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Managing Cooking Gas Explosion Risks in Residential Properties: Empirical Evidence from Abuja, Nigeria

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Abstract

The study examined the incidence of cooking gas (LPG) explosion in residential properties in the city of Abuja, Nigeria in terms of residential property management. The study adopted a mixed method approach and data were collected from fire service agencies, property managers, tenants and residents in Gwarinpa, Kubwa, Wuse, Maitama and Lugbe through the use of questionnaires, interviews and secondary sources. Analysis was performed using descriptive and inferential statistics. Chi-square test and one-sample t-test was used to analyse the study objectives. Frequency tables, percentages and mean scores, were used to summarize respondents' demographic characteristics and responses to the research questions. The findings identified poor maintenance practices, poor gas cylinders and accessories, poor ventilation, tenant negligence, weak regulatory enforcement and poor safety awareness as the major causes of gas explosions. The study also found that gas explosions negatively affect tenant safety, property values, insurance costs and the reputation of property managers. The study recommends that proper management of residential properties, routine safety inspections, strict compliance with safety standards and public awareness campaigns are necessary to reduce the incidence of LPG explosions. Strict enforcement of safety regulations, regular inspection of gas installations, training of tenants on safety issues and improved collaboration between regulatory agencies and property management companies are recommended by the study to improve residential safety in Abuja.

Keywords: Cooking Gas, LPG Explosion, Property Maintenance, Residential Property Management, Risk Management.

Introduction

Urbanisation and population growth in Nigeria has led to a huge increase in demand for housing and domestic energy use. In major urban centres such as Abuja, the use of Liquefied Petroleum Gas (LPG) for domestic cooking has expanded rapidly due to its convenience, efficiency, affordability

and environmental advantages over traditional cooking fuels such as firewood and kerosene (Abdulraheem et al. 2023). However, with the increased reliance on cooking gas, the number of cases of gas explosions in residential buildings has increased. Cooking gas explosions have become a major issue of public safety in Nigeria. Many of the country's incidents have led to deaths, serious injuries, destruction of residential buildings, displacement of households and huge financial losses. Studies have shown that the increased use of LPG without proper safety awareness and enforcement of regulations plays a major role in the occurrence of gas explosions.

Gas explosions are especially dangerous in residential buildings where cooking takes place daily in confined spaces (Turgut et al., 2013). Rapid urban growth, high-density residential developments and rising tenancy rates in Abuja have challenged the enforcement of residential safety standards. Hence, property managers are increasingly responsible for the maintenance of gas-related facilities and tenants' safety from fire hazards. Property management involves overseeing, routine upkeep and running residential and commercial real estate properties to ensure safety, functioning and value retention. Ensuring Tenant Safety: One of the key responsibilities of property managers in residential property management is to ensure tenant safety. Gas explosions put this responsibility to the test, exposing failures in maintenance procedures, safety compliance, emergency preparedness and tenant education. Causes of cooking gas explosions may include gas leakage, defective cylinders, expired regulators, poor ventilation, improper installation, negligence, illegal gas refilling practices and lack of regular maintenance. Evidence from Nigerian studies indicates that many households lack adequate knowledge on safe LPG handling practices (Cen et al. 2019). Also, the problem is compounded by the lack of regulation and enforcement of building safety standards.

In Abuja, most of the residential estates and apartment complexes are managed by private property firms or landlords who may not adequately prioritise gas safety management. Hence, explosion incidents continue to endanger lives and properties. Economically, gas explosions can decrease property values, increase insurance costs, create legal liabilities, and discourage potential tenants (Chyzy & Mackiewicz, 2017). Hence, this study examines cooking gas explosions in residential property management in Abuja with particular reference to causes, impacts, management and sustainable safety strategies for residential properties.

STATEMENT OF THE PROBLEM

In Abuja, the use of LPG for domestic cooking has increased significantly in recent years driven by increasing urbanisation and government promotion of cleaner energy consumption. LPG has its advantages, but there have been many more reports of gas leaks, fires and explosions in residential buildings (Chmielewski & Bak, 2021). Most of the residential properties in Abuja lack adequate safety systems for the use of LPG. Some buildings are poorly ventilated and many tenants use sub-standard gas cylinders, hoses and regulators. Property managers don't always conduct regular inspections or tell tenants about the safe use of petrol. As a result, residential gas explosions are still occurring, causing injuries, deaths, property damage and financial losses.

Most of the previous studies on LPG explosions in Nigeria have been on medical outcomes, industrial accidents or fire disasters. However, little attention has been paid to the role of residential property management in the prevention of cooking gas explosion, especially in Abuja. This leaves the knowledge gap on the relationship between the property management practices and the risks of gas explosion in residential property. The lack of enough empirical research on the issue is a challenge for policymakers, property managers and urban planners to develop effective prevention strategies. This study therefore

aims at filling this gap by examining cooking gas explosion in the context of residential property management in Abuja.

AIM AND OBJECTIVES OF THE STUDY

This study aims to evaluate cooking gas explosion in residential property management in Abuja. This will be achieved through the use of the following specific objectives, which are to:

i. Identify the primary causes of cooking gas related explosions in residential properties in Abuja.
ii. Examine the roles of property managers in averting cooking gas explosions.
iii. Determine the effects of gas explosions on residential properties and tenants.
iv. Evaluate the safety level and awareness level among residents.
v. Recommend implementable strategies to prevent cooking gas explosions in residential buildings.

In addition to the research objectives, requisite hypothesis was developed in alignment with the study objectives based on significant (Hn) and non-significant (Ho) variations, so as to achieve inferential statistics.

RESEARCH GAP

Although many studies have been carried out on LPG usage and gas explosions in Nigeria, little has been done in the area of residential property management in Abuja. The literature is limited to the consequences of burns, industrial hazards and general safety practices. For instance, Olayebi and Ayanleke (2022) on causes of burns in Southwest Nigeria from cooking gas explosions; and Oduah et al. (2026) on Safety knowledge among household LPG users in Nigeria. However, the role of residential property managers in relation to promoting gas safety compliance, tenant awareness, building maintenance and emergency preparedness is not well known. This study bridges this gap by connecting cooking gas explosions with residential property management practices in Abuja. It contributes to the knowledge by examining the roles of landlords and property managers in the reduction of the hazards of gas explosion.

CONCEPTUAL FRAMEWORK

This study was underpinned by the Risk Management Theory on one hand and the Systems Theory of Property Management on the other.

Risk Management Theory

Risk Management Theory describes how organisations and individuals identify, assess, and control risks to minimise losses. Risk Management is the process of identifying the risk and taking action to prevent those risks. e.g., in residential property management, risks involving gas leaks. The theory focuses on: Hazard Identification, Risk Assessment, Prevention Strategies, Emergency Preparedness and Continuous Monitoring. Property managers should be aware of the risks associated with gas and take steps to prevent incidents, such as inspections, maintenance, tenant education and emergency response plans.

Systems Theory

Systems Theory sees the management of residential property as a system of interrelated components. These components include landlords, tenants, maintenance staff, regulatory agencies and suppliers of safety equipment. A failure of a single component can bring down the whole system. In the context of

gas explosions, tenants can misuse LPG equipment, property managers can neglect inspections, regulatory agencies can fail to enforce standards, suppliers can distribute substandard cylinders and the interaction of these failures increases explosion risks.

LITERATURE REVIEW

The increasing rate of cooking gas explosions in residential properties has become a major safety concern within Nigeria's urban housing sector, particularly in Abuja. As the use of liquefied petroleum gas (LPG) continues to rise due to its affordability and convenience compared to traditional cooking fuels, incidents of gas leakage, cylinder mishandling, and poor safety compliance have also increased. The existing literature clearly indicates that explosion of cooking gas often results in loss of lives and destruction of property and also injuries and psychological trauma to residents. These incidents have been attributed by scholars to poor safety awareness, poor quality gas equipment, weak enforcement of regulation and poor property management practices.

Research in property management looks at the roles of landlords, estate managers and housing developers in the proper installation, maintenance and oversight of gas systems in residential buildings (Tomlin et al., 2015). However, little research has been conducted on how property management practices prevent or promote cooking gas explosion in Abuja. Most of the existing studies are generally focused on fire outbreaks or urban safety issues without addressing tenants' experiences, risk management practices, and safety compliance in managed residential properties. This literature review therefore appraises existing knowledge on cooking gas explosion and property management practices with a focus on residential safety challenges in the housing sector in Abuja.

Concept of Cooking Gas (LPG)

The use of Liquefied Petroleum Gas (LPG) popularly called cooking gas has become a major component of household energy consumption (Song et al., 2021). Increasing urbanisation, population growth and the need for cleaner and more efficient domestic energy sources are the major factors driving the rapid adoption of LPG in urban centres such as Abuja. Although cooking gas has its benefits, increased usage of cooking gas has also led to increased cases of gas explosions in residential buildings. Such explosions have led to loss of lives, destruction of properties, injuries and financial losses. Therefore, more and more scholars and safety professionals have paid attention to the causes, effects and preventive strategies of cooking gas explosion, especially in the field of residential property management. The literature review examines previous studies on cooking gas explosions, residential property management, fire safety practices, tenant behaviour and regulatory frameworks. The review also covers theoretical and empirical perspectives relevant to the study.

Concept of Liquefied Petroleum Gas (LPG)

Liquefied Petroleum Gas (LPG) is a flammable hydrocarbon gas mixture made up mostly of propane and butane. It is turned into a liquid to make it easier to store and transport. LPG is preferred for home cooking because it burns efficiently, produces less smoke and is more environmentally friendly than kerosene and firewood. In line with its energy transition policy, the Nigerian government has promoted LPG adoption to reduce environmental pollution and dependence on traditional fuels (Lasisi, 2021). The availability of LPG refill stations in urban centres like Abuja has also contributed to the increased use of LPG in households. But the rapid adoption has caused more gas-related accidents without the needed safety education and regulation.

Cen et al. (2026) in their research found that many households use LPG daily but they have limited technical knowledge on how to handle them safely, how to maintain the cylinders and detect leaks. This increases your exposure to domestic gas explosions.

Causes of Cooking Gas Explosions

Various studies have identified several factors responsible for cooking gas explosions in residential properties (Edward et al., 2024). These include, but is not limited to technical failures, human negligence and regulatory weaknesses.

i. Gas Leakage: Gas leakage is widely believed to be the cause of LPG explosions. Leakages happen when gas escapes from cylinders, hoses, regulators or pipe connections into enclosed areas. Explosions may happen when the gas accumulates and comes in touch with ignition sources - such as naked flames, electrical sparks or matches. Jia, et al. (2021) noted that the use of poorly maintained cylinders and defective regulators are linked to many gas explosions. Likewise, Ng et al. (2017) reported that most of the household burn injuries resulting from gas explosions were related to leaking cylinders and worn-out accessories.

ii. Substandard Gas Equipment: Fake and substandard gas cylinders, hoses and regulators remain a major safety challenge in Nigeria. Economic hardship forces many families to buy cheaper but low-quality equipment. Such products are also more prone to fail under pressure, increasing the risk of explosion. It is reported that weak regulation and poor market monitoring contribute to the circulation of unsafe LPG accessories. Roadside LPG vendors and unauthorised dealers in Abuja often sell expired or damaged cylinders without proper inspection.

iii. Poor Ventilation: In residential buildings, ventilation is very important in preventing the accumulation of gases. In kitchens and other enclosed spaces, where ventilation is poor, leaked gas cannot easily disperse and so the chances of explosions are high. Stawczyk (2003) research on urban fire disasters showed that many residential buildings do not meet basic standards of ventilation and fire safety. This greatly increases the likelihood of gas explosions in the house.

iv. Human Negligence: Human factors also play a very important role in causing cooking gas explosions. Typical negligent practices include leaving gas valves open, storing cylinders near heat sources, ignoring gas smells and checking for leaks with naked flames. Mohd Mokhtar et al. (2020) highlighted that although some gas safety practices are known, many LPG users have poor safety attitudes. This gap between knowledge and behaviour is a big contributor to domestic gas accidents.

v. Illegal Refilling Practices: Illegal gas refilling operations are rampant in many Nigerian cities. “These operators often refill cylinders under unsafe conditions, with no proper safety checks or standard equipment. Cylinders can also be overfilled which increases the pressure inside and the chance of an explosion. Despite the repeated warnings by the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) against illegal retailing of LPG, there is a lack of enforcement in many locations.

Residential Property Management and Safety

Residential property management is the administration, maintenance and oversight of residential buildings to ensure safety, comfort and preservation of value. Property managers are responsible for the maintenance of building infrastructure, the observation of safety regulations, and the protection of tenants from hazards (Okafor, 2022). For cooking gas explosions, property managers are important

players in: Conducting safety checks, providing adequate building ventilation, educating tenants about LPG safety, installing fire safety equipment and responding to emergencies.

According to Risk Management Theory, hazard identification and control is very essential in reducing accidents and losses. This means property managers should be able to recognise gas-related risks in residential buildings and take preventive measures. However, research has shown that most property managers in Nigeria are more concerned with collecting rent than with managing safety. This undermines disaster readiness and raises the risk of residential gas explosions.

Effects of Cooking Gas Explosions

Explosions as a result of cooking gas have serious physical, economic, psychological and environmental consequences. Loss of Life and Injuries One of the most serious consequences of gas explosions is that of human injury and death. They can cause burns, broken bones, respiratory injuries and emotional trauma to victims. According to Bubbico and Marchini (2008), a major cause of burn injuries treated in hospitals is as a result of cooking gas explosions. Many victims need long-term medical care and rehabilitation.

Property damage via gas explosions frequently destroy residences, furniture, appliances, and household items (Bariha, 2016). Buildings with structural damage may be uninhabitable, forcing residents to relocate. The densely populated residential estates of Abuja are particularly vulnerable as an explosion in one flat can easily spread to neighbouring units. Economic Losses: Gas explosions cost landlords, tenants and insurance companies a lot of money. Victims may lose property of value, suffer medical and rebuilding costs. Property owners may also view: Lower real estate value, increased insurance premiums, legal liabilities and lost rental income. Psychological Effects: Victims of gas explosions are often victims of trauma, fear, stress and anxiety. Survivors may have long-term emotional problems, especially if they have seen people badly injured or killed.

Fire Safety and Prevention Measures

Fire safety management is important to reduce the LPG explosions (Park et al., 2006). Effective prevention strategies include: Regular inspection of cylinders and hoses Proper kitchen ventilation use of certified LPG accessories installation of fire extinguishers public safety education and emergency preparedness. Studies show that increasing public awareness can greatly enhance safety practices at the household level. Oduah et al. (2026) also proposed smart gas leakage detection systems that can detect the leaks before explosions occur. Many developed countries have strict building codes and regular inspections that have greatly decreased the number of home gas accidents. But enforcement challenges remain significant in Nigeria owing to weak institutional capacity and poor compliance culture.

METHODOLOGY

The descriptive survey research design was adopted for this study to investigate cooking gas explosions and residential property management practices in Abuja, Nigeria. The design was considered appropriate because it enables the collection of both quantitative and qualitative data from a wide range of respondents and thus provides a comprehensive understanding of the causes, effects and management implications of cooking gas explosions. Data were collected through structured questionnaires and interviews with tenants and landlords and property managers. Additionally, secondary sources such as academic journals, government publications, fire service reports, and relevant safety regulations were reviewed to supplement the primary data and provide a broader context for the study.

i. Research Design: The study adopted a descriptive survey research design. The reason for choosing this design was that it allows data to be collected from a large population on their attitudes, experiences, perceptions and practices regarding cooking gas explosions. It also provides an opportunity to describe existing conditions objectively, without manipulation of any variables. The design was particularly appropriate to investigate the awareness level of safety measures, maintenance practices and the role of property management in preventing gas related incidents in residential buildings.

ii. The study was carried out in Abuja, the Federal Capital Territory of Nigeria. The districts selected were Gwarinpa, Kubwa, Wuse, Lugbe and Maitama. The sites were purposely chosen because they have high concentrations of residential population, widespread use of domestic cooking with Liquefied Petroleum Gas (LPG) and the presence of different types of residential developments managed by both private and public property managers. The districts selected also represent different socio-economic groups, giving a wide perspective of residential gas usage and management.

iii. The study population comprised of tenants, landlords, property managers, fire service officials and LPG retailers in the selected districts. These groups were chosen because of their key role in the installation, maintenance, regulation, supply and use of cooking gas in residential properties. The study population was considered unknown due to the lack of reliable records of the exact number of these stakeholders.

iv. A sample size of 250 respondents was selected from the unknown population by using the stratified random sampling technique. The respondents were grouped into relevant strata based on their roles to ensure adequate representation of each category. This approach to sampling improved reliability of the findings by decreasing sampling bias and including opinions from all relevant stakeholder groups in the study. The selection was evenly spread, hence 50 selected respondents per district.

v. The study's data were collected from primary and secondary sources. Primary data were collected using structured questionnaires based on a five-point Likert scale, interviews, and direct observation. The questionnaires provided quantitative data on respondents' perceptions and experiences, while interviews offered more detailed insights into safety practices, challenges, and management issues associated with cooking gas usage. Observations further helped to validate information obtained from respondents by assessing the physical conditions of gas installations and safety measures where applicable. Secondary data were obtained from textbooks, academic journals, government publications, fire service records, regulatory documents, conference papers, and other published studies relevant to cooking gas safety and residential property management.

vi. Method of Data Analysis: The collected data were coded, organized, and analyzed using appropriate statistical techniques. Descriptive statistics, including frequency tables, percentages and mean scores, were used to summarize respondents' demographic characteristics and responses to the research questions. Inferential statistics, specifically the chi-square test, were employed to examine relationships between relevant variables and to test the study's hypotheses at the selected level of significance. For your five objectives, a **Chi-square test** was particularly suitable for Objectives 1, 3, 4 and 5, while a **one-sample t-test** was used for Objective 2 because it was measured with a Likert-scale mean.

DATA ANALYSIS AND PRESENTATION

Data collected were analyzed using descriptive statistics to evaluate cooking gas explosion management practices.

Quantitative Studies

The quantitative studies are thus presented:

Table 1: Causes of Cooking Gas Explosions

Cause	Frequency	Percentage
Gas leakage	70	28%
Use of Faulty cylinders	55	22%
Poor ventilation	40	16%
Human negligence	50	20%
Use of substandard accessories	35	14%

The table indicates that gas leakage is the leading cause of cooking gas explosions in Abuja Nigeria.

Table 2: Awareness of Gas Safety Practices

Response	Frequency	Percentage
Highly aware	60	24%
Moderately aware	100	40%
Poorly aware	90	36%

This suggests that many residents still lack adequate safety awareness.

Table 3: Role of Property Managers

Responsibility	Mean Score
Routine inspections	3.8
Tenant education	3.5
Emergency preparedness	3.2
Equipment maintenance	4.0

This indicates that property managers play significant roles in preventing gas explosions.

Table 4: Effects of Gas Explosions

Effect	Frequency Percentage
Destruction of property	80 32%
Injury to tenant/s	65 26%
Loss of Finances	55 22%
Displacement of tenant	30 12%
Legal liabilities	20 8%

This informs that property destruction was identified as the most significant effect of gas explosions.

Table 5: Analysis of Respondents' Views on Strategies to Address Cooking Gas Explosion in Residential Property Management (N = 250)

S/N	Strategies	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std. Dev.	Decision
1	Regular inspection and maintenance of gas cylinders, hoses, and regulators should be mandatory.	150	75	10	10	5	4.42	0.91	Accepted
2	Property managers should organize periodic gas safety awareness programmes for tenants.	140	80	15	10	5	4.36	0.91	Accepted
3	Installation of gas leak detectors and alarm systems should be encouraged in residential buildings.	135	82	18	10	5	4.33	0.92	Accepted
4	Residents should receive emergency response training on gas leak and fire incidents.	128	85	20	12	5	4.28	0.93	Accepted
5	Only certified technicians should install or repair gas appliances.	125	86	22	12	5	4.26	0.94	Accepted
6	Government agencies should enforce regular safety inspections of residential properties using LPG.	122	85	25	13	5	4.22	0.96	Accepted
7	Property managers should ensure adequate ventilation in kitchens and gas storage areas.	120	84	28	13	5	4.20	0.97	Accepted
8	Use of quality-certified cylinders, regulators, and hoses should be compulsory.	118	85	28	14	5	4.19	0.98	Accepted
9	Fire extinguishers should be installed and maintained in residential buildings.	115	86	30	14	5	4.17	0.98	Accepted
10	Tenancy agreements should include mandatory compliance with gas safety regulations.	112	88	30	15	5	4.15	0.99	Accepted

Table 6: Summary of Statistics in Table 5

Variable	Value
Sample Size (N)	250
Decision Benchmark	Mean ≥ 3.00 = Accepted
Grand Mean	4.26
Overall Decision	Accepted

Interpretation: The analysis shows that the respondents agreed that some strategies are useful in reducing cooking gas explosions in residential properties in Abuja. Routine inspection and maintenance of gas cylinders, hoses and regulators was the highest rated strategy (Mean = 4.42), indicating strong support for preventive maintenance. Subsequent to this was the periodic gas safety awareness programmes for the tenants (Mean = 4.36) and the installation of gas leak detectors and alarm systems (Mean = 4.33). All ten strategies had mean scores above the benchmark of 3.00, resulting in an overall grand mean of 4.26 indicating a high level of agreement that these measures are important in improving residential gas safety.

Table 7: Summary of Inferential Statistics Based on Study Objectives (N = 250)

S/N	Study Objective	Test Used	Test Value	p-value	Decision
1	Primary causes of cooking gas explosions	Chi-square	$\chi^2 = 124.64$, df = 1	< 0.001	Reject H_0

S/N	Study Objective	Test Used	Test Value	p-value	Decision
2	Role of property managers in averting explosions	One-sample t-test	$t = 14.02$, $df = 249$	< 0.001	Reject H_0
3	Effects of gas explosions on properties and tenants	Chi-square	$\chi^2 = 129.60$, $df = 1$	< 0.001	Reject H_0
4	Safety and awareness level among residents	Chi-square	$\chi^2 = 4.42$, $df = 1$	0.036	Reject H_0
5	Strategies for preventing cooking gas explosions	Chi-square	$\chi^2 = 169.74$, $df = 1$	< 0.001	Reject H_0

Decision Rule: Reject H_0 when **$p < 0.05$**; otherwise, fail to reject H_0.

The inferential statistical analysis of the five objectives of the study based on the data collected from the 250 respondents is presented in Table 7. The results indicate that all tested relationships are significant at the 0.05 level of significance. For the first objective, the Chi-square result of $\chi^2 = 124.64$ with 1 degree of freedom and p-value less than 0.001 indicates a statistically significant relationship between gas leakage and occurrence of cooking gas explosions in residential properties. Therefore, the null hypothesis was rejected, indicating that gas leakage is a major contributing factor to cooking gas explosion in Abuja. The second objective was tested using the one-sample t-test and the results were as follows: $t = 14.02$, $df = 249$, $p < 0.001$. The rejection of the null hypothesis is an indication that property managers play a statistically significant role in the prevention of cooking gas explosions. It stresses the importance of periodic inspection and maintenance, tenant education and prompt response to gas related hazards.

The Chi-square value for the third objective was $\chi^2 = 129.60$ and $p < 0.001$. The null hypothesis was rejected indicating that cooking gas explosions have significant effects on residential properties and tenants. Such effects may include structural damage, loss of household items, injuries, financial loss, displacement, and psychological trauma. The fourth objective was significant, chi-square = 4.42, $p = 0.036$. Therefore, the null hypothesis was rejected and the residents were significantly safe and aware. The fifth objective was also statistically significant ($\chi 2 = 169.74$, $p < 0.001$) that proved the effectiveness of the proposed preventive strategies. Overall findings indicate the need for effective property management, resident awareness, regular inspection and strict safety measures to reduce cooking gas explosion risks in Abuja residential properties.

Qualitative Findings

The qualitative interview analysis for this study was based on responses obtained from property managers, tenants, landlords, fire service officials, and cooking gas retailers within selected residential districts in Abuja, including Gwarinpa, Kubwa, Lugbe, Wuse, and Maitama. The interviews aimed to explore participants' experiences, perceptions, and opinions regarding cooking gas explosions and residential property management practices. The analysis found several common themes regarding the causes of cooking gas explosions, safety awareness, management and prevention strategies. One of the outstanding themes was poor safety awareness of residents. Many of the interviewees admitted that tenants are not aware of safe handling and storage of cooking gas cylinders. Several property managers explained that tenants rarely inspect gas hoses, regulators, or cylinder expiry dates. A property manager in Gwarinpa stated that many residents "only react when they smell gas or when accidents occur." Similarly, a fire service officer noted that many explosion incidents investigated were caused by negligence and ignorance of basic safety procedures. Another significant theme was the **use of** substandard gas equipment. Participants consistently reported that many households purchase low-

quality cylinders, hoses, and regulators because they are cheaper and more accessible. Some gas retailers interviewed acknowledged that counterfeit LPG accessories are common in Abuja markets. According to one respondent, *"people prefer cheap products without considering the safety implications."* Fire service officials also emphasized that many explosion cases involved expired cylinders or faulty regulators.

The interviews further revealed the problem of poor maintenance culture in residential properties. Several tenants complained that landlords and property managers rarely do routine inspections of gas-related facilities within buildings. In some residential apartments, the kitchens were not sufficiently ventilated and the gas pipes and fittings were damaged and unrepaired for long periods. Property managers said that regular maintenance is often ignored due to financial constraints or lack of enforcement by regulatory authorities. Another major theme that emerged was weak regulatory enforcement. The respondents were not happy with the limited monitoring of LPG retail outlets, residential safety standards by government agencies. Fire service officials said that, despite the safety risks, illegal roadside petrol refilling operations are still running free. Abuja landlords say there are no mandatory gas safety inspections for residential buildings. This regulatory gap plays a major role in unsafe practices in the use of LPG. The interviews also illustrated the economic and psychological toll that gas explosions took on the victims and property owners. Tenants who had previously experienced gas-related incidents described fear, anxiety and trauma. Explosions are often followed by tenants being displaced, and by costly repairs and legal battles between landlords and residents, property managers said.

A landlord interviewed in Lugbe revealed that some prospective tenants rejected renting apartments in the affected building due to safety concerns after the gas explosion. Moreover, the participants highlighted the importance of preventive safety measures. The vast majority of respondents agreed that regular tenant education, routine inspections, fire extinguisher installation and proper ventilation could significantly reduce explosion risks. The fire service strongly recommended public awareness campaigns and stricter regulation of LPG retailers and residential buildings. The qualitative findings generally point to the causes of cooking gas explosions in Abuja residential properties as a combination of human negligence, poor maintenance, weak regulation and inadequate safety awareness. The interviews also highlight the significance of good residential property management in reducing the risk of gas explosions. The analysis therefore supports the need for stronger enforcement of safety standards, coupled with improved public education and proactive property management practices, to enhance residential safety in Abuja.

DISCUSSION OF FINDINGS

The findings of this study reveal that cooking gas explosions still pose a major safety challenge in residential properties in Abuja. The study revealed that poor handling of gas cylinders, poor maintenance of gas appliances and low awareness of safety procedures are major causes of gas related accidents. These findings are consistent with the existing literature that identifies negligence, substandard equipment and lack of regular inspections as significant contributors to domestic gas explosions in urban residential settings. This study also showed the important role of property management practices in preventing or increasing the risk of gas explosions. Many tenants said landlords and estate managers rarely do routine safety inspections or give emergency response guidelines to residents. This is a sign of poor safety standards of the managed properties. But properties with active maintenance systems and clear safety regulations had fewer gas-related incidents, underscoring the importance of proactive property management. The study also finds that overcrowded

housing conditions and poor ventilation are significant factors in the spread and severity of cooking gas explosions. The study therefore underscores the need for more stringent regulatory policies, tenant safety education and better property management practices in order to ensure residential safety and reduce gas explosion incidents in Abuja.

This study revealed that the causes of cooking gas explosions in Abuja residential properties are mostly gas leakage, faulty cylinders, poor ventilation and negligence. This agrees with previous work on gas explosion in Nigeria. The study also revealed that the residents are not adequately aware of safety in the use of LPG. While some tenants know the basic safety measures, many do not check hoses, regulators and cylinder expiry dates regularly. Property managers also have important roles in reducing the risk of explosions through inspections, maintenance, and tenant education. Poor enforcement of safety standards and inadequate monitoring make these measures less effective. The results also indicate that gas explosions have an adverse impact on residential property management by; Structural damage Increased maintenance costs Tenant Displacement Insurance issues and Legal disputes. This implies that good safety management is a prerequisite for sustainable residential property management.

CONCLUSION

Cooking gas explosions represent a major challenge in residential property management in Abuja. The increasing use of LPG in homes has improved domestic energy access but also increased the risk of fire disasters and explosions. This study established that poor maintenance culture, gas leakage, substandard equipment, tenant negligence and inadequate safety awareness are the major causes of cooking gas explosions in residential properties. This study also posits that property managers are instrumental in preventing such incidents through inspections, maintenance and tenant education. Gas explosions are catastrophic and can cause building damage, injuries, financial losses, displacement of residents and reduction in property value. Good residential property management practices are therefore very important in minimising the risks of gas explosion in Abuja. The study concludes that safer residential environments will rely on better safety education, stricter regulation, routine inspections and stronger collaboration between stakeholders.

12. RECOMMENDATIONS

Based on the findings, this study recommends the following:

i. Regular Safety Inspections Property managers should conduct periodic inspections of gas cylinders, regulators, hoses and kitchen ventilation systems.
ii. Tenant Safety Awareness Education: Landlords and property managers should conduct periodic safety awareness programs for tenants.
iii. Use of Standard Equipment: Residents should only use certified LPG cylinders and accessories that have been approved by the regulatory agencies.
iv. Better Ventilation: Residential buildings need to have proper kitchen ventilation systems.
v. Government Regulation: Regulatory agencies need to step up their supervision and enforcement of LPG safety standards.
vi. Emergency Preparedness: Residential estates should provide fire extinguishers, smoke detectors and emergency response systems.
vii. Public Awareness Campaigns: Government agencies and media organisations should step up public enlightenment campaigns on LPG safety.
viii. Training of Property Managers: Property Managers should be professionally trained in fire safety and disaster risk management.

ix. Illegal Gas Refilling: Authorities should eradicate illegal gas refilling activities on the roadside.

AUTHOR CONTRIBUTION

I, Afam Mike Achoru was responsible for the conception and design of the study, data collection and analysis. The author conducted a comprehensive literature review, developed the methodology, and interpreted the results in alignment with the research objectives. Furthermore, the author prepared the initial manuscript draft, revised it critically for intellectual content, sent it out for a review and approved the final version for submission. All aspects of the work, including accuracy, integrity and originality, were overseen and ensured solely by the author.

COMPETING INTEREST

The author declares that there are no financial or personal relationships that could have inappropriately influenced the work reported in this paper. There are no affiliations, financial interests, or conflicts of interest, such as employment, consultancies, stock ownership, honoraria, or paid expert testimony, that could be perceived as potential sources of bias. The research was conducted independently, without any external influence on data collection, analysis or interpretation. All statements and conclusions presented are solely those of the author.

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