Araştırma Makalesi / Research Article
Geliş Tarihi / Received: 07.06.2021
Kabul Tarihi / Accepted: 10.11.2021
Yayımlanma Tarihi /Published: 30.11.2021

Afet ve Risk Dergisi 4(2), 2021, (135-144)
Journal of Disaster and Risk 4(2), 2021, (135-144)
e-ISSN: 2636-8390
DOI: 10.35341/afet.949030

Analysis of Fire Safety Measures in Residential Buildings in Yaba LCDA, Lagos State, Nigeria

Adebola O. DARAMOLA [1], Lateef IBRAHİM [2]

Abstract
Fire incidents are common place in urban areas like Lagos metropolis, given its multi-dimensional nature. Extensive loss of lives and properties from incessant fire outbreaks are indicative of some obvious need to tackle the problem of fire incidence from prevention to recovery. This study analyzes fire safety measures adopted in residential buildings in Yaba Local Development Council Area of Lagos state. Specifically, it highlighted fire incidents over the period 2008 to 2018, maps the distribution of mitigation facilities and assessed fire safety measures in selected residential buildings in the LCDA. Administrative records and field surveys provided the spatial and aspatial data used for the study. Fifteen (15) incidents were recorded administratively. There is just one (1) fire station in the area and four (4) hydrants, mostly located at the center of the LCDA. Incidents were an average 3.03km from the fire station with an average response time of 9.36 minutes. Fire exits and extinguishers were the main safety facilities available to residents even though a high percentage of the extinguishers were non-functional. The cost and indifference of residents to safety device integration in their homes were identified as the major hinderances. Education of residents on fire safety protocol and insurance; enacting laws for fire safety equipment in homes, and increase in mitigation facilities were recommended.

Keywords: Fire, Safety Measures, Residences

Yaba LCDA, Lagos Eyaleti, Nijerya'daki Konut Yapılarının Yangın Güvenliği Önlemlerinin Analizi

Özet
Yangın olayları, çok boyutlu doğası nedeniyle Lagos metropolü gibi kentsel alanlarda yaygın olarak görülmektedir. Aralıksız devam eden yangın dalgalarından kaynaklanan geniş çaplı can ve mal kaybı, yangının önlenmesinden kurtarmaya kadar olan süreçte ortaya çıkan yangın sorununun üstesinden gelmek için bariz bir ihtiyacın göstergesidir. Bu çalışmada, Lagos eyaletinin Yaba Yerel Kalkınma Konseyi Bölgesi'ndeki konut yangını olaylarını ve güvenlik önlemlerini analiz edilmiştir. Çalışmada spesifik olarak, 2008-2018 dönemindeki olaylar vurgulanmış, azaltma tesislerinin dağılımı haritalanmış ve LCDA'da seçilen

1 Dr. Department of Geography, University of Lagos, Akoka, Yaba, Lagos
Corresponding author e-mail: dbtt2@yahoo.com ORCID No: 0000-0001-7691-6857
[2] Department of Geography, University of Lagos, Akoka, Yaba, Lagos
e-mail: ibmilez@gmail.com ORCID No: 0000-0003-0745-9239

Bu makaleye atıf yapmak için- *To cite this article*
Daramola, A.O. and Ibrahim, L. (2021). Analysis of Fire Safety Measures in Residental Buildings in Yaba LCDA, Lagos State, Nigeria. *Journal of Disaster and Risk*, 4(2), 135-144.

konut yapılarında yangın güvenliği önlemlerini değerlendirilmiştir. İdari kayıtlar ve saha araştırmalar ile çalışma için kullanılan mekânsal ve mekânsal olmayan veriler sağlanmıştır. Bölgede on beş olay idari olarak kaydedilmiştir. Bölge genelinde yalnızca bir itfaiye istasyonu ve çoğunlukla LCDA'nın merkezinde bulunan dört hidrant vardır. İtfaiye istasyonundan ortalama 3,03 km uzakta gerçekleşen olaylara ortalama tepki süresi 9,36 dakika olmuştur. Yangın söndürücülerin büyük bölümünün işlevsel olmamasına rağmen, yangın söndürücüler ve yangın çıkışları konut sakinleri için mevcut ana güvenlik tesisi olmuştur. Olaylarda konut sakinlerinin evlerine güvenlik cihazı entegrasyonuna ilgisizliği ve cihazların maliyeti en büyük engeller olarak belirlenmiştir. Bu çalışmada, konut sakinlerinin yangın güvenliği protokolü ve sigortası konusunda eğitimi, evlerde yangın güvenliği ekipmanlarının bulundurulması için yasaların çıkarılması ve azaltma tesislerinin arttırılması önerilmiştir.

Anahtar Kelimeler: Yangın, Güvenlik Önlemleri, Konutlar

1. INTRODUCTION

Fire is a basic everyday element of most people's lives. Its tendency to cause disasters cannot be underplayed, as improper handling and use of fire has led to several accidents in homes, offices, schools, and other public places with very serious repercussions. A fire requires an ignition source and a combination of oxygen and fuel to sustain the fire (Henderson and MacKay, 2009). Fire incidents can be grouped by cause into natural and man-made. Residential and non-residential structural fires are largely man-made while industrial and chemical fires are often due to explosions or fires made by humans or due to machine failures (Wahab *et al.,* 2013).

Globally, fires are an important contributor to death and disability. In the United Kingdom, residential fires caused at least 500 deaths and 15,000 injuries in 1998 and according to the report by US fire department in 2010, there were 384,000 residential fires with 2,640 casualties excluding fire fighters, and 13,350 injuries (Kater, 2011). Uncontrolled fire, either of natural or man-made causes remains one of the major causes of death and property damage in modern society especially in cities of the developing countries where fire accidents occur repeatedly without implementing lessons learnt from previous events (Agbola and Falola, 2021). Losses attributed to fire incidents recorded at home, institutions, commercial places, factories, oil facilities, platforms and many other sites worldwide run into billions of dollars annually, estimated at approximately 1% of global GDP per annum (Ugbebor, 2015; Agbola and Falola, 2021). In Nigeria, fire outbreak is a perennial problem with about 7,000 incidents annually, resultant deaths of over 1,000 persons and estimated losses of over Two Hundred and Fifty Million Dollars (Wakili, 2013). These frequent occurrences of fire disasters in buildings in Nigeria have now become a serious threat to the nation's fragile economy (Obasa *et al.,* 2020).

Indeed there could be nothing we could sustainably do to completely eradicate the occurrence of fire disaster but only mitigation to check the spread (Adeleye *et al.,* (2020); Omahanna *et al.,* (2016). The general vulnerability of communities is fast growing with human activities leading to increased poverty, urban density and environmental degradation; coupled with socio-economic stress and inadequate physical infrastructure in urban areas of developing countries (Agbola and Falola, 2021). A fire disaster preparedness plan ranges from a broad mitigation and preparedness strategy to a detailed contingency plan for responding to the fire hazard. Rehabilitation and reconstruction are also likely to be included in more strategic plans, although in practice they tend to be poorly integrated with emergency response (UN/ISDR, 2004) Kurniawan *et al.,* (2018) evaluated the performance based appraisal method (Available Safety Egress Time > Required Safety Egress Time) for high rise residential buildings and found simulation of fire hazards using these parameters as a useful tool in accurate planning. On their part, Arewa *et al.,* (2021) examined the "stay-put" tactic in fire disaster response for high rise buildings. They found this to be obsolete and with a potential to cause misjudgments.

In Nigeria, the extensive loss of lives and properties from incessant fire outbreak are indicative of some obvious need to tackle the problem of fire incidence. Residential buildings frequently go up in flames basically as a result of inadequate fire safety awareness in the country. The culture of fire safety is yet to take roots here as a panacea to frequent and deadly house fires; a situation also noted by Zhou (2017) in some parts of China. Most homes in Nigeria are not equipped with fire safety equipment that can detect fire outbreaks at early stages. Worse still, high rise buildings are springing up in the country with is growing concern towards fire safety issues in such buildings due to several fire incidences that have occurred.

Makanjuola *et al.,* (2009), assessed fire safety practices in public building in western Nigeria and showed that most of the highlighted fire safety equipment were either not available or often times not functional, or that the occupants are not even aware of their availability, functionality or usage. Agbonkhese *et al.,* (2017) in their study of urban fire outbreaks in Gombe metropolis 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 was the most significant causal factor the in the metropolis. A high number of the residential buildings in the metropolis did not have fire extinguishers and those that had either didn't know how to use them or the fire extinguishers had expired.

A number of other studies have also identified the issues with fire disaster preparedness and response globally: to Agbola and Falola (2021), safety from fire is not put into consideration in new building developments or refurbishments, and communication infrastructure and road networks are inefficient to ensure prompt response. Oloke *et al.,* (2021) attributed fire disaster to human activities, negligence, as well as faulty electrical equipment and power surge. Zhou (2017) identified weak awareness of fire safety as the bane of disasters while Kodur *et al.,* (2019) stated that unquantified level of fire safety in buildings lead to the adoption of minimal strategies that do not account for contemporary fire hazard issues.

Arewa *et al.,* (2021) identified six fundamental pillars of fire safety in buildings (Figure 1) They also advocated the use of artificial intelligence communication systems and infrared image detector camera to enhance fire evacuation in high rise buildings.

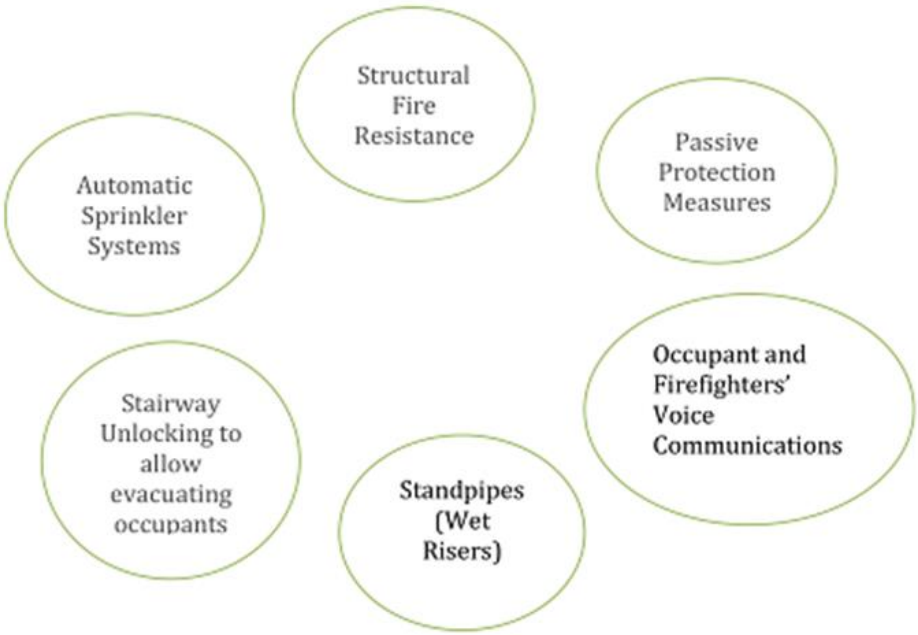

Figure 1. Six fundamental pillars of fire safety in buildings (Arewa *et al.,* 2021)

Other authors also noted measures that are required for appropriate fire disaster preparedness and response. Omahanna *et al.,* (2016) advocated using fire rated doors and windows, compartmentalizing building spaces, and avoiding fire fuels in housing environment. Oloke *et al,* (2021) recommended an upgrade of community road networks and enlightenment of residents on fire safety. On their part, Hamida and Hassanain (2019) advised increase in the number of fire exits, installing sprinkler heads, sufficient coverage of fire extinguisher distribution and installing fire rated doors.

Olorunfemi (2008) identified Nigerian urban areas, such as Lagos, Ibadan and Port Harcourt as typical examples of cities with high level of risk and vulnerability, especially fire disasters. Lagos, the commercial hub of Africa's most populous nation, has experienced severe urban fires ranging from residential apartments, along transport routes, industrial and public buildings and even market places. Most of these fire incidences have claimed lives, properties worth millions of naira, displaced many and sad enough, the culture of insurance has not been sufficiently imbibed, thus making recovery from such incidence take longer than necessary. Even where fire fighters are keen on salvaging fire disasters, incessant traffic and congested streets make this more difficult. Adekunle *et al.,* (2018) noted that most residential fire incidents in Lagos started from furniture and other loose fittings with no smoke detectors installed. As the population of Lagos keeps increasing due to uncontrolled urbanization, it is imperative that fire safety issues are examined at the household level in order to determine specific steps required to prevent incidences and during crises, mitigate the damage while they await state personnel.

Zhou (2017) and Agbola and Falola (2021) identified that residential buildings were mostly affected by fire disaster in selected regions of China and Nigeria respectively. This study thus analyzes fire safety measures adopted in residential buildings in Yaba Local Development Council Area of Lagos state. Specifically, it highlighted recorded incidents over the period 2008 to 2018, maps the distribution of mitigation facilities and assessed fire safety measures in selected residential buildings in the LCDA.

2. METHODOLOGY

The study made use of both spatial and aspatial data comprising of field recordings, questionnaires, administrative records and interviews. The satellite image of Lagos state was acquired from Google Earth, which served as basis for mapping of incidences and mitigation facilities. This was processed using ArcMap 10.3.1. Data on fire incidents were acquired from the Lagos state fire department, Alausa, Lagos. The location of fire hydrants in the area were by field measurements using a handheld GPS. A total of seventy (70) households were selected for the administration of questionnaires. These were selected using the stratified method; sample houses where chosen based on proximity to already documented fire incidences. Data from the questionnaires were used to assess current fire safety measures and challenges to adopting more efficient measures.

3. RESULTS AND DISCUSSION

3.1.Mapping of Incidents and Facilities

A total of fifteen (15) incidences were recorded administratively by the Lagos State Fire Service Department over period 2008 to 2018 in Yaba LCDA (Figure 2). The low number can be attributed to the non-inclusion of the fire service department in curtailing fire incidents in most places as they were those the fire station responded to. Other incidents around the LCDA are also included in the map.

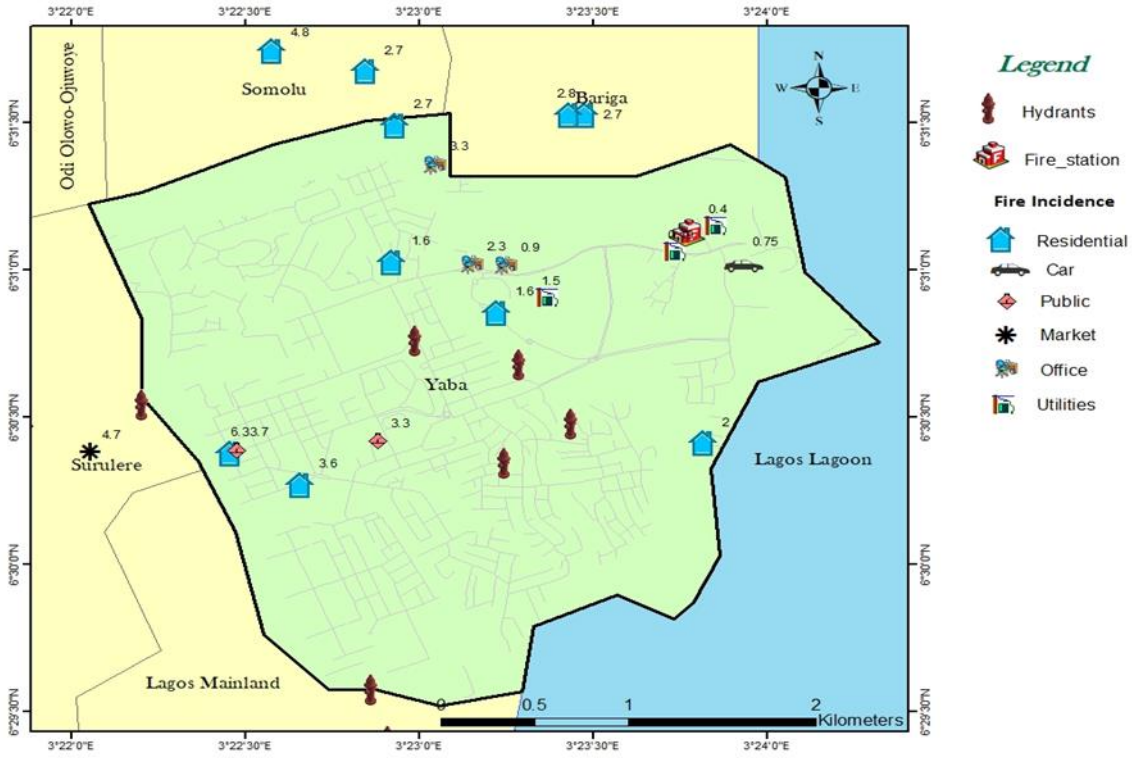

Figure 2. Fire incidents, hydrants and distance to fire station in Yaba LCDA (2008-2018) (Source: LSFD and Authors' fieldwork)

The fire incidents recorded varied from residential to commercial, office buildings and public utilities. There is only one fire station in the area, located inside the University of Lagos and its distance to each of the fire incident locations is indicated in figure 1. The average distance is about 3.03km and the average estimated time of arrival is about 9.36 minutes. Lagos metropolis is often associated with heavy traffic with high population density which is also very motorized. This has implications for response time of the fire service. Unlike many other LCDAs in the state, Yaba LCDA has the advantage of fire stations located within it. There are a number of fire hydrants in the LCDA which are to provide quick access to water for the fire service during an incident. Unfortunately, official records on the exact locations of these hydrants were not available. Field observations were used to identify and map some of them as presented in figure 1. A total of four (4) hydrants were identified which were around the center of the LCDA and another two (2) just by its edge but within Lagos Mainland and Surulere LCDAs.

3.2. Residential Fire Safety Measures

Primary fire prevention and management is expected to be carried out by building occupants/managers. Such measures as provision and maintenance of smoke detectors, portable fire extinguishers, sprinkler systems and fire exits can go a long way in subduing residential fires. The study therefore assessed the availability of basic fire management tools in residential houses within the LCDA. The most significant facility available to residents is the fire exit as alluded to by about 66% of respondents (Table 1).

Fire exits are basically the alternative exit points in the house, which is important because several houses in the area have a single entry and exit point. The extra cost of construction to add alternative exit points discourages new building developers in the area who are out to maximize profit while minimizing cost. Fire extinguishers are also available in a number of houses, ranking as the second most available tool. This is still far from the ideal as the national fire service

regulations of 2019 mandates every building to have smoke detectors and fire extinguishers. There was a complete lack of emergency lighting systems in sampled residences.

Table 1. Availability of fire safety measure in buildings

Safety Measures/Equipment Availability	Not sure		Not available		Available	
	Count	Row N %	Count	Row N %	Count	Row N %
Smoke Detector	13	18.6%	45	64.3%	12	17.1%
Heat Detector	10	14.3%	59	84.3%	1	1.4%
Flame Detector	10	14.3%	57	81.4%	3	4.3%
Fire Alarm	12	17.1%	46	65.7%	12	17.1%
Sprinkler System	10	14.3%	60	85.7%	0	0.0%
Portable Fire Extinguishers	2	2.9%	27	38.6%	41	58.6%
Emergency Lighting System	12	17.1%	58	82.9%	0	0.0%
Fire Exits	8	11.4%	16	22.9%	46	65.7%
Halogen Gas System	14	20.0%	49	70.0%	7	10.0%
Fire Safety Signs	14	20.0%	45	64.3%	11	15.7%
Fire Hose Reel	17	24.3%	45	64.3%	8	11.4%

Source: Field Survey, 2019

Beyond availability is the need for functionality of fire safety equipment in residential buildings. In the sampled buildings, the fire exits were found to be the most functional by about 38% (Table 2). This is not unusual being the most available fire safety measure and it requires little maintenance.

The portable fire extinguishers are the most widely used and accessible fire control tools in the region, yet only about 36% had functional extinguishers in their homes. It is not sufficient to exit the building during fire incidents but also to preserve property. Fire extinguishers can be the difference between access to fire exits or otherwise. The low level of functionality of fire safety equipment in the area is simply a further pointer to the indifferent attitude or residents to fire safety.

Residents were pressed further about the reasons for the low level of fire safety system integration in their homes from cost, to policy, etc. Table 3 summarizes their response.

Yaba LCDA is a mixed income area including high, mid and low-income residents. All the respondents identified initial and maintenance cost of safety equipment and their attitude as the most significant hinderances to this integration. Fire safety monitoring by government agencies is barely done in the area, leaving residents to plan out and implement safety protocols at will. Most residents therefore would rather avoid spending so much on building retrofitting with detectors, extinguishers and alarm systems. The general attitude of residents in downgrading the possibility of a fire incident in their homes is also a significant hinderance. This calls for re-orientation of residents by the fire service.

Table 2. Functionality of Safety Systems

Functionality	Non functional		Functional		Highly functional	
	Count	Row N %	Count	Row N %	Count	Row N %
Smoke detector	62	88.50%	6	8.60%	2	2.90%
Heat detector	70	100.00%	0	0.00%	0	0.00%
Flame detector	70	100.00%	0	0.00%	0	0.00%
Fire alarm	64	91.40%	4	5.70%	2	2.90%
Sprinkler system	70	100.00%	0	0.00%	0	0.00%
Portable fire extinguishers	45	64.30%	11	15.70%	14	20.00%
Emergency lighting system	70	100.00%	0	0.00%	0	0.00%
Fire exits	43	61.40%	11	15.70%	16	22.90%
Halogen gas system	66	94.30%	0	0.00%	4	5.70%
Fire safety signs	61	86.80%	9	13.20%	0	0.00%
Fire hose reel	66	94.30%	4	5.70%	0	0.00%

Source: Field Survey, 2019

Table 3. Hinderances to integration of Fire Safety Systems

Hindrance of Integration of Fire Safety Equipment	very low		low		high		very high	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Initial Cost	0	0.0%	0	0.0%	10	14.5%	59	85.5 %
Maintenance Cost	0	0.0%	0	0.0%	20	29.0%	49	71.0 %
Government Policy	6	8.7%	7	10.1 %	19	27.5%	37	53.6 %
Ignorance of Professional	0	0.0%	3	4.3%	24	34.8%	42	60.9 %
Ignorance of Client	0	0.0%	0	0.0%	25	36.2%	44	63.8 %
Carelessness of Design Team	0	0.0%	1	1.4%	26	37.7%	42	60.9 %
Attitude of End User	0	0.0%	0	0.0%	24	35.3%	44	64.7 %

Source: Field Survey, 2019

One of the ways of re-orientating residents is by organizing trainings and demonstrations within neighbourhoods, at public places or at workplaces. Respondents were asked if they had ever participated in such activities (Fig. 3).

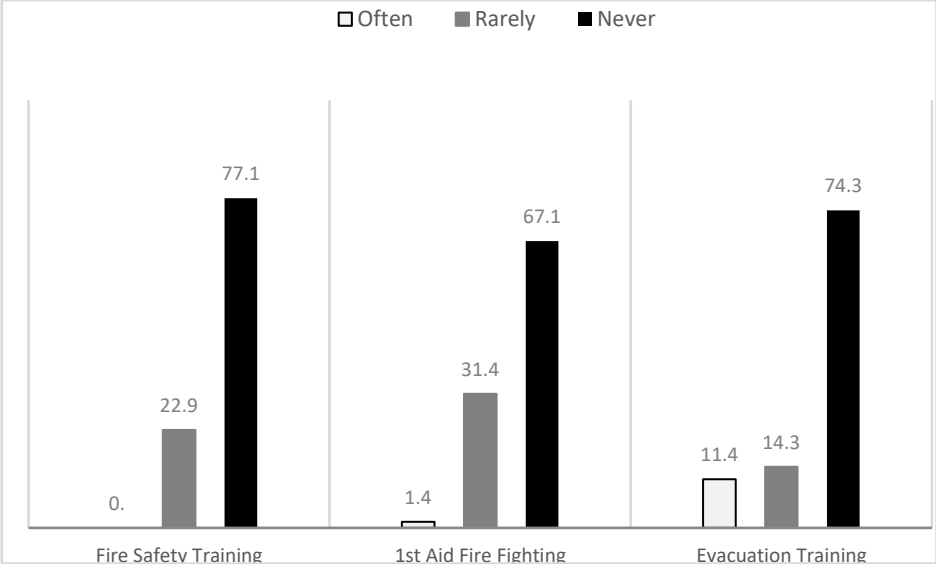

Figure 3. Fire safety training (Source: Field Survey, 2019)

Only few respondents have had some form of fire safety training (23%). The percentage increased with respect to first aid training during fire incidents and more on evacuation training. The fire service is not only expected to control fire incidents but also ensure prevention by enlightening citizens accordingly.

Recovery after a fire incident can be a very tedious process for residents. One of the most important recovery mechanisms is insurance. About 92% of respondents had some level of knowledge about fire insurance; while another 22% had actually gone ahead to inquire about this service. However, only about 15% of the respondents have used this service before or are currently under one scheme. The role of the insurance companies is also evident here as they are expected to educate the public on the advantages of running such schemes.

Respondents were also asked to assess the level of responsibility of different actors in fire outbreaks. The most significant was building occupants (53%), thereby highlighting the need for them to take action personally. The service organizations were apportioned some blame because some of fire incidents spring from electrical faults and sparks.

Table 4. Fire Outbreaks Level of Responsibility

Fire Outbreak Level of Responsibility	None		Average		Above average		High	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Building Designers	0	0.0%	32	45.7%	20	28.6%	18	25.7%
Regulatory Bodies	1	1.4%	36	52.2%	9	13.0%	20	29.0%

Fire Fighters	0	0.0%	23	33.3%	24	34.8%	22	31.9%
Building Occupants	0	0.0%	22	32.4%	10	14.7%	36	52.9%
Service Organisations (e.g. PHCN, Water Cooperation. Etc)	3	4.3%	33	47.8%	5	7.2%	27	39.1%
Building Owner	0	0.0%	27	39.1%	22	31.9%	20	29.0%

Source: Field Survey, 2019

4. CONCLUSION

The study evaluated fire incidents in Yaba LCDA of Lagos state between 2008 and 2018. Based on administrative records, fifteen (15) incidents were identified. The relatively low count was attributed to the weak data management structure and non-reporting of incidents by victims. There is just one (1) fire station in the area and four (4) hydrants, mostly located at the center of the LCDA. Incidents were an average 3.03km from the fire station with an average response time of 9.36 minutes. Fire exits and extinguishers were the main safety facilities available to residents even though a high percentage of the extinguishers were non-functional. The cost and indifference of residents to safety device integration in their homes were identified as the major hinderances.

5. RECOMMENDATIONS

The following recommendations were made based on the results of this study:

1. Maintenance and increase in the number of fire hydrants in the LCDA with proper geographic spread to cater for all sections.
2. Residential buildings must be mandated to mount functional fire extinguishers, coupled with efficient building safety monitoring by the fire service.
3. Education and enlightenment of residents on fire safety protocols and the need for equipment integration in homes through public demonstrations and target visits.
4. Fire safety training should be conducted periodically first, in government establishments and in private organizations over time.
5. Investment in more efficient incident administration and reporting.
6. Insurance companies should also be actively involved in fire safety education and enlightenment on the importance of fire and building insurance.

REFERENCES

Adekunle, A., Umanah, I.I., Ibe, K.E., & Imonikosaye, M.R. (2018) Statistical analysis of fire outbreaks in homes and public buildings in Nigeria: a case study of Lagos state. *International Journal of Engineering Research and Advanced Technology.* 4(8). 21-30. http://doi.org/10.31695/IJERAT .2018.3294

Adeleye O.I., Ajobiewe T.O., Shaibu S.V., & Oladipo T.O. (2020) Fire disaster preparedness of public buildings in Ibadan metropolis, Nigeria. *Open Science Journal,* 5(2), 1-14. DOI: https://doi.org/10.23954/osj.v5i2.2249

Agbola B.S. & Falola O.J. (2021). Seasonal and locational variations in fire disasters in Ibadan, Nigeria. *International Journal of Disaster Risk Reduction,* 54, 1-12. DOI: 10.1016/j.ijdrr.2021.102035

Agbonkhese, O., Yerima, A.B., Abba, Y. L., & Kawu, Y. (2017). Curbing menace of urban fire outbreak in residential buildings; a case study of Gombe metropolis. *Scientific Research Journal (SCIRJ)*, V(VII), Pg. 49-63. http://www.scirj.org/papers-0717/scirj-P0717419.pdf (Last Accessed: 13.07.2019)

Arewa, A.O.; Ahmed, A.; Edwards, D.J.; & Nwankwo, C. (2021) Fire safety in high-rise buildings: is the stay-put tactic a misjudgment or magnificent strategy? *Buildings,* 1-16. doi.org/10.3390/buildings1 1080339

Hamida, M.B. & Hassanain, M.A. (2019). Fire safety in the built-environment: a case study in a residential facility. *Architecture, Civil Engineering and Environment,* 2, 27-34. DOI:10.21307/ACEE-2019-020

Henderson, J. & MacKay, S. (2009). Retail availability of fire-starting materials and their misuse by children and adolescents. *Fire Safety Journal.* 44(1), 131 – 134. DOI:10.1016/j.firesaf.2008.05.001

Kater, M.J. (2011), Fire loss in United State during 2010: Quincy MA: National Fire Protection Association, Fire Analysis and Research Division.

Kudor V., Kumar P., & Rafi M.M. (2020). Fire hazard in buildings: review, assessment and strategies for improving fire safety. *PSU Research Review,* 4(1), 1-23. DOI 10.1108/PRR-12-2018-0033.

Kurniawan, T., Tambunan, L., & Imaniar, L. (2018). Fire Safety Parameters of High-Rise Residential Building: A Literature Review of Performance-Based Analysis Method. *IOP Conference Series: Earth and Environmental Science.* 152, 1-5. DOI: 10.1088/1755-1315/152/1/012030.

Makanjuola, S.A, Aiyetan, A. O & Oke A.E. (2009), Assessment of Fire Safety Practice in Public Buildings in Western Nigeria. RICS COBRA Research Conference, University of Cape Town, September 2009.Pp1-21 https://www.researchgate.net/publication/313850680_Assessment_of_fire_safety_practices_in_public_buildings_in_western_Nigeria (Last Accessed: 12.07.2019)

Obasa, O.O.S, Mbamali, I., & Okolie, K. C. (2020) Critical investigation of causes and effects of fire disaster in buildings in Imo state, Nigeria. *IOSR Journal of Environmental Science, Technology and Food Technology,* 14(5), 7-15. DOI: 10.9790/2402-1405010715

Oloke O.C., Oluwunmi O.A., Oyeyemi K.D., Ayedun C.A., & Peter N.J. (2021). Fire risk exposure and preparedness of peri-urban neighbourhoods in Ibadan, Oyo state, Nigeria. *IOP Conf. Series: Earth and Environmental Science,* 655, 1-10. DOI:10.1088/1755-1315/655/1/012079

Olorunfemi F.B. (2008) Disaster incidence and management in Nigeria, *Research Review of the Institute of African Studies*, 24 (2), 1–23. DOI: 10.4314/rrias.v24i2.42711

Ugbebor NJ. (2015). *Modern safety principles and practices*. First edition. Vertex Media Limited. Ilupeju, Lagos, 104-109.

UN/ISDR (2004). *Living with Risk: A Global Review of Disaster Reduction Initiatives*. United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction. Geneva: Pp429. https://www.unisdr.org/files/657_lwr1.pdf (Last Accessed: 12.07.2019)

Wahab,B., Atebije,N. & Yunusa,I. (2013) (Eds), *Disaster Risk Management in Nigerian Rural and Urban Settlements*. Abuja: Nigerian Institute of Town Planners and Town Planners Registration Council. Pp 1-37.

Wakili, L. (2013). *Nigeria's federal government okays national fire safety code.* The Daily Trust Newspaper (5th September, 2013). https://allafrica.com/stories/201309050846.html. (Last Accessed : 08.07.2019)

Zhou B. (2017). Fire situations and prevention measures of residential buildings. *MATEC Web of Conferences,* 100, 1-5. DOI: 10.1051/ matecconf/201710002062