages of 18 – 50 years (regarded as the active age group) form the bulk of the population of residents/users of buildings in Lagos Island. These figures further pay credence to the fact that the study area is the commercial hub of Lagos State hereby having a sizable proportion of its population as the independent/working class. Figures from the Lagos State Bureau of Statistics indicate that 97% of Lagos residents are between the ages of 15-65 while 3% comprised adults above 65 years.

Across the study area, the male gender had a higher proportion- 63.2% as compared to 36.8% accruing to females. This is not unusual considering that Nigeria is a patriarchal (male dominated) society – male folks are expected to be breadwinners of their respective families hence, they go all out to meet the everyday needs of their families. On the average, university and other tertiary institutions degree holders make up the significant proportion of the population within the study area with 67.0%. This is not particularly surprising considering the fact that Lagos Island plays host to a number of government buildings, head offices for Nigerian banks, consultancy firms and

other multinational outfits who will only have the best brains in the land on their pay roll. Secondary school leavers form 27.9% of the population while Primary school certificate holders and persons with no formal education constitute 2.9% and 2.2% of the population respectively. This suggests the study area has a high adult literacy level.

Respondents in the study area who are into trading ranging from perishable goods to non-perishable goods account for 37.5%. They are closely followed by persons working with private firms/establishments with 34.6%. These figures only buttress the assertion that Lagos Island is commercial district of Lagos. 36.8% of respondents in the study area are said to earn a monthly income of between ₦50,000 - ₦100,000, 22.1% earn between ₦100,000 - ₦200,000 while 19.9% earn above ₦18,000 (which is at present the minimum wage package in Nigeria) but not more than ₦50,000.

Table 1: Socio-economic Characteristics of Respondents (N = 136)

Variable	Frequency	%
Age		
18-29 years	63	46.3
30-39 years	36	26.5
40-49 years	28	20.6
Above 50	9	6.6
Gender		
Male	86	63.2
Female	50	36.8
Level of Education		
No formal Education	3	2.2
Primary	4	2.9
Secondary	38	27.9
Tertiary	91	67.0
Occupation		
Student	12	8.8
Civil servant	16	11.8
Private firms	47	34.6
Farming	3	2.2
Artisan	7	5.1
Trading	51	37.5
Monthly Income		
Less than ₦18,000	21	15.4
₦18,000- ₦50,000	27	19.9
₦50,000- ₦100,000	50	36.8
₦100,000- ₦ 200,000	30	22.1
Above ₦200,000	8	5.8

Source: Authors' Field Survey, 2019

These socio-economic characteristics depicted in Table 1 suggests that a significant proportion of the population can come to terms with the knowledge of the need for adequate fire preventive measures and management while they can also easily grasp the latest digital development in fire emergency management.

4.2 Frequency of Fire Outbreak in Lagos Island

Frequency of fire outbreak across the study area through the span of five years (2014-2018) as obtained from the Lagos State Fire Service (LSFS) is as depicted in Fig. 7

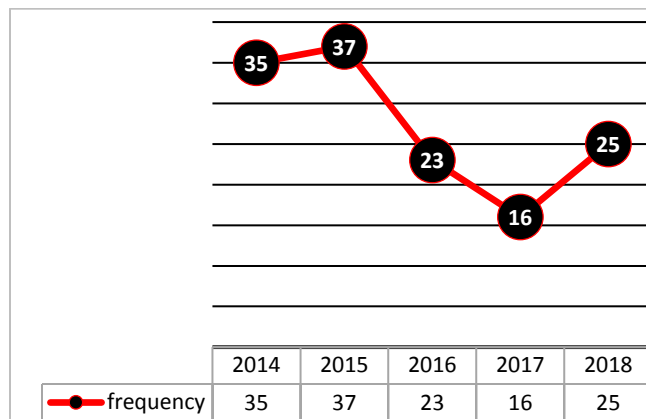


Fig. 7. Frequency of fire outbreaks in the Study Area between 2014-2018

Source: Lagos State Fire Service (LSFS), 2018

The year 2015 had the highest occurrence (37) of fire outbreaks within the period under review. This is closely followed by the figures obtainable in the year 2014; 35 while there were 25 and 23 cases of fire outbreaks in the year 2018 and 2016 respectively. The least occurrence of fire outbreaks within the period under review was the year 2017 with 16 of such outbreaks.

The building use for these fire incidents range from residential, public, industrial and commercial building/land uses. The cause of these incidents also vary from electric surge, inappropriate storage of chemicals, petroleum products spillage and others (Dates, time of call, location of incidence, causes of incidence and other relevant information about each incidence within the period under review have been properly documented in Appendix III)

The figures of the recorded cases of fire incidents in the study area suggests a relative decrease in the occurrence of fire outbreaks between 2016 to 2018 as compared to what was obtainable in the year 2014 and 2015. The drop in numbers cannot readily be

attributed to any specific factor that borders on existing fire emergency management within the study area.

4.3 Land Use Characteristics of Fire Incidences in Lagos Island

Empirical analysis shows that: fire outbreaks in the study area within the period of 2014 to 2018 occurred mostly in residential buildings with 29% of all incidences; Commercial and Industrial land use which make the Lagos Island Local Government Area the commercial hub of Lagos State accounted for 25% and 19% respectively of all fire outbreaks; Government Ministries, Departments and Agencies accounted for 10%; while Recreational, Health, Mixed and Educational land use had the least occurrence of fire with 1% each of fire incidences recorded in the area (Fig. 5). This phenomenon suggests that land uses that attracts the use of high electric wattages, heavy industrial machines and petro-chemical products are more susceptible to fire incidences. Efforts should therefore be geared towards improving upon existing fire safety measures and response in residential, commercial and industrial land use zones in the study area.

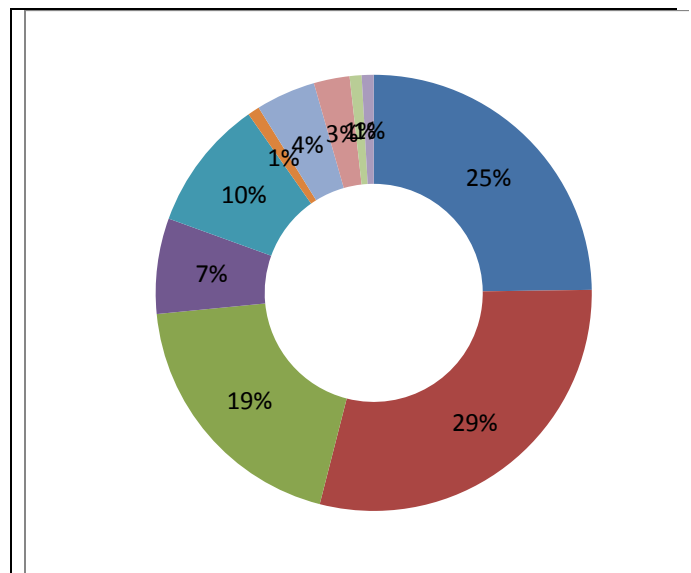


Fig. 5. Land use Characteristics of Fire Incidences in the Study Area

Source: Author's Field Survey, 2019

4.4 Time Dimension Characteristics of Fire Incidences in Lagos Island LGA

Fire patterns in the months of the years under consideration are as shown in Fig. 6. Cumulatively, the months of September to February indicate the

highest occurrence of fire outbreaks across the study area (Fig. 6)

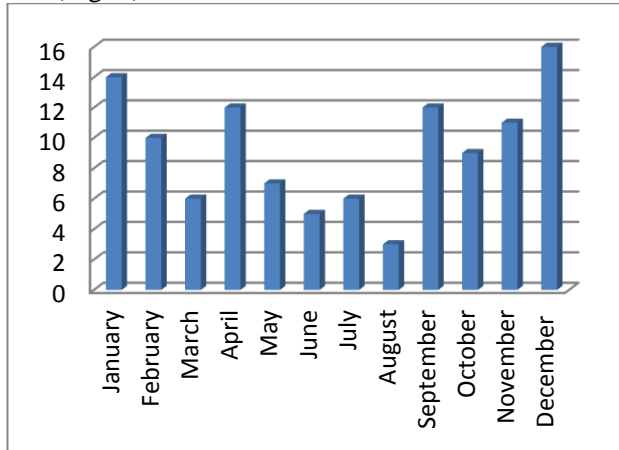


Fig. 6. Monthly Occurrence of Fire Outbreaks in Lagos Island
 Source: Author’s Field Survey, 2019

This phenomenon could be attributed to the period that heralds the country’s dry season (usually lasting between November and March). Similarly, the months of the year with the least incidence of fire (March – August) also coincide with the wet season in Nigeria which is believed to last between April to October. It is therefore obvious that the peak season of fire outbreaks is between December to March due to hot and dry climatic conditions obtainable in the study area during the period.

4.5 Characteristics of Fire Outbreaks in Lagos Island

A major factor of fire incidents in the study area is electrical related (Table 2). For instance, Table 2, shows that 62.1% of fire outbreaks experienced during the period under study were attributed to electrical fault. This is not unconnected with incessant power outages by the Ikeja Electricity Distribution Company - the government provider.

The continuous on and off characteristic of electric supply results in power surges responsible for sparks leading to fire outbreaks. Human errors such as illicit storage of inflammable products, inappropriate use of electrical appliances and indiscriminate burning of bushes and refuse among others accounted for 33.9% of fire outbreaks in the study area. Other causes such as deliberate setting fire to property by criminals accounted for 3.2% of fire incidences in the area.

This finding has been corroborated by Wahab et’al, who opined that fire outbreak is triggered by three elements: fuel, heat and oxidizer [17]. A study conducted in the six geopolitical zones of Nigeria by the National Emergency Management Agency

(NEMA) in collaboration with the Federal and State Fire Service revealed that many causes were responsible for fire disasters in the country. Some of these causes include: accidents and carelessness, faulty wiring, reckless use of electrical appliances and heating gadgets, unattended stoves and gas cookers, children playing with matches amongst others [11]. NEMA also says 90% of fire outbreaks in Nigeria are caused by human negligence. Fig. 7 shows an example an untidy electricity connection which could encourage the likelihood of a fire outbreak in the area.

Table 2: Leading Causes of Fire Incidences in Lagos Island

Causes	Frequency	Percentage
Electrical fault		62.1%
Untidy Connections		33.9%
Weather condition		0.8%
Others		3.2%
Total		100%

Source: Author’s Field Survey, 2019

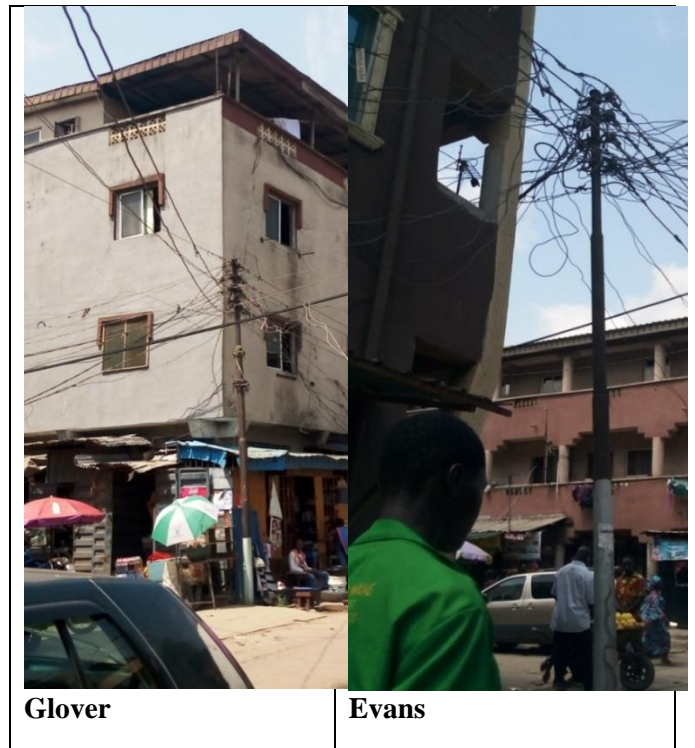


Fig. 7. Untidy Electricity Lines Connection along Glover and Evans Streets, Lagos Island.
 Source: Author’s Field Survey, 2019.

5 Conclusion/Recommendations

The frequency of fire outbreaks within the study area within the years under review experienced a slight increase between the first and second year while there

was a reasonable level of reduction through 2016 and 2017. There was however, another increase during the 2018 calendar year.

Commercial buildings (85% of them) engulfed by fire during the period under review are located around the densely populated eastern side of the island which plays host to the main markets and the low-income housing. The locations with frequent occurrence of industrial/company fire outbreaks between 2014 – 2018 within the study area are Marina, Martin Street, Tafawa Balewa Square (TBS), CMS, Moloney Street, Boyle Street Onikan, Obun Eko Street, Ereko Street amongst others.

The hourly pattern of fire occurrence according to the information obtained from the Lagos State Fire Service suggests that the interval of 06:00 – 11:59 hours and 12:00 – 17:59 hours have had the highest occurrence of fire outbreak within the period under review with 28.83% and 29.73% respectively. It was observed that fire outbreaks in the study area within the period of 2014 to 2018 occurred more in residential buildings with 29% of all incidences.

Commercial and Company/Industrial land use which make the Lagos Island Local Government Area the commercial hub of Lagos State account for 25% and 19% respectively of all fire outbreaks. Government ministries, departments and agencies accounted for 10% while recreational, health, mixed and educational land use had the least occurrence of fire with 1% each of fire incidences recorded in the area.

Cumulatively, the months of September to February indicate the highest occurrence of fire outbreaks across the study area. In a similar vein, the months of the year with the least incidence of fire (March – August) also coincide with the wet season in Nigeria which is believed to last between April to October. Fire incidents in Lagos Island Local Government Area are mostly caused due to electricity related issues. Human errors and mistakes was another cause of fire.

Based on the findings in this study, this paper recommends that: constant and continuous sensitization of the public by the Lagos State Fire Service (LSFS) on the prevention of fire incidences is canvassed; functional fire preventive measures and equipment should be enforced on the people by the Lagos State Fire Service; Use of electricity-protective devices such as surge protector should be encouraged to curb incidences of power surges;

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