

## Full Length Research

### An Empirical Evaluation of Fire Outbreak Management in Ghana: The Case of Accra Metropolis

Debora Kwasi Kpui<sup>1</sup>, Bright Nana Kwame Ahia<sup>2\*</sup>, Dally Kwasi<sup>3</sup>

<sup>1,2,3</sup>University of Electronic Science and Technology of China No. 2006, Xiyuan Ave, West Hi-Tech Zone 611731, Chengdu, Sichuan Province, China

\*Corresponding Author.Email: obrempong0673@gmail.com

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#### Abstract

*The outcome of the variance inflation factor test in the study showed there is no issue of collinearity. To study the relationship between the variables under study, Pearson correction test was conducted. The result indicated that all the independent variables had some relationship with the dependent variable to some extent. Furthermore, a correlation analysis and linear regression is conducted to evaluate the extent to which these variables influence the outcome of fire management. The results from the study indicated that, constant inspection of property by authorities is one of the critical factors in fire management. The behavior of individuals is shaped through these frequent visitations from authorities and this is statistically significant. Household occupants due to the frequent visitation of city authorities adopt positive fire prevention attitude. This supports findings in literature that suggest supervision from mandated agencies plays critical role in disaster management. Disaster management includes preventive measures and promoting individuals to be ready in times of any uncertain event. Furthermore, the locations of firms and entities in designated areas, road mappings and ventilation are prudent step to curb these fire disasters. Outcome of the statistical analyses support the findings of the study and shows that risk in disaster can be reduced drastically through the various ways elicited on the research work.*

**Key words:** Fire Management, Disasters, Fire Prevention, Variance Inflation Factor Test, Ghana

#### INTRODUCTION

Universally, the aggregate intricacy of society and the strength of the interfaces between humans and their surroundings make us more helpless than ever to unexpected events. Recent disasters (e.g., Hurricane Katrina in 2005, the Wenchuan Earthquake in 2008, the Haiti and Chile Earthquakes in 2010) prompt us again of the fact that we are far from being prepared for disasters (Smith 2001). In these calamities, the direct damage to society has been enormous in terms of death, injury, and property loss. The long-term economic impact, both domestic and international, is more difficult to estimate (Kachenje et al. 2010).

In Africa specifically, some developing economies have experienced consistent worse forms of disasters recently. This calls for the need to draw much attention to readiness towards future disasters. Disasters themselves have no limitation to specific parts of the world. No country is immune to disasters but there are differences in disaster vulnerabilities (Sperling, 2005). Some countries might be more prone to a disaster. The more advanced a country is, the higher the level of its preparedness (Bailey, 2010). Another thing that might lead to a big loss during certain disasters is the utilities and facilities provided to inhabitants of a location (Pearce, 2003). One of the issues that seems to be getting out of hand is the numerous fire outbreaks in Ghana. Investigations

conducted so far by all institutions concerned including the team from the United States of America have revealed that the disasters are mainly caused by accidental and the careless way of handling gas cookers, naked fires and electricity in our offices, homes, markets and industrial sites.

As we are on an edge of recording larger financial or economic growth there is the need for us to take steps to curtail or stop the current occurrences of fire outbreaks through preventive means to elude possible delays resulting from loss of properties and lives. Apart from numerous fires at Kantamanto, Agboghloshie and Makola markets which caused huge damage to market merchandises, lots of communities and industries throughout Ghana have had their portion of disasters from fires.

Fire has since been a foundation of comfort and devastation for the human race. However, fire poses a great risk and challenge to human and wildlife (Barnett, 2008), fire continues to be a fundamental element of everyday life of most people. This propensity of one's acquaintance to turn into his worst enemy cannot be understated, as unfitting handling and use of fire has led to several accidents in homes, offices, schools, and other public places with very serious ramification (Ayako et al. 2010).

In 1983, fire submerged Ghana and led to a severe hunger crisis. This has become the major point of reference in the country's history (Sam-Okyere, 2010). There is no doubt, therefore, that these recent fire outbreaks have generated numerous discussions. However, the question that needs to be addressed is; "What is the real root of these recent outbreaks of fire in the country?" (Gakpe, 2014; Boateng, 2013). The paramount goal of fire management is to reduce the fatalities that come with those unfortunate happenings.

Despite the essence of this prevailing situation, studies have focused on fire vulnerability and risk assessment (Sarpong 2013, Norma et al. 2015). Future studies examine the preparedness of agencies to combat fire in business districts (Agyekum et al. 2016). From this perspective, studies have not investigated the appropriate ways of managing this disaster, thereby limiting researchers understanding of the situation and hindering the decision of policy makers. This has prompted the researcher to investigate and ascertain which of the modes, will be appropriate for fire management.

### **Problem Statement**

Globally, the increasing complexity of society and the intensity of the interactions between humans and their environment make us more exposed than ever to unexpected events such as fire outbreaks, read accident, flood, just to name a few. Recent disasters remind us again of the fact that we are far from being prepared for emergencies in these disasters. The direct harm that it poses to the society has been huge in terms of injuries, loss of lives or death and property loss. This leads to huge economic loses on the part of state and individuals. In addition, many lives are lost through these calamities and that reduces the productivity level of a nation since most of its' healthy citizens are lost to these tragedies. The long-term economic impact, both domestic and international, is more difficult to estimate. Although studies agree on the damage and extent of which fires outbreaks or disasters affect economic growth and development, most studies attempt to address these issues mainly by concentrating on the economic and social value aspect of fire outbreak. Therefore, limiting researcher insights into how fire management techniques aid in the prevention and control of fire outbreaks.

In the U.S. comprehensive emergency management is commonly described in terms of four programmatic phases: mitigation, preparedness, response, and recovery (Thieken, 2007). The four-phase approach covers all the actions described in Tufekci and Wallaces classification while providing a more focused view of emergency management actions. Moreover, the four-phase classification is based on the Comprehensive Emergency Management concept introduced in the 1978 report of the National Governors' Association Emergency Preparedness Project. In a very real sense, disasters represent a loss of opportunity, not only to individuals, but also to entire societies (Bouwer, 2007). They can also be serious setbacks to the country's entire development program. The impact of the disaster on individuals and their society should be reduced to a minimum. Although many types of disasters have been occurring in Ghana, the most dominant one is fire outbreak. For a nation struck by a disaster, this means managing the disaster in such a way that recovery is accomplished quickly and that the recovery efforts contribute to the overall development needs of the country and all its citizens. Even though much has not been published about disasters in Ghana, we can cite from the work of Akussah and Fosu (2001), which states that disaster management in Ghana became an issue as a result of the National Disaster Management Organization (NADMO) report

about the annex of the Balme library of the University of Ghana which occurred in Ghana in 2009 (Dzivenu, 2016).

The disaster that occurred in Kumasi Central Market fires reported by the Ghana News Agency on the 28th of May 2009 (myjoyonline, 2017), the Kokomba Market fires in Agbogboloshie, Accra on the 31st of May 2009 (myjoyonline.com, 2015) the Ministry of Foreign Affairs fires on 22nd October 2009 (Puplampu, 2012) that destroyed almost the entire building and its content including archival documents, the fires that engulfed the national offices of the National Commission on Civic Education (NCCE) and the Electoral Commission on the 7th of December 2009 in Accra and the recent fires that destroyed the house of Former President J.J. Rawlings on 14th February 2010 (voanews.com) and many more motivated the researcher to investigate ways through which disaster can be managed within the Accra metropolis from the perspective of policies and possibly to the entire country.

### Research Objectives

The objective of this research is to identify measures employed to mitigate fire outbreaks while examining the impact of these measures on fire management, life, property and finally awareness of these measures among individuals in the fire management sectors and how they employ them in their duties.

### Research Question

This research seeks to answer the following question: What measure could lead to the reduction of fire outbreak and how helpful are these measures in solving issues, measuring their impact and which of them are employed in times of need?

### Significance of the Study

This study will enlighten people's knowledge on domestic fire management practices in the Accra Metropolis of Ghana. It will also help to determine the level of compliance with fire safety regulations as enshrined in the Fire Precaution regulation of Ghana (Twum-Barima, 2014). It will also help people living in Accra to be abreast with the fire safety measures that must be incorporated in their building plan. It will serve as a reference point for students, researchers and policy makers in decision-making. Decision makers will be able to improve on the effectiveness of fire prevention,

detection and control if they are able to predict the causes of fire outbreaks (Sarpong, 2013). This study will also come out with fire safety standards that can provide a comprehensive document to form the basis of a structured approach to fire safety management.

### Research Innovations

There have been several writings on fire outbreaks in Ghana and the continent at large however, this paper seeks to delve into the impact of fire outbreaks identifying measures employed to mitigate fire outbreaks, examine the impact of these measures on fire management in the Accra Metropolis in Ghana. It will also bring out policies that are good and worthy of emulation. Though there have been literatures about the menace of fire outbreak in Ghana, this research seeks to delve further and bring out factors that often bring about fire outbreaks occurrence in Accra, whether there are any kind of measures that are implemented to curb these fire outbreaks as well as examine the extent to which these mitigation strategies impact fire management in the Accra Metropolis

### Research Delimitation

Day in day out there are chunk of fire outbreaks throughout the country and these occurrences has led to loss of lives and properties. It therefore behooves on researchers to investigate the course and measures that can be aligned to curb this rampant menace of incessant outbreak of fire. It is however tedious to look holistically at the issue of fire outbreak in the entire country, this paper therefore seeks to deal with measures employed to mitigate fire outbreak and examine the impact of these measures on the fire management specifically in the Accra Metropolis, narrowing the work and giving room for the researcher to have measurable variable and a population that is reasonable for research.

### Research Limitation

Though there have been several literatures about the outbreak of fire in Ghana, few has been able to delve into the measures that are employed to mitigate outbreaks of fire as well as the impact these measures have on the management of fire in the Accra Metropolis. The major possible problem for this study is readily availability of primary sources of information. Finance has been another

limitation to this paper. Not only this, the fear of exposure of ills in the fire management department is another great limitation faced by this paper making it difficult to find respondents to administer questionnaires and giving out vital information to make this research a successful one.

## LITERATURE REVIEW

### Core Concept

Fire disasters have been on the rise in recent times. For example, the world has witnessed a number of disasters such as floods, tsunamis, fires, storms, earthquakes, volcanic eruptions and landslides. One of the worst incidences is the fire in Mexico, the Mozambican floods in 2000 and the 2010 Chilean earthquake (Victoria, 2005). The losses these fires cause have a negative tow on both environmental and economic welfare of any country and further poses as a threat to sustainable development.

Fire is the quick oxidation of a material in the exothermic chemical process of burning (Amoako, 2015). It involves the release of heat, light and reactive products (Pyne, 1982). According to Wahab (2015), fire begins in different ways and serves as a potentially destructive force in the lives of people. Many major markets and office buildings located within the central business districts of many countries have been gutted by fire, destroying lives and properties that are worth millions of dollars (Amoako, 2015). Fire is a rapid, self-sustaining oxidation process accompanied by the evolution of heat and light in varying intensities (Addai et al., 2016).

The negative impact of these fires has promoted policy makers at both local and national levels to formulate and implement mechanisms that help to mitigate the effect of these disasters. The Wildland Fire Management defines the term fire management as all the activities required for the protection of burnable forest and other vegetation value from fire and to ensure they meet land management goals and objectives. These activities involve several strategies coupled with several factors such as the knowledge of fire policy regimes, probable fire effects, values-at-risk and level of forest protection requirement (Joachim et al, 2010). Global Fire Initiative viewed fire management as ‘an approach to addressing the problems and issues posed by both detrimental and beneficial fire. Through the evaluation and balancing of the relative risks posed by fire with the beneficial or necessary ecological or economical roles that it may play, facilitating the implementation of cost-effective approaches of preventing detrimental fires and maintaining desirable

fire regimes. Recognizing that managing beneficial aspects of fires may involve various forms of fire use (Joachim et.al., 2010).

Fire management can also be defined as the procedures put in place and executed to protect people and items from the effects of fire. One would be not burning anything in a forest landscape to avoid creating a forest fire.

Universally, management is an activity of resolving a disorderly situation into a purposely orderly situation, to achieve pre-determined result that has a purposeful outcome. Since disorder continuously arises from creativity, destruction, decay, variance, versioning, chaos, and other natural and intentional changes, resolving that disorder into an intended order requires continuous tracking and adjustments in the "architecture" of the intended order's part. Management is necessary because desired result must be established. Just as fire is an integral part of the forest, fire management is an integral part of forest management.

Fire management is also the method of planning, avoiding and mitigating fires to protect forest resource, property and the people. It also involves fire to attain forestry, wildlife and land-use objectives.

### Fire Management

The concept of disaster management was never intended for Europe, and the philosophical system of Flame Paradox pass an innovative approach for its effectuation. In fact, Flak Paradox proposes the full phase of the moon integration of fervor use in the prevention and suppression strategies by promoting the hypothesis of the beneficial use of fervor by prescribed electrocution, and the traditional flame use; and by using fire to suppress wildfire. When compared to other less populated parting of the macrocosm, the European state of affairs offers a very special circumstance to the use of the Ardor Paradox philosophy, as in many regions of Europe fire has been traditionally used and continues to be used in rural patterns whereas, at the same clock time, the vast majority of damaging wildfire have human causes. This apparent paradox is more obvious in Europe than in many other regions of the world; because of this, there may also be more potential solutions to solve the paradox. The methodology taken in Fire enigma was based on the paradox that fire can be “a badness master but a good servant”, thus requiring the contemplation of the negative impacts of current wildfire government (understanding induction and multiplication) and the beneficial impacts

of managed fires in flora direction and as a planned mitigation practice (prescribed burning together with some traditional fire uses) and for combating wildfires (suppression fire).

If fire is not well managed it might pose an imminent risk to forest and non-forest ecosystems and also be a threat to biodiversity and the environmental, scenic, recreational and cultural value of forests. The surrounding area's population may become seriously affected by smoke pollution, death or loss of lives, injuries and losses in properties. Post-fire secondary disasters such as floods or mudflows are additional threats to human populations, especially in mountain environment. Fires burning in environment polluted by unexploded ordnance and land mines both leftovers of previous conflicts pose an additional threat to personnel involved in firefighting and residents. In order to overcome the inadequate capacity in fire management there is a need to reinforce human and technical resources of agencies and local communities that deal with fire prevention and response.

To manage a surge in fire disasters in recent times, diverse risk management frameworks have been employed to aid in the mitigation of these negative occurrences. Risk management is considered as the process of identification, assessment and ranking of risk in an order of importance. In addition, the economic and environmental impact of the risk is evaluated to ascertain the effect of these uncertainties (Hilakivi, 2010). Fire safety management is a legal responsibility on having control over premises and to take reasonable measures to prevent the occurrence of a fire and to protect the lives and safety of personnel in the event of a fire. The occupants have to be aware of the significance of the responsibilities and of the appropriate action to take in the event of fire (Chow, 2001).

One of the essential objectives of fire management is to implement policies that are geared towards ensuring fire safety. According to Chow, (2001), on his study on review of fire management in Hong Kong, he reiterated that, for new buildings, fire safety management should be planned at the design stage of fire safety provisions using the 'engineering approach. The fire safety objectives should be stated clearly in a fire safety manual as proposed. For existing buildings, the fire safety provisions applauded to be assessed with a ranking system on the passive building design and active fire protection system by comparing with the new fire codes. The plan outlined to ensure fire safety is drafted to

provide clarity to the management of fire. From scholarly review, there is the view that fire management program needs to have 8 components namely: inspections, education and training, fire suppression, emergency service, evaluation of fire possibility, fire prevention, reports and record keeping and communication. Fires are recurrent disturbances in landscapes. Environmental effects are therefore shaped by fire regimes, namely the collective effects of fire frequency, intensity, season and type (Gill et al. 2002, Gill and Bradstock 2003).

### Causes of Fire Outbreak

Fire outbreak is not a pleasant incident at all. When fire breaks out, there are serious problem for the resident of the particular property because eliminating it or eliminating the fire is not an easy task at all. Fire outbreaks and disasters can be caused by many factors of which some can be blamed on us and some are beyond our control. The Recent series of fire outbreak in urban area in Republic of Ghana is very worrisome. All hands must be on pack of cards to determine the causes, suggest result and to penalize the perpetrators (incendiary) of the crime if there is any. If we attack the problem with a fair brain bereft of political blame-game, we shall never unearth the real causes of the problem and subsequently, may not be able to prevent their futurity return.

One of the significant causes of fire is attributed to human errors. Human errors account for 48% of fire outbreak in British Columbia district of Canada in 2009. Further search suggests 90% of fire outbreaks in Nigeria are caused by human negligence and therefore required a change in behavior or attitude to fix these challenges (Fire Smart Manual, 2009; Giwa, 2012). A study conducted by Addai et al., (2016) indicates that fire is caused by four key elements in a person's home. These are fuel, ignition source, oxidizing agent and mechanism of reaction. Their study argued that when these factors or elements are not checked in a proper manner, it usually led to an outbreak of fire. Furthermore, the electrification connection in one's building is a causation factor in the event of fire outbreak. When substandard products are used in the wiring of a house coupled with power fluctuations, there is the propensity of fire outbreak. Poor installation of these inferior products has been the cause of several fire outbreaks (Rubaratuka, 2013).

Firstly, we have to look at electrical energy as the major cause. The flow state of rampant unannounced on and off electricity supplying in the area can cause flame outbreaks. The incessant mogul outages coupled with

repeated switching on/off tycoon by the power provider (Electricity Company of Ghana: ECG), with the co-occurrence input surge electric flow  $S$  created each clip power switched back on by ECG, fire can result. Surge Currents are otherwise called inrush current. This current could go as far as 100 sentence the normal current needed by the electrical device. This results in impairment to the electrical contraption which may escalate into fire outbreak if the racing circuit is not well protected by fuses or circuit Synonyms/Hypernyms (Ordered by Estimated Frequency) of noun breaker. What a recipe for disaster? "If the current is higher than a predetermined maximum, or persists beyond a determined clip delay the circuit breakers will trip removing the power to the equipment. These power fluctuations locally known as 'dumsor' in Ghana can also cause fire outbreaks. When electricity goes off, people forget to turn off the electrical gadgets they use. When the power comes back and they are not around, the high voltage that comes with it tends to set fire to the electrical gadgets which might be probably on. Also, overloading of electrical appliances can cause fire outbreaks in the markets, especially, in the wrongful use of extension sockets as the market women tend to overload them without knowing its consequences. Improper and old electrical wirings pose a big threat to fire outbreak because once they get very close to any dry combustible material, fire can easily ignite and set the whole market place ablaze (Twum-Barima, 2014).

Boateng (2013) further suggests that the surge in fire outbreaks in buildings can be attributed to the overburden of electrical appliances on same fuse. With the ever-increasing outbreaks of fire in building infrastructure in Ghana, with the most recent occurring in state buildings and the central business districts in major towns in Ghana, the issue still keeps escalating with no definite ways to control it. Smoking while falling asleep is another key cause of fire outbreak.

One major source of fire outbreak is through human carelessness that is the manner in which house chores especially cooking is carried out. Cooking in the home and workplace with naked fire also causes fire disasters. Improper disposal of waste materials susceptible to spontaneous combustion, such as oily rags from wood finishing or polishing; accumulation of organic materials, such as green hay, grain or woodchips; and accumulation of waste combustible materials near potential sources of ignition all cause fire outbreaks (Pyne, 1982). Anaglatey (2013) in his study observed that one of the major causes of fire outbreaks in buildings in Ghana has been an electrical problem that result from faulty wiring and

misuse of electrical gadgets. Other studies conducted in Ghana have further identified the causes of fire in buildings to include poorly designed and constructed electrical circuits, improper electrical fittings, use of substandard electrical materials, defective generators, power fluctuations and illegal tapping from the national grid (Boateng, 2013; Simpson, 2010).

Secondly, the electric car automobile telegrams or overseas telegram chosen to carry out the installation of electricity in our home base, marketplace stalls, kiosks etc. are also of greater essence. We must be very conscious about the lineament and sizing of transmission line or telegrams we use for any given electrical installation. Mogul electrical circuit, sparkle circuit, etc. If an inferior size electric wire, let us say, one .5 millimeters normally used for lighting is used for John R. Major power (socket 2.5 millimeters) or electric boiler circuits? 4.0 millimeters, the wire heats up when the lading on the circuits (inductive or resistive loads) are turned on. "Voltage drop on conducting wire due to impedance causes hotter wires and less potential drop to footrace the gimmick attached to it. Program ahead for circuit size, the distance it must travel, and what is going to be connected to it will save you money and frustration later". Do we often abide by that precept? Heated transmission line or wires can cause fervor outbreak? The quality of the wires or cable television service is also important. I understand the wires/cable imported from China are of Low quality with the likelihood of giving in to any hazards. Mice chewing the protective coverings on the cables/wires give rise to electric sparks or cause short-circuits when two such nude cables/wires come into contact. There is also the hypothesis of incendiarism behind the firing outbreaks. However, I will in the meantime stick to electricity as being the major cause even though the actions of some leaders raise the stake of arson very high?

### **The Impact of Fire Outbreaks on Properties and Lives**

In the United Kingdom, the British Fire service identified and implemented some best praxis in fervor prevention. The best practices were classified into eight major categories, namely, identifying and analyzing high risk of infection households, increasing staffing and training on fire prevention course of study, qualification home safe visit, and conducting extensive school and youth programs. The rest were directing programs to the high-risk elderly population, developing safer consumer products, increasing the use of fire Stations of the Cross

for biotic community fire safety programs, and coordinating subject and local fire safety crusade (Schaenman, 2007). In the category of fire safety safari, the armed service identified and used some selected local radio stations and paper to spread fire safety messages to ethnic populations who were the prime target area audience for those media. The campaigns were intended to wage increase awareness of the fire problem, increase smoke dismay ownership, and variety fire safety doings. In Scotland, a particularly clever idea was the use of real land newspapers. The Fire Service placed video of partially destroyed homes among the video of beautiful homes that were being sold. This increased readers' curiosity, and then delivered a message on fire safety (Schaenman (2007). A 1999 Food and Husbandry Organization's (FAO) corporate infotainment specified that active media coverage of unusually large blast in Indonesia, the Amazon, and United Mexican States, increased public awareness of these predominantly man-made environmental disaster. The smoke from the flaming, which endangered public health and thriftiness beyond national borderline, also helped in focusing public attention on the fires and the need to spate with insurance policy issues related to fires (Food and Agricultural Organization, 2010). According to (Lowrey et al. 2006), audiences rely most heavily on television during community emergencies, but as perceived threat increases, dependency on newspapers increases as well. Need for deeper understanding about social consequences of a collective problem then drives individuals to newspapers, and the greater the dependency on newspapers, the greater the change in attitude and behavior. Fire outbreaks are logically dramatic, and when they take place in someone's home, the human component that makes an event particularly newsworthy is almost undeniable (Smith, et al., 2007). The opinion that effective prevention strategies for residential fires were being properly used and that the print and news media was an available communication channel to encourage such approaches, motivated Smith and his colleagues to monitor four daily newspapers circulating widely in Maryland for one year.

In Ghana, the National Fire Service Act, 1997 (Act 537) in accordance with article 190 of the Constitution, reinstated the Ghana National Fire Service (GNFS) to be the sole organization responsible for preventing and managing undesired fires and making arrangements for related matters, including educating Ghanaians on fire safety (GNFS, 2011). The GNFS however, is faced in recent years with frequent verbal attack from both the

public and the media for their inability to act swiftly and bring fires under control. The menace could partly be associated to the nation for not being able to commit enough resources towards fighting and curtailing the impact of fires. There were only 45 fire tenders nationwide, few fire-resistant suits and breathing apparatus and complete non-existence of hydraulic platform in the entire country for fighting fires (Oblejumlah, 2010).

The persistent increase in fire related destructions calls to mind the collaborative role the media could play in not only informing the public about fire outbreaks, but also disseminating fire safety information to the public and helping create awareness about the devastating consequences of fire outbreaks. According to Akinfeleye (2008), the fundamental philosophical basis of the mass media systems in most parts of the world includes that of "information, education, entertainment, persuasion etc." Akinfeleye (2008) envisages the mass media as influential educational tools which must assume the responsibility to state and clarify the standards towards which society should strive. "The mass media must be thought of as common carriers with regard to public debates and attitude formation, attitude modification, and attitude change" (Akinfeleye, 2008).

In support of the useful role the media could play in contributing to the reduction of disasters in every society, participants at a World Conference and Roundtable held in Annenberg in Washington, USA, expressed hope that the media would focus more of its coverage on disaster prevention and reduction, instead of loss of life and damage to property (Walker 2010). Key among the issues discussed during the conference was that media throughout the world play a vital role in educating the public about disasters and facilitating discussions about disaster preparedness and response. The Conference believed that timely, accurate and sensitive communication during disasters were cost effective means of saving lives, reducing damage to property, and increasing public understanding, since such communication could educate, warn, inform and empower people to take practical steps to protect themselves from hazards. The participants recommended, among other things, that disaster mitigation organizations should develop working relationships with the media and provide the media with newsworthy events.

Diverse scholars have examined the effect of fire outbreaks over the years. The rationale for these studies is to evaluate the extent these fires disrupt both the economic and environmental well-being of an individual

or region as a whole. A study conducted by Merchant Bank (2014) to assess the financial impact of fire outbreaks covering a period of 8 years, thus from 2004 – 2012 found that out of 2418 fire outbreaks under study 50 fires related injuries are reported and in addition 60 deaths. Causes of most of the deaths and injuries were due to smoke inhalation or various degrees of burns. The more catastrophic injuries resulted in death at either the ignition point or later in the hospitals. Those injured or dead came from various socio-economic backgrounds and other demographics. The aggregate volume of losses in terms of assets was GHC 14,303,061 in 2004, equal to US \$14,303,061; with a monthly average cost of ruin of social asset for that year at US \$1,191,921.8. Doing the same analysis for 2005, we found that the average monthly cost for 2005 was USD \$4.2m, which fell to USD \$626,607 in 2007 and USD \$663,214 in 2008. In 2006, however, the 2004 damage figure was almost doubled from US \$14,303,061 to US \$27,275,130 respectively. (Note: the exchange rate of GHC to the US dollar stands at US \$1 = GHC 1 between 2004 and 2006, and GHC 1.20 between 2007 and 2011 In 2012, it was trading at about GHC 1.50 but then shot up thereafter) (Merchant Bank, 2014).

Furthermore, although Greater Accra region with the utmost concentration of firemen and women as well as equipment suffers the most injuries and deaths, recording a total of 43 injuries and 46 deaths in 2004. Accra City however continued to endure the greatest losses totaling USD \$7.4m within 2004 alone. All the deaths and injuries in Greater Accra region were accredited to Accra City. The national occurrence of domestic fires was 43% of the total fire outbreaks of 2418 while industrial and commercial activities related fires registered 4.4% and 5.4% respectively (Addai et al., 2016).

### **Fire Safety Mechanism**

To reduce the probability of fire occurrences, certain measures are instituted by agencies and mandated authorities to serve as blueprint for effective fire prevention and management. Fire safety is defined as the mechanism or program instituted to reduce the probability that a person in or adjacent to a building would be exposed to an unacceptable fire disaster as a result of design or construction. Fire safety is the set of practices intended to reduce the death caused by flack. Fire safety measures include those that are anticipated to prevent explosion of an uncontrolled fire, and those that

are used to limit point the development and effects of a fire after its show time.

To this effect, two distinct aspects of fire protection are found. These are life safety and property protection (Frederick and Ricket, 2001). Fire safety preparedness is defined as pre-fire disaster activities designed to increase the level of readiness or improve operational capability, for responding to a fire emergency (Murage, 2012). Building designs need to conform to proper safety measures to ensure that life and properties are secure from hazards. According to Colonna (2001), one of the universally followed guidelines in fire disaster preparedness is that, fire extinguishers and other firefighting equipment which include fire extinguisher hose reel, dry riser, wet risers, sprinklers, fire detectors and sensors should be kept wherever necessary. In the workplace standards, it is also important that the equipment in each of these facilities are maintained on a regular basis and any faults, when detected, must be rectified immediately (Murage, 2012). In addition to make sure a building is prepared for any unanticipated danger it is prudent to have in place a means of escape during disaster periods. If an escape route or emergency exit must be blocked for any reason, then alternative arrangements must be made, and these arrangements must be conveyed to all those occupying the building (Mfinanga, 2007).

To reduce the level of human negligence in fire outbreaks, it is proper for organizations to put in place proper signs indicating the directions one needs to follow in times of emergencies. Bowker (2011) noted that in order to have effective fire preparedness in high-rise buildings, it is important to teach people about the fire safety methods and procedures. Educational and training programs pertaining to the fire safety measures help in providing knowledge to the people about the various aspects of a fire disaster. In addition to placing of required signs, it is required by law especially in the U.K for all employers to train employees in fire safety management particularly in the construction sector (Proulx, 1999).

Compliance is by far one of the critical mediums of mitigating fire outbreaks. Compliance with Fire Safety Measures is an integral aspect in fire prevention regime. Members or individuals occupying an apartment need to reframe from a behavior that pose as a threat to life and property, (Hall, Flynn and Grant, 2008). Argueta et.al. (2009) In his study in Australia, indicated that residential accommodations are sometimes non-compliant with fire

safety standards. Due to recent fire fatalities in some substandard lodgings, the public has become more aware of these deficiencies and has called for change. Individuals at the Metropolitan Fire and Emergency Services Board (MFB) have taken an active role in assessing the situation and implementing solutions. Fire safety mechanism could be enumerated in several ways i.e.; Fire Alarms system, fire sprinkler system, carbon monoxide detection, fire door. Flak Consternation Organization the Fire Alarm System of rules on all three campuses are monitored and supervised 24-7 by the Tuft Police Communication Theory Centers located on the Hub of the Universe and Medford campuses. The procedure is engineered, mounted and supervised in accordance with applicable Massachusetts flack and building codes. The organization are maintained, checked and tested per annum in accordance with applicable code. Smoke sensors are mounted in each resident's room, the green hallway, staircase and corridors. Horn/strobe warning gimmick are installed to alarm resident to a life-threatening incident. Manual Fire Alarm Pull Stations are located at every exterior departure on all degree of the buildings. Bedroom skunk detectors (local twist) are programmed to alert the occupants if the origin of the smoke is in that room only. The detection devices (system devices) in the common areas (i.e., kitchen, living rooms, hallways, stairways and basements) sprinkler head activation, or the activation of a manual blast alarum clout station will sound the building wide evacuation alarm and will also sound in all of the individual bookman rooms. Whenever a flack alarm activation is transmitted to the Communications Center, a Tussock Police patrol ship's officeholder is immediately dispatched to the location and the local flak department is notified and responds. The patrol officer arrives within 2-3 minutes, followed by the local life history fire department whose reaction time is usually 3-4 minutes. Upon arrival, the patrol officer defines the location of the alarm instigation and proceeds to that location to verify the instance. When the fire department arrives, they take charge of the incident and investigate the brainpower for the activation. All of the university buildings are equipped with portable, multi-determination, dry chemical fire extinguishers. Tufts patrol officers are trained to operate the fire extinguishers. If the fire is small enough to be organized or extinguished by its usage, the officer will attempt to quench the fire.

The firing hose system on all three campuses are monitored and supervised continuously by the Tuft University Communications Center located on the Boston

and Medford campuses. The systems are contrived, installed and supervised in accordance with applicable Massachusetts codes. 97% of all flames in fully scattered buildings are ascendance by two sprinkler questions or less. When the temperature orbit 155° at the sprinkler head, the fusible connection dismissal and per currents to ascendance and contain the bed cover of the flaming. Only that sprinkler head current water, subsequent heads will flow water only when the temperature releases the fusible connectedness. Carbon Monoxide Detection in accordance with the applicable Massachusetts code, all university residential buildings that contain dodo fuel burn apparatus or have enclosed parking are fortified with Carbon Monoxide Alarm protection. The detection devices are wall mounted within tenner (10) feet outside of any sleeping accommodation on each level of the dwelling unit. When the device has detected abnormal parts per gazillions of carbon paper monoxide (CO), it sounds a local word of advice and sends a signal to the Tufts University Communications Center who will communicate emergency services resources appropriate to the atmospheric condition. Flak Doorway Fire barriers looseness an integral role in managing a fire by preventing the spread of scent, toxic gases, and fire itself from one area to another. Fire door are fundamental to the wholeness of fire barriers, because any time there is an open doorway to a compartment, a fire barrier is temporarily broken. To prevent faults in fire protection, fire doorway must be self-closing and be equipped with proper latching devices in ordination to provide as much resistance as possible to the spread of fire, smoke and toxic gases. Fire exit doors are often held open for the convenience of employees and visitor, creating a significant fire hazard for all building resident due to the disruption created in the fire barrier.

Doors that are designed to be fire exits can be held open, but only if they mechanically release when the building fire alarms are activated. Fire exits may only be held open by a device that mechanically releases when the fire alarm is activated (such as an electromagnetic hold-open device).

#### ***When fire doors are needed:***

Where a door has an 'EXIT' sign on or around it  
 Where a door leads to exit stairwells and horizontal exits  
 Where a door leads to a hazardous area such as flammable storage  
 Where a door leads to a hallway or from one fully-enclosed room to another

### **Hazards to avoid with fire doors:**

Fire doors should never be tied open or held open by devices such as door wedges or blocks

When closed, fire doors should never have their latched taped over. During a fire outbreak, gases can easily build up enough pressure to cause fire exits to blow open.

#### **Portable Fire Extinguishers**

The majority of portable fire extinguishers situated throughout every University building is made up of multi-purpose, dry chemical extinguishers that will be effective on any type of fire that might be encountered:

Ordinary combustibles, such as paper, cardboard, cloth and wood

Energized electrical equipment

Flammable liquids (except for flammable metals)

If you ascertain a fire, you must instantly set off the building fire alarm system by activating a manual fire alarm pull station to warn building inhabitants. This will also initiate the response of the Tufts Police and the local fire department.

Only attempt to extinguish the fire if it is very small, not more than 2 feet high. Keep your escape route behind you. Should you decide to try to extinguish the fire, use the following acronym to help you.

#### **P. A. S. S.**

- o Pull safety pin from handle.
- o Aim at base of fire.
- o Squeeze the trigger handle.
- o Sweep from side to side.

If you decide not to combat the fire, try to close the door to the fire area, if it is harmless to do so. This will help to prevent heat, smoke and toxic gases from entering the egress corridors. Then evacuate the building via the closest exit.

A periodic check of the extinguishers should be performed to ensure:

The extinguisher is not being used inappropriately, (for example, to prop a door open)

The extinguisher pressure gauge needle is in the green zone

There are no visible indications that the extinguisher has been damaged, discharged, or removed from its proper location

That the inspection tag is related to the fire extinguisher. The inspection tag must be stamped with a month and year showing that the extinguisher was inspected within the past twelve months.

If an extinguisher needs to be replaced, submit a Work Order to Facilities.

### **Fire Outbreak Situation in Ghana**

Fire outbreak has been a major delinquency for market women in Ghana. The problem is usually compounded because of congestion (Anaglatey, 2013). As markets do not have proper blueprints, accessibility by fire tenders is always difficult when there is fire outbreak because every major market in Ghana faces the problem of overcrowding. Due to this, fire hydrants have been concealed by stalls; lanes that fire trucks could use to as entrance to the markets are converted into stalls etc. All these come together to cause the kind of destruction that occurs during such outbreaks of fire. These have become rampant and the effect characteristically is that goods and structures are always destroyed with cost running into thousands of Ghanaian Cedis. These losses always become a burden for the market women because they do not have fire insurance cover for their goods.

Data from the Ghana National Fire Service Department indicates that the country has been battling with fire outbreaks for a long time. Data spanning through 2000–2016 suggest over 60,000-fire outbreaks in both private and commercial buildings. Some of the notable ones over the period include a recount of some series of fire outbreaks in the country such as those at Lands Commission, Tema Oil Refinery, Kumasi Central Market, Ministry of Foreign Affairs and others have resulted in unquantifiable loss of lives and properties. In addition to fire outbreaks in buildings there have been prevailing wildfires in the southern sector of the country resulting in the loss of farm products and lives in some instances. For instance, a total of 2,214 fires were recorded in the year 2000 as against Gh¢ 789,720.41 cost of damage. It however appears that when fires dropped from 2,721 in 2000 to 2,647 in 2003, the cost of damage also increased from Gh¢ 1,249,933.9062 to Gh¢ 2,039,229.2 respectively. Again, when fires dropped from 2,647 in 2003 to 2,436 the level of inconsistency was also well noted when the estimated cost of damage also increased from GH¢2,039,229.2 to Gh¢ 5,061,077.9008 (GNFS, 2013).

More recent developments aimed at reducing the huge number of fire outbreaks in the country can also be attributed to the training of fire service personnel in firefighting. Personnel in the service have undergone

series of training particularly in the handling of new fire tenders and equipment acquired for the service and as a way of enhancing their capacity in emergency driving (Ghanaian Times, 2013).

### **The Role of State Agencies in Fire Management**

Selected administrators must have a clear appreciation of their roles and responsibilities for successful disaster management and response. At times, these roles may need helping with ways and guidance to residents during an incident. On an ongoing base, elected and appointed officials may be invited to help outline or modify laws, policies, and budgets to assist preparedness efforts and to improve disaster management and response capabilities.

The mayors, city managers, or county officials may also have crucial responsibility for the actions listed below, depending on state and local acts. Responsibilities and authorities differ by jurisdiction. These duties are often delegated to the emergency manager if allowed by the acts.

### **Role of Local Emergency Manager**

The most of emergencies and disasters cases are confined and are handled locally by first responders and emergency managers. The local emergency manager has the obligation for coordinating emergency management programs and activities, including:

#### ***Managing resources before, during, and after a key emergency or disaster***

Recording the inventory of personnel and material resources to include the private-sector sources that would be available in an emergency.

Classifying resource deficiencies and working with appropriate officials on measures to resolve them.

Developing and carrying out public awareness and education programs.

#### ***Conducting activities related to the key components of emergency management***

Organizing the planning procedure and working supportively with organizations and government agencies. Categorizing and analyzing the potential impacts of hazards that threaten the jurisdiction.

Conducting threat/hazard and risk assessments.

Coordinating a review of all local emergency and disaster-related authorities and suggesting amendments, when necessary.

#### ***Coordinating with all partners in the emergency management process, to ensure they;***

Have an idea of possible threats to the community, including launching a system to alert officials and the public in an emergency or disaster.

Take part in mitigation and prevention activities.

Strategize for emergencies and disasters using an all-hazards approach, including establishing and maintaining networks of expert advisors and damage assessors for all hazards.

Work efficiently in emergency situations.

Conduct effective recovery maneuvers after a disaster.

Are advised and informed about emergency management activities.

### **Local Emergency Manager Coordination**

A significant part of the local emergency manager's role is harmonizing with all partners in the emergency management system to make sure the whole community is prepared. These partners include:

Fire services

Police/law enforcement services

Emergency medical programs

Public works

Volunteers and voluntary organizations

Private and nonprofitmaking sector organizations

Other groups involved in disaster activities

Citizenry.

The preparedness of a given society or community to handle any emergency is critical to the sustainability of such a community (Wayne-Blanchard, 2003). The essence of disaster risk management organization is critical to the coordination and management of personnel and resources to tackle uncertainties in a given area. A disaster management organization's practices involve the methodical process of using administrative plans and programs, standard operating measures, organizational and operational skills and capacities to implement strategies, policies and improved coping skills and capacities in order to lessen the contrary impacts of hazards and the potentials of disasters (UNISDR, 2009). To control the risk of disaster, researchers have

anticipated continuous capacity building exercises for organizations, especially those involved in emergency management. For example, in Ghana, a set of best practices are designed to constantly advance the skills of individuals involved in emergency management (NADMO Act 517, 1996). This comprises policy making in four areas; namely: mitigation, preparedness, response and recovery (Petak, 1985; Quarantelli, 1989).

Mitigation policies are those intended to prevent emergencies or to reduce their influence (Vaughn Jr. and Hy, 1990). Preparedness policies involve measures to increase a community's ability to respond effectively to emergencies (McEntire and Myers, 2004). Response policies are those relating to the provision of assistance to victims during and immediately after an emergency (Petak, 1985). Recovery policies address concerns related to community recuperation after a disaster such as debris removal, restoration of lifelines, etc. (Petak and Atkisson, 1982).

### **Theoretical Background on Inspection of Building by Authorized Personnel**

To prevent rampant occurrence of fire, studies advocates for frequent inspection of buildings by authorized personnel. The conduct of people has the propensity to change to adopt a positive image towards fire compliance laws and regulations. Adhering to industrial fire compliance law is critical in the prevention stage of fires in an era of an increasing disaster. The fire regime regulation requires that city authorities and approved inspector pay regular visits to building to ensure occupants are abiding by stipulated regulations. Studies have shown that continuous visitation by inspectors' aids in shaping the mental model of individuals. It is anticipated that these individuals would move from negative attitude to a more proactive one that ensure compliance and adhering to safety standards. The rationale for such periodic visitation cannot be underestimated if authorities want to curb the surging number of fire outbreaks (GNFS, 2013; Anaglatey, 2013).

Furthermore, one significant factor in the fight against fire outbreaks is to be able to identify fire hotspot before it turns into a crisis. During these visitations' authorities are able to map out specific locations and buildings that are fire prone. These identified, structures can be provided to prevent the occurrence of a fire outbreak. For instance, through visitations authorities would notice if individuals have installed the required fire alarm system, fire extinguisher and other required safety mechanisms.

Being able to identify which entities are abiding by set standards is critical to ensure those lacking upgrades to meet set out standards. Another significant rationale for the inspection is since defaulter can be identified and brought to book while rewarding law abiding citizens. Rewarding fire compliance individuals or organization serves as a positive benchmark for others to emulate both in the short and long run (Pyne, 1982; Boateng, 2013; Anaglatey, 2013).

Frequent inspection has a positive effect on the management of fire outbreaks. One proactive way of combating fire outbreaks is fire prevention. And this can be achieved through constant inspection of facilities and buildings by authorized agencies and bodies. Based on above theory, the researcher formulated the hypothesis 1 below;

H1: The ability of authorized personnel to frequently visit building and structures have a positive impact on fire management process.

### ***Compliance with safety standards***

Ensuring occupants and individuals adhere or comply to laid down procedures, rules and regulation is critical to fire management. To decrease the number of outbreaks in the nation, there have been some laid down rules that every contractor or someone who puts up a building needs to follow to the latter. In Ghana, law requires that every building have in place a fire extinguisher and fire safety alarm. This measure is designed at decreasing the number of disaster outbreaks in the nation. When disaster reduces it has an optimistic effect on the finance and well-being of citizenry. Complying with this requirement ensures these structures are fire prepared. Being prepared is critical to fire fighting. In addition, fire preparedness has proved as a key determinant in the management of fire disaster (Frederick and Ricket, 2001; Murage, 2012).

Fire safety compliance is an essential ingredient in reducing fire outbreaks. By complying with safety measures set out by law ensures that occupants do not exhibit high-risk propensity. When risk propensity of occupants is reduced through conforming to rules and safety laws it mitigates the risk of building from catching fire. For instance, a study conducted by Argueta et al (2009) indicates that fire outbreaks decrease in vicinities that adheres to fire safety laws and vice versa. In addition, compliance to law further goes a step to advice builders on the quality of products to use for their buildings to

prevent any unexpected crises. The rationale for ensuring builders adhere to safety standards is since using substandard products and equipment has been the source of fire outbreak in many jurisdiction (Hall et al, 2008).

On the part of authorities, monitoring compliance to law affords those authorities to review its laws to changing environment. Effective fire management cannot be attained if citizens are not complying to laid down fire safety laws and vice versa. Based on the theory, the hypothesis 2 is proposed:

H2: Ensuring that builders and occupants adhere to building safety laws have a positive impact on fire management.

### *Safety Law*

Safety law is a form of law that protects the safety and welfare of the general public and certain distinct sectors of the population such as workers. The urgency to ensure individuals and builders are prepared for the unexpected fire outbreaks are essential to fire management. To curb the situation policy makers and authorities have enacted laws that is aimed at ensuring people conform to safety standards. It also helps to prevent and manage disaster in time of occurrence. In addition, these laws set out to establish new institutions to regulate and manage disasters in a proactive manner. Human activity 537 Ghana National Fire Service ACT, 1997 is an ACT to re-establish the National Fire Service; to provide the managing of undesired fire and to make provision for related matters.

KUO Fire Safety Ltd. is a comprehensive fire safety and industrial company in Ghana and it specializes in branded firefighting equipment, electromechanical services, individual defensive equipment, CCTV camera and burglar alarm systems, work with a collection of companies and institutions throughout the country and their clients include numerous top corporations. KUO Fire is positioned to professionally grant all welfare needs while providing exemplary customer service. They look forward to providing the public with their reputed excellent service.517. The mandate of this entity is to ensure organizations and individuals to comply with safety requirement and One of such agencies is the National Disaster Management Organization set out by the NADMO Act coordinate the activities in the time of disaster (UNISDR, 2009; NADMO Act 517, 1996).

In Ghana there have been in place several laws to curb the increasing fire outbreaks. One of such laws in recent times is one set out by the Environmental Protection

Agency that stipulates that no one can establish a gas station in residential areas. The rationale for this law is to safeguard property and lives in the time of any unforeseen disaster. In addition, these laws outline the responsibilities of various emergency management bodies (McEntire and Meyers, 2004; Petak, 1985; Quarentelli, 1989).

The theory elaborated set out to be the basis of the hypothesis 3,

H3: Having in place a safety law has a positive impact on fire disaster management

### *Proper Sites of Building and Training*

During the construction process city authorities and citizens have a responsibility to ensure structures are sited at designated places. Building in approved location is crucial requirement for city and urban planning. The location of building is an essential aspect of improving safety measures of a community. Unapproved structured happens to be a major cause of fire disaster according to findings from a study conducted by Ghana National Fire Service (2013). In their study it was revealed that one of the major factors that contributes to the increase in fire outbreak in urban areas is the improper sites of building in localities. These unapproved buildings are in most cases made up of unapproved products or substandard buildings material especially regarding its electrification system making these building fire hazards. Substandard products have been acknowledged to be a source of recent fire outbreaks (Mfinanga, 2007).

Although sites of building in line with approved laws and designated locations have been proved to prevent and aid combat fire outbreaks in numerous studies (e.g Colonna, 2001; Murage, 2012; Waugh Jr and Hy, 1990) there is still some level of fire threat rising from the behavior and attitude of occupants of such a building. Human factor is critical in the fight against disaster reoccurrences. Human negligence is one of the topmost causes of fire in recent times. For instance, survey by NADMO indicates that most fire outbreak especially at market places and slum location is caused as a result of negligence on the part of some individuals. This places a huge responsibility on landlords, organizations and employers to educate its employees and occupants on fire prevention and fighting methods. In U.K a study conducted by Proulx (1999) shows that when employees are trained in fire prevention and how to act in times of emergency it led to a reduction in the number of casualties. The amount of property and live lost during

fire outbreak is reduced drastically if all employees and occupants have a fair knowledge about how to deal with such a situation. Therefore, the researcher is of the view that if individuals are trained in fire prevention and management it has the propensity to mitigate the number of fire outbreaks. In addition, losses would reduce to the barest minimum. Based on this assertion the study stipulated hypothesis 4 and 5.

H4: When buildings are sited in right or appropriate location it has a positive impact on fire disaster management.

H5: Providing employees with the needed training aids in eliminating the human error factor associated with fire outbreaks and this has a positive impact on fire disaster management.

### **Property Certification**

Regular inspection in earlier section is argued to utter the attitude of occupants to adopt a more proactive positive approach in disaster management. Not arguably this has a positive impact on fire prevention but also it argued that inspection alone cannot aid in curbing these crises but rather if buildings undergo a regular certification process. In jurisdiction such as U.K, U.S.A and other developed economies buildings are often issued with certificate that proves that of structural integrity and combat ready for any unintended disaster. During the certification process buildings undergo a strict check to ascertain if the structure is kept in proper shape. And owners adhere to all fire safety requirement. Owners are required by law to conduct periodic changes on their property to ensure fire extinguisher and other essential suppliers are always readily available and in good shape (Boateng, 2013; Pyne, 1982; NADMO, 1996).

Authorities have advocated for each building to be provided with a unique certification number to ensure proper monitoring of its conditions. The rationale for this approach is to enable policy maker and authorities track, reward and punish owners for either adhering to the law or vice versa. Building certification from the occupant perspective provide some level of comfort since individuals are assured of their safety in their building respectively. For instance, in recent time the Ghana National Fire Service has enacted a by law that requires every building to get a fire safety certificate before it can be rented out to potential occupants. It is worth noting that this certification process is an activity that happens every six months. This move is anticipated to reduce the number of crises. During routine checkups if one's

buildings fail to conform to laid out certification process, its certificate is revoked and given an ultimatum to fix the issue or pay off its occupant to move. The essence of property certification cannot be underestimated if proper fire disaster prevention and management policies can achieve its objective. The hypothesis 6 indicated that having in place a proper mechanism of certifying building is critical and have a positive impact on fire disaster management. Based on it the hypothesis 6 is states as;

H6: The issuing of property certification to owners on periodic bases has a positive impact on fire disaster management.

### **Provision of Continuous Training for Employee of Disaster Management Organization**

Disaster preparation training is one of the exercises to provide workers with the right knowledge, skills and attitude when facing a disaster. It is a training program provided to employees and volunteers to prepare them and reduce the effects of disaster such as flood, fire etc. and also to increase their knowledge and readiness (Alam, 2000). A diversity of training is needed to provided skills such as swimming skills, cardiopulmonary resuscitation (CPR) technique, basic rescue, disaster management, physical intelligence and basic disaster exploits. According to the World Health Organization, prevention and preparation is equally imperative with emergency supplies.

The society should be fortified to approach any disaster with enough information and skills (Alim et al. 2014) and disaster awareness training should be held regularly (Rahman, 2012; Gissing, 2003) In the study of (Jasper et al.2013) regular disaster awareness training and knowledge preparation for medical workers has been found to be inadequate as employees were still not ready to deal with the disaster (Bistaraki et al. 2011). One of the ways for medical organizations to ensure the transmission of knowledge during the training is to make sure that assessments on disaster awareness are conducted continuously in order to preserve or retain information, knowledge and skills acquired during training. Therefore, trainers need to know their roles and responsibilities by stressing on knowledge (Hamzah, 2005) and understanding it by attending disaster preparedness training.

Training is a demanding learning process that is established in order to enhance the knowledge, abilities and attitudes of employees to increase their performance

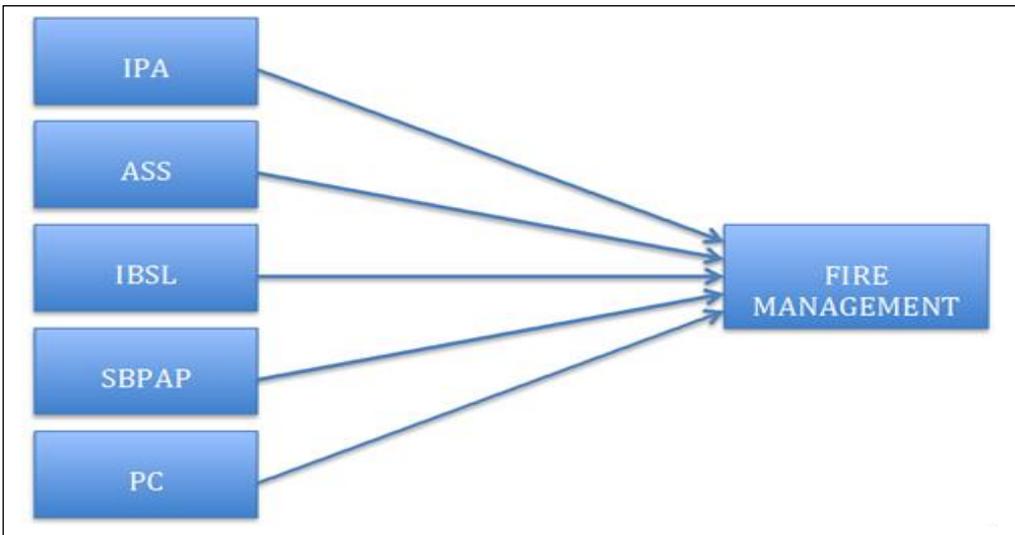


Figure 1. Conceptual Framework  
Source: Author

levels. The learning process is very significant. It needs to be done on an ongoing source in order to ensure the transfer of ideas and skills picked up in training. It is one of the organization's efforts in planning of training for staff with the purpose to ease learning and improve worker's competency in doing work. The transfer of preparation is therefore process of transferring new knowledge, aids and outlook for effective work performance. What has been acquired in training to prepare for disasters must be used pragmatic in the workplace or at the location of the incidence of the disaster (Lim, Nowell, 2014). Most of the training and development programs that have been carried out by organization is unexploited because the trainings were not effective, and employees weren't able to apply their new learnt knowledge, skills and attitude at the workplace.

Frequently, most employees cannot use what they have learned at the workplace (Bouzguenda, 2014). There is therefore no solution to this problem, and it has become a worldwide phenomenon. Employees who are not practicing what they have learned during training, the training is considered ineffective. If the employees are idle for six months, the new knowledge, skills and attitude will be forgotten by individuals who have undertaken training. It is considered unused as it has not helped to improve organizational performance. When an employee is able to change after returning to work after the attendance of training, the training is considered efficacious. There are factors that affect the transfer of

training that has been spoken of by past research. These are the work environment, training design, individual characteristic and organization environment. All these elements are acknowledged by researchers as they greatly influenced the transfer of training. It is therefore very significant that employees of fire management sector undertake regular training in order to gain enough knowledge to fight emergence situation when the need arises.

The conceptual framework above portrays the relationship between the independent variables and the dependent variable (Fire Management) it shows that the variables serve as measures for mitigating fire management. Sectors under Fire Management therefore depend on these measures in curbing fire outbreaks within the Accra Metropolis. These factors came as a result of preliminary interviews conducted with key informants in the fire management sector. Therefore, the researcher thought is wise to investigate how these measures help to mitigate fire outbreaks. The IPA stands for Continuous Inspection of properties and building by authorities, ASS for Adherence to safety standards, IBSL for Introduction of building safety laws, SBPAP for Sites of building in properly allocated places and PC for Property certification. These are measures employed by agencies under fire management to mitigate fire. They are also independent variables. Figure 1 show the conceptual framework for this study.

## RESEARCH METHODOLOGY

### Research Design and Method

Research design is a design process or plan intended to serve as a framework for a research process. It serves as a guide to the whole strategy that a researcher decides to utilize to incorporate the diverse aspects of the research process in a rational manner. The study espouses a quantitative research approach. The study attempts to explore and explain the impact of fire management policies and mechanisms in curbing the surging outbreaks in fire outbreaks in recent times. This is also where information as much as possible is collected instead of creating conjectures or intricate models to foretell the future - the 'what' and 'how,' rather than the 'why' (Babbie and Mouton, 2001; Fox, 2007).

To address the research questions, a quantitative approach is adopted. A survey is conducted using questionnaires to acquire data from main informants within the sector (Yin, 2009). The questionnaire is divided into two distinct sections, thus, section 1 focuses on the demography of respondents and section 2 focuses on constructs used in the study.

### Population and Sampling Techniques

Population of a study encompasses the individuals or events under study. In this study the identified population is the staff of Ghana National Fire Service Department (GNFS), National Disaster Management Organization (NADMO) and Environmental Protection Agency (EPA). Since the population is generally large and cannot be studied in a single study, the researcher turns to draw appropriate samples from these populations for the purpose of data collection. A sample is a subsection of a population (Coughlan et. al 2007).

To identify a sample that is representative enough, a random sampling approach is utilized. A random sampling approach is a sample distribution technique in which every member of a group (population or universe) have an equivalent and autonomous prospect of being selected.

The reason behind simple random sample distribution is that it eliminates prejudice from the survival of the fittest process and must result in representative sample distribution, so the researcher made use of this sampling approach to eliminate the biases that come with purposive sampling (Yin et. al, 2000). In addition, due to the large scale of the population, random sampling provides the

researcher with an opportunity to gain information and data from relevant stakeholders.

### Sample Size and Data Collection

The choice of sample and approach to data collection is critical if the study can arrive at a meaningful conclusion. Sample needs to be selected in a manner which is representative enough of the overriding populace since it is not viable to study an entire population size (Kadam and Bhalerao, 2010; Saunders et al, 2007).

Since the study sort to utilize Accra Metropolis as its study location, the population of the study included staff and members of the disaster or emergency management organization identified. These organizations are the Ghana National Fire Service, Environmental Protection Agency and the National Organization of Disaster Management. These entities are the major players once it emanates to management of disaster in the country. The overall number of personnel working in these various government agencies is in the thousands, therefore making it impossible to collect data from all.

Using a random sample approach, the researcher acquired information and data from actors within the disaster management ecosystem in Ghana. For the purpose of privacy, the name of individuals is eliminated from the study. Before data collection process begun initial contact is made with the heads of selected institutions. Initial meetings were organized to explain the purpose of the study to the intended respondents and also solicit their permission to use their premises for data collection. After deliberations that included discussion of the significance of the study to their organizational success, the authorities granted the researcher access to the place and its staff.

To ensure smooth collection of data, a questionnaire is designed and piloted. After the pilot phase, errors and suggestions that arise are used to enhance clearness and readability of the questionnaire. The items on the questionnaire are measured on a 7-point Likert scale. In total, 200 questionnaires were sent out. After the data collection era that covered a period of 2 months, the response rate was 44% amounting to 88 respondents. The data acquired is inputted and stored in Microsoft Excel 2007 and later transferred to Statistical Package for Social Science (SPSS) version 21.

### Data Analysis

In order to make sense of the data acquired from the field survey, the Statistical Package for Social Science (SPSS)

statistical tool is used in the analysis procedure. The Statistical Package for the Social Sciences (SPSS) is a software suite used in statistical analysis of data. The rationale for selecting this software is due to its robustness attribute in dealing with data and computations. In addition, it happens to be one of the most commanding software or packages for quantitative analysis. Initial reliability and validity tests are conducted to examine the credibility of the data acquired from the survey. Reliability is the amount to which a valuation tool yields constant and reliable results and test validity denotes the amount to which the test really measures what it claims to measure. Test validity is also the degree to which suggestions, conclusions, and decisions made on the base of test and how well a test measures what it is supposed to measure. While reliability is needed, it is not adequate to be alone. For a test to be reliable, it needs to be valid as well therefore, factor test is also conducted. Descriptive statistics is then performed to ascertain the means, standard deviations, minimum and maximum data points of the constructs examined. The means scores of items are used to comprehend the extent that these constructs affect fire disaster management. In addition, correlation and regression analysis is conducted to explore the relationship and prediction behavior between the independent and dependent variables.

An independent variable is a variable that stands on its own and it is not altered by additional variables that one is trying to measure. For instance, someone's age might be an independent variable. Other factors (such as what they eat, how many times they attend school, how intelligent the person is) will not change a person's age. when one wants to look for some kind of relationship between variables one has to see if the independent variable causes some kind of change in the other variables, or dependent variable. The independent variables in this work are inspection of properties and building on regular basis, compliance, building safety law, proper sites of building, training and property certification.

A dependent variable is a variable that depends on other factors. For instance, a test score could become a dependent variable when it changes depending on several factors such as how hard you studied and how long you slept without studying much on the night before you took the test. Generally, when you want to find out the relationship between two things you need to find out what makes the dependent variable change the way it does. In this work the dependent variable is fire disaster management.

### Model Building

A linear regression model is developed based on the independent and dependent variables. The general linear regression model follows;

$$Y_{it} = X'_{it}\beta + Z'_{i\alpha} + \varepsilon_{it}$$

Where,  $Y_{it}$  is a dependent variable,  $\beta_0$  is the constant,  $\beta_{1,2,3,\dots}$  are the coefficients of the independent variables  $X_{1,2,3,\dots}$  and  $U_{it}$  is the idiosyncratic error term.

## DATA ANALYSIS AND FINDINGS

### Validity and Reliability

Validity refers to how well a scientific test or a research actually measures what it is supposed to measure or how well it reflects the realism it represents. It deals with the extent to which a concept, conclusion or measurement is justifiable and correspond exactly to the real world. The validity of a measurement tool is deliberated to be the degree to which the instrument measures what it is to measure; in this instance, the validity is an equivalent to accuracy.

In psychometrics, validity has a specific application known as test validity i.e.; the extent with proof and theory that support the results of test scores. It is generally accepted that the notion of scientific validity addresses the nature of reality and as such is an epistemological and philosophical issue as well as a question of dimension. The use of the term in logic is more improved, relating to the truth of implications made from premises. Validity is significant because it can help assume what types of tests to use and help to make sure researchers are using approaches that are not only ethical, and cost-effective, but also a process that truly measures the idea or construct in question.

Reliability is the degree to which an assessment tool yields stable and regular results. Test-retest reliability is a type of reliability that measure of reliability found by running the same test two times over a duration of time to a collection of individuals. Reliability is a measure of the stability of test scores. You can also assume of it as the capacity for a test or research findings to be repeatable. For example, a medical thermometer is a reliable tool that would measure the correct temperature each time it is used. In the same way, a reliable math test will accurately measure mathematical information for every student who takes it and reliable research findings can be replicated over and over. The reliability of data acquired through field survey needs to be tested to ensure consistency

Table 1. Variance Inflation Factor

<b>Variables</b>	<b>VIF</b>
Fire Management FM	3.081
Continuous Inspection of properties and building by authorities (IPA)	1.227
Adherence to safety standards on part of property owner (ASS)	2.184
Introduction of Building safety law (IBSL)	1.021
Sites of building in properly allocated places (SBPAP)	2.978
Provision of continuous training for employee of disaster management organization (CTDM)	2.654
Property Certification (PC)	5.160

between variables. In this study the Cronbach alpha value is adopted as the unit of measurement to examine the reliability of data. An acceptable alpha value should be more than 0.5. The alpha value obtained for the study is 0.81, which is above the acceptable threshold and therefore makes the data reliable. In addition to reliability of the data, validity of data is examined. The average variance extract test is conducted to test the validity of the construct understudy. The variables examined had an AVE value of 0.645, which is quite above the threshold of 0.5. Inferring from these results indicates that the data acquired is reliable and valid for further analysis.

### **Variance Inflation Factor Test (VIF)**

Variance inflation factor is a measure of the amount of multi-collinearity in a set of frequent regression variables. A multiple regression is used when a person wants to inspect the effect of multiple variables on a particular outcome. The dependent variable is the outcome that is being operated upon by the independent variables, which are the inputs into the model. Multi-collinearity occurs when there is a linear relationship, or correlation, between one or more of the independent variables or inputs. Multi-collinearity generates a problem in the multiple regression because since the inputs are all persuading each other, they are not actually independent, and it is hard to test how much the combination of the independent variables have effect on the dependent variable or result within the regression model.

The variance inflation factor test (Table 1) is conducted to discover the error in measurement. A high VIF score suggests there is high inter-correlation between variables and therefore might affect the discoveries of the study. Table 1 displays the outcomes of VIF values of the variables Fire management (FM) recorded 3.081, Continuous Inspection of properties and building by

authorities (IPA) a value of 1.227, Adherence to safety standards on part of property owner (ASS) 2.184, Introduction of Building safety law (IBSL) 1.021, Sites of building in properly allocated places (SBPAP) 2.978, Provision of continuous training for employee of disaster management organization (CTDM) 2.654, Property Certification (PC) 5.160. From the table 3-1 it can be realized that all the variables have acceptable VIF value that should be less than 10 on a 10-point measurement scale.

### **Demographic Statistics**

The gender, educational background, workplace and work experience of the respondents are outlined in Table 2. A total of 88 answered questionnaires are included in the analysis. Among these individual's male respondents comprises of 72% and 28% females. The distribution of male and female respondents is shown in Table 2 and Figure 2.

### **Educational Background of Respondents**

Table 3 and Figure 3 presents the educational background of respondents of the study. The result shows that every

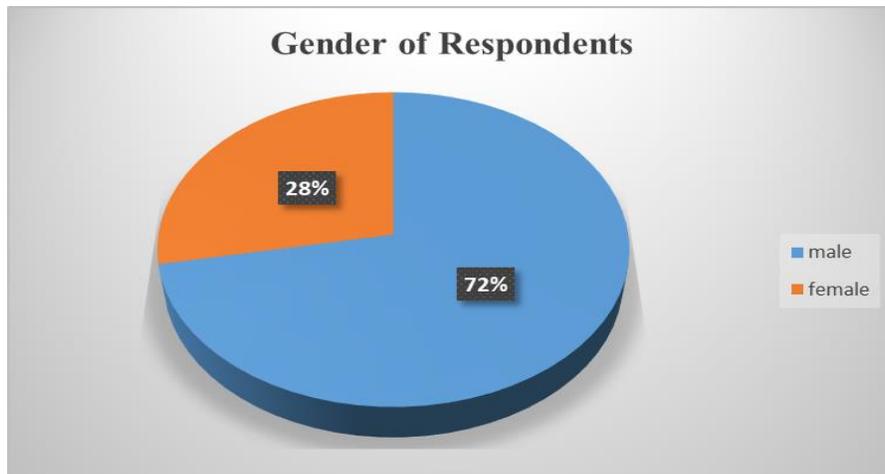


Figure 2 Gender of Respondents

Table 2. Gender of Respondents

Gender of Respondents	Percentage
Male	72%
Female	28%

Table 3. Educational Background of Respondents

Educational Background	No of Respondents
Bachelors	58
Masters	11
Doctorate	2
Some educational background (e.g SHS, JHS)	20

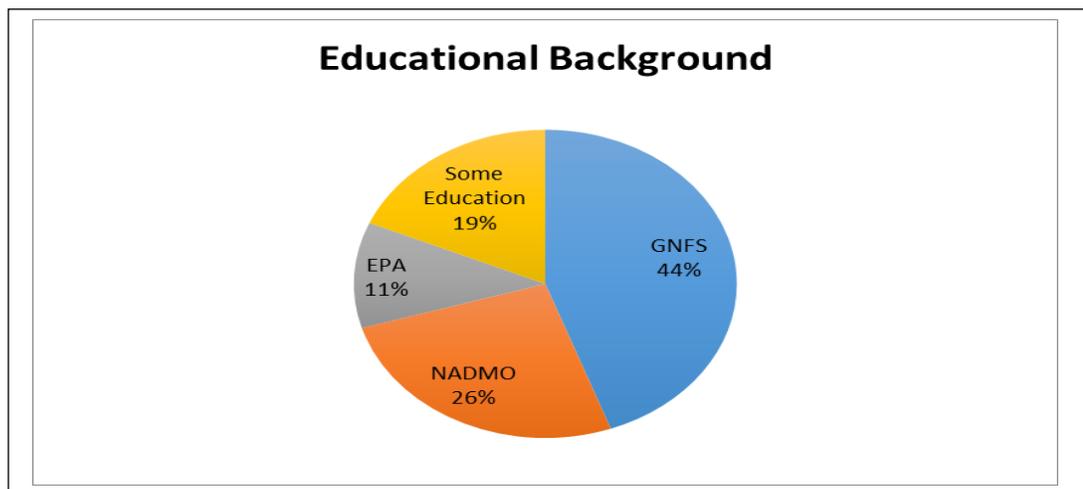


Figure 3. Educational Background of Respondents

Table 4. Respondents Workplace

Workplace	No of Respondents
Ghana National Fire Service	48
National Disaster Management Organization	28
Environmental Protection Agency	12

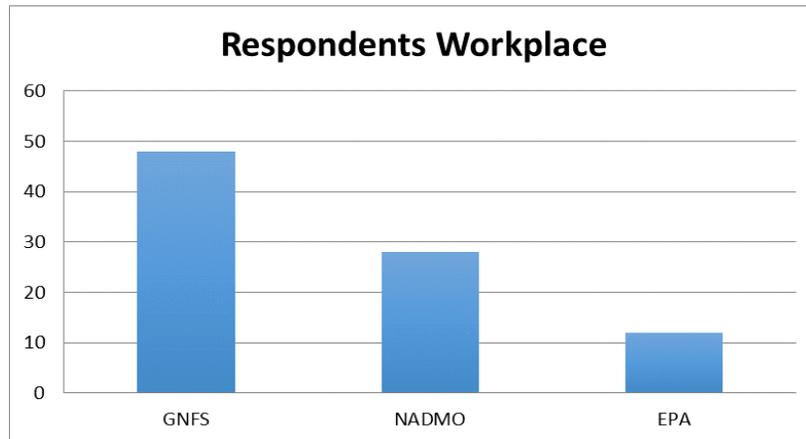


Figure 4. Respondents Workplace

individual involved in the survey has some level of education that enable him/her to read and understand the questions presented in order to give a fair response.

### Work Place of Respondents

The respondents for the study are selected from diverse organizations, that is, Ghana National Fire Service Department, National Disaster Management Organization and Environmental Protection Agency. Table 4 shows the distribution of respondents from each organization.

### Work Experience

The number of years respondents have been working is captured in Table 5 and Figure 5. The result indicates that majority of respondents have been working for considerable number of years and have the tendency to understand the questionnaires and be able to respond to them is very reliable in order to get better response. On the average individuals have spent 8–12 years in their respective organizations that is beneficial to this research paper.

### Descriptive Statistics

Table 6 displays the descriptive statistics of the variables under study. The measures examined include the mean, sample size, standard deviation, minimum and maximum

values of the data acquired. The descriptive statistics shows the measures that are employed to mitigate fire outbreak within the Accra metropolis. From the table it is noticed that Fire Management (FM) has a mean and standard deviation of 5.10 and 1.755, Continuous Inspection of properties and building by authorities (IPA) record a mean and standard deviation of 5.94 and 1.108, Adherence to safety standards on part of property owner (ASS) 2.51 and 1.478, Introduction of Building safety law (IBSL) 5.89 and 1.011, Sites of building in properly allocated places (SBPAP) 5.40 and 1.726, Provision of continuous training for employee of disaster management organization (CTDM) 5.22 and 1.629 and Property Certification (PC) 4.03 and 2.272

Inference from the descriptive statistics shows that Continuous Inspection of properties and building by authorities (IPA) plays a critical role in the management of fire and fire outbreaks. Respondents are of the view that when their inspection of properties by authorities in charge it reduces the propensity to catch fire and also provides easy access to facilities in times of disaster. That is Continuous Inspection of properties and building by authorities (IPA) aids in the prevention of fire as well as aid in combating fire in times of an outbreak. Aside the inspection of properties and buildings in proper designated locations, the frequent inspection carried out by agencies such as the EPA and GNFS help to prevent

Table 5. Work Experience of Respondents

Years	No. of Respondents
< 5	17
6 – 10	38
11 – 15	14
16 – 20	11
21 – 25	8

### Work Experience

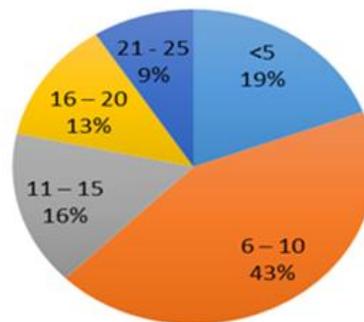


Figure 5. Work Experience of Respondents

Table 6. Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
FM	88	5	2	7	5.10	.187	1.755
IPA	88	4	3	7	5.94	.118	1.108
ASS	88	6	1	7	2.51	.158	1.478
IBSL	88	3	4	7	5.89	.108	1.011
SBPAP	88	5	2	7	5.40	.184	1.726
CTDM	88	5	2	7	5.22	.174	1.629
PC	88	6	1	7	4.03	.242	2.272
Valid N (listwise)	88						

Source: Author

unnecessary fire outbreaks. During these visitation authorities can check whether individuals are abiding by laid down rules. Furthermore, the introduction of building safety certification would have an impact on the safety of buildings in the metropolis. Taking a cue from some jurisdictions that have implemented building safety, Ghana can also introduce this kind of safety certification to serve as a check on the quality of material used in construction. As it stands now, there is no such law or certification; hence leaving buildings and properties vulnerable.

### **Inferential statistics: Correlation Analysis**

Correlation analysis is a method of statistical assessment used to study the strength of a connection between two, numerically measured, continuous variables example height and weight. This specific type of analysis is useful when a researcher wants to establish connections between variables and a strong, or high, correlation means that two or more variables have a strong connection with each other while a weak or low correlation means that the variables are hardly related. Correlation analysis is the course of studying the strength of that connection with available statistical data.

Table 7 presents the correlation result of all the variables examined in this study. To some extent all the variables had some relationship with the dependent variable that is fire management. In addition, inter-correlation between variables happens to be low indicating variance inflation factor is not present within the dataset. In so far as all the variables correlated with the dependent variable, the introduction of safety laws will have positive impact on the management of fire outbreaks. The introduction of this law would ensure each building is constructed with the safety of occupants as its prime motive. The introduction of safety law has a correlation value of 0.914 at  $p > 0.01$  (2-tailed); hence, supports the strong relationship between safety law introduction and fire outbreak management.

Sites of building property at allocated locations also has a correlation value of 0.878 at  $p > 0.01$  (2-tailed) implying that it has a positive correlation with the dependent variable. Such behavioral changes are critical for fire prevention and keeping occupants prepared for any unintended hazard. Provision of continuous training for employee of disaster management organization (CTDM) has a correlation value of 0.438 at  $p > 0.01$  (2-tailed), Inspection of building for properties has a correlation coefficient of 0.358 at  $p > 0.01$  (2-tailed).

Other variables such as Property certification (PC), Adherence to safety standards on part of property owner (ASS) also have correlation values of .325, -.065 at  $p > 0.01$  (2-tailed) respectively; indicating that the variable PC has some influence on management of fire outbreaks. Adherence to safety standards on part of property owner (ASS) however has a negative correlation on the dependent variable. In addition, when properties are sited at the right places it reduces the probability of catching fire. Aside sites buildings at right locations, it is prudent to adhere to outlined safety standards to ensure construction is done in a friendly environment. Adhering to standards starts from the sourcing of right materials to construct a facility that is befitting enough to protect its occupants from an unintended danger. Using proper products and materials guarantee safety for occupants and neighbors. In worst-case scenarios, in times of disaster, adhering to the usage of valuable materials insures the building against sustaining major damages.

### **Regression Analysis**

The study went a step further to investigate which of these variables have most significant influence on fire management. Aside identifying the extent these factors relate with the management of fire outbreaks, it is critical to ascertain the level of influence each variable has on the outcome of fire management policy.

Table 7 shows the outcome of the regression analysis. In statistical modeling, regression analysis is a set of statistical processes for estimating the relationships among variables. It includes many modus operandi for showing and examining several variables, when the focus is on the relationship between a dependent variable and one or more independent variables or predictors. More specifically, regression analysis helps one to understand how the typical value of the dependent variable alters when any one of the independent variables is varied thus serving as predictor tool, while the other independent variables are held fixed.

According to the coefficients table, it is realized that IPA, IBSL, SBPAP and CTDM are significant at ninety five percent confident interval with sig values of 0.000. The linear regression equation (Table 8 Equation) is developed to help predict the rate of fire management given some measures.

According to the equation in table 8 it is realized that the overall constant of the model is a negative value which tells us that fire disaster has a negative impact on the economy and individuals as well. Based on that, the

Table 7. Result of Correlation Analysis

		FM	IPA	ASS	IBSL	SBPAP	CTDM	PC
FM	Pearson Correlation	1	.358	-.065	.914	.878	.438	.325
	Sig. (2-tailed)		.001	.549	.000	.000	.000	.002
	N		88	88	88	88	88	88
IPA	Pearson Correlation		1	-.537	.508	.373	.644	.805
	Sig. (2-tailed)			.000	.000	.000	.000	.000
	N			88	88	88	88	88
ASS	Pearson Correlation			1	-.230	-.099	-.414	-.502
	Sig. (2-tailed)				.031	.360	.000	.000
	N				88	88	88	88
IBLS	Pearson Correlation				1	.850	.643	.477
	Sig. (2-tailed)					.000	.000	.000
	N					88	88	88
SBPAP	Pearson Correlation					1	.542	.413
	Sig. (2-tailed)						.000	.000
	N						88	88
CTDM	Pearson Correlation						1	.815
	Sig. (2-tailed)							.000
	N							88
PC	Pearson Correlation							1

\*\* Correlation significant at 0.01 level (2-tailed)

\* Correlation significant at 0.05 level (2-tailed)

Table 8. linear Regression Equation

$$-3.507(\text{FM}) = -.317(\text{CTDM}) + 1.401(\text{IBSL}) + .333(\text{SBPAP}) + .080 (\text{PC}) \dots\dots\dots 1$$

Table 9 Result for linear regression analysis

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-3.507	.570		-6.154	.000
1 IPA	-.051	.096	-.032	-.525	.601
ASS	.078	.047	.066	1.652	.102
IBSL	1.401	.127	.807	11.013	.000
SBPAP	.333	.066	.328	5.072	.000
CTDM	-.317	.072	-.294	-4.423	.000
PC	.080	.060	.103	1.337	.185

a. Dependent Variable: FM

Table 10 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.956 <sup>a</sup>	.914	.907	.535	.914	142.632	6	81	.000

a. Predictors: (Constant), PC, SBPAP, ASS, IPA, CTDM, IBSL

measures to prevent it are supposed to be positive constants, making sure it reduces the risk of loss in disaster therefore the existence of the equation. The equation depicts that an increase in the independent variables will reduce the rate of risk in the disaster. However, insignificant variables are not part of the equation since their existence does not aid in our objective to minimize or prevent risk in disaster.

It's also realized the Continuous Inspection of properties and building by authorities (IPA) is not involved in the equation because it has a negative constant and insignificant while ASS has positive but insignificant. Provision of continuous training for employee of disaster management organization (CTDM) to some extent is negative but according to respondents, once policies could be strictly adhered to then, there will be less need to continuously invest huge amounts to train personals which also poses a form of risk in terms of government revenue. Therefore, based on the mode above, one can tell the rate of disaster management cost given some set of disaster management ways. This prediction may not be

exact but can tell how estimated it will be. Table 9 and Table 10 shows result for linear regression analysis and model summary respectively.

The regression result suggests that model 3 has the significant r-square value of .807 indicating that the factor Introduction of building safety law (IBSL) determines the outcome of effective fire management. It also follows the model in the methodology part of this research work, where the independent variable is Fire Management FM and the dependent variables are Provision of continuous training for employee of disaster management organization, Introduction of Building safety law, Sites of building in properly allocated places and Property Certification.

The t-statistics result suggests variables such as adhering to introduction of building safety law, site of buildings in proper location and Introduction of building safety laws have significant impact on fire management. These variables obtained t-value greater than 1.96, which is the acceptable threshold. Also, results from the model summary shows that about 90.7 per cent of disaster risk

can be accounted for given the above management methods and this is significant.

## **DISCUSSION, RECOMMENDATIONS AND CONCLUSION**

### **Discussion and Recommendations**

The aim of the study is to investigate the impact of fire management policy on proper fire management in the event of surge of fire outbreaks. There has been an increase in the number of fire outbreaks and arson cases. To deal with the research questions stated for this study, a quantitative approach was utilized. Data was collected employing questionnaires in a field survey. Data was collected from key personnel in the Ghana National Fire Service Department, National Disaster Management Organization and Environmental Protection Agency. In total data is collected from 88 individuals from these various sectors.

The result of the study indicates that the variables examined have some influence on proper fire management in times of surging fire outbreaks and can help to reduce the risk associate with fire outbreak. Constant provision of training in safety protocols ensures compliance with set standards. Adhering to standards helps to ensure consistent quality and value across board. Aside the influence of these variables on the outcome of fire management, inspection of properties on a frequent basis enable authorities to gain access to real time data on the safety situation of properties in its catchment area and this is statistically supported by the field data collected. Gaining access to real time data is critical for proper planning. In this era of analytics, data acquired can be analyzed to identify patterns relevant to combating fire outbreaks. In addition to the information obtained from analyzing these data, the frequent inspection routines carried out by authorities will have an affirmative control on the safety behaviors of occupants and neighbors. The behavior of individuals has been identified as one of the most important determinants of fire outbreaks (Addai et al., 2016) followed by human negligence. These constant checks will alter the attitude of individuals. These inspections have the propensity to deal with negative behaviors identified in studies conducted by (Rubaratuka, 2013; Twum-Barima, 2014).

Property certification is critical to ensure contractors and occupants adhere to outlined procedures and safety measures. Behavioral changes need to be checked from time–time to ensure its consistency and certification is way proper mode of legitimizing this approach. This declaration is supported by findings in a study conducted by Holden and Tefera (2008). To ensure residents enjoy high quality of life, city regulators outline procedures and processes to guide the activities of estate developers, landlords and tenants. For a building to be habitable it needs to meet some specific ventilation requirements among other factors properly in place.

Sites of property is critical to management of disaster in any locality. National laws and local by-laws stipulate the requirement of any kind of building within a location. For instance, EPA regulations forbid estate developers from locating Gas Filling Stations in commercial areas. The rationale for instituting this policy is to prevent an increase in casualties in an event of a fire disaster. It is therefore prudent to ensure these laws and by-laws are implemented to ensure safety preparedness of location. This contributes to studies conducted by Addai et (2016) that reveals that the sites of properties are a contributing factor to fire outbreak and therefore if managed will increase the success of fire prevention mechanisms and this conforms with significant statistic value obtained from the field data.

The finding of the study indicates that if property safety laws are adhered to properly there is the probability to decrease fire outbreaks and also ensure proper management of fire. Authorities need to enforce current policies and initiate new policies that are geared towards achieving limited disasters in future. In fighting fire outbreaks, the mandate mostly rests on city authorities, government agencies and statutory institutions. But city authorities and agencies cannot function properly unless the cooperation of citizens is gained. Therefore, laws need to be formulated to encourage citizen participation in the fire prevention and preparedness process. Property laws will ensure equity in the entire occupational health ecosystem. These laws serve as yardsticks with which regulators, tenants and landlords are measured in terms of safety and the building prowess to fire.

According to the findings of this study, the researcher suggests city authorities and agencies pay frequent visits to identified hot zones to ensure these entities are complying with stipulated safety policies and measures. As uncovered by the study frequent visits from personnel have the propensity to change the safety habits of occupants of any kind of property. In addition to frequent

inspections, it is prudent for policy makers and law enforcers to have the courage to penalize offenders to serve as a deterrent to others and vice versa.

### **Policy Implications**

The study does not only contribute to academic literature on the subject matter but also has some implications on policy formulation and implementation. Instituting property certification laws or by-laws in specific localities would contribute to a decrease in fire outbreaks. Continuous certification process ensures property owners keep their property in good shape and quality to ensure habitability. To meet the sustainable development goal on providing citizens with quality standard of living it is prudent for authorities to enact policies and laws that promote the usage of quality products and materials. In addition, through certification process, policy makers can evaluate the quality of lives its citizens are enjoying amidst the challenges associated with it. Gaining access to this household data is critical for design and development of communities. The study advocates for the enactment of laws that encourages personnel and individuals to commit to adhering to strict quality and value standards on a timely basis.

Furthermore, the researcher advocates for the introduction of safety laws to guide the activities of stakeholder in the real estate sector and disaster management ecosystem. The institution of safety law plays a critical role if stakeholders would adhere to proper standards and quality management procedures. Safety laws are prerequisite if there can be a health hazard free environment. Laws serve as framework to guide the activities of the health ecosystem. Having in place proper law and regulations guiding the behavior and activities served as safeguards for entire nation's health. Fighting fire outbreak, the mandate mostly rests on city authorities, government agencies and statutory institutions. But city authorities and agencies cannot function properly unless it gains the cooperation of citizens. The study finds out that fire management relies on the ability and capabilities of various stakeholders including GNFS and Government agencies therefore the bane of this new safety law needs to have an in-built value loop that ensure smooth coordination between the various actors.

### **Conclusion**

The purpose of the study is to investigate the impact of fire management policy on proper fire management in the event of an increase in fire outbreak. The study uses a quantitative approach to empirically evaluate the impact of these measures on efficient fire management. To collect relevant information and data for the purpose of this study, field survey was conducted. Data collected from diverse individuals in the Ghana National Fire Service Department, National Disaster Management Organization and Environmental Protection Agency. A total of 88 respondents answered the survey questionnaire during the data collection period. The acquired data was analyzed using correlation and regression techniques with the aid of SPSS version 22. Initial reliability and validity test were conducted before further analysis were made.

The findings of the study indicate that frequent inspection of properties by responsible authorities help to ensure buildings are maintained properly. Constant inspection of property would put owners on their toes regarding adherence to safety standards of high quality. In addition to frequent inspections, properties need to be sited in the most appropriate locations to ensure compliance with local, state and national rules and regulations. Furthermore, the introduction of property certification laws will help ensure that buildings constantly maintain high standards since quality plays an essential role in fire prevention and management process and supported by the findings of the study.

Aside contributing to literature, the study has some implications on policy formulation and implementation as well. The study advocates for the introduction of property certification standards as a means to ensure continuous quality in the property market. In addition to issuing property certificate policy makers need to institute measures to enact property safety laws.

Although the study makes some significant contributions to academic literature and policy there are some limitations. To address these deficiencies, future studies need to employ panel approach to data collection and analysis to ascertain how effective these factors affect fire management over time.

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## Appendices

### Questionnaire

Department of Public Administration  
 School of Political Science and Public Administration  
 University of Electronic Science and Technology of China

Dear Participant,

This questionnaire is from a graduate student of the University of Electronic Science and Technology of China and wish to invite you to help complete it as part of a study been conducted to identify the factors that influence proper management of fire outbreak in the metropolis. Should you agree to take part in this survey you will be asked questions pertaining to your gender, work experience and educational background. In addition, you be ask to ascertain the extent some outlined policies contribute to effective fire management. The information you provide during the session will be kept confidential and only the researcher will have access to it and would be used for no other purpose but to complete this study. Personal information such as name will not appear in our records. This information you provide would serve as with a whole new perspective on the issues under study therefore we suggest respondents should be objective and feel at ease to draw our attention to any point that needs clarification.

Demography of Respondents (Please tick  only one in this section)

1. Gender

Male

Female

2. Educational Background

PhD

Master's Degree

Bachelor's Degree

Others

3. Place of Work

Ghana National Fire Service

National Disaster Management Organization

Environment Protection Agency

4. Work Experience (in years)

< 5

6 – 10

11 – 15

16 – 20

21 – 25

**To what extent does these factors Influences the management of fire outbreaks in your locality?**

	Non-significant					Significant	
1) Continuous inspection of properties and buildings by authorities	1	2	3	4	5	6	7
2) Adherence to safety standards on part of property owner	1	2	3	4	5	6	7
3) Introduction of building safety law	1	2	3	4	5	6	7
4) Sites of building in properly allocated place	1	2	3	4	5	6	7
5) Provision of continuous training for employee of disaster management organization	1	2	3	4	5	6	7
6) Property certification	1	2	3	4	5	6	7

**Not Effective Extremely Effective**

1) What is your assessment of the effectiveness of fire management practices	1	2	3	4	5	6	7
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