

Reducing the Risk of Fire Outbreak in Compliance with Fire Safety Regulations in Ghana

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Abstract

Fire outbreak is a disturbing phenomenon that has over the years destroyed market centers. There is growing knowledge that the persistence of these fire disasters is as a result of people's noncompliance with fire safety regulations. This study therefore contributes to the search for solutions by assessing stakeholders' capacity to manage fires, While creating the individual trader's awareness and knowledge on what they need to do against fire risk and disasters. The study is cross-sectional and involved 140 traders and three institutions: National Disaster Management Organization, Kumasi Metropolitan Assembly and Ghana National Fire Service. A systematic sampling technique was used in selecting 140 respondents from a total of 386 with the help of the Sloving technique. The study revealed that traders in the Kumasi Central Market were unaware of what they need to do in case of fire outbreak. It was also shown that, both traders and firefighting institutions do not comply with the safety measures to preventing fire outbreaks. Again it was revealed that haphazard development within the city center serves as a major hindrance for effective fire prevention and control. Based on findings, the study recommends intensive education of traders on how to prevent fire and how to use firefighting tools in case of fire disasters. The study further recommends the review and enforcement of fire prevention codes and regulations to ensure compliance by traders.

Keywords: Fire, Safety, Safety measures Risk, Firefighting, Fire training

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1. Introduction

The world is gradually being destroyed by different forms of disasters such as fire that kept impeding some development efforts by governments, benevolent society and individuals established to alleviate poverty in order to bring development to society (United Nations Development Programme, 2014). Records on world fire outbreaks showed that the United States in 2008, fire gutted between 1.4% and 2.7% properties yearly across the entire country with wildfire recording 70% and prescribed wounds or burns 30% (Kasischke et al., 2011). According to World Fire Statistics derived from International Monetary Fund, thirty-two (32) out of fifty (50) countries who reported in 2012, reported fire outbreak representing 15% of the world's population. 2.7 million fire outbreaks of which 20.7 thousand deaths and 64.3 thousand fire injuries were recorded. This was reported by the Fire Services across the thirty-two (32) countries around the globe. Russia which is the second populated country after the USA has fire death rate at 7.4 per a hundred thousand deaths. This could cause Gross Domestic Product (GDP) drop since affected lives have effect on production.

In Ghana, the narration about fire outbreaks in residents, industries and commercial centres is not different. Fire has destroyed properties and claimed several lives. In the Accra and Kumasi Metropolitan areas, domestic fires amounted to 51% and 79% respectively, of all reported fire outbreaks in the Metropolis in 2003 (GNFS, 2004 in Ayarkwa et.al., 2010). Statistics received from the Ghana National Fire Service (GNFS) for 2014 showed that rural fires recorded 19 cases; vehicular fires that the GNFS attended to stood at 10 cases, commercial fires recorded eight cases and industrial fires, five cases. Other important places that were destroyed by fire in the country include the Ministry of Information, the loading gantry of Tema Oil Refinery and Ministry of Health National Drugs warehouse. The country keeps incurring huge losses in terms of property damage and resources lost because of fires. For example, in 2013 approximately 11,000 Ghanaians were affected by fire and explosion, and the cost of these types of incidents was approximately \$7 million according to the Ghana National Fire Service. Most of these fires whether domestic, industrial, institutional, commercial, vehicular, or bushfires come with devastating consequences, including loss of lives and properties. The most recent disaster that took the country to mourning is the Accra Circle flood and fire outbreak that claimed so many lives which still remain fresh in the minds of people and which indicated that the problem of fire outbreak is collapsing homes, property and lives of precious ones. Most of the recent fire outbreaks have taken place in state facilities that are of great strategic value, thereby making

fires an issue of public concern and debate. For example, the Kumasi Central Market has suffered from a series of fire outbreaks. The first occurred on May 28, 2009, with another occurring on January 2, 2010.

It is observed that one of the main causes of fire outbreak in Ghana has been electrical problems resulting from faulty wiring and misuse of electrical gadgets. According to Addai et al (2016), electrical faults originate from poorly designed and poorly constructed electrical circuits. The research of Addai et al (2016) found that electrical wiring in many domestic buildings in Ghana is designed not by an electrical engineer, but by an artisan with scant knowledge of electrical circuit design. Electrical cables are commonly found strewn haphazardly on the ceiling of most domestic buildings, and when the cables' insulation deteriorates with time, short circuitry occurs, resulting in fire outbreaks. Causes of naked flames include cooking (e.g., kerosene stoves, electric cookers, gas cookers, coalpots), lighting devices (e.g candles, lanterns), cigarettes, and lighted mosquito coils. Addai *et al.* (2016) also indicated that the rise in fire outbreaks can be traced to intense harmattan, overloading of electrical appliances on the same fuse, and improper electrical installation in homes and workplaces. He also noted that illegal, improper, and old wiring systems, as well as cooking in the home and workplace with naked fire, are some of the major causes of frequent fire outbreaks.

However, nothing seems to have been done to prevent their occurrence even though the situation keeps worsening as these incidents continue to increase. It is observed that urban fire disasters receive a baffling lack of response from aid agencies like the National Fire Service who are mandated and resourced to carry out the task of responding to issues of fires whenever it occurs indicating major gaps in urban preparedness. Such fires usually demand firefighters working in highly risky state, thereby creating an environment for lives lost. High magnitude fires also tend to affect a great number of people and destroy more property, especially at the urban-wild land interface (Hudak *et al.* 2011).

The rate of fire outbreak in Ghana is increasing and has over the past few years been a worry to stakeholders. Apart from the lives and properties usually claimed in these fire outbreaks, the consequence usually affects the economy so critical such that limited resources are used to re-organised what is lost. Despite efforts made by successive governments to restructure the markets centres to modern status to enable the country's development, most of these facilities are being destroyed by fire outbreak. This can be attributed to government's poor planning process which did not provide safety measures such as easy access to the market by the firefighters in case of fire outbreak and also lack of firefighting equipment such as alarm clock and fire extinguisher installed at various stores to enable the users detect signs of fire and to prevent it from escalating. In attempting to deal into fire issues, various studies including Predicting the Imminence of Fire Disaster Risk on the Ghanaian Economy (Boadi, 2015) have been carried out aimed at minimizing the outbreak of fires especially in the urban areas, often perceived the problem from the causes of the fire outbreak without due regard to the level of compliance with the appropriate fire regulations by users of urban properties established by (Sarpong, 2013). It is a difficult task to account for exact results or outcomes in fire avoidance and as a result there is the likelihood that work can be abandoned following the inability to achieve results. Ghana's current issue of fire outbreaks in the city centers is blamed largely on negligence of compliance with the appropriate regulations to prevent fire disaster. UNDP (2014) expresses right knowledge in response to disaster risk in an early warning system to improve firms, policy holder's awareness and understanding, so that it can increase their direct tackling to threats or opportunities. It is against this backdrop that this study seeks to investigate the issues of fatal fires complying with appropriate regulations provided in the legal framework by the Ghana National Fire Service in order to prevent the risk of fatalities and property destruction in Ghana through a case study of the Kumasi Metropolis. The objective of this study is to analyze fire management capacity of Kumasi Metropolitan Assembly, Ghana National Fire Service, National Disaster Management Organization and the Traders (Shop Owners) at large in the Central market, with emphasis on individuals' awareness and knowledge on what they need to do against fire risk and disasters.

2.1 Conceptual and Theoretical Review

2.1.1 Fire Disaster

Fire is a combustion process involving fuel typically oxygen in the form of heat transfer, ignition, flame spread and heat flux as a damage variable. Fire is described as a rapid oxidation that occurs if a material in the exothermic chemical process of combustion results in the emission of heat, light and various reactive products.

Despite the maximum benefits that human being derives from the use of fire such as cooking and lightening, the devastating effect of fire on the environment especially the developing world is seriously affecting development. The increase in disaster occurrence in the developing world is actually due to rapid population growth with ineffective land use management in the urban areas and abandoning of certain principles in the conduct of work. Disaster in general materialized when the human being adapts risky attitudes in their daily lives without considering the hazards, exposure and the vulnerability involve in their actions.

2.1.2 Fire Risk

Fire risk is the identification of fire hazards which has the potential of destroying lives and properties and has the tendency of occurring within speculated period. The issue of fire has been a long-standing problem that destroyed

properties, caused loss of lives, injured lives and left some devastating effects worldwide. Fire risk is a function of three factors: harm to valuables such as life, property, business continuity, heritage and the environment, the scenario that induces the harm and the intention that the harm will occur. Fire risk can be detected by an Early Warning System (EWS). This is a system of a set of capacities to form and distribute useful warning information to enable communities and organizations threatened by a hazard to be alert and make provisions to face it sufficiently and on time to prevent the possibility of loss.

2.1.3 Fire Risk Reduction Models

There are models that enables fire risk reduction in the country as well as the market centers, and according to Stojanova et al (2011), fire risk reduction is can be successful by estimating the risk involved in fire outbreak and then applying the regulations towards fire prevention. Estimating risk of fire outbreak is done through the use of fire prediction models such as GIS data, remote sensing imagery and the weather prediction model, and the Metrological data or AireLimitée Adaptation Dynamique Development International (ALADDIN). To carry out a successive prediction of fire outbreak, modeling the factors of fire threat and the factors that influence the occurrence is required. Weather conditions such as climate change, the speed of wind could influence fire threat and because these factors are influenced by the location, the model is developed by Geographic Information System (GIS).

Using climate change and socio-economic scenarios, as well as fuzzy indicators of fire risk also applied the decision trees to future conditions to create maps of future fire risks, which showed that in some areas fire risk is changing. They developed a statistical method based on logistic regression technique for estimating probabilities of large fire occurrences and comparing past fire occurrences to forecast conditions in order to predict fire risk.

2.1.4 Fire Risk Assessment

Assessment is a process or a development approach to fire risk to identify certain dangers or losses that occurred or has the likelihood of occurrence in a particular premise. This is done to enable the assessor or assessors to device means of preventing the fire risk from occurring.

Assessing fire risk will aid in determining the possibility of fire occurrence and the dangers that is likely to occur at the premises. According to Management of Health and Safety at Work Regulations 1999, employers must ensure that business places assess risk of fire to protect lives and property in the event of fire occurrence. Under the Regulation (3) of the Management of Health and Safety at Work Regulations 1999, the purpose of risk assessment is to identify measures needed to comply with the requirements and prohibitions imposed on employee under the Statutory Provisions. This will enable both management and users to prioritize and determine risk and to exercise some preventive and control measures to deal with it. The Management of Health and Safety at Work Regulation 1999 recommended that, a successive risk assessment can be achieved by carrying out the following:

- a) Evaluate the level of risk and then remove or reduce any risk identified. Combustible or flammable material within the business premises for instance build up waste, display material. The Safety at Work Regulation, 1999 says things that can easily be combustible should be handled away from fire. Like words fire Source such as electrical equipment and naked flames should be put off after use. This can materialize effectively with security checks on traders during closing hours to ensure that, fire ignition such as candles, gas cookers are put off before leaving a market place.
- b) Evaluating the likelihood of a fire outbreak after risk is identified, is done to decide whether there are sufficient measures or available solution to prevent or control the identified risk. For example, the risk of explosive atmosphere occurring will normally be controlled by the ability of ventilation system to dilute any flammable gas and a firedamp drainage system. Deciding who might be harmed and how in risk assessment that might occur from fire, managers and users will need to consider most importantly the effect on the closest persons in the immediate environment. The outcome of this process will determine the right control and protective measures to include in the plan of fire and explosion protection. The assessment will consider potential risk arising from the nature and extent of any flame, heat wave and possible disruption of the ventilation system as a result of overcrowding.

Employers in other words management should review the risk assessment periodically to avoid further risk that might emanate during some ongoing activities. This will help to reduce risk in an outbreak of fire.

2.1.5 Fire Risk Management

Fire starts in three main ways: wrongful use of appliances, deliberate ignition and equipment failure. Fire outbreak starts in various forms and the end result is destruction of human lives. Fire safety management has started with the initial stage of the building design which covers all aspects of its occupation, maintenance, modification and decommissioning and demolition. The major objective of fire safety management is to provide fire safety measures that will help to initiate actions in case of fire outbreak which would enable occupants to reach a safe environment; also, to review existing fire safety measures where there is a change of building use and new technology on fire services installation (Chow, 2001). The objective of fire safety or risk management is therefore to reduce risk to life and property to very low levels acceptable to a property owner and society at large. This objective can be achieved by carrying out fire prevention activities such as education and training of users on fire safety which

would reduce the frequency of fires significantly and installing passive and active fire protection measures such as the fire extinguisher and fire detector to give signs and notices of fire outbreak which would minimize the damage when the fire occurs. For instance, in the University of Glasgow, a fire safety policy has been instituted by management in compliance with Fire Act 2005 and the Fire Safety Regulations of 2006 to prevent fire occurrence in Scotland of the United Kingdom. In the management of fire safety, it is advised that where any structural or material alterations are carried out within appropriate locations are likely to impact on the fire safety provision which is the duty of Management Unit or Director of Estates and Buildings, as appropriate, to make sure that important information is made available to the Fire Safety Manager for his or her attention and action. Thereafter, it relies on the Fire Safety Manager to ensure that a review is deemed necessary, for fire safety risk assessment to be carried out. It is also cautious to make sure the Fire Safety Manager is incorporated at the beginning part of communications with regard to any proposed material changes or alterations to any of the appropriate buildings. External waste containers, refuse bins and industrial skips are a potential fire hazard to all buildings. Fires often occur in such receptacles and where they are placed in close proximity to a building, the potential for fire spread through radiated and converted heat currents is a realistic possibility hence the need to place the bins at a distance away from the building. The Fire Act 2005 of Scotland- United Kingdom, states that every employer must carry out a risk assessment to identify areas or points that are at risk of catching fire to make sure a safety measure is put in place to save lives and property.

This aim can be achieved by carrying out fire prevention activities which would reduce the occurrence of fires significantly and installing passive and active fire protection measures the use of fire extinguisher which would minimize the damage when the fire occurs. By effective maintenance, it is necessary to ensure that, when a fire occurs, all the safety measures provided will be available for use and will perform adequately.

2.2 Safety Regulations

Safety regulations are codes, laws or rules in the legislation that seeks to ensure the safety of individuals and properties in the event of fire outbreak. By the legislation it is mandatory in fire safety that buildings must be installed with Fire Service Installations to protect lives and properties of persons in the event of fire outbreak. A regulation is acceptable if the terms (codes, laws) can effectively achieve quality or safety. Regulation generally aims at preventing fire which poses danger to lives and properties and the effectiveness of paramount importance (John M. Cobin, 2013).

According to Chow & Gigi C.H lui (2001) Fire Safety Regulations for businesses are that Fire Service Installations (FSI) should be installed to minimize fire damage, protect life and property. The installations are used to extinguish fire (fire extinguisher) and make alarm to give warnings and ensure safety of occupants. There are various requirements with different functions to serve different premises which are played under FSI Code. The FSI for existing buildings requires five installations:

Water systems including fire hydrant or hose reel systems and automatic sprinkler. These are used together when there is fire burning to sprinkle water to extinguish the fire. Gas protection systems and smoke management systems. A fire alarm should be installed to provide indication and warning when there is danger so that life and property can be safe. Detection and alarm systems: Activated smoke detectors should sound the alarm throughout the zone of origin. Their location inside the building will determine their role. Others include emergency generators, emergency lighting and exit signs.

2.2.1 Compliance with fire safety regulations

The purpose of compliance with safety regulations is to ensure the protection of damage to life and property against fire occurrence. This is done by adopting the code requirements and to motivate owners and building managers to prevent future hazards by educating them as to the hazards (Hall et al, 2008). Hall, Flynn and Grant's (2008) study revealed that compliance with fire regulations involves fire inspection and fire prevention. Fire inspection is the support of fire related requirements appearing in a code, law and other formal and binding requirements whereas fire prevention broadly include reductions in the likelihood of fire ignition and also reductions in the severity of fires that do occur. Prevention and Mitigation of fire correspond to two parts of fire risk – likelihood and consequence whose reduction is the intended result of code compliance and fire prevention. According to the Fire Fighting and Rescue Act of 2007 of Tanzania, every building construction with more than one storey should install firefighting facilities. It did instruct building owners to train users so that they can acquire knowledge on the use of the facilities for safety. In Ghana, the fire service act 1997 mandated the Ghana National Fire Service to carry out educational programmes to educate people on fire issues in which installations of firefighting facilities are included in the Act. Without the know-how to operate the equipment against fire hazards could render attempts to contain fire outbreak at their preliminary stage impossible. It has been established by research in recent times that, a robust system of fire safety management consisting of regular checks on all equipment and full training and induction of users in relation to fire safety, enables physical fire protection (Roberts and Chan, 2000).

Fire Fighting and Rescue Act of Tanzania if adopted by Ghana to mend their laws in tackling fire safety, would have been a perfect regulation for both management and traders to reduce that long-standing issue of fire

outbreak in the Kumasi Central Market. The structures of the Kumasi Central Market are mostly wooden which the likelihood of fire occurrence is high as described in fuzzy theory. The set ups are done without provision for fire prevention in the form of firefighting facilities to be used when the need arises (Amoah and Dadzie, 2013).

2.2.2 Fire safety measures

Apart from faulty electric wiring in buildings, studies have shown that building design is one major contributory element causing fire outbreaks in homes and business centres (Tony et al 2016). Poor building designs contribute to fire outbreak in building which have severe consequences on safety of life and property (Tony et al 2016). This is why knowledge of fire safety among architects, electricians and the users must be a subject of study to aid the design of safer buildings in terms of fire protection. The design is expected to be provided in the approved building plan which should include fire safety measures. To reduce fire outbreaks in homes and business centres will depend largely on the design of the building. That is architects must be given education on fire safety and have adequate knowledge about suitable materials building and design construction.

Fire safety is expected to ensure maintainability, functionality, aesthetics, human comfort, structural longevity, cost-effectiveness and sustainability (Kodur, et al 2012; Park, 2014) that building designers must consider at the beginning of the building design process (Fire Sector Federation, 2015). This will ensure safety of building users and properties in event of fire outbreak. Stollard (2014) further added that achieving a fire safety objective depends on the architect doing the right thing in the building design. The safety measure requires the designers to use the right material for building to attain a strong standard.

3.1 Methodology

This study was carried out in the capital city of the Ashanti Region, Kumasi. The study was cross-sectional and employed mainly primary data obtained from one hundred and forty (140) market traders in six sections of the Kumasi Central Market with the help of systematic sampling technique. The objectives of the study were ascertain with the help of descriptive statistics, Chi-square test and presented in tables, graphs and relevant charts. The data was analysed with the help of the SPSS software version 22.

3.2 Study Location

The study area was Kumasi Central market. The Kumasi Central Market is a vast and vibrant market located at the centre of the city Kumasi, the capital city of the Ashanti Region of Ghana. The market was established in the year 1939 and occupying a land size of twenty-five (25) hectares. It is located in between Subin and Manhyia South Constituencies. The market has the capacity to accommodate about thirty thousand (30,000) people a day which includes buyers and sellers and even window shoppers. Administratively, the market has six offices located at various points within its premises. This is done for effective revenue collection for the Kumasi Metropolitan Assembly and it is headed by supervisors. All the activities of the sub offices are being checked by the Central Market Manager. It is a major market where other regions such as the three regions of the Northern sector of Ghana and other neighboring towns do wholesale business. As a result, human traffic is very high posing a lot of threat and destruction to the facility. Below is a map showing the Kumasi and the Kumasi Central Market.

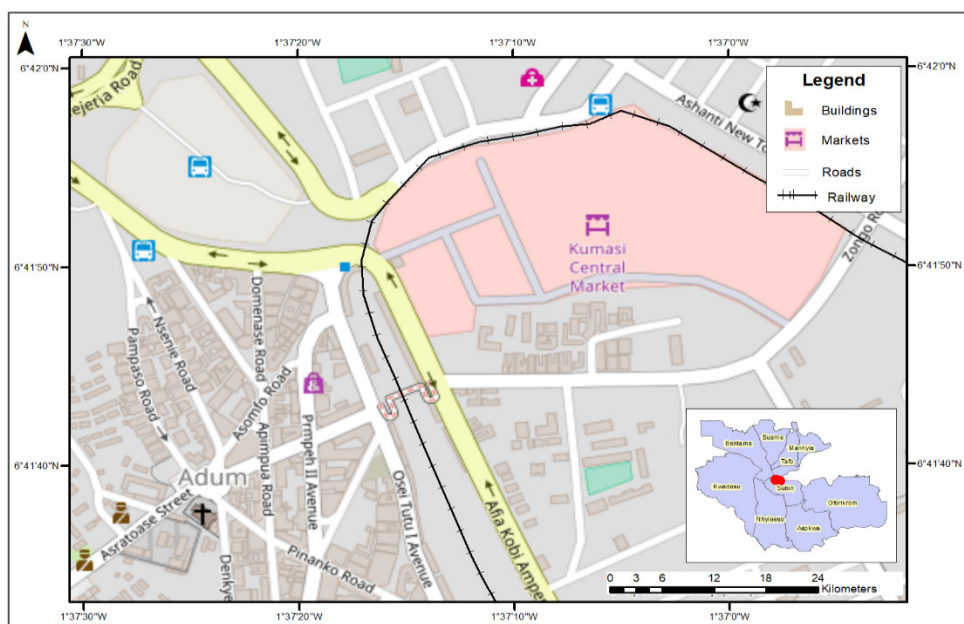


Figure 1 A map of Kumasi showing the location of Kumasi Central Market at the centre of the city.

4.1 Results and Discussion

4.2 summary of background characteristics of the traders

A total of 140 eligible traders participated in this survey. Of the 140 participants, (59.3%) were males and the rest, (40.7%) were females; a male to female ratio of 6:4. The sex representation (as found in this study) did not follow the usual trend in which women tend to engage more in trading activities than men. On the average, each of the traders surveyed had spent 16.24 years trading in commodities as their main business in the market at the time of the study with the minimum and maximum number of years spent working in the market being 1 and 40 years

Table 4.1: Background of Traders surveyed in the market

	Frequency (N = 140)	Percentage (%)
Years spent in the market		
<= 10	36	25.7
11 – 20	62	44.3
21 – 30	23	16.4
>= 31	19	13.6
Gender		
Male	83	59.3
Female	57	40.7
Items sold		
Bags/ clothing	42	30.0
Detergents	8	5.7
Electrical cables & appliances	28	20.0
Cosmetics	13	9.3
Stationaries/ Provisions	10	7.1
Bouquets	5	3.6
Foodstuffs	9	6.4
Cooking utensils	10	7.1
Drinks (wholesale)	15	10.7

Source: Field Survey, 2017

4.2.1 Vulnerability to fire incidences

The study also examined respondents' type of trade and their vulnerability to fire incidences, addressing the question of an existing relationship between the type of trade and the likelihood of fire outbreaks in the market. The results of cross tabulation as seen in Table 4.2 below revealed a significant relationship between trade type and the likelihood of experiencing fire in the market. The Chi- squared value of 25.806 with its accompanying P-value of $0.002 < \alpha = 0.05$ reveals that the trade type of the respondents significantly influenced the frequency of fire incidence or their likelihood of being victims of fire outbreaks. This is also true in the reverse. Bags and clothing sellers were the most vulnerable followed by those who trade in electrical cables and appliances. The least vulnerable among the traders who partook in this survey were those who traded in detergents, bouquets and foodstuffs. This is seen in Table 4.2 below.

Table 4.2: Respondents' type of trade and vulnerability to fire incidence

Type of trade		Have you ever been affected by fire outbreaks that gutted this market		Total	Chi Square	P- value ($\alpha = 0.05$)
		Yes (%)	No (%)			
Polythene bags	% within type of trade	9 (7.5)	4 (20.0)	13 (27.5)	25.806	0.002
Sells bags/ clothing		29 (24.2)	0 (0.0)	29 (24.2)		
Sells detergents		4 (3.3)	4 (20.0)	8 (23.3)		
Electrical cables and appliances		24 (20.0)	4 (20.0)	28 (40.0)		
Cosmetics		9 (7.5)	4 (20.0)	13 (27.5)		
Stationaries/ Provisions		10 (8.3)	0 (0.0)	10 (8.3)		
Bouquets		5 (4.2)	0 (0.0)	5 (4.2)		
Foodstuffs		5 (4.2)	0 (0.0)	5 (4.2)		
Cooking utensils		10 (8.3)	4 (20.0)	14 (28.3)		
Drinks (wholesale)		15 (12.5)	0 (0.0)	15 (12.5)		
Total			120	20		

Source: Field Survey, 2017

4.2.2. Traders knowledge and awareness about fire safety

Study also examines traders’ knowledge and awareness about fire safety. Figure 4.1 below reveals the various means by which the traders managed to bring down fire which gutted their shops in the market. It could be seen from the diagram that the firefighting measure that was commonly known and practiced by the traders in the market was calling on the Ghana National Fire Service (GNFS) whenever there was fire outbreak. This was the first thing done by 65.0% of the traders in this survey whose shops were consumed by fire in the market. Others who relied on the use of fire extinguisher as a first aid measure still called on the GNFS for assistance. Only 20.0% of the affected traders were able to manage the outbreaks in their shops with a fire extinguisher alone.

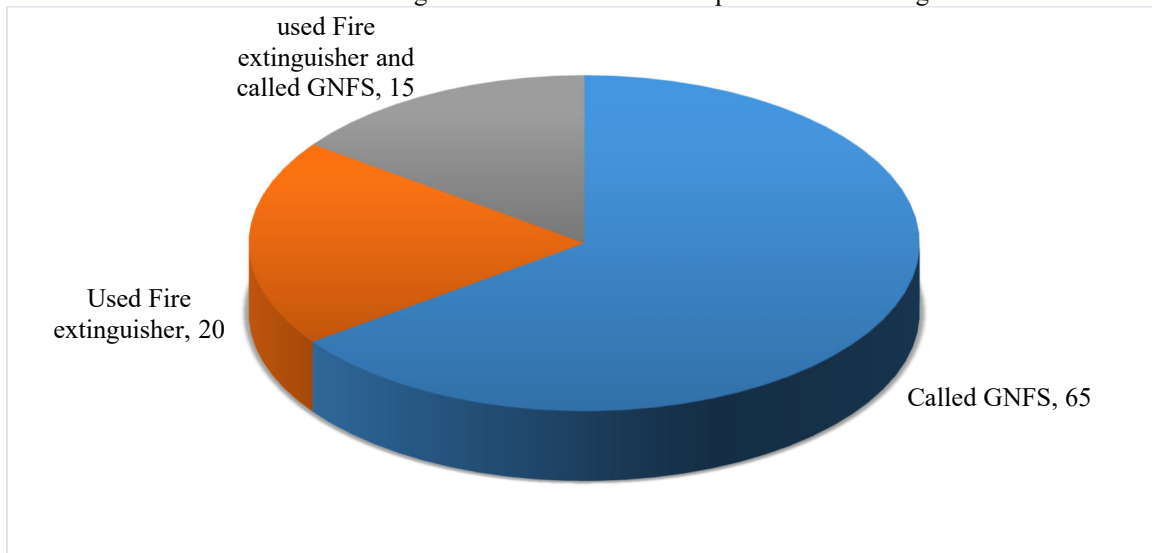


Figure 4.1: Means by which fire outbreak was managed by traders

Source: Field Survey, 2017

4.3.2 Fire management capacity programs in the market

At the time of the study, about (85.7%) traders surveyed had received training in fire safety from the GNFS. The training program covered the use of fire extinguishers, how to escape from fire without being hurt, how to detect fire at its early stages and other methods of fighting fire. As a result of the training, a little over forty percent of them (41.4%) said they had stopped cooking inside their shops. This was as a result of the lessons learned from previous fire incidences and 30.0 % of them developed good habits and were still keeping to the good practice of turning off all electrical appliances in their shops before they leave for their homes, while the remaining 16.6% were regularly replacing faulty electrical appliances, employing the services of only qualified electricians and also doing regularly refilling of expired fire extinguishers. These statistics highlights the influence of the training programmes organised by the GNFS. On knowledge for safety measures, the study revealed that, all the traders who partook in this study knew of safety measures that prevent fire outbreaks. The most commonly known safety measure among the traders was the use of high quality electrical wires and appliances which was cited by nearly thirty percent (29.7%) of the traders. The list traders with the knowledge on safety measures about 9.9 % of them mentioned the use of fire detection systems in the shops.

4.3. Causes of fire outbreaks in the market

The Chi-squared goodness of fit test was performed to examine the significance of the causes of fire outbreaks observed at the market. The computed Chi-squared values with their associated p- values are shown in Tables 4.3 below. The results (as shown in Table 4.3 below) revealed that the specific factors observed in the study were statistically significant causes of fire outbreaks in the market.

Table 4.3: Causes of fire outbreaks at the market as indicated by respondents

Causes of wildfire	Frequency	Percent (%)	Chi-squared value (χ^2_{cal})	P- value ($\alpha= 0.05$)
Electrical fault	57	40.4	47.85	0.004
Fire left after cooking	41	29.6		
Heater left after use	12	8.4		
Wrong use of appliances	30	21.6		
Total	140	100.0		

Source: Field Survey, 2017

As can be seen in figure 4.2 above, the leading cause of fire outbreaks in the Kumasi Central Market as found in this study was the frequent occurrence of electrical faults with the electrical networks in the market. This was

followed by fire left unchecked after cooking. This has been a usual practice of the traders.

As cited earlier in the literature of this study, data from Ghana National Fire Service (GNFS) reveals that there had been several of these fire outbreaks in the Kumasi Central Market. And studies by Ayarkwa et al. (2010) revealed that, electricity was the highest factor in causing fire outbreaks in the country.

4.3.4. Awareness of the availability of firefighting facilities

The study also explored traders' awareness of the availability of firefighting facilities in the market. Each respondent was asked to name the firefighting facilities they were aware of. Each of the traders interviewed mentioned at least one firefighting facility. The firefighting facility commonly known among the traders was the fire extinguisher. Over ninety per cent of the respondents (92.9%) mentioned this firefighting facility. The rest (7.1%) mentioned either a wet blanket, a wet towel or fire bucket as firefighting facility they are aware of. Among the 140 respondents surveyed, only 12.9 % of them could operate the fire extinguishers they owned in their own shops. In other words, for every 100 of the traders trained by the GNFS who were selected for this study, only about 15 of them could operate fire extinguishers in times of fire disaster. This suggests the looming danger ahead despite the training they have had if they could not operate the extinguisher. The remaining 85 were exposed to the danger of fire outbreaks as they could not even carry out first aid measures. The remaining respondents (87.1%) had to rely on persons or individuals from nearby shops or passerby who happen to be around at the time of the outbreak to quench fire in their shops.

The study also revealed that the fire extinguisher is the firefighting facility that is readily available for use by the traders in times of fire outbreaks. 66.4 per cent of the traders who were aware of the use of this tool had it in their shops in the market. 10.0 per cent of them had fire blankets while fire buckets were available to 6.4 per cent of them. Irrespective of the provider of the firefighting facility, the awareness and how to operate the facility is of concern to the research. The remaining 2.9 per cent had alarm clocks to alert themselves and others in the market of fire outbreak.

Figure 4.2 below shows the firefighting facilities that were readily available to the traders to use in the event of fire outbreak.

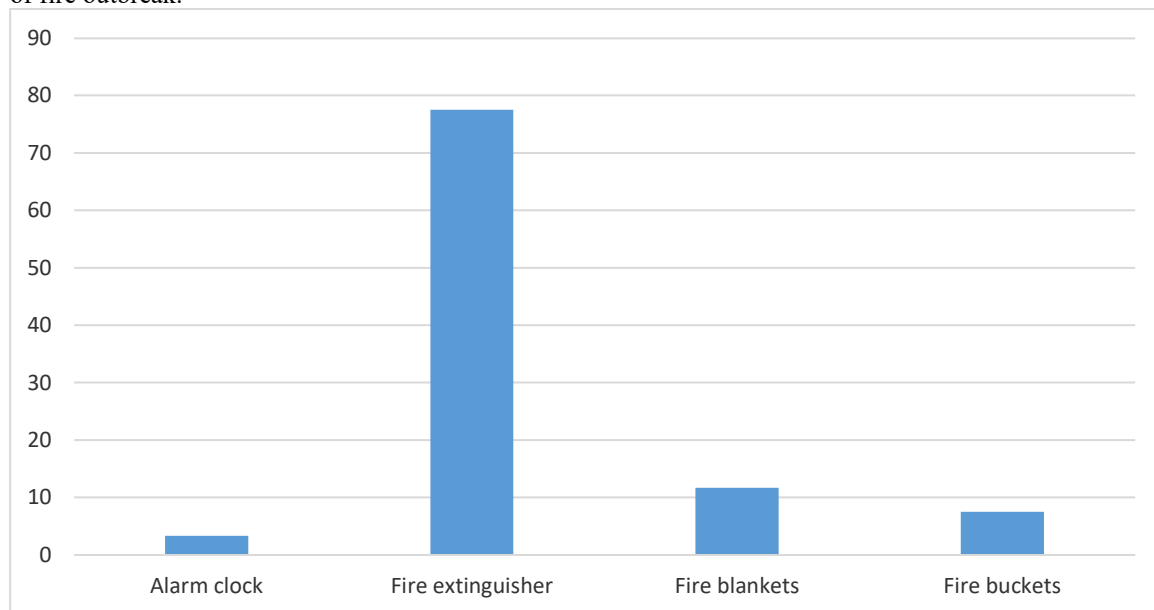


Figure 4.2: Firefighting facilities available to the traders

Source: Field Survey, 2017

When asked about the presence of an automatic fire detector or alarm system in the market, all the 140 respondents (100.0%) mentioned that there was no such detector or alarm system to help them out in case of fire outbreak in the market.

Among traders who had received training in the use of firefighting facilities the study also revealed that only 31.7 per cent of the traders were aware of the signs and notices provided in the market to assist victims escape fire outbreak. Only 10.0 % were aware of smoke detectors provided in the market. The remaining 58.3% were aware of other means of escapes provided in the market.

It could be inferred that even though most of the traders interviewed had received training in fire detection and prevention, a large number of them were not fully or properly equipped to detect and escape the debilitating effect of fire outbreaks in the market. It was interesting to find that there was no automatic fire detector or alarm system in the market and that nearly 70% of the traders were unaware of the signs and notices provided in the market to assist victims escape fire outbreak. Thus, knowledge of traders on fire outbreaks is still inadequate to

help them out in case of fire.

The KMA in collaboration with the GNFS Fully equipping the traders through a comprehensive program will reduce fire risk. Studies by Huseyin and Sayten (2006) revealed that fire safety awareness allows an individual (victim) to carry out his/her activities in a better and diligent way to reduce fire risk such as death and loss of properties and the use of fire alarms in homes and workplaces. The signs and notices for fire outbreaks in the Kumasi Central Market (where the study was conducted) have not been placed at the right positions/places or have finally faded out as a result of overpopulation. As such consulting with fire experts for knowledge is very necessary in the building plan. This is evident in the Fuzzy theory of maintenance culture where the behaviour of people becomes an issue if proper training is given to the users of the market facility. This will ensure safety of properties and longevity of the market.

5.1 Conclusions and Recommendations

5.2 Conclusions

This study was undertaken to examine fire management capacity at the Kumasi Central Market, with emphasis on individuals' awareness and knowledge on what they need to do against fire risk and disasters. Traders are important because they bridge the gap between the producers and the final consumers and also break the bulk into smaller units that can suit the demands of consumers. Without them, the workers in the other sectors of the economy will have to stop whatever thing they are doing and spend time to meet the producers of the commodities they want which can bring the economy to a halt. This study has revealed that even though traders in the Kumasi Central Market have some knowledge of firefighting facilities and what to do with them in case of fire outbreak, there is the need for more education (from public safety agencies) to enable these traders rightly use the rules to fight and escape fire outbreaks. The traders need to be better equipped in order to be able to fight fire. The study has also revealed that compliance with safety codes in the Kumasi Central Market is also a big challenge to both the traders and the safety authorities. The efforts of the safety agencies seem to be over shadowed by the large population and over crowdedness of the Kumasi Central Market.

5.3 Recommendations

Based on the above findings the study recommends that, various tested ideas should be adopted and implemented and back by law to allow rules to work effectively in the line of operation to reduce the canker that has destroyed large amounts of properties over the years.

Ghana's current issue of fire outbreak in most of the city centres is blamed largely on neglect of complying with the appropriate regulations to prevent fire disaster. The GNFS being the sole institution responsible for fighting fire issues was given a Legislative Instrument (LI) in 1724 a regulation set up by Fire Precaution Regulation to carry out inspection in premises to review building plans and to issue certificates for proper operation in order to protect lives and properties. Management in consultation with government through GNFS can review the law and effectively see to it that, people are complying with the rules. This will go a long way to correct incoming problems that might cause fire outbreak.

Most of the markets are built in wood and have been in existence for a long time and actually need to be restructured. It is believed that, concrete buildings are more resistant to fire than wood; therefore, the markets should be rebuilt in concrete to stand the test of fire. Effective training and education on fire safety measures should be carried out quarterly to enable traders become abrasive with the ideas and use of firefighting facilities. Effective monitoring of traders' activities in the market is safe. This is a responsibility of management to ensure that before the market is closed for the day activities, all electrical gadgets are put off from electrical source.

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