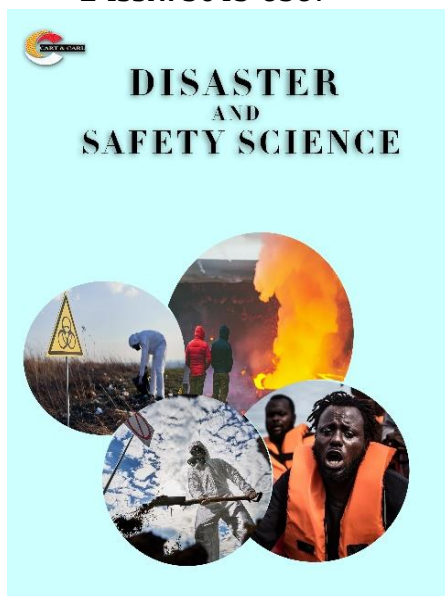


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Assessment of Fire Safety Preparedness of Merchants in the Principal Market Places of Port Harcourt Metropolis, Rivers State

Abstract

Fire disasters in major markets present serious socio-economic, human, and infrastructural challenges, particularly in rapidly growing urban centres. This study assessed fire disaster management practices in five major markets in Port Harcourt Metropolis, focusing on the causes, effects, preparedness, emergency response, and recovery measures. A survey research design was adopted, and data were collected from 398 respondents using structured questionnaires, supported by secondary sources. Descriptive statistics and Analysis of Variance (ANOVA) were used for data analysis and hypothesis testing. The findings revealed that the major causes of market fires include inadequate fire safety equipment (WM = 4.26), careless handling of naked flames (WM = 4.23), poor electrical wiring (WM = 4.22), weak enforcement of safety regulations (WM = 4.20), and poor market planning (WM = 4.18). The effects were severe, including loss of livelihoods (WM = 4.51), destruction of goods and property (WM = 4.50), increased unemployment (WM = 4.45), and rising prices of goods (WM = 4.43). The study also found a low level of fire disaster preparedness, with all preparedness indicators recording weighted mean values below 2.32. ANOVA showed no significant variation in preparedness across the selected markets ($p > 0.05$). Furthermore, emergency response and post-fire recovery facilities were inadequate, with weighted mean values ranging from 2.08 to 2.20. The study concluded that inadequate infrastructure, weak enforcement of safety regulations, and poor preparedness increase the vulnerability of markets to fire disasters.

Keywords: Disaster Management, Emergency Response, Fire Disaster; Fire Safety Preparedness; Fire Safety Equipment, Market Fire Risk; Port Harcourt Metropolis

Introduction

Incidents of fire have escalated into a persistent calamity in prominent outdoor markets across Nigeria. Abdulsalam et al. (2018) indicated that fire outbreaks are attributed to insufficient awareness, carelessness, inadequate energy management, and overcrowding. Adekunle et al. (2018) contended that numerous significant open marketplaces in emerging nations lack adequate emergency response facilities for fire disasters. The suggestion is that during a fire incident, the financial losses are substantial, and the recuperation of market assets is minimal. Adeleye (2020) asserted that numerous losses following a fire incident were irretrievable. Nevertheless, losses may be mitigated via insurance coverage, investment in safety measures, and public education.

A fire event is an unexpected or unanticipated situation within constructed spaces (Adeleye et al., 2020). Catastrophic fires in constructed settings including public institutions, places of worship, marketplaces, educational establishments, and healthcare facilities can arise from numerous causes, including human error and the utilisation of defective electrical devices (Ugwu, 2025; Udoh et al., 2025). While fire is an essential element for human existence, it poses a threat when it ignites in inappropriate locations. Abdulsalam et al. (2016) contended that the devastation resulting from fire incidents is challenging to assess both

socially and economically because of the complexities involved in appropriately gauging personal losses. Akanmu and Arokoyo (2023) contended that research aimed at assessing the consequences of fire disasters primarily focuses on economic losses, resulting in a significant lack of data regarding the psychological effects on victims. Abdulsalam et al. (2016) attributed the recurrent incidence of fire outbreaks in emerging nations to the exponential increase in population, disorganised placement of market establishments, carelessness about unauthorised electrical connections, domestic fire usage, and fuel storage.

Adekunle et al. (2018) contended that factors contributing to fire incidents are continually evolving due to changes in the built environment, urban development, the use of open markets, and varying levels of adherence to safety protocols. Historically, and in numerous instances also today, electric blankets, space heaters, defective household appliances, and cooking devices have been significant contributors to fire incidents (Mukhwana et al., 2017). However, in recent years, the utilisation of lithium-ion batteries has introduced a new and concerning hazard to the fire sector. Alao and Mohmood (2020) indicated that fire catastrophes might lead to numerous fatalities, severe injuries, and considerable property damage along with the devastation of public infrastructure. Adekunle et al. (2018) conducted a trend study of fire incidents and noted that the first documented fire catastrophe occurred in 587 B.C., resulting in the total destruction of Jerusalem and its temple. The tragic incident resulted in the loss of both lives and property. A significant conflagration in human history is the naturally triggered fire catastrophe resulting from the earthquake in San Francisco in 1906. Anthony et al. (2019) contended that no other imperial city has had such catastrophic fire incidents in human history. Anthony et al. (2019) contended that the United States and Canada have advanced further than any other nation in creating instruments for assessing fire-related mortality, with fatality rates often two to four times greater than those in Europe.

A catastrophe may refer to any event, either anthropogenic or natural, that leads to irreparable destruction requiring assistance. Incidents of fire in prominent markets primarily stem from human mistakes, including improper electrical usage, non-adherence to fire safety regulations, and overcrowding. Ayabei (2016) contends that fire is essential for human welfare, although it can be challenging to predict when

an epidemic will occur. Ugwu (2023) contended that reducing the harm inflicted by fire incidents necessitates the accessibility of fire management resources and the proficiency of users in public establishments like markets, hospitals, and schools.

Bejide (2023) identified deficiencies in awareness of the use of some installed fire safety equipment in developing nations. They contended that despite the installation of fire management equipment, such as extinguishers, in several public venues, such as open markets, consumers lack sufficient education regarding safety protocols, the use of safety devices, and evacuation methods during fire emergencies. Chan et al. (2018) contended that the stress and panic elicited during a fire breakout often lead to disorganised reactions that may exacerbate losses.

Port-Harcourt Metropolis serves as the capital of Rivers State, characterized by swift population increase and spatial development. The increase in business operations in the Metropolis has resulted in the establishment of numerous traditional open markets. Nonetheless, numerous markets are packed, overcrowded, and chaotically organized, lacking a culture of safety. The suggestion is that sporadic fire incidents have been documented, and the effectiveness of reaction and recovery efforts has been insufficient. While various studies have assessed the effects of fire incidents in the Metropolis, the focus has primarily been on economic repercussions, with insufficient emphasis placed on response and recovery strategies. Consequently, this research aimed to examine the effects of fire incidents, as well as the subsequent reaction and recovery efforts in the Port-Harcourt Metropolis.

Materials and Methods

Study Area

Port Harcourt, the capital of Rivers State in southern Nigeria, is situated within the Niger Delta region. Geographically, it lies between latitudes 4°44'N and 5°05'N and longitudes 6°55'E and 7°08'E (Nwankwoala, 2015). The city is positioned along the Bonny River and serves as a major port and industrial hub, especially for Nigeria's oil and gas sector. The total land area of Port Harcourt is approximately 360 square kilometers (Oruonye & Ahmed, 2011). This urban area has grown significantly due to industrialization and population expansion, making it one of Nigeria's most economically strategic cities.

Population and Sample

The target population comprised all residents of Port Harcourt Metropolis. The population of Port-Harcourt Metropolis according to 2006 National Population Census was two million (2,000,000). When projected to 2025 using the current growth rate of 2.87% provided by the National Population Census Bureau (National Population Commission, 2010), the population of Port-Harcourt is currently 3, 3939,993. Using the Taro Yamane formula at a 5% level of precision, a sample size of 400 respondents was obtained based on the projected population of over 3,000,000.

Sampling Techniques

A purposive sampling technique was adopted for the selection of markets used in this study. Using the ballot method, names of all major markets in Port Harcourt Metropolis were written on slips and placed in a bag. Five markets were randomly selected through a lucky dip process. The selected markets include: Obio/Akpor International Market, Mile 1 Modern Market, Mile 3 Ultra-Modern Market, Creek Road Modern Market, and Rumuodumaya Market. Following the selection, the total population of shop owners and market squatters in each market was determined. The structured questionnaire was administered to respondents to obtain information on the impact of fire outbreak, response and recovery. The instrument was divided into two sections: Section A captured socio-demographic characteristics, while Section B contained items addressing the research objectives using a four-point Likert scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1). A total of 400 questionnaire was deployed and 398 were returned worthy of use for the data analysis process.

Methods of Data Analysis

The data collected from the field were analysed using both descriptive and inferential statistical techniques. Descriptive statistics were employed to organize, summarize, and present the data in a meaningful form. Specifically, the data were collated, processed, and presented using tables, pie charts, and bar charts to provide a clear quantitative representation of the findings. Frequencies and percentages were computed to describe the characteristics of the respondents and the

distribution of responses to the study variables. In addition, inferential statistics were used to test the study hypothesis. The hypothesis, which stated that the levels of preparedness for fire disaster do not vary across the selected markets in the study area, was tested using Analysis of Variance (ANOVA). ANOVA was considered appropriate because it determines whether there are statistically significant differences among the mean levels of preparedness across the selected markets by examining the variation within and between the groups.

Results and Discussion

The Level of Fire Disaster Preparedness of the Users Of Major Markets in Port-Harcourt Metropolis

Table 1 presents respondents' assessment of their level of preparedness for fire disasters in major markets within Port Harcourt Metropolis. The findings reveal a low level of preparedness, as all weighted mean (WM) values ranged from 2.05 to 2.32, below the benchmark of 3.00. This indicates that most traders lack the knowledge, skills, and resources needed to respond effectively to fire outbreaks.

Although knowledge of how to use basic fire safety equipment recorded the highest WM (2.32), over 82% of respondents admitted they lacked this skill. Likewise, more than 84% had never received fire safety training, while most respondents were unaware of emergency exits or did not have emergency contact numbers for fire service agencies. These findings suggest poor awareness and limited preparedness for fire emergencies.

The availability of fire safety facilities was also rated poorly. Respondents indicated that functional fire extinguishers, emergency response plans, and regular fire drills were largely absent in their markets. In addition, very few traders had insured their goods or contributed to fire safety initiatives, highlighting weak institutional and financial preparedness. Respondents did not consider themselves adequately prepared to respond to fire outbreaks, with the grand weighted mean remaining below the acceptable benchmark. The findings point to serious gaps in fire safety training, emergency planning, safety infrastructure, and insurance coverage, underscoring the need for improved preparedness measures to reduce fire risks and their associated losses.

Table 1: Level of fire disaster preparedness of the users of major markets in Port-Harcourt metropolis

Statement	SA (%)	A (%)	U (%)	D (%)	SD (%)	Total	WM
I have received training on how to respond to fire outbreaks in the market	15 (3.8)	20 (5.0)	25 (6.3)	190 (47.7)	148 (37.2)	398 (100)	2.29
I know how to use basic fire safety equipment (e.g., fire extinguisher, fire blanket)	18 (4.5)	22 (5.5)	30 (7.5)	180 (45.2)	148 (37.2)	398 (100)	2.32
There are functional fire extinguishers and safety equipment available in my market	10 (2.5)	15 (3.8)	20 (5.0)	190 (47.7)	163 (41.0)	398 (100)	2.15
I am aware of the location of emergency exits in my market	12 (3.0)	18 (4.5)	30 (7.5)	180 (45.2)	158 (39.7)	398 (100)	2.23
Traders and shop owners in my market regularly participate in fire drills or safety exercises	8 (2.0)	12 (3.0)	20 (5.0)	195 (49.0)	163 (41.0)	398 (100)	2.1
There is an emergency response plan or committee in my market	10 (2.5)	15 (3.8)	25 (6.3)	190 (47.7)	158 (39.7)	398 (100)	2.15
I keep emergency phone numbers of fire service agencies accessible while in the market	15 (3.8)	18 (4.5)	25 (6.3)	185 (46.5)	155 (38.9)	398 (100)	2.25
I have insured my goods or property against fire disaster	8 (2.0)	10 (2.5)	15 (3.8)	190 (47.7)	175 (44.0)	398 (100)	2.05
Traders in my market contribute financially or materially to improve fire safety measures	12 (3.0)	15 (3.8)	20 (5.0)	190 (47.7)	161 (40.5)	398 (100)	2.16
Overall, I feel adequately prepared to respond in the event of a fire outbreak in my market	10 (2.5)	15 (3.8)	25 (6.3)	185 (46.5)	163 (41.0)	398 (100)	2.14

Source: Researchers Computation, 2025

The Causes of Fire Disaster in Major Markets in the Study Area

Table 2 shows respondents' views on the causes of fire disasters in the selected markets. All the items recorded weighted mean (WM) values above the benchmark of 3.00 (4.14–4.26), indicating that respondents agreed that each factor contributes to fire outbreaks. The highest-ranked cause was the lack of fire safety equipment such as fire extinguishers and hydrants (WM = 4.26), followed by careless handling of naked flames and cooking stoves (WM = 4.23) and poor electrical wiring and illegal connections (WM = 4.22). These findings suggest that inadequate fire-fighting facilities, unsafe use of open flames, and faulty electrical installations are the leading causes of market fires. Other important factors included overcrowded shops and stalls and the non-enforcement of fire safety regulations (WM = 4.20 each), as well as the use of substandard electrical appliances and poor market planning (WM = 4.18 each). Respondents also agreed that the lack of regular safety inspections (WM = 4.17), traders' poor knowledge of fire safety practices, and the storage of inflammable materials in shops (WM = 4.14 each) contribute to fire incidents. The variables recorded high levels of agreement, with weighted mean scores above 4.00. This indicates a strong consensus that

market fire disasters are mainly caused by inadequate safety facilities, unsafe human practices, poor electrical systems, and weak enforcement of fire safety regulations.

The finding that weighted mean (WM) values for all preparedness indicators range between 2.05 and 2.32, well below the benchmark of 3.00, is consistent with literature indicating poor fire safety culture in Nigerian markets. Ogedengbe and Adedayo (2019) reported that most urban markets in Nigeria lack structured emergency plans, functional fire fighting equipment, and routine drills, leaving traders vulnerable to catastrophic losses. Similarly, Adelekan (2016) observed that the traders' poor perception of risk and institutional enforcement deficits are responsible for the lack of proper readiness mechanisms for African informal markets.

The observation by Ariyo and Adeniran (2020) that more than 80% of Lagos market vendors never engaged in any fire response training is evident in the low rating in awareness of using fire protection equipment (WM = 2.32) and being exposed to training (WM = 2.29). With more than 84% of respondents having no training, the current survey reaffirms this trend and indicates education and awareness campaigns are completely

inadequate. Furthermore, poor scores on emergency contact numbers availability (WM = 2.25) and awareness of emergency exits (WM = 2.23) support Alemayehu and Dikale's (2019) finding that the majority of African markets lack exit evacuation routes and signs and thus present a higher risk of fire. The almost negligible utilization of fire drills (WM = 2.10) and non-existent functional safety infrastructure (WM = 2.15) corroborate NFPA (2020) guidelines, wherein constant drills and equipment maintenance are essential factors of

readiness. However, as is the case in earlier research (Ogedengbe & Adedayo, 2019), these do not exist in markets to be studied.

The lowest preparedness indicator, insurance coverage (WM = 2.05), reflects systemic financial vulnerability, a pattern highlighted by Alemayehu and Dikale (2019), who noted that traders rarely insure goods due to cost and lack of awareness.

Table 2: Causes of Fire Disaster in Major Markets in the Study Area

Statement	SA (%)	A (%)	U (%)	D (%)	SD (%)	Total	WM
Poor electrical wiring and illegal connections contribute to market fires	210 (52.8)	120 (30.2)	25 (6.3)	28 (7.0)	15 (3.8)	398(100)	4.22
Use of substandard electrical appliances increases the risk of fire	195 (49.0)	135 (33.9)	28 (7.0)	25 (6.3)	15 (3.8)	398(100)	4.18
Storage of inflammable goods within shops contributes to fire outbreaks	185 (46.5)	140 (35.2)	30 (7.5)	28 (7.0)	15 (3.8)	398(100)	4.14
Overcrowding of shops and stalls increases vulnerability to fire	200 (50.3)	130 (32.7)	25 (6.3)	28 (7.0)	15 (3.8)	398(100)	4.2
Lack of fire safety equipment (e.g., extinguishers, hydrants) escalates fire risk	215 (54.0)	125 (31.4)	20 (5.0)	23 (5.8)	15 (3.8)	398(100)	4.26
Careless handling of naked flames and cooking stoves in markets causes fire	205 (51.5)	130 (32.7)	25 (6.3)	23 (5.8)	15 (3.8)	398(100)	4.23
Absence of regular market inspections by safety authorities contributes to fire disasters	190 (47.7)	135 (33.9)	30 (7.5)	28 (7.0)	15 (3.8)	398(100)	4.17
Traders' lack of awareness of fire safety practices is a major cause of market fires	185 (46.5)	140 (35.2)	30 (7.5)	28 (7.0)	15 (3.8)	398(100)	4.14
Congested market layouts and poor planning contribute to difficulties in controlling fires	195 (49.0)	135 (33.9)	28 (7.0)	25 (6.3)	15 (3.8)	398(100)	4.18
Non-enforcement of safety regulations by local authorities encourages fire disasters	200 (50.3)	130 (32.7)	25 (6.3)	28 (7.0)	15 (3.8)	398(100)	4.2

Source: Researchers Computation, 2025

The ANOVA results showing no significant differences in preparedness levels across markets ($p > 0.05$ for all indicators) suggest that the deficiency is not isolated but systemic. This aligns with the findings of UNDRR (2015), which stressed that disaster risk reduction in informal sectors requires holistic, city-wide approaches rather than localized interventions. Similar conclusions were drawn by Adelekan (2016), who noted that fragmented interventions fail to address the structural and institutional weaknesses inherent in market systems across sub-Saharan Africa.

Assuming all else remains equal, our findings confirm the claims in the body of literature that Nigerian market poor

readiness for fire is caused by a mix of factors such as the lack of infrastructure, poor training, limited funding, and poor enforcement of fire legislation. To close these gaps, the government agencies, trade associations, and private sector players have to come together to adopt insurance, infrastructure, and education policies.

The findings presented in Table 2 indicate that respondents perceived several interconnected factors as major causes of fire disasters in the selected markets within the study area. All the weighted mean (WM) values ranged from 4.14 to 4.26, which are well above the decision benchmark of 3.00. This reflects a strong consensus among respondents that infrastructural

deficiencies, unsafe human practices, and weak enforcement of safety regulations collectively increase the vulnerability of markets to fire outbreaks.

The lack of fire safety equipment (WM = 4.26) emerged as the highest-rated cause of fire disasters. This finding is consistent with Adebayo and Umeh (2020), who identified inadequate firefighting facilities as one of the major factors responsible for the rapid spread of fires in congested Nigerian markets. The fact that more than 85% of the respondents either strongly agreed or agreed with this statement suggests that the provision of basic fire prevention and firefighting facilities remains inadequate in many markets. Likewise, the high rating for careless handling of naked flames and cooking stoves (WM = 4.23) supports the findings of Eze and Igwe (2019), who reported that the widespread use of open flames for cooking and trading activities in markets without adequate safety measures significantly increases the risk of fire outbreaks.

The findings also revealed that unsafe electrical practices, including poor electrical wiring and illegal electrical connections (WM = 4.22), as well as the use of substandard electrical appliances (WM = 4.18), are major contributors to market fires. These findings agree with Oladipo et al. (2018), who found that a large proportion of market fire incidents resulted from faulty electrical installations and failure to comply with electrical safety standards. The high level of agreement among respondents further suggests that unsafe electrical practices have become common in many markets, a situation that has also been reported in similar studies conducted in Ghana and Kenya.

Furthermore, overcrowded shops and congested market layouts, with weighted mean values of 4.20 and 4.18 respectively, were identified as important factors contributing to fire disasters. This finding supports the work of Akinyemi and Lawal (2021), who argued that poor market planning and congestion not only encourage the rapid spread of fire but also make evacuation and emergency response more difficult. Respondents also identified weak institutional and regulatory practices, including irregular market inspections (WM = 4.17) and poor enforcement of fire safety regulations (WM = 4.20), as significant causes of market fires. These findings are consistent with Ndungu (2020), who attributed the high incidence of market fires in many sub-Saharan African countries to weak governance and poor enforcement of safety regulations.

Finally, respondents agreed that traders' inadequate knowledge of fire safety practices (WM = 4.14) and the improper storage of inflammable materials (WM = 4.14) contribute significantly to fire disasters in the markets. This finding agrees with Abubakar and Musa (2017), who reported that more than 60% of market traders in northern Nigeria had never received formal fire safety training. The study therefore highlights the need for continuous fire safety education and awareness programmes for market users. Overall, the consistently high weighted mean values across all the variables indicate that market fire disasters are caused by the interaction of multiple factors, including inadequate infrastructure, unsafe human behaviour, and weak institutional enforcement. This supports the Systems Theory of Accident Causation, which explains that accidents are rarely caused by a single factor but rather result from the interaction of several interrelated failures within a system.

Conclusions

The findings revealed that fire disasters in the major markets are mainly caused by inadequate fire safety equipment, unsafe electrical installations, careless handling of naked flames, poor market planning, and weak enforcement of safety regulations. These factors show that fire outbreaks result from both human activities and infrastructural deficiencies, highlighting the need for improved safety measures, regular inspections, and public awareness. The study also found that market fires have serious socio-economic consequences, including loss of goods, livelihoods, income, increased unemployment, poverty, disruption of trade, higher prices of goods, and occasional loss of lives. Furthermore, the results showed that the level of fire disaster preparedness among market users is poor, emphasizing the need for proactive fire prevention, emergency preparedness, and coordinated disaster management to reduce future fire risks.

Government agencies should strengthen enforcement of fire safety regulations through regular inspections, proper market planning, and adequate fire safety infrastructure. Market management and traders' associations should promote fire safety education and encourage compliance with safe practices. State and local emergency management agencies should improve disaster preparedness by conducting routine fire drills, enhancing emergency response, and reducing market congestion. In addition, government, insurance providers, NGOs, and traders' associations should

provide affordable insurance and financial support to help affected traders recover from fire disasters.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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