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Assessment of the Underlying Causes and Impact of Fires at the Kumasi Kejetia Market

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Abstract: Marketplaces, serving as vibrant hubs of economic activity and social interaction, are susceptible to various fire-related hazards. The market has suffered repeated market fires, causing economic, livelihood, and safety devastation, necessitating thorough research into their underlying causes and impacts. The study employed a mix of research methodologies: a structured questionnaire for the Ghana National Fire Service (GNFS) and the National Disaster Management Organization (NADMO) (experts) and vendors (non-experts), key informant interviews, focus group discussions, direct observations, and the analysis of results using the Chi-square test, in pursuit of some questions. In the course of assessing the underlying causes of fires in the market, the findings have revealed that negligence (RII: 0.65, rank: 1) was a significant cause of fire incidence in the market, followed by accidents (RII: 0.58, rank: 2). Electrical issues were mentioned as the main "other reason" for the fire outbreaks, with over half of the respondents (74) (53.2%) attributing fires to this cause. With respect to the impact, the majority (109) 64.1% of respondents cited the loss of properties as a significant disadvantage of market fires. The majority of the respondents (35) (63.6%) consider support from Non-Governmental Organizations (NGOs) and about (18) 32.7% of respondents emphasized the importance of having insurance as crucial additional measures to address the economic consequences of market fires. Through observations and findings, the researcher recommends proper safety protocols and public education to prevent similar incidents in the future. Also, encouraging vendors to obtain insurance coverage could help mitigate the financial burden they face in the aftermath of such fire incidents and aid in their recovery process.

Keywords: Kumasi Kejetia Market; fire

Introduction

Marketplaces, as vibrant hubs of economic activity and social interaction, are highly susceptible to fire-related hazards, making both structures and individuals extremely vulnerable (Abunyewah et al., 2022). Despite often being viewed as localized events, market fires have significant implications for communities and economies, with profound socio-economic consequences (ILO, 2011). The socio-economic ramifications of market fires are extensive, causing immediate losses of property and goods, leading to severe economic instability for displaced vendors and disruptions in the supply chain that affect entire economies (Dwomoh, 2015). The recurring and devastating impacts of these incidents on the local economy, livelihoods, and public safety are profound.

Historical incidents, such as the Great Market Fire of Valparaíso, which destroyed over 2,900 homes and left about 950,000 people homeless, illustrate the potential scale of devastation (Reszka & Fuentes, 2015). Similarly, in Bangladesh, numerous fire incidents have resulted in substantial property damage and casualties (CNN, 2024). In Ghana, market fires such as those at Market Circle in Takoradi, Circle Odawna Market, and Kantamanto Market have caused extensive economic disruptions and losses (MyjoyOnline, 2015; Mensah, 2020; MyJoyonline, 2022). The Central Market in Kumasi (Kejetia Market), which is the largest single market in West Africa, has also been significantly affected by fires, resulting in extensive property damage and financial losses for traders (Addai, 2019; Darko, 2023).

Addressing the underlying causes and impacts of market fires in Kumasi is essential to mitigate these recurring challenges. Research into fire causes such as cooking, negligence, improper electrical work, high-voltage electricity, and explosions (Addai et al., 2016) can provide vital insights for developing effective fire prevention strategies. The frequent occurrence of market fires in Kumasi underscores the need for improved infrastructure development and emergency response systems to protect traders and their livelihoods (Boakye, 2017; Seyedin et al., 2020).

The financial losses resulting from market fires are substantial, affecting the income and economic stability of thousands of traders. For many, these markets are their sole source of livelihood, and the loss of goods and infrastructure not only disrupts the local economy but also has broader regional and national

economic implications (Nakitto and Lett, 2010; Omar et al., 2023). Comprehensive research is necessary to safeguard these economic assets and ensure the resilience of market activities (Pooley et al., 2021).

Market fires also pose significant threats to public safety, often resulting in injuries and loss of life (Ghana National Fire Service, 2018; WHO, 2020). Understanding the underlying causes, such as electrical faults and inadequate safety measures, is crucial for developing effective prevention and response strategies (Kendal and Nichola, 2022). The urgency of conducting research on market fires in Kumasi cannot be overstated. Given the recurrent nature of these incidents and their profound socio-economic and safety impacts, there is a critical need for comprehensive research to understand the underlying causes impact of fires in kejetia market.

Methods

Study area description

Kumasi Metropolitan Assembly (KMA) is located between latitude 6.35˚N and 6.40˚S and longitude 1.30˚W and 1.35˚E with an elevation of 250 to 300 meters above sea level in the transitional zone and about 270 km north the national capital Accra. It has a total land surface area of 214.3 Km^2 which is about 0.9% of the regional total land size. KMA is the most populated and industrialized among the 27 districts in the Ashanti region. The metropolis shares boundaries with the Kwabre East and AfigyaKwabre Districts to the north, the AtwimaKwanwoma and AtwimaNwabiagya Districts to the west, the Asokore Mampong and Ejisu-Juaben Municipalities to the east, and Bosomtwe District to the south. The Central Market is the largest open-air market in West Africa (Boakye, 2017).

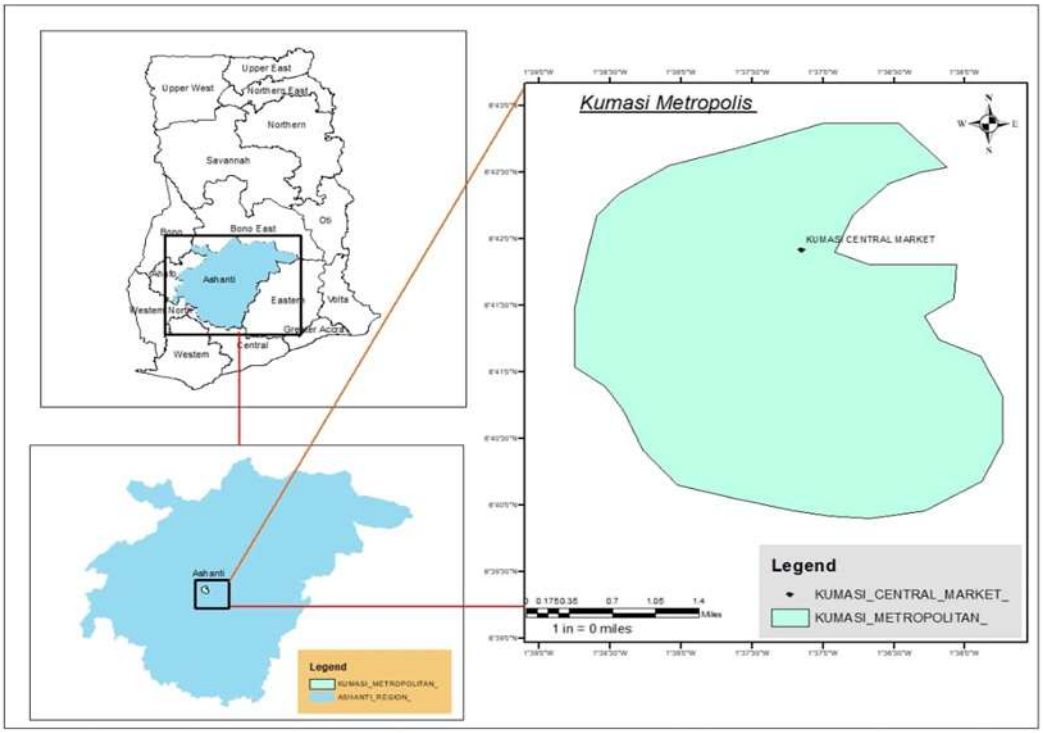
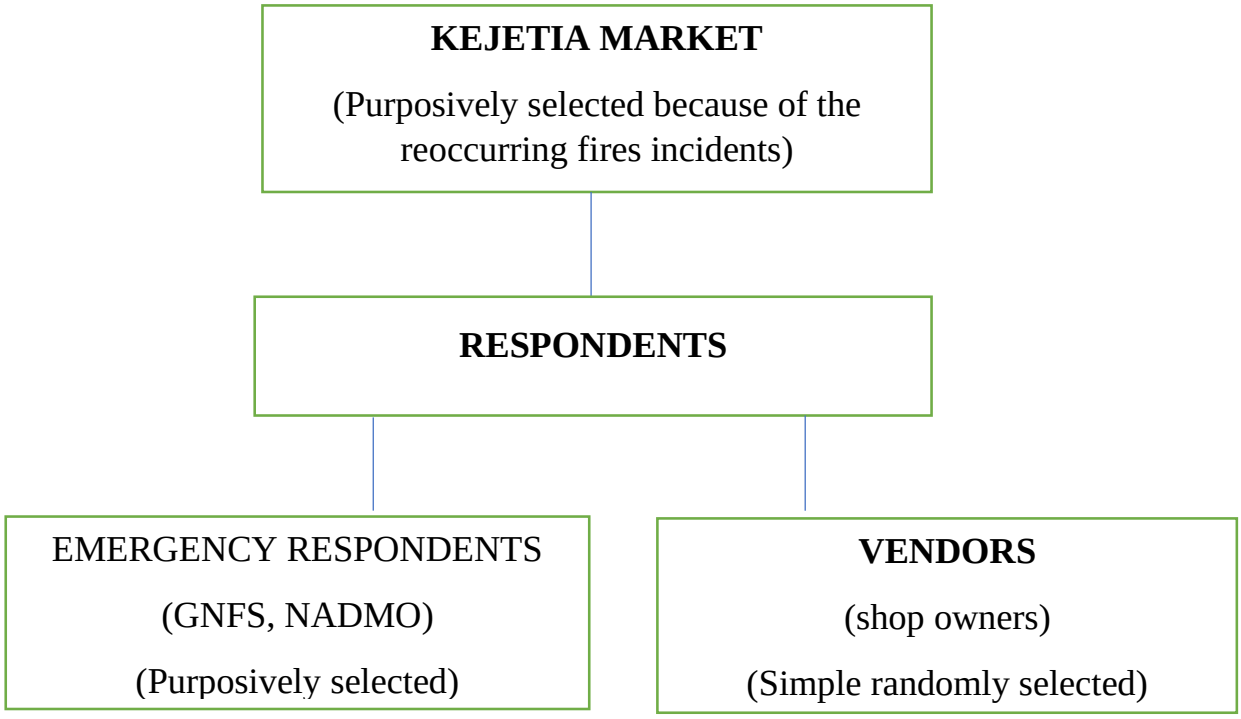


Figure 1. Map of the study area

Study design and sampling technique

This study employed both a survey and an interview approach for data collection. A structured, guided questionnaire was developed to guide the surveying of the target population, and focus group discussions were also used to interview participants outside the study population who serve as key stakeholders (Ghana National Fire Service and Natural Disaster Management Organisation) for more information. The study also employed purposive and simple random sampling techniques to collect data. Purposive sampling is used because the study purposely targets market vendors, and random sampling is used to select participants to answer the questionnaires.



GNFS- Ghana National Fire Service **NADMO**- National Disaster Management Organization

Figure 2. A summary of the research design

Study size and population

The study population for this study was focused on users of the Kejetia market both sellers and buyers. This group was selected because they are the people who are mostly the users of the Kejetia market and within the confine criteria. The Central Market was randomly selected for this study. The targeted population size was 725.

The sample size was estimated using the Yamane's Formula:

$$n = \frac{N}{1+N\,(e)^2}$$

$$n = \frac{100}{1+100\,(0.05)^2}$$

For this study purpose, 257 respondents were sampled.

Data collection

The study used primary and secondary data. The primary data collection tool for this study was a structured questionnaire designed to capture socio-demographic, and behavioral data. The secondary data was obtained from stakeholders that are involved in emergency and disaster management such as the NADMO, GNFS and the KMA through survey and interviews.

Data Analysis

Data collected from the field were processed and analyzed with the use of the SPSS software through the use of analytic tools such as simple descriptive statistics and inferential statistic (cross tabulation for the relationship). The responses from the respondents were also ranked using the Relative Important Index (RII). Furthermore, Chi-square analysis was used to test for the validity of the hypothesis. Results obtained from the data processing and analyses were displayed in the form of tables and graphs (pie chart, bar graph) through the use of SSPS Software.

Results and Discussion

This chapter presents the findings and interprets the results of the study based on the data collected from the market traders on the assessment of the availability of fire safety systems in Kejetia Market-Kumasi. The demographic characteristics of the market traders based on their level of knowledge on the usage of fire safety systems.

Social Demographic Characteristics of Respondent

The demographic characteristics of the respondents in this study are consistent with other studies. The majority of respondents (91.1%) were non-experts, which aligns with findings from a study on fire safety in markets in China, where most respondents were also non-experts (Wang et al., 2020). This suggests that a large portion of market stakeholders, who are directly impacted by fire incidents, may lack specialized knowledge in fire safety, highlighting the need for targeted education and training programs to improve fire safety awareness and preparedness among market users. The gender distribution of respondents, with a higher percentage of females (63.4%), is also consistent with studies in India, where females are more likely to be involved in market activities (Mukarram et al., 2018).

The educational background of respondents is varied, with the highest percentage having secondary education (49.6%). This is similar to findings in Ghana's Makola market, where most traders had secondary education (Dwomoh, 2015). The percentage of respondents with tertiary education (22.0%) is also consistent with findings in Kumasi Central Market, where a significant number of traders had tertiary education (Twum-Barima, 2014) **(Table 1).**

Table 1. Socio-demographics characteristics of the respondents

	Response	Frequency	Percentage
Occupation	Expert	23	8.9
	Non-expert	234	91.1
	Total	257	100
Gender	Male	94	36.6
	Female	163	63.4
	Total	257	100
Education	Tertiary	55	22.0
	Secondary	124	49.6
	Primary	55	22.0
	No formal education	16	6.4
	Total	250	100

Field survey, 2023.

Underlying causes and other causes of fires in the Kejetia market

The study identified negligence as the primary cause of market fires, followed by accidental causes, insurance claims, arson, socioeconomic factors, and cultural factors. This ranking is consistent with other findings, where negligence and accidental causes are commonly identified as leading causes of fires in markets (The Hindu, 2024).

The significant influence of negligence and accidental causes highlights the need for improved fire safety measures, such as regular electrical maintenance and proper waste disposal (Doherty, 2020, Pim-Wusu 2022). The ranking of insurance claims as the third most significant cause suggests that economic factors may also play a role in market fires, as seen in Ghana's Makola market (Dwomoh, 2015) (table 2)

The table and chi-square analysis reveal insightful findings on the causes of market fires in Kejetia. Electrical issues emerge as the leading cause (32%), followed by cooking (25%). The significant difference (p value = 0.001) in reported occurrences of accidents, negligence, and electrical issues between experts and non-experts suggests varying perspectives or awareness levels among groups (table 3) These findings align with other studies, where electrical issues and cooking are common causes of market fires in countries like Nigeria (Ilodiuba, 2020). Negligence and accidents also feature prominently in market fire causes, as seen in Ghana's Makola market (Dwomoh, 2015).

A study in India's wholesale markets identified negligence as the primary cause of fires (The Hindu, 2024). Similarly, research in China's markets attributed electrical issues and cooking as significant causes of fires (Xinhua, 2017, Xiong et al., 2022). In the United States, the National Fire Protection Association reported that electrical distribution and lighting equipment were leading causes of fires in markets and industries (USA Fire Protection, 2023).

The relatively low ranking of arson and socioeconomic factors suggests that intentional acts and economic pressures may not be the primary underlying causes of market fires, contrary to findings (Twum-Barima, 2014). Cultural factors were ranked lowest, indicating that traditional practices and beliefs may not be a significant contributor to market fires in this context. (Table 1)

Table 2. Underlying causes of fires in the market

Underlying causes	Weight	RII	Ranking
Cultural	908	0.30	6
Socioeconomics	916	0.33	5
Insurance	948	0.43	3
Arson	920	0.41	4
Accidental	964	0.58	2
Negligence	984	0.65	1

Field survey, 2023.

Table 3. causes ofmarket fires

causes of fires	Occupation		Total (%)	chi square
	Expert	Non-expert		
Accident	7	10	17(10%)	
Ignorance	4	8	12 (7%)	
Negligence	2	32	34 (21%)	p value=
Electrical	3	49	52 (32%)	0.001
Cooking	3	39	42 (25%)	
Deliberate	3	4	7 (4%)	
Mishandling of flammable substance	0	1	1 (1%)	
Total	**22**	**143**	**165**	

Field survey, 2023.

Impact of fires in the Kejetia market

The respondents identified various disadvantages of market fires, with the majority (64.1%) citing property loss as the most significant consequence. This is followed by loss of lives (11.8%), disruption of work (11.2%), and loss of revenue (11.8%). A minority (1.2%) noted the potential to deter investors and harm the market's reputation.

The findings suggest that market fires have significant economic and social impacts on traders, vendors, and the wider community. The loss of properties and revenue can lead to financial instability, while the disruption of work can affect livelihoods. The loss of lives is a devastating consequence that highlights the need for improved fire safety measures. The chi-square analysis reveals no significant difference between males and females in reporting these disadvantages, indicating a shared understanding of the impacts of market fires

across genders.

These findings align with other studies, where market fires have resulted in significant economic losses and social impacts in countries like Indonesia and Nigeria (Aliyu et al., 2021, Hatmoko & Larassati 2021). The importance of fire safety measures and emergency preparedness in markets cannot be overstated.

Similarly, it was in line with other studies; where fire incidents in traditional markets cause loss of life, damage to the environment and assets, disruption to production activities, and job losses (Pratama et al., 2016).

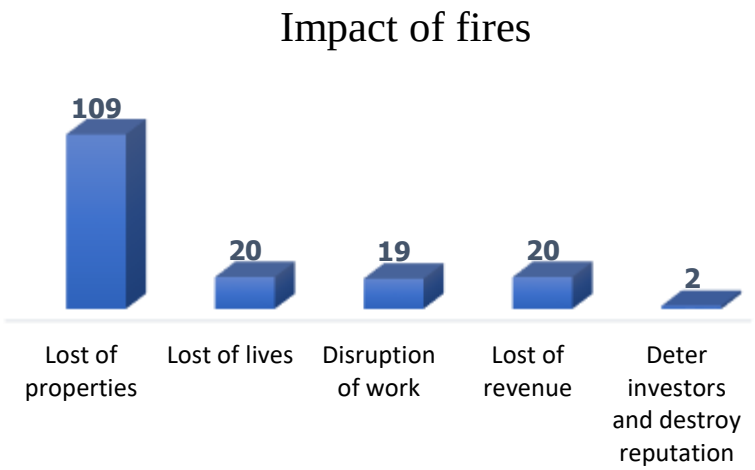


Figure 3. The negative impact of market fires

Field survey, 2023.

Conclusion

In the cost of assessing the underlying causes and impacts of market fires in the Kumasi Kejetia market, Negligence emerged as the primary underlying cause. Which means that the fire cases at the market are due to vendor's negligence. Accidental causes also play a significant role, emphasizing the need for proactive measures and infrastructure improvements to minimize risks. Cooking and other activities at the markets also contributes significantly to the fires. Also, market fires have far-reaching and multifaceted impacts that extend beyond property damage as they affect livelihoods, public safety.

In light of the findings of the study, the following recommendations are made to curb the high rampart of fire outbreak in Ghanaian markets. First of all, the researcher recommends to address the causes of the fire, it is important to focus on implementing proper safety protocols and providing education. These measures will help prevent similar incidents from occurring in the future. Secondly, encouraging vendors to obtain insurance coverage can help lessen the financial burden they may face after such incidents. Insurance coverage can also aid in the recovery process for affected vendors.

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