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SPECIAL ISSUE: CELEBRATING 20 YEARS OF GEOGRAPHY IN KADUNA STATE UNIVERSITY - ADVANCES AND FRONTIERS IN GEOGRAPHY

An Assessment of Fire Safety Status and Preparedness in Public Facilities in Lagos Mainland Local Government Area of Lagos State, Nigeria

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ABSTRACT

Fire outbreaks in rapidly urbanizing areas, particularly affecting public facilities, come with significant losses. These could range from critical record loss to disruption of public services and potential casualties. Fire preparedness in such facilities is thus critical. This study assessed the dynamics of fire preparedness of Lagos State government facilities in Lagos Mainland LGA, a highly urbanized region. Specifically, facilities were mapped, and their distribution was analyzed. Available fire preparedness equipment and staff fire safety knowledge were also evaluated. A combination of fieldwork, direct observation, and social survey was employed for data collection. Twenty-one (21) facilities were identified, coordinates retrieved, and mapped accordingly. A total of 105 staff members of the facilities were randomly selected for questionnaire administration. Sampled facilities were found to be randomly distributed with a nearest neighbour index of 1.0472. All the facilities were within a 2km buffer of fire stations, but fire safety equipment across the facilities was largely inadequate. The highest fire preparedness index attained was 0.5 out of 1.0, indicating generally low scores across the board. Fire drills and training of staff were largely lacking, even though 72% indicated personal knowledge of the use of fire extinguishers. Urgent retrofitting of facilities with modern equipment and mandatory quarterly fire drills, among others, were recommended.

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1 Introduction

Fire outbreaks remain a critical concern in urban areas due to rapid population growth, infrastructural development, and inadequate fire prevention measures (Adeleke, 2019). Rapid population growth is unfortunately highest in developing nations, with limited capacity to provide adequate resources to meet rising demand (Cohen, 2006). Such an influx of population without requisite fire safety measures presents a potentially dangerous situation.

Globally, fire incidents in public institutions are often linked to factors such as aging infrastructure, inadequate fire safety systems, human error, and arson. Studies have shown that older buildings are particularly susceptible due to outdated electrical wiring and a lack of modern fire suppression systems (Drysdale, 2011). In developing nations, rapid urbanization and insufficient investment in public infrastructure exacerbate these risks, with fire incidents often resulting in significant casualties (United Nations Office for Disaster Risk Reduction (UNDRR), 2015). Lagos Mainland Local Government Area (LGA) is one of the most urbanized and economically vibrant areas in Lagos State. The LGA houses several high-risk zones, including markets, industrial facilities, and residential neighborhoods with some closely built structures. Increased risk exposure is expected with such a concentration of assets, especially where there is limited emergency management capacity (Olawale & Ogunbiyi, 2021).

Lagos State Fire and Rescue Service (2022) noted that a significant proportion of fire incidents originate from electrical faults and human negligence. Comparative studies with other major urban centers in Nigeria, such as Abuja and Kano, suggest that Lagos experiences a higher frequency of fire incidents due to its unique urban density and economic activity (Adebayo et al., 2018). The inadequacy of firefighting equipment and the slow response time of emergency services have also been identified as critical issues in Lagos (Cyprian & Alao, 2023).

Nigeria has a history of devastating fire incidents in government facilities. These incidents have often been attributed to a combination of factors, including poor maintenance, electrical faults, and lack of adherence to fire safety regulations. Examples include Cocoa House in Ibadan, University College Hospital, Ibadan, and Orthopaedic Hospital, Igbobi, Lagos, and several fires at government-owned markets and office complexes in various states (Ogun State Government, 1996; National Emergency Management Agency (NEMA), 2018; Ukegbu et al., 2022).

A critical concern is the effectiveness of fire emergency preparedness within Lagos government offices and service centers. This is critical because many public institutions exhibit significant gaps in fire preparedness, including insufficient fire safety drills, inadequate maintenance of firefighting equipment and facilities, and

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the lack of clearly defined emergency response protocols. These deficiencies not only increase the likelihood of fire hazards but also hinder the capacity for timely and effective response when incidents occur. According to the Lagos State Fire Service (2022), several fire incidents in Lagos State resulted in extensive property loss due to poor accessibility and congestion, which hindered fire trucks from reaching affected locations promptly.

Fires in government offices and health centers can escalate rapidly, leading to the loss of critical records, disruption of public services, and potential casualties. The need for a well-structured fire preparedness strategy is therefore imperative to mitigate potential disasters and safeguard lives and property in the region. Makanjuola et al. (2009) found that only 58% of government facilities had undergone mandated inspections within the previous three years of their study. In view of these, the study identified the public facilities in Lagos Mainland LGA, analyzed their distribution, and evaluated the status of fire equipment installed in each facility.

Effective fire management involves public awareness campaigns, stringent building regulations, enforcement of safety measures, and well-equipped fire service units (Akinyemi & Adejumo, 2021). Eze and Aluko (2020) emphasized the role of community engagement in fire prevention strategies through proactive measures. Staff training and awareness programs represent a critical human element in institutional fire preparedness. Ukegbu et al. (2022) surveyed 412 employees across various Lagos State government institutions and found that while 68% had received some form of fire safety information, only 37% could correctly identify appropriate actions during specific fire scenarios. This revealed a substantial gap between information provision and practical knowledge acquisition.

The quality and frequency of training show significant variation. Wan-Ching et al. (2022) noted that government departments with quarterly refresher training demonstrated 64% higher success rates in fire emergency simulations compared to those conducting annual training only. Anyanwu et al. (2021) earlier evaluated fire safety campaigns in Lagos public institutions and found that programs emphasizing behavioral psychology and scenario-based learning achieved 53% higher knowledge retention than traditional information-based approaches.

Evidence suggests, among other things, limited training for Lagos State staff on fire emergency response preparedness (Popoola et al., 2016; Oluwunmi, 2023). This deficiency raises serious concerns about institutional vulnerabilities, particularly in high-risk zones where regulatory oversight is weak. Coupled with rapid urbanization, high population density, and prevalent use of combustible materials create a volatile environment susceptible to devastating fire incidents. The study thus examined the fire safety knowledge of staff of the sampled government facilities in Lagos Mainland Local Government Area.

2 Materials and Methods

2.1 Study Area

Lagos Mainland Local Government Area (LGA) is strategically located in the central part of Lagos State, in the southwestern region of Nigeria. It lies approximately between longitude 3° 22'E and 3° 24'E, and latitude 6° 27'N and 6° 32'N (Fig. 1). The LGA has its headquarters in Ebute Metta and shares boundaries with Shomolu LGA to the north, Mushin and Surulere LGAs to the west, Lagos Lagoon to the east, and Apapa LGA to the south.

Lagos Mainland LGA is one of the most densely populated areas within the Lagos metropolis. According to official statistics, the local government has a population of approximately 629,469 residents, comprising 326,433 males and 303,036 females (NBS, 2019). This represents about 3.6% of Lagos State's total population, which continues to grow at a remarkable rate compared to global standards. The population density underscores the significant urban pressures facing the local government area and highlights the challenges for effective urban planning and service delivery. As noted earlier, high urban density presents a peculiar challenge for fire safety and emergency response, especially when development occurs with limited monitoring and regulation.

2.2 Data Sources

Spatial and non-spatial data were used for this study. Non-spatial data include those from relevant literature on fire disaster preparedness, and data on fire equipment and safety awareness, which were gathered through checklists and structured questionnaires. The checklist was used to confirm the presence and functionality of firefighting installations such as fire extinguishers, first aid kits, smoke detectors, fire alarm systems, fire blankets, and emergency exits in the government facilities. Twenty-one (21) facilities were identified, from which five (5) staff each were conveniently selected and sampled for questionnaire administration, making a total of one hundred and five (105).

The spatial data used for the study include the coordinates of installed hydrants, obtained from the Lagos State Fire and Rescue Service, and the coordinates of facilities and fire stations, which were acquired using a handheld Garmin Geographical Positioning System (GPS).

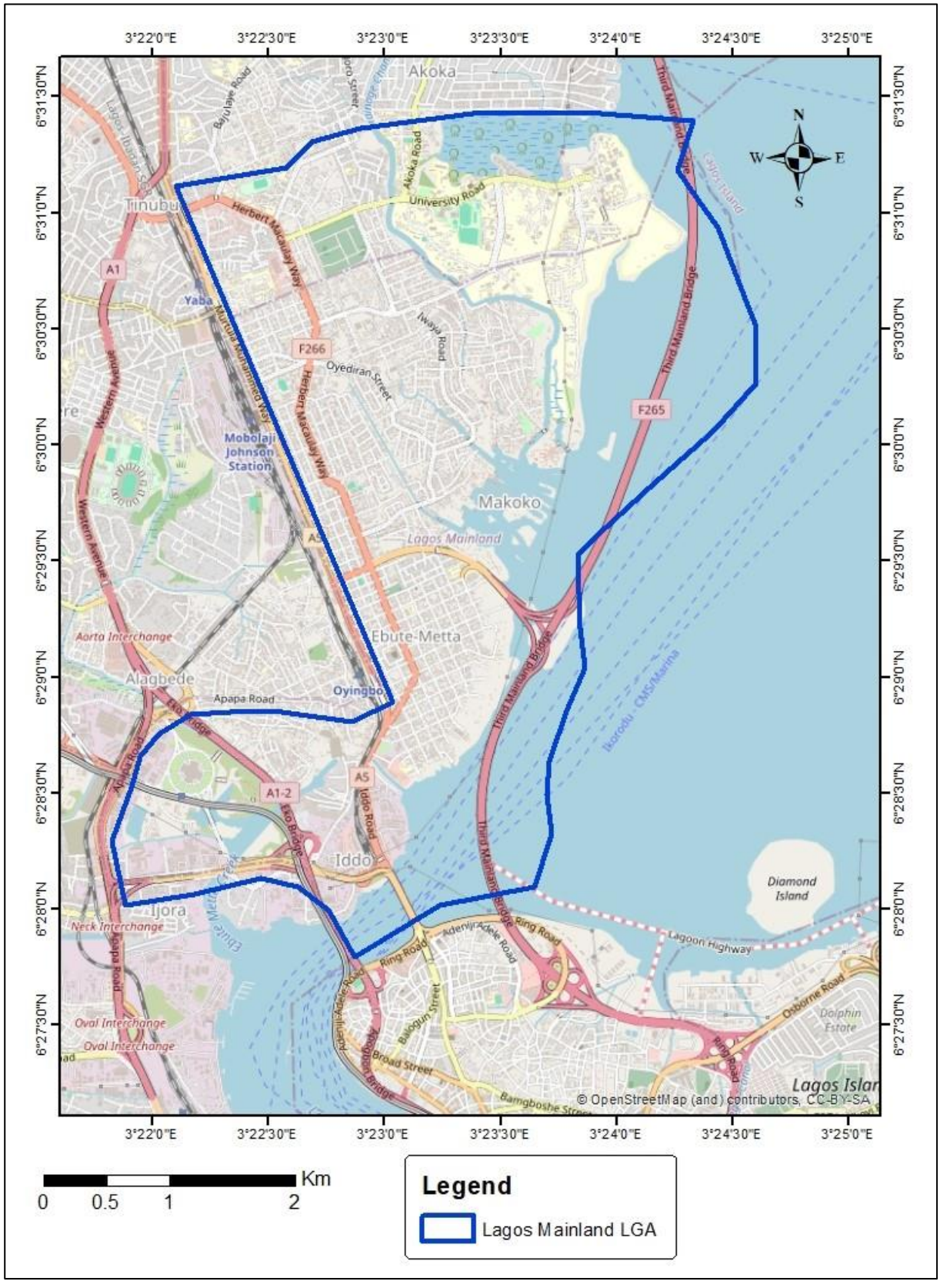

Figure 1: Lagos Mainland Local Government Area
Source: GRID 3.

2.3 Data Analysis

The questionnaire administered elicited responses from government staff regarding fire safety training, fire drills, availability and knowledge of fire evacuation plans, and familiarity with the use of installed fire safety equipment. The data acquired were analyzed using measures of central tendency.

Other spatial data acquired were input into ArcGIS for analysis. Coordinates of sampled facilities, fire stations,

and hydrants were used to develop maps and conduct nearest neighbour and buffer analyses. To establish the weight of fire preparedness, ten (10) variables were used, including fire extinguisher, smoke detector, fire alarm, fire blanket, muster point, emergency exit, dry sand bucket, first aid kits, fire hydrant, and fire stations. Presence of each variable was ranked (1), while absence was weighted (0). Summation of these yielded the allocated facility weight. The index ranges from 0 to 1, where 0 means total absence and 1 means complete availability of equipment.

3 Results and Discussion

Twenty-one (21) Lagos state government facilities were identified in the study area (Fig. 2).

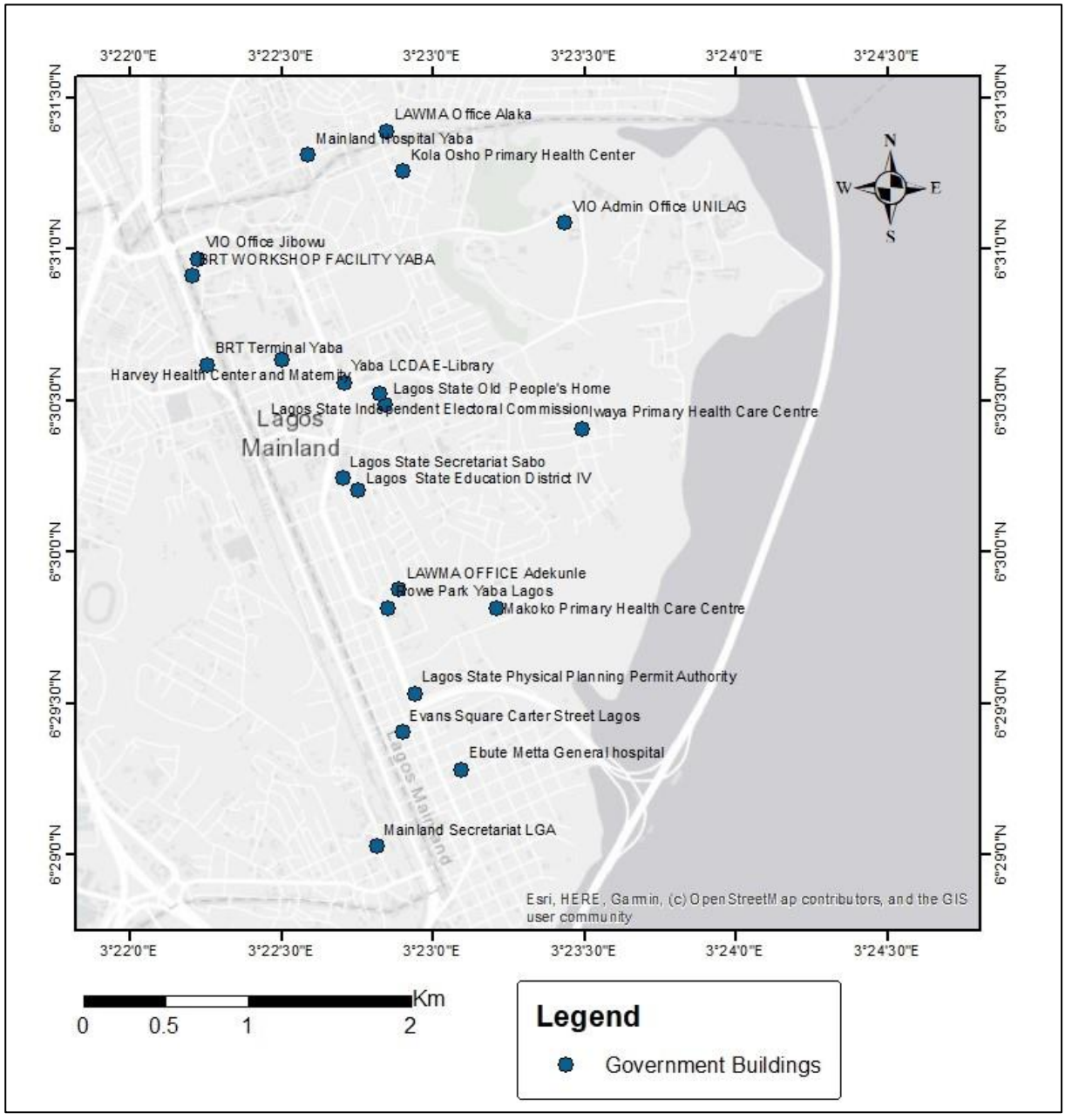

Figure 2: Lagos state government facilities in Lagos Mainland LGA

These facilities revealed some level of historical interest from the state, as these facilities have been under the ownership of the government. They perform functions ranging from transportation, administrative, healthcare, to recreational. A nearest neighbour analysis of the facilities showed a random distribution with an NNI of 1.0472 (Fig. 3).

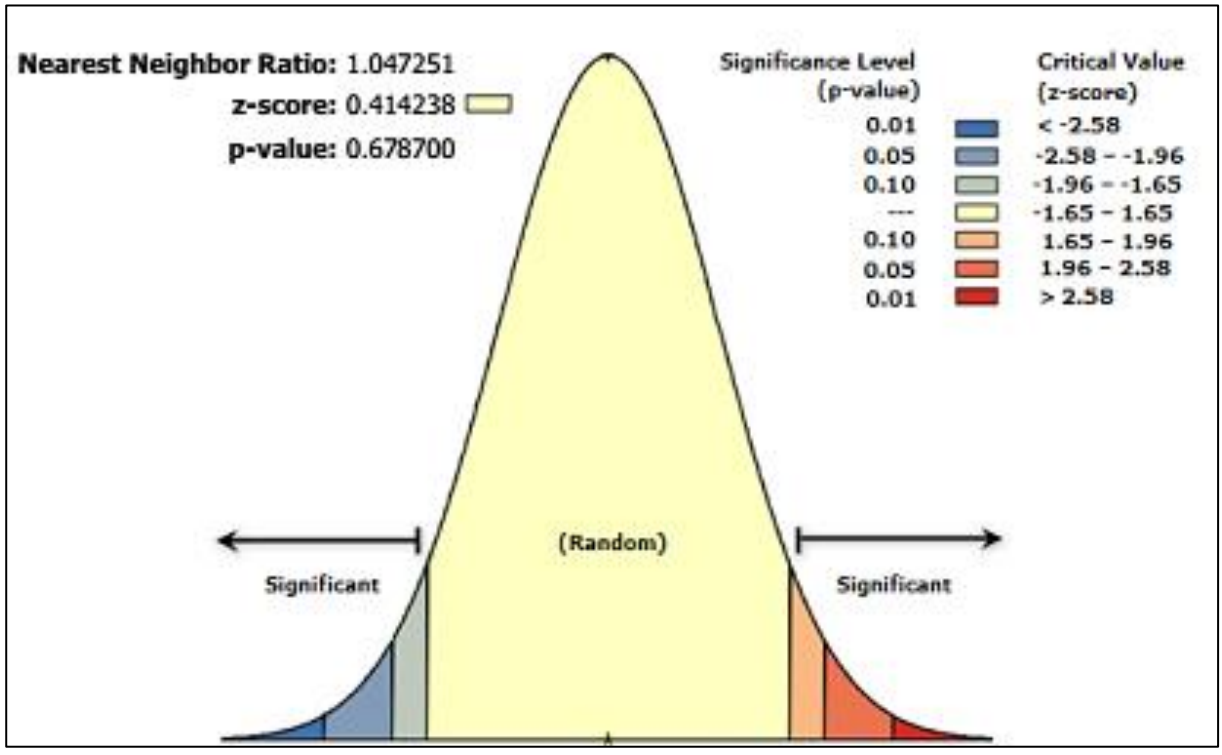

Figure 3: Nearest Neighbour Index of sampled government buildings in Lagos Mainland LGA

This implied that facilities were barely planned to be in a distinct pattern. Development in the area over the decades rarely followed land use zoning patterns, and with diverse functions of these public facilities, it is not unusual that they are randomly distributed. Some facilities, like the primary health centers, are sited in each ward, while others, like the BRT terminal and workshop, are sited along the Murtala Mohammed Way, which is an important transport hub connecting Lagos mainland with the island region.

One of the most significant fire management components is the availability of fire stations around the facilities, ensuring prompt response to a fire incident. Ferreira (2022) noted that proximity to fire service stations is a key determinant of preparedness and effective response capacity. There are two (2) fire stations within Lagos Mainland LGA, including the University of Lagos Fire Unit and Federal Fire Station, Ebute. A third station was added to the analysis since it was within a 2km buffer of sampled facilities (Fig. 4). It was, however, also a Federal fire station under Surulere LGA.

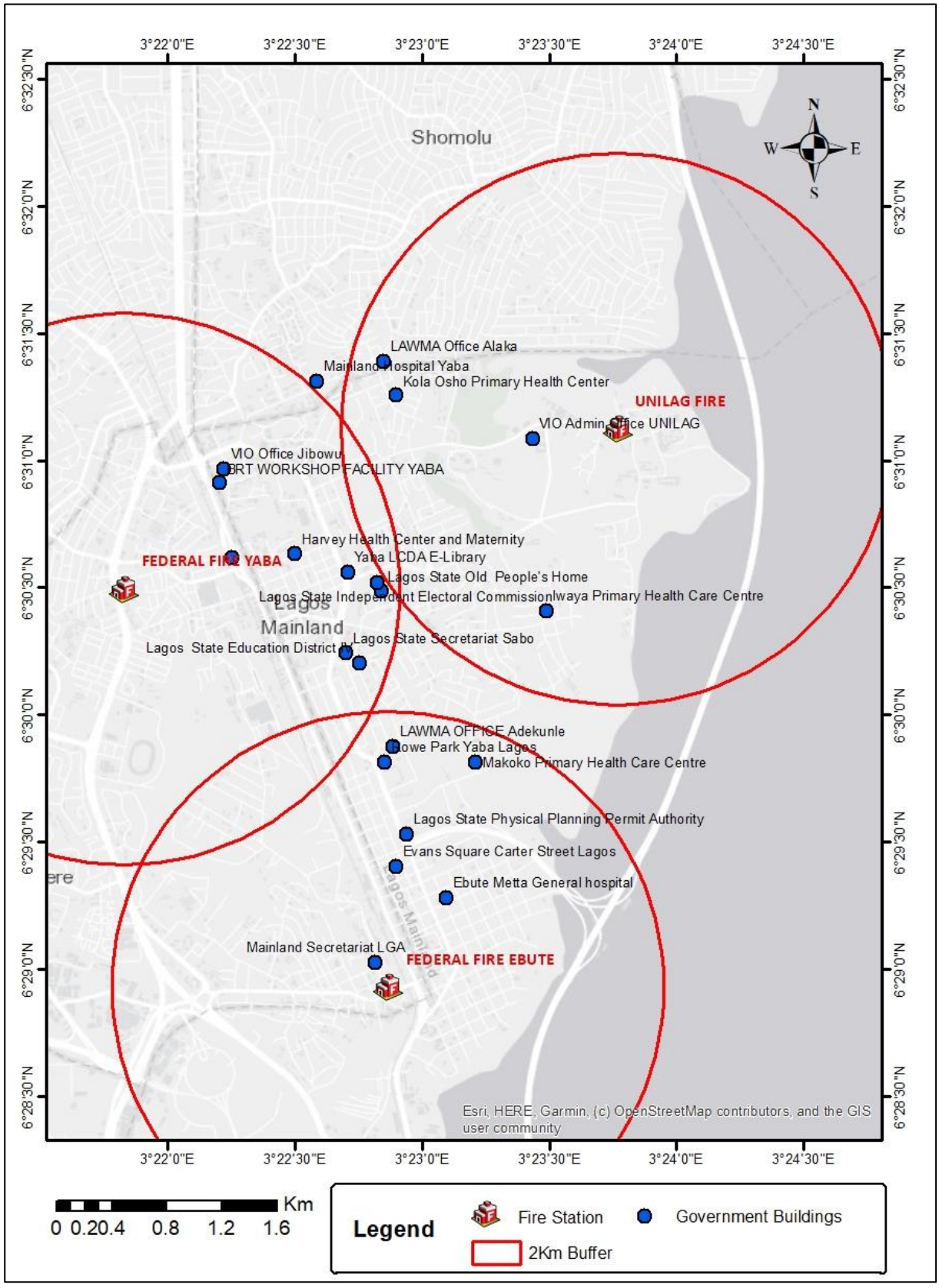

Figure 4: Distribution of facilities within 2km buffers of fire stations

The Lagos State Fire and Rescue Service identified that a 3 km buffer represents the optimal service coverage for rapid response. However, the nature of urban development in the area, being a high-density region, requires a shorter buffer for better risk assessment. The absence of a Lagos State Fire and Rescue Service station in the local government is apparent. In spite of this, analysis revealed that all the facilities were within 2 kilometers of a fire station.

A while ago, the Lagos State government reactivated old British and American-styled hydrants across the state and also added new ones. Hydrants provide water

replenishment for fire trucks in cases of water exhaustion during rescue operations. A 300-meter buffer was created around each hydrant in the area to determine accessibility from the sampled facilities (Fig. 5).

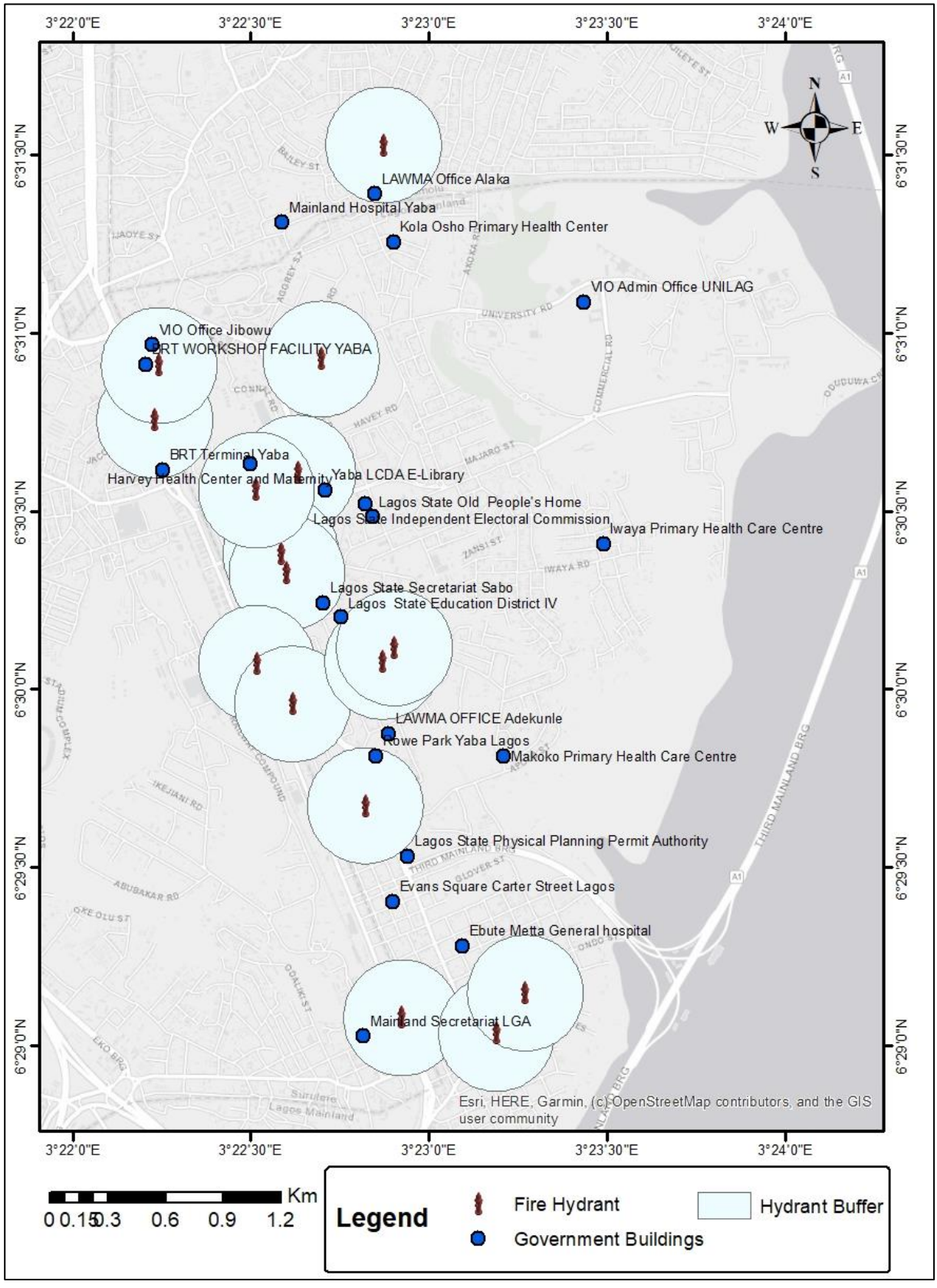

Figure 5: Buffers around fire hydrants in Lagos Mainland LGA

The hydrants are mostly concentrated around Herbert Macaulay Road, one of the major roads in the area. Hence, facilities around it were covered by these hydrants. However, facilities such as Kola-Osho, Iwaya, and Makoko Primary Health Centers were not covered. The study could not establish the rationale for the choice

of locations for the initial hydrant siting.

A fire preparedness index was generated for the sampled facilities, including components such as fire extinguishers, smoke alarms, functional fire exit doors, muster points, and proximity to fire stations, among others (Fig. 6)

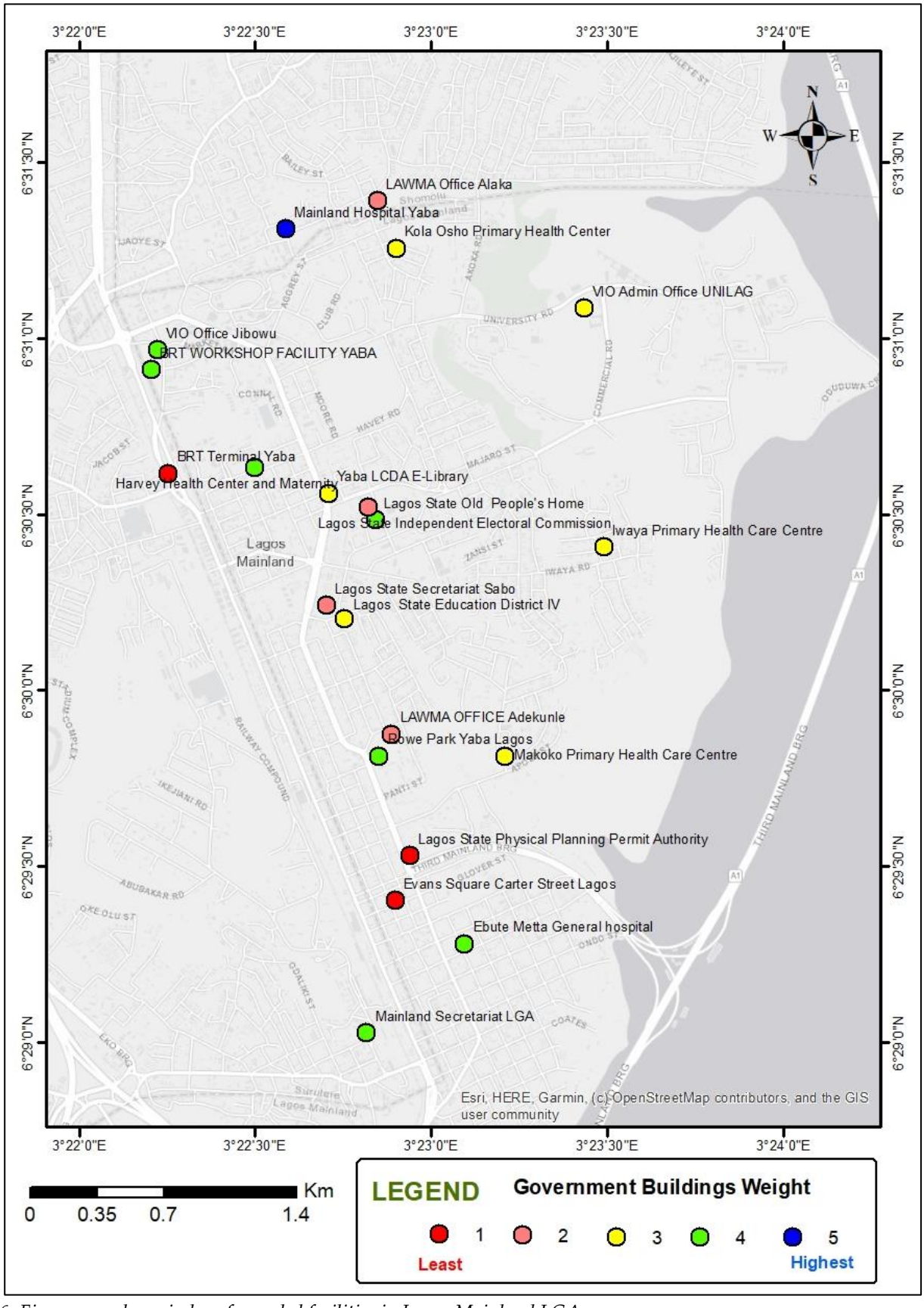

Figure 6: Fire preparedness index of sampled facilities in Lagos Mainland LGA

Facilities were ranked from the least prepared facility, being the one lacking most in fire preparedness components. Some of these include the BRT Terminal at Yaba, a transportation hub, and Evans Square, a recreational facility. These facilities had no fire preparedness equipment installed and only had the coverage of a fire station within 2 kilometers. A significant proportion of facilities (33%) had the next highest scores after Mainland Hospital Yaba, the only facility with the highest score of 5 (0.5). This highest score indicates that the best facility had only 50% of the evaluated indices available, which represents a significantly low level of fire preparedness within public facilities in Lagos Mainland LGA. The findings are consistent with previous studies that identified poor levels of fire preparedness in Nigerian public institutions. Agu et al. (2022) reported that most government-owned facilities lacked essential fire detection and evacuation systems, relying primarily on extinguishers.

The results from the social survey, which focused on staff safety training, revealed significant institutional vulnerabilities to fire disasters. The data show that only 10.5% had ever undergone fire safety training, while the majority, 89.5%, had never received such instruction. This implies a general lack of the basic knowledge required to identify fire risks, use firefighting equipment, and respond appropriately during emergencies. The absence of training is particularly concerning given the high proportion of these multi-storey facilities, where safe evacuation requires coordinated staff action.

The frequency of fire drills was also assessed. Only 8.6% reported that their institutions conducted fire drills regularly, while 12.4% indicated that drills occurred occasionally. A striking 79% revealed that their facilities had never organized a fire drill. This lack of practice significantly undermines preparedness, as staff are unlikely to know evacuation routes, muster points, or the sequence of actions required during a real fire emergency. Regular drills are internationally recognized as essential for ensuring both compliance and readiness, yet this result highlights a major gap in enforcement within the study area.

Another indicator of compliance is the availability of documented fire safety plans. Only 11.4% confirmed the existence of such plans in their institutions, compared to 78.1% who reported the absence of any plan, and 10.5% who were unsure. This suggests that in most facilities, fire safety planning is either non-existent or poorly communicated to staff. Similarly, regular equipment inspection was confirmed by only 16.2%, while 75.2% reported no inspection regime, and 8.6% were unsure. Without routine checks, critical equipment such as fire extinguishers, alarms, and detectors may remain non-functional when most needed.

On a more positive note, 72.4% reported knowledge of how to use fire extinguishers, reflecting some level of awareness. However, awareness of other essential fire safety measures was much lower. Only 15.2% indicated awareness of fire alarms or detectors, while 20.9% knew the location of muster points. Furthermore, only 19.1% were aware of emergency fire service contact numbers, leaving 80.9% of staff unable to quickly reach professional responders during an incident.

Overall, the findings highlight that government facilities within Lagos Mainland LGA demonstrate low levels of regulatory compliance with fire safety standards. Training and fire drills are rare, safety plans are largely absent, and inspection of equipment is not systematically conducted. While knowledge of extinguishers is relatively widespread, awareness of other safety measures, such as alarms, muster points, and emergency contacts, is alarmingly low. These compliance gaps suggest that institutional preparedness for fire emergencies remains minimal, despite the presence of some basic equipment in a few facilities.

This low safety compliance level not only increases vulnerability to fire disasters but also reflects weaknesses in policy enforcement and institutional accountability. Addressing these gaps requires both capacity-building initiatives, such as mandatory training and regular drills, and stronger enforcement of fire safety codes by regulatory authorities.

4 Conclusion

This research identified that the vulnerability of public facilities in Lagos Mainland LGA is not just about weak or obsolete infrastructure, especially concerning installed equipment. Poor institutional practices and governance also contribute significantly to this. Fire safety codes are not well enforced, monitoring is inadequate, and routine inspections are often missing, allowing non-compliance to continue in many public agencies. This is of great concern because these parastatals hold important public records, deliver key services, and manage assets that affect millions of residents in Lagos. Without urgent action, these weaknesses could lead to severe losses during fire outbreaks, affecting governance, public safety, and the city's overall resilience.

Based on these findings, the following were recommended:

i. All government facilities with essential fire safety systems, including smoke detectors, fire alarms, hydrants, emergency exits, and proper signage.
ii. Compulsory fire safety training, quarterly evacuation drills, and documented emergency response plans should be instituted across all facilities, with particular focus on high-occupancy facilities such as hospitals.

iii. Lagos State Fire and Rescue Service should conduct mandatory quarterly inspections of government facilities, implement a certification system for continued facility operations, and impose penalties for non-compliance with fire safety standards.
iv. Establish volunteer fire warden programs within each parastatal to support emergency preparedness and community awareness initiatives.
v. Further studies should extend this analysis to other LGAs in Lagos State to generate comparative insights and broader city-wide fire risk patterns.
vi. Cost–benefit analyses of safety interventions could also guide investment decisions by weighing retrofitting costs against potential fire losses.
vii. Community-centered assessments should capture the role of surrounding neighborhoods in shaping institutional fire risk.

Declaration

The authors declare that this research presents an accurate account of the work performed, all data presented are accurate, and methodologies are detailed enough to permit others to replicate the work. All procedures performed in this study involving human participants for questionnaire administration were conducted ethically according to ethical standards. Informed consent was obtained from all individual participants included in the study. This manuscript represents entirely original works, and if work and/or words of others have been used, that this has been appropriately cited or quoted, and permission has been obtained where necessary.

This material has not been published in whole or in part elsewhere. The manuscript is not currently being considered for publication in another journal. All authors have been personally and actively involved in substantive work leading to the manuscript and will hold themselves jointly and individually responsible for its content. There is no conflict of interest in carrying out this study.

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