UNIVERSITY OF CAPE COAST

FIRE SAFETY PREPAREDNESS OF PUBLIC UNIVERSITIES IN THE CENTRAL REGION OF GHANA

SAMUEL KWASHIE AMEGBOR

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BY

SAMUEL KWASHIE AMEGBOR

Thesis submitted to the Institute for Educational Planning and Administration, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Administration in Higher Education

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature …… Date ……

Name: ……..……...

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis were supervised following the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature …… Date ……..……

Name: ……

Co-Supervisor's Signature …….. Date …….……..

Name: ……..

ABSTRACT

This study explored the fire safety preparedness (FSP) of public universities in the Central Region of Ghana. This study was proposed against the background of a lack of empirical evidence on FSP routines and processes in public universities in the region. The study employed a convergent parallel mixed-method design and adopted both the census approach and the purposive sampling procedure to obtain data from the Heads of Departments (HoDs) and Fire Safety Officers (FSOs) respectively. A total of 149 HoDs were involved in the study. The instruments used for data collection was self-administered questionnaire, which was supplemented with semi-structured interviews and field observation checklist. The data from the retrieved questionnaire and observational checklists were analysed using descriptive statistics in the form of frequencies and percentages. The responses from the interview were transcribed and analysed thematically. The results demonstrate that efforts of the public universities in the Central Region of Ghana to operationalise Fire Safety Measures [FSM] (i.e., fire safety equipment [FSE], emergency exits [EEs], fire safety signage [FSS] and notices), and reinforce compliance are generally inadequate. The majority of HoDs and FSOs opined that the major challenge to that effect was as a result of the negligence on the part of the facility users on the campuses rendering the public universities unprepared for fire outbreaks. Against this backdrop, the study concludes that public universities are not fully prepared for unforeseen fire disasters. The study therefore recommends that university leadership need to review and operationalise fire safety policies to effectively and efficiently execute fire safety operations to safeguard lives and properties as required by fire safety legislative instruments.

KEYWORDS

Fire Safety Officers

Fire Safety Preparedness

Fire Safety Equipment

Fire Signage and Notices

Fire Safety Measures

Emergency Evacuation System

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DEDICATION

To my wife and children

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LIST OF ABBREVIATIONS

AAM-USTED	Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development
BVTRI	Biriwa Vocational Training and Rehabilitation Institute
CAGRIC	College of Agriculture Education Mampong
CCTU	Cape Coast Technical University
COLTEK	College of Technical Education Kumasi
CSSPS	Computer School Selection Placement Secretariat
DHSSPS	Department of Health and Social Services and Public Safety
EEs	Emergency Exits
FEMA	Federal Emergency Management Agency
FSE	Fire Safety Equipment
FSOs	Fire Safety Officers
FSP	Fire Safety Precaution
FSS	Fire Safety Signage
GES	Ghana Education Service
GHS	Ghana Health Service
GNA	Ghana News Agency
GNFS	Ghana National Fire Service
GPS	Ghana Police Service
GTEC	Ghana Tertiary Education Commission
HoD	Head of Department
IEPA	Institute for Educational Planning and Administration
IGF	Internally Generated Fund
ILO	International Labour Organisation
ISDR	International Strategy for Disaster Reduction
KNUST	Kwame Nkrumah University of Science
LI	Legislature Instrument

MM	Mixed-methods
MoE	Ministry of Education
NAB	National Accreditation Board
NADMO	National Disaster Management Organisation
NASP	National Association of School Psychologists
NASRO	National Association of School Resource Officers
NGOS	Non-Government Organisation
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation of Economic Cooperation Division
PNDC	Provisional National Defence Council
PPMRR	Prevention, Protection, Mitigation, Response and Recovery
PU	Public University
RQ	Research question
UCC	University of Cape Coast
UEW	University of Education Winneba
UG	University of Ghana
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
UNECE	Economic Commission for Europe of the United Nations
UNISDR	United Nations International Strategy for Disaster Reduction
USFA	United States Fire Administration

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INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

CONSENT FORM

Introduction

You are invited to participate in the research aimed at investigating the **Fire safety preparedness of public universities in the Central Region of Ghana.**This research is conducted by Amegbor Kwashie Samuel a Master of Philosophy in Administration in Higher Education student of IEPA, UCC.

Confidentiality and Anonymity

This study shall be anonymous - I will not be collecting or retaining any information about your identity. The records of this study shall be kept strictly confidential – the research records will be kept in a locked file, and all electronic information will be coded and secured using a password-protected file stored in the clouds. I will not include any information in any report I may publish that would make it possible for you to be identified

Your Rights as a research respondent/participant

The decision to participate in this study is entirely yours. You may refuse to take part in the study at any time. You have the right not to answer any single question, as well as to withdraw completely from the study at any point during the process. You also have the right to request that I should not use any of your response in the research. You have the right to ask questions about the study and to have those questions answered by me before, during and after the research. If you have further questions and/or concerns, please feel free to contact me at amekwasam@gmail.com or via mobile phone on 0208857850/0554222494.

Consent

I have read and understood the information provides on this consent form, I certify that I am above 18 years age, and indicate my willingness to voluntarily take part in this study.

Participant/Respondent

Date: 24/08/2020

Signature.....

Researcher

Date: .....

Signature.....24-08-2020

Background to the Study

Global risks are intensifying, but the collective will to tackle them appears to be lacking (World Economic Forum, 2019). This seems to be why

various experts and prominent organisations have argued that disasters can be avoided (Balita, Bautista, & Mangurali, 2018). World Health Organization (WHO) describes a disaster as a sudden ecological phenomenon of sufficient magnitude that requires external assistance and that disaster may occur in learning institutions where there may be some weaknesses in the safety preparedness (WHO/EHA, 2002).

Disasters of various forms are one of the significant problems in the management of learning institutions globally. They interrupt learning schedules and cause various psychological traumas (Wanjala & Onyango, 2018). Simatwa (as cited in Akumu, 2013) stated that a universal increase in the number of student deaths and injuries in school disasters such as fires could have been avoided if safety measures had been strictly followed. In particular, fire disasters in learning institutions have become a source of concern across the world, as they cause significant fatalities, damage property. They also affect development initiatives and threaten the safety of students and staff (Shibutse, Omuterema & China, 2014).

Incidence of fire disaster deprives learning institutions of their routine functions (World Health Organization/EHA, 2002). According to Ejeta, Ardalan and Paton (2015); Paton (as cited in Kukali & Indoshi, 2009), fire disaster preparedness is an essential element in the reduction of risk. Despite its importance, however, little has been done globally to improve fire safety preparedness (FSP), especially in public learning institutions. FSP, in the context of this study, entails administrators of learning institutions putting in place the appropriate fire safety equipment, signage and notices, and emergency evacuation systems, conducting drills and creating awareness of the need for

fire safety measures. These actions enable learning institutions' communities to respond appropriately to the initial stage of a fire outbreak before the arrival of national fire services and limit the damage caused to people and property (Ejeta et al., 2015). Regrettably, FSP has generally not been prioritised in learning institutions (Kihila, 2017).

Safety in a learning institution is the responsibility of all stakeholders to help promote and maintain school-wide safety and minimise the effects of emergencies and other dangerous situations (Writers, 2021). Ensuring safety requires unwavering leadership, coordination by the university administration, and involvement and participation from all segments of the university community (Guy & Lownes-Jackson, 2010). Safety and Security Synergy is a vital tool to protect life and property on university campuses. It often requires a range of first responders such as students, staff, surrounding communities, groups, fire brigade, police, ambulance service, military and/or environmental agency (Horizon, 2020).

Preparedness ensures that there are mobilization of personnel, funds, equipment, and supplies within a safe environment for effective relief (World Health Organization /EHA, 2002). According to Onyango (2013), every university or school is unique per its design, location and students and has its history and culture. A culture of safety is a key concern to all; implying that fire safety must be taken seriously. A university may be held liable if it does not make effort to provide a safe and secured learning environment. In view of this, FSP in universities should be well coordinated (Onyango, 2013).

In view of the above, FSP is a continuous process of planning, organising, training, equipping, exercising, evaluating, and improving

strategies to ensure the effective coordination and improvement of capacities to respond to fire disasters (Federal Emergency Management Agency [FEMA], 2007). Guy and Lownes-Jackson (2010) have also stated that FSP is fire risk assessment and planning physical protection. It also entails capacity development to respond to fire emergencies. Fire risk assessments are designed to protect all, particularly students and staff who are the significant users of university facilities to ensure continuity of teaching and learning and to maintain a culture of fire safety (Guy & Lownes–Jackson, 2010). Fire disasters arise due to natural causes, negligence, civil disorder, accidents and enemy action (Gitau, 2006). Kukali and Indoshi (2009) cautioned that lack of knowledge regarding how to react to fire tragedy contributes to the many casualties. Mitigation plays a vital role in protecting school buildings and their occupants against fire outbreaks. Fundamentally, mitigation refers to reducing the risk and vulnerability. The act of mitigation also results in permanent reduction of the risk of a disaster (Ethiopia Public Health Training Initiative, 2006). The recent trend of fire incidents in institutions calls on educational administrators to focus on mitigation through FSP to help safeguard lives and properties (Ayarkwa, Danso & Adinyira, 2010).

Fire disasters have caused damage to educational infrastructure and occupants of educational buildings in both developed and developing countries. For example, in the U.S, fire-fighters attend to some 5,690 fires in school settings annually from 2000 to 2015 (Campbell, 2013; FEMA, 2009), and 41% of school related fires within the period 2000 to 2015 were started intentionally. Therefore, it is imperative to emphasise FSP in schools (Nationwide, 2019). In 2007, the U.S. Fire Administration, National Fire (USFA, NF; 2007) did not

report any school related fire deaths. This achievement was attributed to school authorities' commitment to and compliance with fire safety measures, the creation of fire safety awareness and the use of fire safety drills. Nevertheless, this attainment does not indicate to a large extent that the developed countries is absolutely prepared in matters of FSP (Federal Emergency Management Agency (FEMA), 2007).

In the U.K., for instance, the Department for Communities and Local Government (DCLG) reveals that school fires caused 115 million pounds worth of damage to educational facilities between 2012 and 2013 (DCLG, 2015). In addition, there was a total of 90 fire incidents in preschools, nurseries, primary schools and secondary schools in 2017, up from 67 incidents in 2016. The London Fire Brigade's Facts report (2018) also show that fires at educational buildings such as colleges and universities, increased from 20 incidents in 2017 to 28 in 2018 (Brigade, 2018).

In the developing world, India has also experienced fire disasters in educational institutions. For example, Reuter (as cited in Nyagawa, 2017) indicated that fires killed 400 students in 1995 and 90 in 2008. In addition, another school fire accident in Kumbakonam in the Tanjore district in 2004 exposed the lack of fire safety precautions in Indian schools. This accident took the lives of 94 children (Carlton, 2018).

Studies conducted in Tanzania, Kenya, Nigeria and Ghana indicate a lack of facilities, poor facility conditions and a lack of awareness among users as factors causing high fire risks (Amoako, 2015; Kachenje, Nguluma & Kihila, 2010; Makachia, Gatebe & Makhonge, 2014; Sankey & Omole, 2014). To draw attention to the threats and effects of fire disasters, Kukali and Indoshi (2009)

and Shibutse et al. (as cited in Nyagawa, 2018) indicates that fire disasters have caused damage to educational infrastructure and occupants of educational buildings in both developed and developing countries.

Kihila (2017) opines that higher learning institutions in Tanzania appear to be unprepared for fire safety. His study of ten higher learning institutions in Dar es Salaam indicated that higher learning institutions are not well prepared to manage fire outbreaks. Against this background, he suggested that plans to rectify the situation are essential and require immediate attention. Nyagawai (2017) has also stated that in boarding secondary schools in Tanzania lack of discipline and riots among students lead to fire disasters.

Shibutse et al. (2014) conducted a study of 35 Kenyan schools and found out that five of these schools had experienced fire disasters from 2004 to 2014. For example, in 2005, 15 fire incidents were reported countrywide in various schools in Kenya. In one instance, two boys were burnt to death in their quarters at Endarasha Boys Secondary School dormitory in Nyeri County (Otieno, 2010). Kirui (2009) also reveals that fire disasters are the most common disasters in Kenyan learning institutions. Otieno (2010) noted that, Kenyan schools are poorly equipped to handle fire disasters and identified a need for fire safety measures in schools to help reduce these incidents to a minimum.

Boasiako (2013) has affirmed that fire outbreaks are hazards that Ghana is currently facing. Agyekum, Ayarkwa and Amoah (2016) have further revealed that numerous fire outbreaks have occurred in Ghana in recent years. According to the authors, these outbreaks involved business premises, markets, and educational facilities at both senior and tertiary level institutions.

Furthermore, Agyekum et al. (2016) have confirmed that higher institutions such as universities and colleges are vulnerable to fire outbreaks. For example, the University of Ghana had three fire incidents in 2018, which affected its Registry and the Physics and Food and Nutrition Departments (GNFS Legon, 2018).

At the senior high school (SHS) level, Abdul-Majeed,(2019) reported fire that destroyed the boys' dormitory of the St Charles Senior High School (SHS) in the Tamale Metropolis of the Northern Region of Ghana. According to the school authorities, no students was injured in the fire, but properties were destroyed. This fire disaster was the third within four years (Abdul-Majeed, 2019). In a similar incident, the girls' hostel of the Biriwa Vocational Training and Rehabilitation Institute caught fire. Although no one was seriously injured, the fire was reported to have displaced more than 350 students and destroyed property worth several thousand Ghanaian cedis. The fire was caused by an electrical fault (Ghana News Agency, 2018, Sept 20).

Unfortunately, fire incidents in learning institutions have continued to occur. According to a Ghanaweb report on the subject ('Dossier on fire disasters', 2022, Feb 21st), between January 2020 and February 2022, about 19 institutions of learning experienced fire outbreaks. This figure did not consider unreported cases (GNFS, 2021). Concerning the trend of fire outbreaks and their effects on learning institutions, Kihila (2017) indicated that the effects of these fire disasters have been severe in institutions with low levels of fire disaster preparedness. Concurring regarding the importance of fire safety preparedness (FSP), Amoako (2015) added that a lack of knowledge of FSP

might hamper escape from fire hazards and attempts to contain fire outbreaks in their preliminary stages (Kachenje, Nguluma & Kihila, 2010).

Koester (2016) indicates that the occupants of buildings tend to ignore fire drills since they perceive them only as tests. This attitude may increase the impact of fire disasters when they occur. Kilbourne (2010) has also suggested that fire safety drills help prepare people to respond quickly, calmly and safely in the event of a fire outbreak. For instance, Pennsylvania Policy Manual (2017) states that fire drills should be conducted twice a year in all non-residential buildings and twice a semester in all residential buildings. In addition, the U.S. Federal Emergency Management Agency (FEMA, 2013) has stated that universities are perceived as an optimal setting for disseminating risk-based educational programmes. If students and staff are provided with the appropriate preparedness skills training, they can develop these skills further, carry them into adulthood, and pass them on to the next generation (Balita, Bautista, & Mangurali, 2018). The University of Cape Coast (UCC) reported that Professor Joseph Ghartey Ampiah, the former Vice-Chancellor of UCC, had appealed to the Central Regional Fire Service Command to conduct regular fire training for staff and students of the university. He noted that prevention is the most critical aspect of fire safety, and drills can prepare staff and students to deal with fire outbreaks (Mensah, 2017).

FSP has been confirmed as an essential element in disaster risk reduction (Ejeta et al., 2015). Therefore, one of the critical factors to help safeguard lives and property on university campuses is continuous FSP. If an unprepared learning institution falls victim to fire, students may be denied access to university education or have their access delayed. In addition, the

affected institution will need to re-build damaged facilities instead of expanding their existing. This shows that the price that must be paid for fire safety unpreparedness outweighs that of FSP (Right to Education Initiative, 2018). In view of this Abdulai (2014) has advised that academia, the Ghanaian Police Service (GPS), the Ghanaian National Fire Service (GNFS) and the National Disaster Management Organization (NADMO) should undertake a study to investigate the trends in fire outbreaks, their causes and solutions in the form of preventive measures, as well as to learn best practices in other parts of the world.

In view of the increase in fire incidents in learning institutions, this study explored the perceptions of heads of departments in the public universities in the Central Region of Ghana. In addition, it explores the views of the officers in charge of the fire safety of the public universities to assess the universities' level of preparedness against possible fire disasters. The belief is that this endeavour will shed light on the universities' FSP to allow evidence-based decisions to be made to prevent fire disasters. As a result, this may help contribute significantly to safeguarding the university and the neighbouring communities from potential fire outbreaks.

Statement of the Problem

Ghana continues to experience fire outbreaks in various public organisations, not excluding learning institutions (Boasiako, 2013; Ayarkwa et al., 2016; Ghanaweb, 2022, Feb 21st). Mowrer (1999) opined that, fire outbreaks is one of the deadlier perils that threatens the safety of staff and students, and burdens some administrators of learning institutions. The prevalence of fire incidents constitutes a serious public concern. Despite these

fire threats and concerns, fire outbreaks in Ghanaian public learning institutions are widespread, and the public universities in the Central Region have not been sparred of their effects. Unfortinately, the UCC and University of Education Winneba campus (UEW-w) recorded at least four fire incidents (at the College of Agriculture offices -new site among others) between 2017 and 2018, and their most recent fire outbreak (at chemistry labolatory- South campus) on August 13th 2020 respectively (GNFS-UCC fire station, 2019; UEW-winneba campus fire safe/security officer, 2020).

There is considerable evidence that these fire outbreaks are due to a lack of proactive and reactive fire safety preparedness in learning institutions. A survey conducted on managing multi-storey student`s hostels at the Kwame Nkrumah University of Science and Technology showed that most occupants residing in the hostels did not view fire safety as an essential issue (Agyekum et al., 2016). They also raise the concern among stakeholders that learning institutions may not be adequately prepared in the event of fire disasters, as is required by fire safety legislative instruments locally and internationally. Furthermore, not much study has been conducted to assess the fire safety preparedness of the public universities in the Central Region of Ghana.

Wambugu (2016) conducted an assessment of fire safety preparedness at Jomo Kenyatta International Airport Nairobi, Kenya. Also, Huzayifa (2019) carried out a study on fire emergency preparedness in the faculty of engireering in UTM in Johor Bahru Sekaayi Huzayifa University of Technology in Malaysia. However, these studies were conducted outside Ghana; thus, in a different geographical areas with conditions that may be different from that of the public universities in Ghana. However, in Ghana, Agyekum, Ayarkwa and

Opoku (2017) undertook a study on fire safety preparedness in the Central Business District of Kumasi, Ghana. Similarly, Sebbeh-Newton (2018) did a study on fire emergency preparedness among staff of Tarkwa Municiplal Hospital. Again, Aidoo, Ansah and Densy (2020) did a study on fire disaster preparedness in Accra Technical University (ATU) of Ghana. Although these studies were conducted in Ghana, they were conducted in geographical areas other than the Central Region of Ghana. Again, with the exception of the study done by Aidoo, Ansah and Densy (2020), the other studies were done in non-academic institutions. Thus, there is a dearth in literature so far as the fire safety preparedness among public universities in the Central Region of Ghana is concerned and this study sought to fill this gap.

Purpose of the Study

This study explored the fire safety preparedness of the public universities in the Central Region of Ghana. Specifically, the study sought to:

1. examine the fire safety measures put in place at public universities in the Central Region of Ghana
2. find out how public universities in the Central Region of Ghana ensure compliance with fire safety measures.
3. idenify challenges public universities in the Central Region of Ghana face in their attempts to comply with fire safety measures.
4. find out the fire safety preparedness of the concerned universities.
5. ascertain how fire safety preparedness of universities in the Central Region of Ghana can be improved to safeguard lives and property.

Research Questions

The study was guided by the following research questions;

1. What fire safety measures are in place at public universities in the Central Region of Ghana?
2. How do public universities in the Central Region of Ghana ensure compliance with fire safety measures?
3. What challenges do public universities in the Central Region of Ghana face in their attempts to comply with fire safety measures?
4. What are the fire safety preparedness of the universities concerned ?
5. How can fire safety preparedness of universities in the Central Region of Ghana be improved to safeguard lives and property?

Significance of the Study

Understanding the fire safety preparedness of the public universities in the Central Region of Ghana should be a primary concern to the universities' administrations, staff, students and communities, as well as potential students and parents, the GNFS, the MoE and the Ghana Tertiary Education Commission (GTEC). This understanding will ensure that data-driven decisions are made to safeguard lives and properties. For the universities' administration, the findings are expected to provide evidence of fire safety practices and for the HoDs to streamline their fire safety activities in line with the legislative requirements.

For the universities' staff, students and communities, the findings will provide insight into the state of fire safety preparedness. In doing so, the findings will encourage them to work together with management to renew their commitment to creating a safer teaching and learning environment. For safety-

oriented potential students, applicants and their parents, the findings regarding fire safety preparedness will portray the universities' level of commitment to fire safety standards and as a result inform their choice of universities.

The findings shall also provide the MoE and GTEC with information on how safe the public universities are against any fire outbreaks and guide the formulation of policies and plans for revamping the existing policies and practices in learning institutions in the Central Region of Ghana.

In addition, the findings may also be helpful to the GNFS, as they indicate the state of fire safety situation in public universities. Hence, there may be an opportunity for the GNFS to modify their strategies regarding inspections and fire safety awareness creation in schools.

Likewise, the study will add to the body of knowledge on fire safety preparedness in that it may stimulate further research on fire safety in universities in other regions in Ghana. This may assist capacity building to help minimize fire outbreaks in university communities.

Finally, the findings of this study would be communicated to the administrators of the public universities, their staff, students and university communities, potential students and their parents and policy makers through seminar, presentations, Master of philosophy viva, appearances on radio talk shows and publications in reputable peer-reviewed journals and also to the MoE, the GNFS and the GTEC.

Delimitations of the Study

The study explored fire safety preparedness (FSP) at the UEW-Winneba campus, the UCC, and the CCTU, all in the Central Region. These are the public universities in the Central Region of Ghana. Besides, private

universities were not targeted for this study since their settings and systems of operation differ. Also, the study did not take into consideration threats or safety issues aside from fire disasters and FSP. Other hazards and safety problems within the university communities were not considered. These hazards and safety concerns may serve as topics for future research.

Limitations of the Study

This study focused only on the heads of departments including registrars and FSOs of the public Universities in the Central Region of Ghana, without their Vice chancellors, due to the inability to access them as a result of the covid-19 pandamic restrictions leading to the partial closure of universities, and their busy schedules. Their involvement in the study could have made the study extra reliable and credible yet the inability to reach them is a research gap for further study on the topic. This means that the study's findings reflect the unique conditions prevailing in the Central Region wihout the vice chancellors's views although permission for the study on the campuses were granted by the registrars. Hence, generalisations of the study's conclusions to areas other than the Central Region of Ghana must be treated cautiously.

Definition of Terms

The following key terms were defined within the context of the study to guide the reader.

- **Fire safety preparedness** refers to the capacity to comply with mandated fire safety rules and regulations to prevent and respond appropriately and promptly to fire outbreaks to help safeguard lives and properties.

- **Fire safety equipment** denotes mandated fire defence tools, such as alarms, smoke detectors and fire extinguishing systems, and any related technology installed in building facilities to prevent the spread of fire.
- **Fire emergency exit** refers to a particular exit provided for the swift evacuation of occupants from premises in times of disaster.
- **Fire safety signage** refers to signs and notices commonly used in buildings to provide general information and safety messages to the occupants of university premises to assist them during both academic activities and the evacuation of premises during emergencies
- **Emergency escape light systems** refer to illuminated escape route devices fitted in corridors and stairways to allow individuals to locate fire-fighting equipment and provide escape directions for one to three hours following a power outage.
- **Fire Safety Policy** refers to a document shared with all staffs and students that outlines potential risks, how to avoid the risks, and what to do if fire breaks out.
- **Fire Safety Measures** – refers to the established measures in place to fight fire outbreaks as required by legislative instrument.
- **Emergency Evacuation System** – refers to established mechanism where persons inside a fire engulfed premises can be brought to safety
- **Fire Safety Measures** – refers to the established measures in place to fight fire outbreaks as required by legislative instrument.

Organisation of the Study

The study consists of five main chapters. Chapter One presents an introduction to the study, which provides background to the study, the problem

statement, the purpose of the study, the research questions, the significance of the study, its delimitation and limitations, definitions of terms and the organisation of the study. Chapter Two presents a review of the related literature. This review focuses on conceptual frameworks and theoretical and empirical studies. Chapter Three presents the research methods employed. This chapter provides a detailed description of the research design, study area, population, sampling procedures, data collection instruments, data collection procedure and data processing and analysis. Chapter Four presents the results and discussion. Finally, Chapter Five provides a summary of findings, conclusions, recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews related literature relevant to the study. McCombes (2019) has stated that a literature review is a study and critical analysis of scholarly books, journal articles, and thesis on a given topic. A substantial literature review summarises sources and analyses, interprets, and critically evaluates the literature and synthesizes sources to highlight patterns, themes, conflicts, and gaps. To establish a firm foundation for this study and to identify what is known and unknown in the context of fire safety preparedness, related literature on fire safety preparedness were reviewed and organised under following captions:

- Meaning and Nature of Fire Safety
- Four fundamental theories of fire disasters
- The five missions of emergency preparedness
- The Concept of Fire Safety Preparedness in higher institutions of Learning.
- Mandatory fire safety measures in higher learning institutions in Ghana
- The causes of fire outbreaks in higher learning institutions
- Challenges universities face in their attempt to comply with mandatory fire safety measures
- The effects of fire safety unpreparedness in higher learning institutions
- Theoretical framework
- Conceptual framework
- Chapter summary

Meaning and Nature of Fire Safety

Fire can be helpful when monitored and controlled, but it is dangerous and destructive when used carelessly (Farlex Dictionary of Idioms, 2015). Fire is devastating if it disrupts an active university community and affects the community's ability to cope using its resources (K Jha, Barenstein, Phelps, Pittet, & Sena, 2010; Office, 2012; Prime Minister's Office, 2003; Saltbones, 2006; Sena & Michael, 2006; Tuay, 2002; United Nations Disaster Reduction Organization (UNDRO), 1992). Fire behaviour is commonly defined as how fuel ignites, flame develops, and fire spreads (Cruz & Alexander, 2010). Fire is a rapid, self-sustaining oxidation process accompanied by the formation of heat and light of varying intensities. Fire is hinge on the presence of four elements: fuel, an ignition source, an oxidising agent (usually atmospheric oxygen), and a reaction mechanism (Addai, Tulashie, Annan & Yeboah, 2016).

Once a fire starts, it will continue burning only if heat, oxygen, and more fuel are present. These three elements comprise the "fire triangle" (Natural Resources Canada, 2019). Furthermore, the fire triangle represents the three elements needed for a fire to develop. Fuel is ignited by a heat source in the presence of oxygen from the air. A fire can be controlled by eliminating one of the three elements (Department for Children, Schools & Families, 2007).

Fire Development and Spread in Buildings

Fire safety in buildings not only concerns personal safety but also includes the protection of physical assets. Smoke and toxic gases cause the majority of deaths. Smoke and toxic gases can be fatal long before the temperature has risen or flames have developed (Abdullah, 2019). According to literature, as a fire grew in a room or space, flames and radiated heat spread

to any combustible materials, including fittings, furniture, and exposed books. The gases generated become very toxic and contain high amounts of carbon monoxide. The smoke will be irritating and noxious, causing coughing, streaming eyes, and difficulty breathing. The atmosphere will become dense and rapidly restrict vision, resulting in disorientation and difficulty moving away from the affected room or space. Once the flames reach the ceiling, the ensuant radiation will promote fire growth (Department for Children, Schools & Families, 2007).

When the temperatures of the smoke and gas reach about 500–600 Degree Celsius, the heat radiation will be high enough to ignite all combustible surfaces in the room, causing a flashover. After the flashover has become a fully developed fire, the temperature can rise to 1,000 to 1,200 Degree Celsius (Abdullah, 2019). Though fire is deadly, smoke and toxic gases kill more people than flames. A fire consumes the oxygen people need to breathe and produces deadly smoke and poisonous gases. Breathing small amounts of smoke and toxic gases can make a person drowsy, disoriented, and short of breath. The odourless, colourless fumes can lull a person into a deep sleep before the flames reach them. A person may not wake up in time to escape (United States Fire Administration (USFA), 2015).

In sum, the literature reviewed on the context of principles of Fire behaviour suggests that, controlling unwanted fire, is paramount to all members of the university community, more especially administrators, HoDs, staff and students as the dominant university facility users understand vividly, as part of fire safety measures, the role of "fire triangle" (i.e.the part heat, oxygen, and fuel play to start, and grow fire outbreaks/disaster) within minutes of

carelessness, negligence, arson, et cetera. This awareness may enlighten and arouse interest of university community members to boldly help prevent or reduce fire disasters to the bearest minimum with less resources, less or no casualties.

Four Fundamental Theories of Fire Disasters

Administrators of higher learning institutions are to understand the four fundamental theories of disasters in a bid to contribute effectively to decision-making and planning before, during, and after a disaster. These four vital concepts are essential for the administrators of higher institutions of learning, most especially with more extensive staff and student population. The four principles are as follows: (1) fire disaster as an act of God, (2) fire disaster as an act of nature, (3) fire disaster as a combined effect of nature and society, and (4) fire disaster as a social construction (Carr, 1932; White, Kates & Burton, 2001). These four fundamental theories of fire disasters are explained in the following subsections.

Fire Disaster as an act of God

Some people believe that disasters are an act of God. Disasters are viewed as divine retribution for human misdeeds and failings. Today, many people still believe that disasters are natural retribution (White et al., 2001). In the context of this study, this belief implies that God might use disasters such as fires to rebuke or punish people within a university community as a result of the high level of indiscipline and corrupt conducts, or disregard to safety rules and regulations meant to protect life, property and environment.

Fire Disaster as an act of Nature

This approach suggests the root cause of large-scale death and destruction associated with a fire disaster can be attributed to the excesses of nature rather than the human world (Montz, Tobin, & Hagelman, 2017). This view may also imply that fire outbreaks result from the movement of the Earth's crust and the temperatures of its interior but not due to negligence or passive attitude of people within a community such as a school.

Fire Disaster as a Joint Effect of Nature and Society

According to Carr (1932), the collapse of the cultural fabric of society may lead to disaster. It takes both a hazardous natural occurrence and a vulnerable human system to produce fire disasters. If either element is missing, disasters do not happen (Carr, 1932). In keeping with Carr's opinion, fire outbreaks in school or university communities may be due to non-compliance with established fire safety measures meant to safeguard life and property. In any school or university establishment, the failure to identify risks in the environment can have damaging effects within the community. Humans cause disasters such as fires due to negligence and are thus responsible for these disasters.

Fire Disaster as a Social Construction

Social construction involves examining the primary causes of injustice and human vulnerability to hazards such as the fire in society. Managers and administrators should focus on people's vulnerability to hazards by adopting proper scientific approaches, subjectively examining disasters from the perspective of victims, viewing the people who experience disasters as the

victims of a system that created the conditions leading to the vulnerability, and not through blame games (White et al., 2001). The interpretation of the above statement of social construct about the context of this study may imply, for example, that if a fire engulfs a school through human error, the administrators concerned should learn their lessons, identify the root causes, be compassionate enough to make decisions to help the victims without accusing them, and develop plans to avoid future occurrences by restructuring the active and passive fire safety preparedness systems within the school to save lives and properties.

In sum, the literature suggest that fire disaster occurs suddenly through a natural or artificial means. This unavoidable misfortune may happen to any university or school community through human errors, arson and nature. Irrespective of financial challenges faced in running public university, per the sudden nature of fire disaster, administrators have no other choice then to consistently devise proactive and reactive measures required per the fire safety legislative instrument. Therefore, the Fundamental Theories of Fire Disasters hints administrators of public universities, not to perceive fire disaster as far from their institutions, but rather see it as a possibility, and subsequently with vigilance, revive and operationalise fire safety measures to the letter on campuses. to aid curb or reduce any sudden and disastrous fire emergency situation that may occur.

Concept of Fire Safety Preparedness (FSP) in Higher Institutions of Learning

Fire disasters that occurred early in the 21st century have enabled leaders of higher institution of learning to focus on the need for FSP within their campuses (Hémond & Robert, 2012). To be fire safety prepared, facility administrators, staff, and students at higher institutions of learning should be aware of the "fire load" and fire risks of buildings they occupy. The fire load is the amount of fuel within a building that will burn to release heat and feed fire to a destructive level (Stollard and Abrahams, 1991).

Fire load in buildings in higher institutions of learning includes all combustible materials that constitute the building itself and the building's contents, such as furniture, papers, books, plastic, and chemicals (Merritt & Ambrose, 1990). These materials are combustible, and if heated by a small source of heat such as ceiling lights or an overloaded electrical outlet, they may ignite in the presence of oxygen, causing fire that can spread very rapidly to damage the building and its content within minutes (Hassanain, 2006). According to McEntire (2004), the concept of FSP implies the existence of explicit efforts to identify possible hazards to reduce the number of variables that can lead to a disaster. In addition, studies have found that the preparedness of schools increases resilience in the event of a fire outbreak (Kirschenbaum, 2002; Miller, 2003; Patterson, 2002). Mwangi (2016) opined that FSP is thus designed to help prevent fire threats and minimise casualties, property damage, and interruption of learning schedules in higher learning institutions.

Although it is virtually impossible to avoid mass disasters such as fires, well-organised fire prevention measures can significantly reduce the number of

fatalities (Peleg, 2010). In addition, administrators, staff, and students prepared for fire disasters will respond better in real-time emergencies and be less exposed to the risks caused by fire outbreaks (Finkelstein & Finkelstein, 2018). Therefore, to adequately prepare a higher learning community to operate efficiently during a fire disaster, one must consider the community's exposure to fire risks and forestall the types of injuries that can occur. Such comprehensive preparedness includes identifying higher-risk groups within higher institutions of learning and planning intervention and prevention programs accordingly (Adini, Laor, Cohen, Lev, & Israeli, 2010).

FSP has three main elements. First, administrators of public higher institutions of learning and their fire safety management team foresee possible events and issue warnings (i.e., identifying and analysing the fire risk, creating fire safety activity plans, budgeting for fire safety equipment, updating this equipment, posting signage, creating awareness, and designing safe evacuation procedures). Second, administrators of higher institutions of Learning and their fire safety management team should take precautionary measures and identify early warnings (i.e. creating continuous fire safety awareness and the need for compliance with the measures). Finally, the fire safety management team or administrators of public higher learning institutions, such as universities, should improve response measures by organising and strengthening people's capacity to deliver timely and effective rescue, relief, and assistance through fire safety drills (Agyekum, Ayarkwa, & Opoku, 2017; Kent, 1994).

As a final measure to ensure FSP, administrators of public higher institutions of Learning should actively organize fire disaster activities to increase their community's ability to respond to a fire emergency.

Administrators of higher institutions of learning should also collaborate with their fire safety management team in planning fire safety alertness mechanisms, equipping various departmental facilities, training staff and students on fire safety compliance, conducting exercises on how to extinguish unwanted fires, and establishing emergency evacuation processes in order to develop and sustain the institution's ability to manage fire emergencies. Corrall and Brewerton (1999), as well as Murage, Obare, Chianu, Amudavi, Midega, Pickett, and Khan (2012) believe that, planning and implementing fire safety measure is crucial to safeguarding the lives and property of public higher institutions of learning. This view implies that the concept of proper planning and operationalising actions to detect potential fire dangers in each departments of public universities to reduce the number of factors that can lead to a fire disasters, appears weak, because, identifying hardzards elements seems not to be based on thorough and realistic fire risk adentification and analysis of various buildings or departmental facilities on campus. Administrators, staff, and students therefore need to commit to these plans, and fire risk identification and analysis, and coordinate their respective actions. Above all, FSP planning should be seen as a continuous improvement process rather than the simple production of a plan (Kent, 1994).

Mandatory Fire Safety Measures in Higher Institutions of Learning in Ghana

Fire safety measures generally refer to actions taken to mitigate fire hazards (Csanyi, 2011). According to Hall, Flynn and Grant (2008), fire safety measures allow for discovering and correcting situations that can threaten lives

and property. In addition, fire safety measures motivate students, staff, and management to prevent fire hazards (Hall, Flynn & Grant 2008). Safety can be achieved by conducting fire-prevention activities (which significantly reduce the frequency of fires) and installing positive and active fire protection measures (which minimise damage if a fire occurs (Agyekum et al., 2017). The Ghana National Fire Service (GNFS) legislative instrument (LI) 1724 on Fire Precaution Regulations (2003) provides for the mandatory fire safety measures at all higher institutions of learning in Ghana.

The GNFS Legislative Instrument (LI) 1724 of 2003 is a mandatory regulation that aims to improve the fire safety of all Ghanaian public institutions, including universities. According to this instrument, all universities need a fire certificate to operate as a public institution in Ghana. Moreover, GNFS has mandated the inspection of the premises of all institutes of higher learning. A fire inspector authorised by the Chief Fire Officer may enter any university premises at any reasonable time for the following reasons: (1) to inspect the institution's fire certificate, (2) to ensure that a means of escape is provided in the university's buildings and that this means of escape is adequately maintained and kept free from obstructions, (3) to ensure that appropriate fire-fighting means are provided and maintained, (4) to ensure that persons employed to work on the premises have received adequate instruction or drills on what to do in the case of a fire, and (5) to ascertain the maximum number of students or people who can be in a lecture hall or laboratory at any point in time (Ghana National Fire Service (GNFS), 2003).

The GNFS has also mandated the inspection of university premises to ascertain adequate means of escape. According to Delcea, Cotfas, and Paun

(2018), to reduce the evacuation time and the causalities in the event of emergencies, obstacles to emergencies exits must be considered. Liu, Chen, Tian, Wang, and Li (2020) have also added that "when emergencies such as fires, earthquakes, or terrorist attacks occur, the effective evacuation of all personnel from buildings is the primary objectives". To determine the availability and adequacy of fire escapes, the Chief Fire Officer shall take into account (a) the number of persons expected to be in a lecture hall or living in premises such as residence halls, (b) the number of people who could be inside the premises at any time, (c) the height of the building, (d) the running distance to safety in the case of a fire, (e) the location of anything on the premises which may constitute an obstruction to access to safety for a person within the premises, (f) the adequacy of the markings on the emergency exits to render the exits distinct and conspicuous, (g) the size and suitability of doors in the premises to facilitate evacuation, and (h) any other matter considered relevant to assess the means of escape from fire (GNFS Act 537 of 1997).

Furthermore, GNFS is required to inspect fire alarms within university premises for compliance with the following requirements: (1) every owner or occupier of the premises referred to in Regulation 1 shall install on the premises a fire alarm or other effective warning device approved by the Chief Fire Office; (2) each fire alarm shall be audible throughout the building in which it is installed and shall be tested and examined at least once every six months by the Chief Fire Officer; (3) the owner or occupier of the premises shall keep a service tag for each fire alarm, which shall be produced for inspection if demanded by the Chief Fire Officer; (4) the service tag attached to each tested fire alarm shall be kept for the Chief Fire Officer's inspection; and (5) the service tag shall

indicate (5.1) the date and particulars of each defect found on the fire alarm and (5.2) the date and particulars of actions taken to remedy the defect (GNFS), 2003). The requirements regarding testing and record-keeping also apply to fire extinguishers and other fire fighting equipment mandated by (LI) 1724 of GNFS.

The mandate of the GNFS is to ensure that higher institutions of learning such as universities meet set standards; however, the effectiveness of the GNFS LI 1724 of 2003 must be examined, as it impacts all Ghanaians. Edwin Ekow Blankson, the Chief Fire Officer of GNFS, said the following in a statement commemorating International Fire Fighters' Day on May 4, 2021:

> *"Fellow fire fighters, management are well aware of the numerous challenges confronting you as personnel of this noble service in terms of equipment and general personnel welfare. We are assuring you that efforts are being made at all levels to deal with these challenges in order to discharge duties in the manner that is expected." (Ghanaian Times, (2021, May 7).*

Based on this statement, it can be inferred that GNFS is perhaps not fully effective in the operationalisation of its mandate to ultimately ensure that the public higher institutions of learning comply with the GNFS LI 1724 of 2003 due to challenges confronting them. Blankson added further that regardless of the challenges, "[f]ire prevention is the first on the agenda when it comes to fire management" (Ghanaian Times, (2021, May 7). Agyekum et al. (2017) concluded that preventing non-adherence to fire safety standards in higher institutions of learning is a significant path that Ghana must tread.

From the above, the Mandatory Fire Safety Measures required of public Higher Institutions of Learning as universities, includes GNFS Legislative Instrument (LI) 1724 on Fire Precaution Regulations (2003) that enjoins authorities of public universities/schools to provide or install on their buildings fire safety equipments, signage (signs and notices), fire emergency exits free from obstacles), and also conduct drills for occupants (i.e. students and staff) on what to do in the case of a fire emergencies, and other relevant requirements approved by the Chief Fire Office which is subject to scheduled inspections annually. It appears GNFS is not totally active in implementing its mandate to ensure that the authorities of public universities/schools do comply with the LI as anticipated. This development if not curbed may exposes public universities' asset, students and staff lives to danger.

Five Missions of Disaster Preparedness (MDP)

Spicer (2014) explained that emergencies cannot always be avoided, and all-hazards emergency plans offer the best opportunities to prevent emergencies, protect people and property, mitigate damages, respond effectively, and recover from an event. The concept of disaster management originated with civil defence during the days of World War II. Since then, disaster management has evolved to focus primarily on preparedness. Preparedness is indeed the ultimate goal to help reduce disasters such as fire and its impact. Preparedness involves numerous critical missions: Prevention, Protection, Mitigation, Response, and Recovery [PPMRR] (Spicer, 2014). The 'prevention' denotes capabilities necessary to avoid, stop any mass-casualty incident in learning institutions. Prevention is the action taken to prevent a threat such as a fire disaster from occurring in public universities and any other

institutions. The strategies that can be adopted to avoid any fatal incident are; (a) identification of hazards and vulnerability assessments, (b) workplace or university campus violence prevention advocacy programmes, (c) formation of threat assessment teams, and situational awareness education programmes. The next preparedness measure is 'protection', and it implies the capabilities to secure against acts of artificial or natural disasters. Protection focuses on current actions that protect people and property from a threat or hazard. The protection strategies against fire disaster include ensuring that there are (a) fire-resistant infrastructure and facilities on campus, (b) fire risk assessments or safety audits, (c) and sufficient personnel to ensure fire safety in general (Spicer, 2014). Furthermore, he added that 'mitigation' refers to the competencies required to eliminate or reduce the loss of life and property by lessening the impact of an event or emergency. Mitigation strategies include the following: collaboration between stakeholders associated with education, safety, disaster prevention organizations, national fire services, et cetera; (b) the creation of emergency plans for the university community; (c) site or campus mapping; and (d) regular fire safety drills or training.

Finally, ‘response’ encompasses the capabilities needed to stabilise an emergency that has already happened or cannot be prevented, establish a safe and secure environment, save lives and property, and facilitate the transition to recovery. Response strategies include (a) establishing campus safety teams or campus response teams, (b) promptly alerting national fire service or disaster response teams, and (c) fixing automated alerting or mass notification systems on campus (Spicer, 2014).

The literature on the Five MDP prompts adminstrators, staff and students of public universities that fire emergency preparation is one of the vital elements in the maintenance and management of schools and must not be missed in annual planning and budgeting. It embraces cyclical and active prevention, protection, mitigation, response and recovery (PPMRR) actions aimed at accomplishing safety on campus. Consequently, administrators and HoDs of public universities must initiate and opperationalise PPMRR concepts in the management of public universities and their departments. This reflects the public universities's commitment to FSP on campus. Preparedness is seen as a crucial tool to aid decrease in disasters and their effects. Since fire emergencies cannot always be avoided in human society just as in public universiries or schools.

Causes of Fire Disasters in Higher Institutions of learning

Most of the recent fire outbreaks in Ghana have taken place in state facilities of great strategic value, thereby making fires an issue of public concern and debate (Addai et al., 2016). Abu (2013) has also reported that 75% of fire outbreaks in Ghana are caused by smoking, 15% by ignorance of the fire safety rules and regulations, and 10% by accidents. The effects of these fire outbreaks, which have become a frequent occurrence, have been devastating. Kwateng, a GNFS public relations officer, has blamed the increase in fire outbreaks in Ghana on the neglect of fire safety rules (Ghana News Agency, 2019).

As far back as 1932, Carr stated that it is the collapse of cultural protection systems that leads to fire disasters. Anaglatey (2013) has stated that one of the significant causes of fire outbreaks in school buildings in Ghana are electrical problems that results from the poor maintenance and misuse of

electrical appliances. The literature has further shown that the causes of fires in buildings include poorly designed and constructed electrical circuits, improper electrical fittings, use of inferior electrical materials, power fluctuations, and illegal connections to the national grid (Boateng, 2013; Simpson, 2010). Based on the findings of Carr, Anaglatey, and Boateng, it may be concluded that occupants' non-compliance with fire safety rules, poor maintenance of electrical infrastructure, irresponsible use of electricity, and inferior electrical materials and faults are the primary causes of fires in educational institutions. The solution to these challenges may be increasing awareness of the following: electricity, the effects of overloading electrical sockets, and improper usage of appliances on campus. Another beneficial practice may be quality inspections of materials used in electrical wiring, installation, and maintenance (Boateng, 2013).

A study was conducted by Anyanwu, Akaranta and Nwaogazie (2016) on fire safety awareness and fire safety implementation at the University of Port Harcourt in Nigeria. Secondary data were collected from the fire service unit of the university to determine the number of fire occurrences and the major causes of fire incidents at the university. The primary data were collected utilizing questionnaires administered to 250 people, of whom 220 responded, representing a response rate of 88%. Twenty questions were included as questionnaire parameters: the first 10 assessed fire safety awareness among respondents at the University of Port Harcourt, while the second 10 evaluated the fire safety implementation and practices at the university. The response options were strongly agreed (4), agree (3), disagree (2), and strongly disagree

(1). Data analyses were facilitated via the evaluation of Kendall's coefficient of concordance (w), that is, the degree of agreement amongst the respondents.

The results revealed an average level of awareness amongst respondents and low implementation of fire safety practices at the university. Specifically, the study revealed the following gaps: insufficient fire safety policies, a lack of knowledge on the different types of portable fire extinguishers, inadequate provision and inspection of fire fighting equipment, limited inspection and review of past fire incidents, electrical installations or repairs not being handled by competent persons, and issues with fire safety instruction and training. The study recommended a fire safety organogram to delegate duties, training of staff and students on basic fire safety, provision and inspection of fire prevention and protection methods, and employment of competent personnel to handle electrical work to ensure the protection of lives, assets, the environment, and the reputation of the institution.

The work of Agyekum et al. (2017) has pointed out that the poor conditions of facilities, a lack of compliance with fire safety measures, a lack of awareness creation, and insufficient fire drill practices have possibly increased the risk of fire outbreaks at schools in developing countries such as Ghana. Therefore, it is essential to consider who ensures that fire risk assessments are completed at these institutions and who is responsible for providing fire safety equipment, awareness creation, and fire safety drills. The surveys of Agyekum et al., 2017; Anyanwu et al., (2016) did not identify a lack of commitment on the part of heads of public institutions such as universities and schools as key contributing factors towards fire safety unpreparedness. If

the heads of institutions were more committed to fire safety preparedness, fire disasters might become less frequent and their impacts less severe.

Another study conducted by Agyekum et al. (2017) in Ghana assessed students' perceptions of challenges to fire safety management in multi-storey student hostels at the Kwame Nkrumah University of Science and Technology campus. The findings from the study revealed that, some of the challenges to fire safety management included: poor electrical wiring and installations, insufficient water distribution systems, and fire department inadequacies results in fire outbreaks. In addition, passive attitudes of owners and management towards housekeeping and maintenance and individuals' passive attitudes towards personal fire protection are the five critical challenges to effective fire safety management in the hostels. Another study was conducted by Nunoo (2017) at the University of Ghana, Legon, to assess stakeholders' knowledge and impressions of the role communication play in fire safety management. The general objective was to assess the effectiveness of communication in fire safety management. The researcher employed quantitative and qualitative research methods, and the findings of the study revealed that community education is the most popular means of communication used by the GNFS. Davina Mensah therefore recommended that the existing community education and drill be intensified and replicated in all fire stations nationwide.

Nunoo's (2017) findings imply that a lack of effective campus community communication in the management of fire outbreaks impedes the effective fighting of fire outbreaks on campus, increasing casualty levels and property damage. The study by Agyekum et al. (2017) also determined the common causes of fire outbreaks in hostels to be those identified above (i.e.,

electrical faults and a lack of adequate fire fighting facilities and systems) as well as the passive attitudes of owners, management, and heads towards maintenance and the passive attitude of individuals towards personal fire protection. To prevent such passive attitudes, Mensah has suggested raising awareness of effective communication required in fire fighting.

Furthermore, a study conducted by Ahenkorah-Marfo, Borteye and Mensah (2010) examined the preparedness and awareness of staff of the Kwame Nkrumah University of Science and Technology (KNUST) Main Library on the prevention, fighting and managing disasters. The KNUST study highlighted the general lack of awareness and preparedness of the library staff members in the prevention, fighting, and managing disasters. Although the library was fitted with fire extinguishers and carbon monoxide and smoke detectors the majority of respondents indicated that the library seldom trained its staff members on the use of the equipment. There was no written disaster control plan or management team which are essential elements that must exist in the library, as the existence of the disaster control plan will dictate the measures taken in the event of a disaster. Disasters are better managed when there is a fire management team in place.

Fire management team members can coordinate all activities aimed at preventing, fighting, and managing disasters. The foregoing has revealed very pertinent issues regarding staff preparedness to fight and manage disasters when they do occur. Based on their findings, Ahenkorah-Marfo and Borteye (2010) made the following recommendations. As a first measure, they recommended that there should be an emergency exit clearly and visibly marked as such, even though many respondents (68.1%) indicated in their response that there was an

emergency exit in the library. This marked exit should be paired with directional signs indicating to staff members where to pass in order to avoid confusion or a stampede. Secondly, there should be clear and concise notices posted at very strategic areas in the library explaining how occupants (staff, patrons, and visitors) should react to disasters, should they occur. Thirdly, the authors recommended that the library should have a disaster control plan since many respondents indicated they did not know if there was any disaster control plan in the library. Fourthly, activities that engender preparedness, especially training and simulation exercises, should be given the necessary attention in the library so that staff members can adequately deal with any potential disaster. In particular, all staff should be trained to use the fire extinguishers available in the library. Fifthly, as a necessity, a disaster management team should be formed in the library comprising all staff categories so as to be able to undertake fire prevention, fighting and management of the resources required in fire management.

Finally, disaster management tips should be incorporated into the orientation programmes usually organised for new staff (2010). The study of Ahenkorah Marfo and Borteye exposed a general lack of fire safety preparedness and suggested that a written disaster control plan and disaster management team were missing. These findings suggest that library leadership may lack the commitment to fire- safety measures. According to the findings, if a fire outbreak were to occur, the impact would be devastating (2010).

Kihila (2017) conducted a study in Dar es Salaam, Tanzania, to investigate the level of fire disaster preparedness in 10 higher learning institutions. Results from the studies indicated that 60% of the fire fighting

facilities were not regularly serviced, 50% stored some hazardous materials, 70% lacked sufficient water storage for fire fighting purposes, 60% had no identifiable fire assembly points, and 90% conducted sessions with more than 100 people at a single venue. Further results indicated that 51% of the respondents could not operate the installed fire fighting equipment, 80.7% had never received any training on fire fighting and prevention, 95.6% had never participated in any fire drills, and 81.5% were not aware of how to contact fire responders. The findings generally indicated that higher learning institutions in Dar es Salaam, Tanzania, are not well prepared to manage fire outbreaks; therefore, plans to rectify the situation are imperative.

Kihila's (2017) study in Dar es Salaam, Tanzania, should be a guide for Ghanaian higher learning institutions as they have experienced fire outbreaks in the last five years. Although the impacts of these outbreaks were not severe, people, belongings, and property were affected (GNFS Winneba & University Cape Coast Fire Stations, 2019).

In sum, this literature indicates largely that adminstrators of public schools appears not fully commited to operationalising fire safety measures and practices on campus, HoDs or Facility managers appears to have passive attitude on fire safety problems. Some students and staff careless use of building facilities and electronic appliances are safety threats. Inaddition, insufficient fire safety equipment, signage, drills and awareness creations are some of the main root causes fire disasters in schools. Per these revealations by the review of literature, the researcher agrees with Anyanwu, Akaranta and Nwaogazie (2016), and Kihila (2017) that, public schools are not well prepared to manage fire outbreaks. This point to the facts that administrators of public universities

must derive fire safety proactive and reactive strategies and mechanism to correct the situation, otherwise public universities assets, students, and staff lives continues to be at high risks.

Challenges Public Universities Face in Attempting to Comply with Mandatory Fire Safety Measures

The challenges public universities face in the attempt to comply with mandatory fire safety measures include leaderships' insufficient commitment to providing adequate equipment and human resources, students and staff's poor lifestyle, negligence, and disrespect for fire safety drills, as revealed in selected literature (Hope, 2016; Mwangi, 2016; Nunoo, 2017; Owusu-Sekyere, Adjuik, & Wedam, 2017; Russell, 2019; United States Fire Administration (USFA), 2015). To address these concerns, Koomson, a public relation officer of GNFS, urged the schools to prioritise access to fire safety equipment such as early fire warning and detection systems, small fire fighting equipment, sources of water for fire fighting, and hose reels installed in all their facilities to ensure that any emerging fire could be detected early and extinguished before more giant flames developed (Graphic online News, 2020, February 12).

Lack of Leadership Commitment

Choosing a higher learning institution is a significant decision for students and their families. Along with academic, financial, and geographic considerations, campus safety is of vital concern (Hope, 2016). Heads of universities are responsible for ensuring that students and staff using school premises are safe (Department of Health and Social Services and Public Safety, 2011). Although Ghana has developed institutional frameworks and has enacted legislation (such as LI, 1724 of GNFS) that seeks to guarantee the cooperation

and coordination of critical stakeholders in fire disaster prevention, compliance is still an illusion. This safety façade has resulted in increased exposure of national assets to avoidable fire disasters (Owusu-Sekyere et al., 2017).

The Ghanaian Stores Regulation 1305 of 1984 states that it shall be the duty of all heads in charge of stores (for example, public university stores) in Ghana to ensure that adequate fire fighting equipment is provided and that such equipment is regularly tested, at least once a year. This Ghanaian Stores Regulation 1305 of 1984 has been in existence for years. However, as an example of non-compliance, after physical inspection of the premises of the Computer School Selection Placement Secretariat (CSSPS) in Accra, the annual report of the Auditor-General on the Public Accounts of Ghana (2016) revealed that there were no fire extinguishers, signage, smoke detectors, nor a disaster recovery plan to protect the CSSPS's equipment and other national assets. Hence, the auditors recommended that leaders strictly adhere to the regulation by procuring fire extinguishers and fire alarms and advised staff to be given training on fire fighting equipment and evacuation equipment to safeguard lives and properties.

As an institution, the GNFS firmly believes that many fires could have been prevented if the Ghanaian population adhered to mandatory fire safety rules and measures (Melvin, 2018). Owusu-Sekyere et al. (2017) have found that the actions of the Department of Health and Social Services and Public Safety (DHSSPS), GNFS, expose the lack of fire safety preparedness on the part of management and administrators of GNFS and educational institutions. Moreover, Akomah and Kotey (2018) have revealed that some reasons for fire safety non-compliance included lack of funds for procurement of fire safety

equipment and the high cost of fire safety equipment. In addition, lack of fire safety equipment, suppliers limited maintenance of fire safety equipment, inadequate knowledge of how to use fire safety devices, and inadequate communication between GNFS and heads of schools were some of the reasons for non-compliance. The United Nations International Strategy for Disaster Reduction (UNISDR) has indicated that developing countries with weak governance (i.e., leadership) systems are more vulnerable and less resilient to disaster risks such as fires (United Nations Office for Disaster Risk Reduction (UNISDR), 2013, 2015).

Weak governance involves public sector administrators and leaders who are unable or unwilling to assume their mandatory roles and responsibilities in protecting lives and properties; providing essential services; and ensuring that the public sectors' fire safety preparedness management systems, for instance, are efficient and effective. Leaders' lack of commitment to implementing fire safety rules at Ghanaian institutions has implicitly led to an increased number of fire outbreaks at learning institutions and other locations (Melvin, 2018; OECD, 2006; Cooper, 2001). Weak leadership or authority is perhaps the most significant challenge to fully implementing fire safety regulations at higher learning institutions and schools. For example, Agyekum et al. (2017) conducted a study on "Challenges to Fire Safety Management in Multi-Storey Students' Hostels at the Kwame Nkrumah University of science and technology in Kumasi Ghana". The study revealed that challenges include the passive attitude of managers, administrators, and owners of hostels towards fire safety regulation and maintenance and students' passive attitudes towards personal fire protection. The study recommended that fire safety policies be enforced at

various hostels and that there should be sanctions against hostel managers, administrators, and owners who disobey fire safety regulatory laws. Laws could be enforced if the leadership of the sanctioning units or inspectorate units of GNFS, the Ghana Tertiary Education Commission (GTEC), Ghana Technical Vocational Educational and Training (TVET), and the Ghana Education Service (GES) were also committed to implementing fire safety rules institutions.

Weak governance and administration are one possible cause of fire disaster risk in institutions such as public schools and universities in Ghana. To most effectively reduce the risk of disaster, higher education institutions require an integrated systems approach to governance that features strong coordination across sectors and local delegation of responsibilities. Administrators, teachers, staff, parents, and students can cooperate to promote and maintain school-wide safety and minimise the effects of emergencies and other dangerous situations (Russell, 2019).

Poor Lifestyle and Negligence

Abubakar (2012), as cited by Nunoo (2017), has found that people generally cause fire outbreaks through carelessness, ignorance, negligence, arson, et cetera. Koyiri (2018) has also indicated that frequent fire outbreaks in Ghana result from a significant lack of discipline in handling fire and other flammable materials (Ghana News Agency, 2018). Furthermore, Ghanaian daily news articles from 2009 to 2010 have blamed most fires on the Electricity Company of Ghana for severe power fluctuations and unstable power supply.

Furthermore, due to ignorance and absentmindedness, students and staff may leave their electrical gadgets when leaving their offices, workshops,

laboratories, or residence halls. Such actions would violate safety rules and regulations (Gakpe & Mahama, 2014). This suggests negligence on both service providers and students, which may increase the possibility of fire outbreaks and presents a challenge to university authorities in meeting their fire safety standards.

The United States Fire Administration (USFA) (2015) has also revealed that bad habits, such as smoking, irresponsible alcohol consumption, tampering with smoke sensors, are the leading causes of unnecessary fire deaths of college and university students, followed by intentional fires (arson), faulty electrical, and cooking. In some cases, the cause of the fire remains undetermined. In addition, male students accounted for 67% of all fire victims (United States Fire Administration (USFA), August, 2016).

Disrespect for Fire Safety Drills

Fires can have a devastating impact on any public university and universities. They are often filled with numerous fire hazards and hundreds of students may be vulnerable or do not fully understand what to do in the case of a fire. This lack of awareness can make evacuation difficult (Burton, 2018). The biggest obstacle in fire safety preparedness is ensuring that individuals understand the importance and the need for fire fighting drills. University students and staff may not take fire fighting drills seriously (Russell, 2019).

Fire fighting drills are a critical aspect of emergency preparedness, so public universities should focus more on training staff and students (Russell, 2019). A university could have a comprehensive fire safety plan on file, but if this plan is not implemented, it will be ineffective (NaviGate Prepared, 2017). The primary objective of a fire drill is orderly evacuation. Fire drills are used to

teach occupants of buildings such as students and staff how to appreciate an orderly evacuation. Well-planned, well-executed drills are very effective tools for creating university environments resistant to the impacts of fires (Ball, 2001).

Confirming the importance of fire drill, Kilbourne (2010) has stated that, as solutions to reduce fire outbreaks, drills can increase students' knowledge and skills of responding in an emergency. Similarly, in a guidance document compiled by the National Association of School Psychologists (NASP) and the National Association of School Resource Officers (NASRO), practising disaster response procedures have been found to increase the probability of adaptive behaviour during a crisis (Kilbourne, 2010).

Principals, teachers, students, and the other stakeholders must be equipped with the proper knowledge to handle fire accidents in schools such as universities (Gozon, 2013, as cited in Mwangi, 2016). Safety experts believe that the first and best line of defence in any school emergency is a well-trained, vigilant staff and student body. Mwangi (2016) has stated that Vice-Chancellors, Registrars and Principals of institutions must ensure that fire drills are conducted in schools regularly. In view of this, students and staff must take part in regular fire drills to help individuals to fully understand the building's escape routes and the instructions they must follow. This helps to reduce confusion, panic, and any disorderly behaviour (Burton, 2018). Planning for emergencies at the school level cannot be done without input from the schools' community and the official structures responsible for schools. Planning exercises must be inclusive and involve a wide range of representatives from the university and its neighbouring communities, including school

administrators, school principals, school staff, students, and key representatives from the community (National Disaster Management Authority of the Government of India, 2016).

The review findings suggests that although there are some efforts in place in public universities to ensure compliance with the mandatory fire safety measures, there appears to be some challenges limiting efforts to ensure full fire safety compliance. These challenges include weak leadership and low level of management team's commitment to implementing the required fire safety measures. This is manifests in insufficient collaborative efforts to uphold and maintain school-wide/campus compliance to fire safety rules and regulations. Inaddition, this reflects in the passive attitute of facility managers, carelessness in the uses of building facilities, and electronics equipment, ignorance on the effects of fire disasters, disregard to orientation and fire safety drill programmes by the public university community. However, the literature reviewed revealed that, one of the reasons for the non-compliance to safety rules include lack of funds in public schools (Akomah & Kotey, 2018). The present researcher somehow disagrees with this view since without leadership and management teams' commitment the possibility of operationalising positive compliance culture may be an illusion (Cooper, 2001). Therefore, if the culture of fire safety compliance is not intergrated on campus, the continued existence of the non compliance may continue to put at risk assets and lives in the public universities on a day-to-day basis.

Effect of Fire Safety Unpreparedness on Higher Institutions of Learning

Fires cause 1% of the global burden of disease and 300,000 deaths per year worldwide (Wade, Teeman, Golden, Wilson, & Woodley, 2007). Fire disasters destroy cities, families, institutions, staff, and wild lands which may have an enormous impact on human health, the environment, and society (Martin & Milano, 2000). Wade, Teeman, Golden, Wilson, and Woodley (2007) have revealed that some learning institutions that have experienced fire disasters are yet to recover from the physical and emotional damage.

Uncontrolled fires in higher institutions of learning have destroyed property and have harmed or killed the occupants of buildings and facilities on campuses (Martin & Alexande, 2010). The impacts of fire disasters have broader economic and social impacts on learning institutions such as universities and their local community. Alipour-fard (2007) has cautioned that, in addition to other effects, university administrators should be aware that the tragic event of a student death in a fire could substantially affect a university's reputation and may reduce prospective parents' willingness to consider that university for their children's education.

The assertions of Martin and Milano (2000), Wade et al. (2007), and Alipour-fard (2007) imply that fire disasters have psychological, economic, and social impacts on both victims and parents and, in particular, long-term effects on a university's status. As such, administrators must put in place pragmatic measures to avoid these disasters. Cooper (2001) suggests that, it requires strong and committed administrators and management team of public universities to implement workable policies, possibly an adoption of scientific model of human behaviour every two years. This model emphasizes the need

to study cooperating relationship of students, staff and school communities and passive attitudes towards the disregard of fire safety rules and regulation in schools as revealed in the study of Akomah and Kotey (2018) on fire safety. Also, the perceptions the school community holds on fire disaster. Therefore, the use of the scientific model of human behaviour in effect may help comprehend school community culture best with regards to compliance with fire safety measures established as required by legislative instrument. This will aid plan and strategise the creation of awareness programmes on the effects of fire disaster, until the entire university community realise the necessity to obey safety rules and regulation in a regular manner required by the fire safety legislative instrument in order to help avoid the psychological impacts associated with fire disaster as school administrators.

Nyagawai (2017) has also stated that the impacts of fire disasters on students, staff, and facilities have been worse in the developing countries of Asia and Africa than in developed countries. Literature also suggests that in countries such as Tanzania, Kenya, Nigeria, and Ghana, a lack of available facilities, poor conditions of the available facilities, and a lack of awareness among users are all factors contributing to high fire risks (Amoako, 2015; Kachenje, Nguluma, & Kihila, 2010; Makachia, Gatebe, & Makhonge, 2014; Sankey & Omole, 2014). The findings of Amoako et al. (2015), Wade et al. (2007), and Nyagawai (2017) together imply that fire disaster risks in Ghana and other African countries have been high as a result of poverty and negligence and the devastating effects on lives and property have also been emotionally traumatising.

This review suggests that most institutions of higher learning such as universities or schools, that have experienced fire disasters point to the fact that recovering from the physical and emotional damages resulting from fire disaster have been very traumatising and difficult situation to manage (Wade, Teeman, Golden, Wilson, & Woodley, 2007). This traumatised experiences are stressful to administrators and management team, students, staff and also parents. Inaddition, organising resources to restore affected buildings and status of public universities to its original state takes many years. It takes time for victims to recover from emotionally traumatising situations and fully resume accademic work. In many cases, the teaching time table may also be affected. These outcomes of fire disasters as reviewed from the literature can be mitigated begining from leadership and management team of the public university by evaluating interactive behaviour and perception of staff and students (Cooper, 2001).

Theoretical Framework

Swanson (as cited in Kivunja, 2018) asserted that a theoretical framework is the structure that can hold or scaffold a theory of a research study. Kivunja (2018), in turn, defined a theoretical framework as a structure or a data mining lens that summarizes and synthesizes existing concepts and theories to provide the theoretical background needed to substantiate a study's argument and justify its findings and recommendations. Akintoye (2015) added that a theoretical framework further convinces readers and scholars that the study is not based on the researcher's instincts but is firmly rooted in an established theory selected from credible studies.

The theoretical framework for this research is based on building social capital as determinant of belongingness, unity, cooperation, mutual support so as to facilitate fire safety preparedness (FSP) in a public university community via sharing of information and collaboration among the individuals, families, groups and social networks for the attainment of a collective goals (Bourdieu 1986, as cited in Behera, 2020). Social capital is defined as a relational resource which determines the quality of life, including safeguarding lives and properties for continued healthy teaching and learning environment (Coleman, 1988; Putnam, 2000; Lin, 2001; Szreter & Woolcock, 2004, as cited in Shan, Nazeem, Kristjana & Bonnie, 2012). Bonding, bridging and linking social capital creates sense of belongingness, unity, cooperation and communal support among staff, students, families and groups on campus and its surroundings to get access to needed resources and services before, during and after unanticipated disaster (UN/ISDR & UN/OCHA, 2008 as cited in Behera, 2020).

Strengthening the community in the context of the present study refers to community unity fostered through communitarian social capital that helps to improve institutional service delivery (Shan, Nazeem, Kristjana & Bonnie, 2012). In other words public university community could be strengthened better through collaborative relations by improving consultation and building partnership for safeguarding lives and properties intended for good and healthy teaching and learning environments. Therefore social capital as a lubricant can facilitate collaboration to build strong a culture of FSP of public university communities. This supportive role allows people (i.e. administrators, HoDs, students, staff, and others in or around campus) to work together to access benefits from communal relationships when in crisis. For this reason, public

universities that do not consider the importance of social capital as a vehicle for establishment of unity, bonds, bridges and links may find it difficult to establish and nurture FSP (Adler & Kwon, 2014; Szreter & Woolcock, 2004). In order to reinforce coherent communal relations and create an opportunity for improvement on risk inefficiencies and threats, concerted relationships are required via building partnership and broadening information flow to maintain the coherence of campus community for mutual FSP (Tristan, 2021).

The connection between social capital and FSP is now globally relevant due to the increasing severity and frequency of natural and artificial fire disasters (Minerbi, Imagawa, Porter, Sulis & Wozniak, 2016). FSP concepts and actions are increasingly focused on building communal resilience through connection and togetherness (Adams, Eisenman & Glik, 2019). Hence, the researcher is in agreement with Labonte (2004 as cited in Shan, et. al., 2012) that community-based concepts have shifted the attention from individualism to communalism. This possibly suggests that leaders of public universities must strengthen their community by promoting FSP from individuals, departments, and institutions to a collective resilient institutions and society via widening of links, communication, unity, communal vigilance, and willingness to share available resources with a better understanding of the public university communities and its surroundings (Kolanchu, 2011).

A well-known social capital theorist, Putnam, has postulated that assets accrued in a group, such as networks, norms, and trust, allow staff and students or people to work together towards the objective of achieving FSP in campus community (Baron et al., 2000). Thus, social capital is a valuable tool or asset that could reduce risk within campus communities (Koh & Cadigan, 2008).

Clarifying further, Koh and Cadigan have stated that social capital as a tool helps to build a more cohesive, integrated, and prepared university community, where students and staff understand their interdependence amidst fire disaster. In a time of social isolation when many seem unconcerned – for instance, these days, some individuals prefer taking snapshots of fateful moments with their smartphones instead of swiftly helping to save lives and property. Increased efforts in FSP may contribute to strengthening staff and students' interdependence and developing a safer public university community (Koh & Cadigan, 2008).

Keeping students and staff safe from various threats is part of the agreement between a university and its community, and is a crucial responsibility of university administrators. Although teaching and learning are fundamental, safety is not to be far behind (ScholarChip, 2020). Therefore, as an additional factor in fire safety readiness, administrators of public universities may use social capital as a resource alongside those already available to develop new and improved policy instruments for proactive and reactive fire disaster management (Chan, Roy, Lai & Tan, 2018). Furthermore, connecting people and institutions through social networks, shared norms, and ethics play a vital role in connecting students, staff, and public universities' communities and institutions, in general, to prepare for, manage, and recover from fire disasters (Rapeli, 2017).

Consequently the review, suggests that FSP awareness cannot be disseminated and established effectively and efficiently in segregated and weakly bonded university community which is reflective of passive attitude toward fire safety legislation. In view of this, administrators and their

management team should create enabling cohesive public university environment to promote FSP.

Bonding Social Capital to Establish Fire Safety Preparedness (FSP) on Campus

Bonding social capital aids in reinforcing identities and promotes homogeneity (Putnam as cited in Tristan, 2021). Bonding social capital exist within a public university community where staff, students, families, groups, departments within the university have shared identity, shared understandings, and a sense of belonging (Tristan, 2021). In a time of social isolation where many are "bowling alone", disaster preparedness efforts may serve as a force that reverses this trend and contributes to a legacy of stronger well-being of public university community (Koh, 2008). In this context social network aids in accumulating human capital within public university communities to help build strong ties, communicate and instill a culture of FSP. Leaders influence people's behaviours to achieve their goals in any institution. The culture of full compliance to Fire safety legislations, cannot be achieved easily in disintegrated public university community (Cooper, 2001) hence Administrators, HoDs, and Fire safety officers (FSOs) of public university must link and influence their subordinates to institute and deepen collaborative relationships, and campaign to establish, and ensure subordinates and people within the public university community comply with the established fire safety measures on campus for mutual benefit of safeguarding lives and properties at any time (Cooper, 2001).

Collaborative relations grows through building continued bonds among institutions, departments, students and staff groups, via social networking, workshops, online seminars, campus radio awareness programmes

and basic drills. All members of the public university community with common understanding are obliged to respect the established culture of strict compliance to fire safety measures among all and not limiting the culture to themselves, but rather disseminate the culture to friends and generation to come. Vital tools such as social network, shared norms and ethics are required by administrators, HoDs, and FSO of public universities to facilitate bonding through workshops, orientations, radio discussions with funding from families, old students of departments, alumina, internal generated funds, and parents for communal integration (Holloway, 2015). When connecting to tie students, staff, and institutions to a culture of fire safety, administrators of public universities may knowingly or unknowingly differentiate against certain groups reducing community members' trust in the administration leading to communication gap and disregard for fire safety measures (Brook, 2005).

Although social capital could effectively boost FSP in public university community, it could also increase the risk of destruction of lives and property because of its shortcomings. For example, if university management does not conduct maintenance and fail to distribute fire safety equipment equitably in a particular residence hall, the resident students may file a complaint. If the university management subsequently reserves the best treatment for students in other residence halls who did not complain, this would be a form of unfair discrimination. As a consequence, students may rebel. For example, in Kenya, incidences of student unrest has seen at least 100 schools set on fire. These acts of destruction of the school and student property have led the country to seek answers for the causes of this delinquent behaviour (Muhia & Abuya, 2016). Irrespective of potential risk of bonding social capital, it may be an added

resource that could fuel collaborative relationships and awareness of FSP in public university community.

Unlike other safety concerns, fire has the potential to destroy property and injure or kill large numbers of people very quickly (H.M. Government, 2006). Within two months into 2020, it was reported that fires had already devastated eight learning institutions in Ghana, including Accra Academy Senior High School in Accra (Ghana Web, 2020). Jason (2019), the president of Secure Education Consultants, has cautioned, disasters and other emergencies can happen at any time, and when they occur at learning institutions, everyone should be prepared to handle them safely and effectively. As evidenced by the number of fires in 2020 year alone, Ghana is one of the top-ranking African countries regarding exposure to high-risk hazards. Strong coordination is needed to tie and build synergy, and to improve FSP to reduce the impact of fire-related risks in learning institutions (Holloway, 2015). Using teamwork to help ensure FSP at schools or universities is an aim of bonding social capital. Administrators, teachers, staff, parents, students, and related communities should collaborate to promote and maintain school-wide safety and minimize the effects of emergencies and other dangerous situations (Jason, 2019). In a fire disaster, bonds among all beneficial could be vital to manage the situation until outside help comes in (Sanyal & Routray, 2016).

Networking and Bridging Grows Awareness of Fire Safety Preparedness (FSP)

Lack of resources such as: funds for maintenance of building and procurement of fire safety equipment has been identified as one of the common reasons why some public schools are not fire safety prepared (Akomah & Kotey,

2018). Complete awareness on FSP could be deeply rooted in public university communities via networking and bridging. Administrators of public schools can network and bridge local and inter-sectorial leadership to facilitate collaboration, mobilise community and nearby institutions' resources to help support each other in times of emergencies due to limited human and material resources, and the era of social isolation of individuals and institutions (Shan, Nazeem, Kristjana & Bonnie, 2012). Gathering social capital or cohesion for resource mobilisation sometime get decreased by the impact of disasters as individual members, families and communities network get disconnected and the network ties get broken (Kaniasty & Norris, 1993; Ritchie & Gill, 2007; Varda et al., 2009 as cited in Behera, 2020). Administrators of public universities should proactively and reactively utilise bridging and linking as essential tool in mobilising resources (money, human, material and methods) to grow FSP on campus (Adler & Kwon, 2014; Szreter & Woolcock, 2004).

Networking and bridging also nurtures social capital to aid public university community to prepare for unpredicted disasters and threats, respond effectively to emergencies, and rescue people from the impact of fire or other disasters (Behera, 2020). Traditional FSP emphasises the value of physical, economic, and human capital, and emerging research indicates that social networks (i.e. the use social media, related platforms to stay connected to people and institutions) are especially relevant to FSP (Dynes, 2006, as cited by Koh & Cadigan, 2008). In this context bridging social capital creates solidarity, respect and understanding in between people of different strata of power and position, and the individuals and communities to develop network and benefit from connecting social capital (Behera, 2020). Connecting for social capital is

a resource or capacity of the people and communities to mobilize various resources to their essential needs (Poortinga, 2012 as cited in Behera, 2020).

Bridging social capital connect societies far and near public university communities, and share of information, trust, and cooperation between and among organisations such as schools, NADMO, the Police Service, GNFS, alumina groups etcetera for swift resource mobilisation in times of emergency. Siegler (as cited in Behera, 2020) argues that social capital brings about networks, connections and human values that promote benefits due to tolerance, solidarity and or trust. Networks have been proven by researchers of social capital as powerful tools that partner bridging to connect and strengthen relationships and build solidarity among organisations. These organisations with shared values and understanding enable the individual institutions and groups to trust, tolerate, build solidarity and work to create positive result before, during, and after a disaster (Behera, 2020).

This review suggest public universities cannot stay in isolations due to limited resources of all kind in crises, therefore, administrators and management team of public university responsible for planning and policy framework should effectively strategise and establish better social cohesion among nearby institutions as a conduit to spread and maintain FSP. This may serve as a defensive force against fire disaster for the benefit of all. Having established and strengthen relationships and sense of solidarity, it is easier to connect wider, people including leaders of organisations and institutions to close communications gaps on FSP, and its challenges, build partnership. This will encourage reciprocity of resources necessary to help supplement the public

universities internal fire safety capacity and polices via signing of memorandum.

This sense of ethical concern fosters collective action when a community is threatened. If groups or individuals have problems or are dissatisfied with their university communities and institutions or organisations, they may be less likely to help one another during emergencies (Schellong, 2007; as cited by Kolanchu, 2011). Groups such as companies, schools, religious organisations, community organisations, and government agencies such as the National Disaster Management Organisation (NADMO), the Ghana Health Service (GHS), GNFS, and the Ghana Police Service (GPS) can improve fire safety or disaster preparedness through collective socialisation, preparation, and efficacy fostered by formal joint training, drills, and exercises (Koh & Cadigan, 2008).

Institutions such as public universities may adopt a coordinated approach to foster cohesion to ensure the safety of their occupants and properties (Clarkslegal, 2017). Public universities must comply with the GNFS LI 1724 of 2003, which was created to help regulate the fire safety of all public institutions. However, social networking services, such as Facebook, Twitter, Telegram, and Instagram, can also be used to collect information on users' social contacts (Schellong, 2007). These social networks platform can be used by administrators and heads of departments of universities to connect, share or receive information and discuss fire safety legislative instruments or policies, strategies for improving fire safety measures, and disaster management issues with individuals and institutions in and around public university communities. In effect, institutions should build strong ties through regular communication

among members on the social platforms on FSP as compared to the revise of limited connections and ties which might put some community members in the dark rendering them unserviceable during crises as fire disaster. The elements of social capital theory reinforce the principles behind constant public awareness. A public university's response to emergencies may be faster and more efficient if social networks are used to enhance the collective actions of administrators, students, or other community members during emergencies (Kolanchu, 2011). Social networks and social relations are considered the primary joining agent required to respond to fires and other disasters at learning institutions (Drabek, Tamminga, Kilijanek, & Adams, 1981). Therefore, the review brings to light that all members especially leaderships in and around public university community need to help broaden human and material resource base. This can be done through creation of social platforms to discuss fire safety emerging issues, resources mobilisation and fire safety legislation. Doing so could possibly foster public universities communal cooperation.

Conceptual Framework

A conceptual framework is a system or structure that a researcher believes can best explain the natural progression of the phenomenon under study (Camp, 2001). It is arranged in a logical structure to depict how the concepts in a study are related to one another (Grant & Osanloo, 2014). Schissler, Nicholls and Mehra (2016) have stated that conceptual frameworks are general frameworks that reflect the entire research process. Naser and Mokhtar (2004) stated that for an institution to improve overall performance, it should aim at minimising risk and be well prepared for uncertainty. This study aimed to investigate the fire safety preparedness (FSP) of public universities in

the Central Region of Ghana. Based on this conceptualisation to investigate as stated above, the study also intended to reveal how lives and properties are safeguarded on public universities campuses and also report any emerging fire safety challenges that might lead to interruption of teaching and learning activities and fatalities should any disaster happens to public university campus. A conceptualised framework was developed to guide the study. Its assumes this may eventually guide administrators and management team, including those incharge of fire safety to establish fully, a fire safety prepared public university communities.

The conceptualised framework was developed with reference to International Labour Organisation (2022) to help explain the operational systems. This operational systems may possibly ensure that fires do not occur; and if they do occur can be controlled or contained immediately. This view suggests, frontline managers and top level leadership must ensure at both ends, financial and fire safety operational mechanism and its related resources are evenly or equitably distributed for continued maintenance of FSP in all units on campus. The unavailability of either financial, or any of the operational and material resources affect the concept of preparedness (Cooper, 2003). The conceptual framework illustrates an operational mechanism for FSP with the adoption of balance scale mechanism. A weighing balance scale is used in this context, to compare and ensure the financial resource (money) budgeted, and the operational and material resources required to keep FSP are of equal value at both ends of the scale. It implies, if any of the resources at one end of the scale is unavailable or insufficient, it destabilise the balance. This means that life and property are highly at risk (Cooper 2001; ILO, 2021). Hence to ensure

FSP, administrators of public universities and their management team must budget and allocate the required finances to ensure establishment of fire safety mechanism to function continuously without any interference. The framework put administrators and management team at the center of FSP in public universities. It observes that Full commitment and cohesion among administrators, frontline managers (i.e. HoDs), located in or around public university communities; are required to link, bridge, and bond social capital, mobilise communal and fiscal resources, and in effect keep FSP operation mechanism active to safeguard life and property always.

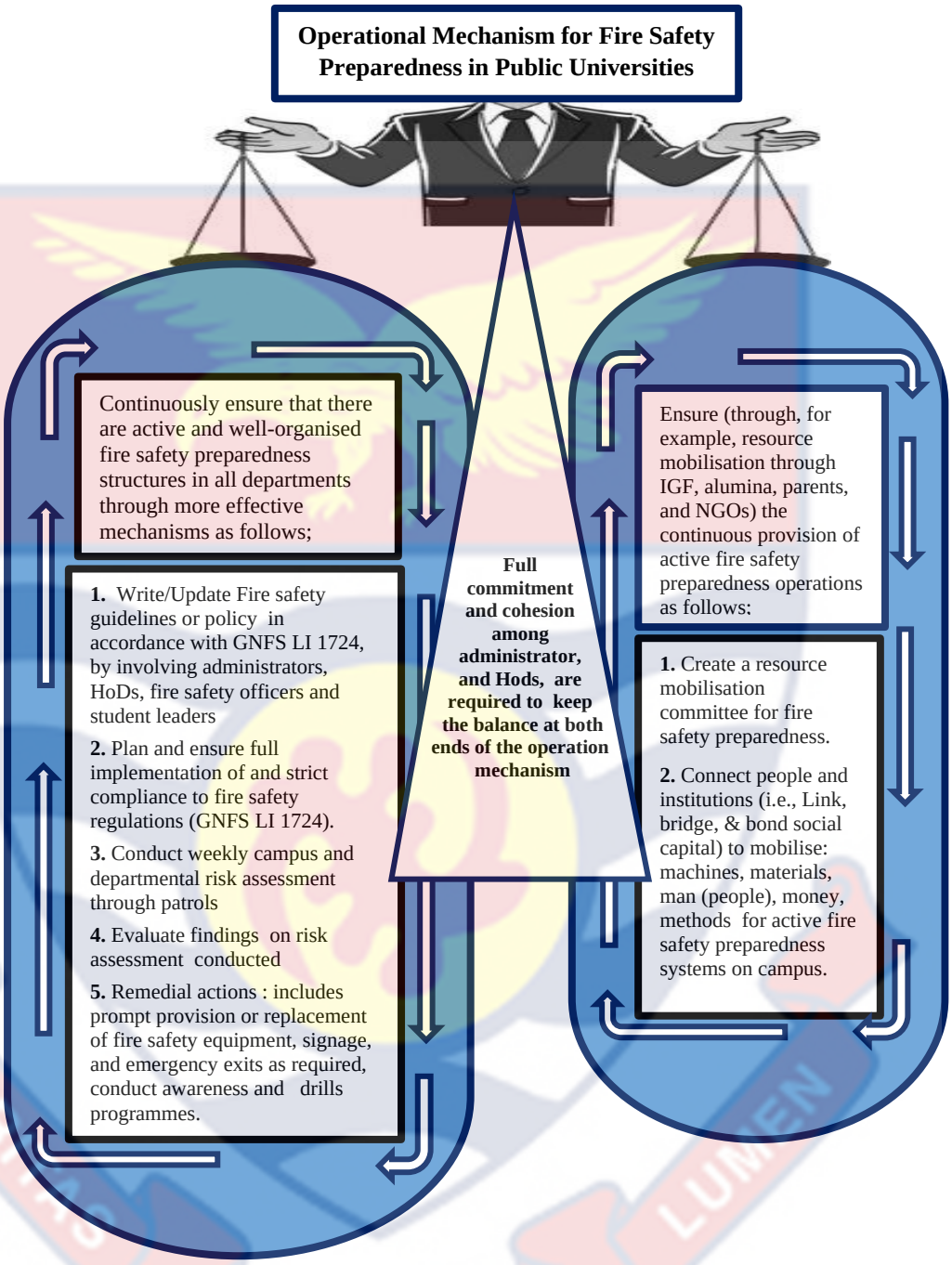


Figure 1: *A conceptual framework of FSP of the public universities developed for this study.*

Source: Author's construct (2022)

The conceptual framework of FSP of the public universities in the Central Region, first, urges administrators of public universities, management team, in the event of fire outbreaks in public institutions, to at least give a priority to FSP, budget appropriately, and raise revenue. This can be done through IGF, alumina, parents, and NGOs to finance FSP and the established operational mechanism. Secondly the framework urges administrators and management teams to be committed in the provision of active and established fire safety operational mechanism engineered through (a)Writing or updating Fire safety guidelines or policy in accordance with GNFS LI 1724, by involving stakeholders including administrators, HoDs, fire safety officers and student leaderships, (b) Plan and ensure through communiqué for the full implementation of fire safety measures, and strict compliance with GNFS LI 1724 (c) Patrol and conduct weekly campus risk assessment on all facilities, (d) analyze findings of the risk assessment made (e) finally take corrective actions to rectify the gaps discovered, some of which include prompt financial provision to replace expired fire safety equipment, replacement of signage not visible or in place, and emergency exits not cleared from obstruction, insufficient awareness and drills programmes on emerging hazards and disregard to safety rules.

Chapter Summary

This chapter presents a literature review of fire safety preparedness (FSP) per the regular fire outbreaks in places such as homes, public institutions, and especially public educational institutions. Four Fundamental Theories of Fire Disasters were discussed. This unavoidable misfortune may happen to any university community through human errors, arson and nature. Therefore, the

Fundamental Theories of Fire Disasters prompts administrators of public universities, not to perceive fire disaster as far from their institutions, but rather see it as a possibility, and subsequently caution, revive and establish fire safety measures to the later on campuses. The reviewed literature suggests that FSP in learning institutions enables individuals, especially students and staff, to promptly and safely respond to uncontrolled fires in the event of an outbreak to protect lives and property on campus.

Referring to RQ1, the Mandatory Fire Safety Measures required of public universities enjoins GNFS legislative instrument (LI) 1724 on Fire Precaution Regulations (2003) and authorities of public universities to; (a) ensure all members of any university community understand the behaviour of fire via orientation that, fire starts and will continue burning only if heat, oxygen, and more fuel are present. These three elements form a "fire triangle". In the absence of any of the elements, there will be no fire. With this understanding, members of public university communities can prevent or control unwanted fire successfully, (b) provide or install on their buildings fire safety equipments, signage (i.e. signs and notices) and unobstructed fire emergency exits. They should also educate occupants on what to do in the event of fire emergencies, and other relevant requirements approved by the Chief Fire Officer which is subject to annual inspections. Literature reviewed suggests that the GNFS is not completely active in implementing its mandate to eventually ensure that the authorities of public universities fully comply with the legislation instruments as enacted. This development if not curbed will expose public universities' assets, students and staff lives to unpredicted tragedy.

Referring to RQ2 on how public universities ensure compliance with fire safety measures, literature suggests that although there are some efforts in place, public universities must ensure compliance with the mandatory fire safety measures. Notably, it seems there are some challenges limiting efforts and this includes, weak leadership commitment to implementing required fire safety measures. This manifests in insufficient collaborative efforts to uphold and maintain school-wide compliance to fire safety rules and regulations. Literature showed that reason for non-compliance to safety rules included lack of funds in public schools (Akomah & Kotey, 2018). Therefore Leaderships' absolute commitment is required to raise required resources to help reduce the risks of public universities' assets and lives on a daily bases.

The literature on RQ3 (i.e.the challenges public universities face in the attempts to comply with fire safety preparedness measures) shows that, there is low management commitment to implementing required fire safety measures. This in effect reflects in the passive attitude of some facility managers, students and staff, in the careless use of building facilities, and electronics equipment. Other passive attitudes are demonstrated through the ignorance on the impact of fire disasters and disregard to orientation and fire safety drill programmes by most public university community members. The continuations of these behaviours, if not curbed, endangers the public universities assets and lives and must be reversed by the public university authorities and front line managers.

Futhermore the literature reviewed on RQ4 suggests that, public universities are fire safety unprepared. Consequently, the impact of fire disasters has significant economic and social effects on public universities and their local communities. Therefore Administrators and front line managers of

the public universities should appreciate that, among other negative consequences, the tragic event of a fire-related death may substantially affect a university's reputation for years, and recovering from the impact may be so expensive.

Likewise, with regards to RQ5 the challenges (i.e. general disregard to fire safety legislative instruments) identified by the literature must be considered. When adopted by administrators, social capital theory may appropriately address some of the challenges through coordinated efforts. Social capital is therefore considered one of the most vital aspects of fire safety preparedness. The cooperation it fosters has the potential to mobilise resources to create awareness; organise orientations and drills to change people's attitude especially students and managements' passive attitude towards fire safety; and to effciently connect all resources within and around academic settings to build synergy to help community members act swiftly and cautiously during fire outbreaks or disaster situation to protect lives and property. Based on these insights from the literature on FSP, conceptualising FSP operation framework as one of the critical structures or mechanisms if established, could contribute in safeguarding lives and properties against fire disaster in public universities.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter presents and describes the methodology employed in the study. It discusses the research design, population, sampling procedures and data collection instruments. The data collection procedures as well as data processing and analysis procedures are also discussed.

Research Design

The study adopted a mixed method research design which is a methodology for collecting, analysing, and "mixing" both quantitative and qualitative data during the research process within a single study, to understand a research problem more completely (Teddlie, Tashakkori & Johnson, 2008). The underlying principle for mixing is that neither quantitative nor qualitative methods are adequate by themselves to capture the details and complexity of the condition studied. When used in combination, quantitative and qualitative methods complement each other and allow for more complete analysis (Almeida, 2018; Teddlie, Tashakkori & Johnson, 2008). In the context of this study, quantitative data was collected with the use of questionnaires which were administered to the HoDs of UCC, UEW and CCTU and was complemented with observation checklist. Also, qualitative data was obtained for the study with the use of interview guide which was administered to the FSOs of UCC, UEW and CCTU.

While designing a mixed methods study, three issues need consideration: priority, implementation, and integration (Creswell, Plano Clark, Guttman, & Hanson, 2003). Priority refers to which method, either quantitative

or qualitative, is given more emphasis in the study. Implementation refers to whether the quantitative and qualitative data collection and analyses come in sequence or in chronological stages, one following another, or in parallel or concurrently. Integration refers to the phase in the research process where the mixing or connecting of quantitative and qualitative data occurs.

This study used the convergent parallel mixed method design. According to Plastow (2016), the convergent parallel mixed method design is characterized by the collection of both quantitative and qualitative types of data during the same stage of the research process. Here, the researcher weighs the methods equally, analyses the two components independently, and interprets the results together (Creswell & Plano-Clark, 2011, as cited in Demir & Pismek, 2018). The purpose of convergent parallel mixed method design is to use both quantitative and qualitative data to more accurately define relationships among variables of interest. Both methods (quantitative and qualitative) are used to overcome a weakness in using one method with the strengths of another. In the context of this study, both quantitative data (questionnaires administered to the HoDs of UCC, UEW and CCTU, supplemented with observation checklist) and qualitative data (interview guide administered to FSOs of UCC, UEW and CCTU) were merged, compared and interpreted in order to ascertain the authenticity of the data collected from either of the respondents. Figure 2 illustrates the convergent parallel mixed method design employed for the purposes of this study below.

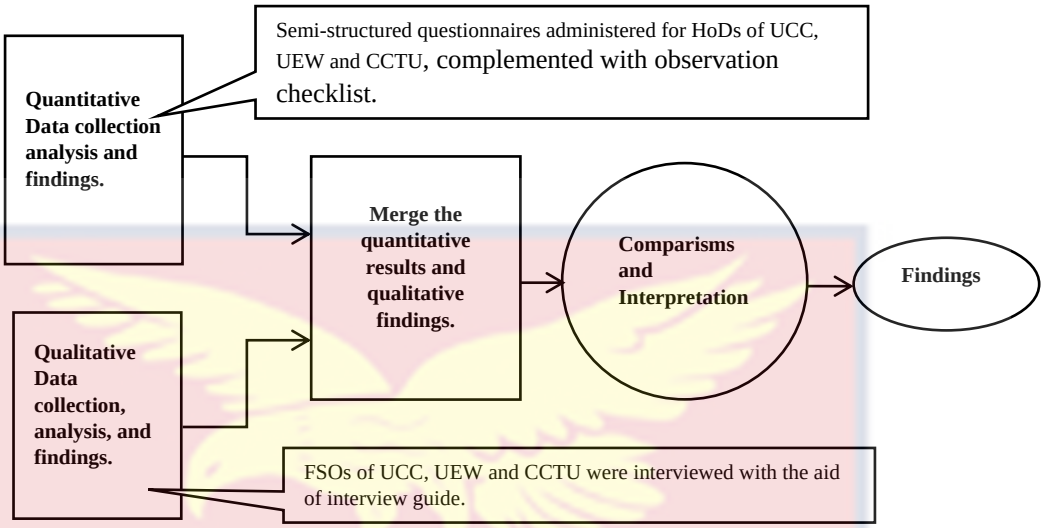


Figure 2: *Convergent parallel mixed methods design*

Source: Adapted from Clark and Creswell (2014)

Study Area

This study was undertaken in the Central Region. Geographically, the Central Region is one of Ghana's 16 administrative regions. It covers an area of 9,826 km^2, which is 4.1% of Ghana's total land area of 238,533 km^2, and is surrounded by the Ashanti and Eastern Regions to the north, the Western Region to the west, the Greater Accra Region to the east and the Gulf of Guinea to the south. This study targeted all public universities in the Central Region of Ghana. According to the National Accreditation Board (2019), at present, the public universities in the Central Region are UEW, UCC and CCTU as illustrated in Figure 3 below.

Figure 3: *Map of Central Region of Ghana, showing the location of public universities*.

Source: Ghana Statistical Service (2019)

The Central Region has been the icon and hub of education in Ghana for decades. There are three public universities in the Central Region of Ghana: the UEW, the UCC, and CCTU (National Accreditation Board, 2016). The UEW was established in September 1992 as a university college under the Provisional National Defence Council (PNDC) Law 322 and was initially called the University College of Education, Winneba. On 14 May 2004, the University of Education Act, Act 672 was enacted to upgrade the College's status to that of a full university. The UEW operates from four campuses, namely the College of Technical Education Kumasi (COLTEK), the College of Agriculture Education Mampong (CAGRIC); the College of Languages Education, located in Ajumako; and the Winneba Campus, where the main administration is also located. COLTEK and CAGRIC of UEW are now full-fledged university,

namely Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development (AAM-USTED) AAM-USTED was created by Act 1026 (2019) which converted the COLTEK and CAGRIC campuses of the University of Education, Winneba into fully-fledged and autonomous universities.

The President of Ghana, His Excellency, Nana Addo Dankwa Akufo-Addo, signed the university's bill into law on August 27, 2020 (Darfah, 2020). The aim of the UEW is to provide higher education and to foster the systematic advancement of the science and art of teacher education; to train teachers for colleges of education and other tertiary institutions; to provide teachers with the professional competences needed for teaching in pre-tertiary institutions such as preschools, basic schools, senior secondary schools and non-formal educational institutions; and to foster links between schools and the community to ensure the holistic training of teachers (University of Education Winneba, 2019). The student population is approximately 56,788 and that of teaching staff about 495 (National Accreditation Board, 2015/2016 Composite Statistics Report page 61).

The UCC is a public university located in Cape Coast, Ghana. The university was established in 1962 in response to a need for highly qualified and skilled educators. On the 1st October, 1971, the University College became an autonomous institution with the authority to confer its own degrees, diplomas and certificates by an Act of Parliament, namely; the University of Cape Coast Act, 1971 [Act 390]. The previous Act was subsequently replaced with the University of Cape Coast Law, 1992 [PNDC Law 278] (UCC, 2022). The university has a student population of approximately 75,000 (Gbagbo,

2017) and that of teaching staff about 661 (National Accreditation Board, 2015/2016 Composite Statistics Report page 61). The UCC was established to train graduate teachers for second-cycle institutions such as teacher training colleges and technical institutions, a mission that the two existing public universities at the time were unequipped to fulfil. The original mandate was revised in the mid-1990s that led to the University expanding and diversifying its programmes in response to changing needs. The university has since added to its functions the training of lawyers, doctors, health care professionals, education planners, administrators and agriculturalists among others (UCC, 2022).

CCTU was established in 1984 as a second-cycle institution. In 1992, the university was upgraded to the tertiary level by PNDC Law 321 to run programmes awarding Higher National Diplomas. The new Polytechnic Act of 2007, Act 745, gave the university the mandate to offer degree programmes. CCTU is situated approximately 5 km from the Pedu traffic lights off the main road linking Cape Coast and Twifu Praso. Its vision is to be a leading technical university in Ghana that offers high-quality career-oriented vocational and technical education for national development. Its mission is to provide increased access to tertiary education for all people who want to acquire hands-on training for academic and professional excellence. The student population is approximately 3206 and that of teaching staff about 97 (National Accreditation Board, 2015/2016 Composite Statistics Report page 70). Thus, these three (3) institutions (UCC, UEW and CCTU) are the public universities in the Central Region of Ghana.

Population of the Study

The research population of a scientific enquiry is generally a large collection of individuals or objects known to have similar characteristics (Hassan, 2019). The population for the study was all the Heads of Departments of UCC, UEW-Winneba campus, and CCTU. The study population comprised two groups. The first group within a quantitative framework comprised Heads of Departments of UCC, UEW-Winneba campus, and CCTU. The second group within a qualitative framework involved interviewing the FSOs in charge of UCC, UEW-Winneba campus, and CCTU. In all, the total target population for the quantitative study was 174 (academic and non-academic HoDs) which entailed 152 Heads of Academic Departments and 22 (non-academic HoDs) comprising of heads of halls of residence, main libraries and administration of the three universities based on the higher risks factors (i.e. higher demands on facility usage and the fuel loads/combustible materials they contain, see Table 1 for clarity) (UCC, UEW & CCTU Registrar's Office, 2020).

The need to study the population is that these Heads of Department are in charge of a large number of students and staff occupying departmental facilities, respectively using learning and office equipment and machines. They know best the state of their departments in terms of fire safety. This makes the departmental heads above students and other staff to respond to the research questions appropriately. Earlier studies have shown that most fire events were caused mainly by negligent or unsafe human behaviours whiles using the building facilities accessible to them. Management of such behaviours to safeguard live and properties under their watch are also part of the responsibilities of departmental heads (Shohouhi, Nasiriani, Cheraghi, Ardalan,

khanker, Fallahzadeh, & Khorasan-Zavareh, 2019). In line with these responsibilities departmental heads are best placed and in effect provided very reliable and credible data that addressed the research questions of the study.

Additionally to the first group, the non-academic heads were involved in the study based on the fact that aside the heads of academic facilities, the non-academic heads equally manage directly large residential and official complexes with numerous students and staff activities, and the fuel loads (i.e. combustible materials) content of these facilities are also very high. Therefore, the number of human activities and the fuel loads in the administration block, halls of residence, and main libraries serve as a risk factor in the universities (GNFS-UCC Station, 2020). Consequently, in an event of any fire outbreaks this can lead to increased injury or death owing to emergency evacuation difficulties (MA, Song, Tian, Lo SM, Liao G, 2012; & Zhang, 2017; as cited by Shohouhi, Nasiriani, Cheraghi. Ardalan, khanker, Fallahzadeh, & Khorasan-Zavareh, 2019). In conclusion, the heads' understanding of university administration and the closeness of the building facilities and its staff and students' behaviour with regards to fire safety in their departments make heads well-grounded to respond to the research questions.

In addition, the second group consisted all the three fire safety officers responsible for fire safety in charge of UCC, UEW-Winneba campus, and CCTU. They were also involved in the study based on the fact that they have broad overview and deeper understandings of the reality of the fire safety issues. Hence the FSO were able to comprehensively clarify, and confirm emerging issues raised by the heads of the various departments; as a result a more reliable

and credible data was obtained. Details of the study population are presented in Table 1.

Table 1 - Distribution of the Study Population for Quantitative Studies

Study Population	Number of Heads			Estimated Number
Head of departments: Academic and Non-academic	UCC	UEW-Winneba campus	CCTU	
Heads of Academic departments	99	38	15	152
Residential Hall Managers	10	5	1	16
Administrator of main Library	1	1	1	3
Registrar- main admin	1	1	1	3
Total	111	45	18	174

Sources: UCC, UEW, & UCC Registrars' Office (2020)

Sample and Sampling Procedure

According to Creswell (as cited in Onyango, 2013) there are numerious methods of sampling that can be used by the researcher, however, researchers must be guided by the purpose of study and research questions to be studied. Studying an entire population is the ideal situation for any researcher based on the possibility of reaching everyone or unit in the population. In all, 174 Heads of Departments of UCC, UEW-Winneba, and CCTU provided information for the study.

Both the census method and the purposive sampling method were used in this study. The census method was used for the quantitative phase where all the 174 Heads of Departments of UCC, UEW-Winneba, and CCTU were

invovled in the study. A census is a study of every unit in a population. It is known as a complete enumeration, which means a complete count. Once a population has been identified a decision needs to be made about whether taking a census or selecting a sample will be the more suitable option. There are advantages and disadvantages to using a census or sample to study a population.The decision to use census is in line with the views of Guest (2019) that, it is appropriate to use census in circumstances where it is possible to contact every one of the study population. A sample is a subset of units in a population, selected to represent all units in a population of interest. It is a partial enumeration because it is a count from part of the population. According to Cohen, Manion and Morrison (as cited in Adosi, 2018), aside the fact that census is costly and time consuming, the findings are highly dependable and accurate since every member of the population is studied. In the view of Lavrakas (2008), a census generally attempts to collect information on all eligible elements in a defined population, while a sample survey pre-selects a subset of elements for inclusion.

The census technique was chosen because it allowed the researcher to ensure the validity of the information because all the 174 Heads of Departments of UCC, UEW-Winneba, and CCTU under study were involved. Hence, a lower margin of error was realized. Irrespective of its numerous advantages, census also has disadvantages. First, it takes longer time where a significant amount of data is to be obtained from the respondents. It is also highly susceptible to researcher bias since the researcher chooses the population to be studied (Regoli, 2019).

The sampling procedure adopted for the qualitative phase was the purposive sampling technique. This type of sampling technique is also known as judgmental. In using this sampling technique, the researcher selects subjects who are knowledeable, relevant and can provide the needed information required for the study. Williams (as cited in Onyango, 2013) posited that purposive sampling allows the researcher to identify the population with respondents capable of providing information pertaining to the phenomenon under study and increases the accuracy and credibility of the results. The FSOs possessed in-depth knowledge and appropriate level of understanding of the FSP of the universities under study due to their key roles as the overseers of day-to-day activities in relation to fire safety. Hence, they could best respond to the research questions. These qualities made the heads of fire departments well-equipped to answer the research questions. Therefore, the decision to select the FSOs was appropriate because interviewing the staff or students, for example, may have limited the data collected to their individual perception rather than realities on the ground. Interviewing the vice Chancellors may also have been very difficult due to the partial closure of the universities as result of covid-19 restrictions, which could have affected the schedule of this study.

Data Collection Instruments

Self-administered questionnaires complemented with field observation checklist, and a semi-structured interview guide were the main data collection instruments used to gather data for the study. Copies of the questionnaire and field observation checklist were repectively distributed to the Heads of Departments, and physically counted the availability of fire safety equipment, signage and emergency exits of some departmental building facilities of UCC,

UEW-Winneba - campus, and CCTU to elicit data for the quantitative analysis, while the semi-structured interview guide used to elicit information from the FSOs of UEW, UCC and CCTU for the qualitative data analyses.

A questionnaire is a research instrument that is made up of a series of questions that are either closed-ended or open-ended and is used to gather information from respondents/participants (Ndukwu, 2019; West, 2019). Alongside the semi-structured interview guide, and field observation checklist, the questionnaire was a key tool used to gather information to assess the FSP of the three main public universities in the Central Region of Ghana. Both instruments were developed with guidance from the study's two supervisors (see Appendix A & B). The content of the questionnaire was mainly informed by the research questions. The reasons for the choice of the questionnaire were that, the questionnaire is suitable for data collection when the sample size is large. In the context of this study, the questionnaire made it easier to collect data from the 174 Heads of Departments compared with the use interviews. Also, the questionnaire is an appropriate tool for data collection when the respondents are literate (Debois, 2019). In the context of the study, the Heads of Departments were literates and that made it appropriate to use questionnaire as a data collection instrument. However, there are some disadvantages associated with the use of questionnaires as some of the items may not be responded to and some respondents may not be truthful with their answers (Debois, 2019).

The closed-ended questionnaire was used because it is advantageous for eliciting specific responses. The respondents were given a list of predetermined responses from which to choose their answers. The questionnaire consisted of

Likert-scale and dichotomous questions aimed at gathering data from respondents (McLeod, 2018) during the quantitative phase of the study (see Appendix A). The questionnaires were administered to all the 174 HoDs to gather data from the three public universities (UEW, UCC and CCTU) in the Central Region of Ghana.

The questionnaire consisted five sections (see appendix A). Section one: gathered demographic information on the respondents such as gender, university of work, and place of residence (on/off-campus). Gathering the demographic information was important for determination of whether the respondents are truly the representative of the target population for generalization purposes. Section two of the questionnaire had six question items and were developed in line with research question one [RQI] (i.e. what fire safety measures are in place at the public universities in the Central Region of Ghana?). This section was made up of one closed-ended and four Likert scale type question item (i.e. degree to which respondents agreed or disagreed with the options given). The options for each statement was given a score which was used to analyse the results. Thus, a score of 1 for Strongly Disagree; 2 for Disagree; 3 for Agree and 4 for Strongly Agree. These scores were used for the entire Liker-type scale questions in the questionnaire. The other five questions were dichotomous responses types (i.e. 'yes'/ 'no' or 'available'/ 'not available').

Section three of the questionnaire was tailored towards getting answers from respondents to RQ2 (i.e. how do public universities in the Central Region of Ghana ensure compliance with the fire safety measures?). Three questions were developed for this section. One out of the three questions was on a four-

point likert scale that asked the respondents to indicate the degree to which they agreed or disagreed with a list of 5 statements. The other two questions were multiple choices; respondents were to choose from a list of options given. Section four of the questionnaire was made up of closed-ended questionnaire on a four-point Likert scale. The Likert-type scale questions asked respondents to indicate the degree to which they agree or disagree with a list of 6 statements. So, the question was developed to elicit answers from respondents to RQ3 (i.e. what challenges do public universities in the Central Region of Ghana face in their attempt to comply with the fire safety measures put in place by the authorities of their institutions?). RQ4, focused and discussed the data gathered on RQ 1, 2, and 3, and what the discussion had, suggested on FSP of the universities studied.

Finally, Section five of the questionnaire focused on RQ5 (i.e. how, in the views of the study's respondents can the FSP of the universities in the Central Region be improved to safeguard lives and property?). This section was made up of a four-point Likert scale items with a list of 9 statements. The statements were on the views of the study's participants on ways of improving FSP of the public universities in the Central Region.

The interview guide (see Appendix B2) contained 12 semi-structured questions developed for the interview of FSOs of UCC, UEW-Winneba campus, and CCTU. The content of the interview guide was based on the reviewed literature. Question 1 of the interview guide was designed to obtain information on the demographic characteristics of the participants. Questions 2 to 12 were designed in line with research questions 1 to 5. Although the semi-structured question approach was time-consuming, the researcher preferred it,

as the fairly open framework allowed for focused and conversational two-way communication. One advantage of a semi-structured interview guide is that the interviewer can, when appropriate, add, delve, even if possible, deviates from the guide to probe more for sufficient answers (Keller, 2018).

The field observation checklist consisted of 32 items in four sections (Sections A, B, C & D). Section A considered the fire safety equipment in the various departments of the universities as identified in the literature with 13 items. Section B looked at the fire safety signage (signs and notices) of the various universities with 5 items. Section C was on the fire emergency exits at the university premises with 7 items. Finally, Section D looked at the fire emergency exits at the halls of residence with 7 items.

The instruments were given to an expert (my supervisor) to ascertain whether they met face and content validity. The suggestions given by my supervisor were used to effect the necessary changes. After this, the instruments were pilot-tested. According to Abey (2012) the tool or instrument (such as questionnaire and interview guide) must be pre-tested/piloted before being adopted for data collection because it is very vital for the success of the study. Pre-testing simply means testing the validity, reliability, practicability and sensitivity of the tool before it is used for actual data collection. The only way to gain reassurance that questions are unambiguous is to try them on prospective small respondents/participants (Abey, 2012). Grounded on the importance of pilot-testing research instruments, as specified in the literature, both the questionnaire and interview guide developed for the main study were pilot-tested. The questionnaires were pilot-tested at the UEW- Ajumako Campus in the Central Region by distributing self-administered questionnaire to 5 Heads

of Departments. The interview guide was also piloted in UEW Ajumako campus in the Central Region of Ghana by interveiwing the officer in charge of fire safety of UEW Ajumako campus.

After pretesting the questionnaire (to determine the reliability of the instrument) the data gathered were analysed and the Cronbach's alpha established for each of the Likert scale items. The Cronbach's alpha reliability co-efficient for items 10 and 14, were 0.89 and 0.844 which means the reliability co-efficient of items were better, except item 13 that scored 0.539 (refer to Appendix E1, to E3 for more details). This was due to the inconsistency or differences in the fire safety challenges in the five departments measured. This resulted in the reliability co-efficient 0.539. Thus, the fire safety challenges differ departmentally; for example, whiles some departments in the university were rating higher scores others were rating low scores on the fire safety challenges. Therefore the diversity in the challenges measured in the five departments resulted in the low reliability co-efficient of 0.539, which perhaps does not necessary indicate poor internal consistency.

Data Collection Procedures

Ethical approval was obtained from the UCC Institutional Review Board (UCC–IRB). The authorisation was required to ensure that all ethical considerations were handled appropriately so as not to cause any harm to the respondents and participants. After ethical clearance was granted, an introductory letter was obtained from the Institute for Educational Planning and Administration (see Appendix F2, and Registrar's office UCC (see Appendix F1, F2, F3, F4) to introduce the researcher to the respondents and participants two weeks before the questionnaires were administered. The consent letter for

both respondents and participants identified the title of the study, the name of the researcher and the purpose of the study, and it also stated the prospective benefits and risks involved (see Appendix F5).

The researcher visited the UEW, UCC and CCTU campuses and administered the questionnaires to all the HoDs within a period of 35 days with the help of two research assistants. Clarifications on how to respond to the questionnaires were given to the participants. The questionnaires were administered and collected from 12thAugust-15th September 2020. The return rate for the questionnaire was 85%. This was so due to the covid-19 restriction at the time. According to Cleave (2020), a survey response rate of 50% and above is often considered to be ideal for most circumstances. Ficcham (2008) explains that, long-established response rates of approximately 60% for most research should be the goal of researchers. Therefore, the return rate of 85% was considered ideal and could be used for the study.

Data for the observation checklist was obtained through physical inspection of some departmental facilities as mandated by the Legislative Instrument (L I) 1724 of GNFS (as identified in the literature). The data were gathered on the availability and adequacy of fire safety equipments, signage, and emergency exits.

For the interviews, an appointment was booked with each of the fire safety officers. The interviews were conducted at the offices of each of the Fire Safety Officers. Before each interview, participants filled a consent form which assured them of confidentiality and anonymity. With the consent of all of the participants, a voice recorder was used to record the interviews. It is vital to

point out that, the researcher carefully followed the questions on the interview guide in order to achieve consistency in the results.

Data Processing and Analysis

This study sought to explore the fire safety preparedness of the public universities in the Central Region of Ghana. Both quantitative techniques and qualitative techniques were used for the data analysis. The quantitative technique was used to analyse data obtained with the use of the questionnaire and field observation checklist. Specifically, descriptive statistics (frequency counts, percentages, means and standard deviations) were used in the analysis of data obtained with the use of the questionnaire. These were done with the use of the Statistical Package for Social Sciences (SPSS version 16). The background characteristics of the respondents were analysed using frequency counts and percentages. Research questions 1-5 were analysed using frequency counts, percentages, means and standard deviations.

Also, quantitative technique was employed in the analysis of data from the field observation checklist. Specifically, frequency counts and percentages were used in the analysis. The physical counts were guided by checklists developed from literature as required of L I, and the data gathered on the availability and adequacy of fire safety equipments, signage, and emergency exits were computed with the aid of Excel spread sheet. The researcher coordinated the key issues that emerged, and how the analyss answered the appropriate research questions of the study. This approach was used for the analysis of research questions 1, 2 and 3.

Qualitative data was used in the analysis of data obtained with the use of the interviews. The thematic approach was employed in the analysis of the

data obtained with the use of interviews. Thereafter, the researcher used the six-step thematic analysis procedure (i.e. Familiarization, Coding, Generating themes, Reviewing themes, defining and naming themes, and writing up) as illuminated by Caulfield (2019) for the qualitative data analysis. The thematic approach was used for the analysis of research questions 1, 2, 3 and 5. Table 2 provides an overview of how the data analysis was done both quantitatively and qualitatively with the use of questionnaires, interviews and field observation checklist guide.

Table 2: Data Analysis of Research Questions

Data Processing and Analysis			
Research Questions 1-5.	**Phase 1: Quantitative data –was processed with the aid of SPSS computer application software**	**Phase 2 (a): Thematic Analysis of Qualitative Data** - through a six-step process as follows: **Source: Caulfield 2019).**	**Phase 3: Quantitative Data** – field observation checklist: physical counts of some departmental facilities guided by checklists were conducted, and analysed data with the aid of Excel spread sheet as follows:
1. What fire safety measures are in place in public universities in the Central Region of Ghana?	Descriptive statistics in the form of frequencies, tables, percentages and bar charts.	1. **Familiarization phase**: the researcher transcribed audio, read through the text and took initial notes, and generally looked through the data and got familiar with it. 2. **Coding Phase**: having gone through the text, the researcher was guided by literature and research questions (1, 2, 3 & 5), and collated together all highlighted sections of the	The researcher physically inspected established fire safety measures (Fire safety equipment [FSE], signage and notices, Emergency Exits and its related requirement [EE] mandated by the Legislative Instrument (L I) 1724 of GNFS (as identified in the literature), required of departmental facilities in UCC, UEW-w and CCTU and analysed data obtained with the aid of Excel spread sheet. The researcher was guided by literature and RQ-1 that led to well-designed observation checklists A, B, C and D as detailed in appendix C1,C2,C3, and C4 respectively, and briefly stated as follows: **1. Field Observation Checklist – A:** this checklist was designed to collate data on the availability and adequacy of some 13 pieces of FSE (as identified in the literature) and mandated by the LI
2. How do the public universities in the Central Region of Ghana ensure compliance with the fire safety measures?	Descriptive statistics in the form of frequencies, table,		

	percentage, and bar charts,	data into groups identified by codes, coded as RQ-1, RQ-2, RQ-3 & RQ-5. These codes gave a condensed overview of the main points and common meanings that recur throughout the data.	required of departmental facilities (refer to appendix C1 for detail). The data on the FSE was gathered into groups as; [a] Yes Available, [b] Yes available but not adequate, [c], No, not available, and analysed with Excel spread sheet - in the form of Descriptive statistics and expressed in the form of frequencies tables, and percentages, assisted answered RQ 1,2,3,4, and 5 appropriately.
3. What challenges do the public universities in the Central Region of Ghana face in their attempt to comply with the fire safety preparedness measures put in place by the authorities of their institutions?	Descriptive statistics in the form of frequency table, percentage, bar charts and cross tabulation	3. **Theme Generation Phase**: The researcher turned codes into themes by combining numerous codes into a single theme as follows ;Section-1: Demographic, Section-2: Fire Safety Measures, Section-3: Universities' Compliance, Section-4: Challenges University Face. Section-5: Strategies Adopted for Improvement	**2. Field Observation Checklist - B:** This checklist- B was designed to collate data on the availability and adequacy of the fire safety signage mandated by the LI (as identified in the literature) and required of Lecture halls/laboratories, Libraries, Halls of residences, Lecturers offices, Administration offices of the departments studied (refer to appendix C2 for details). These physical counts/data on the signage was gathered into clusters as;[a] Yes Available, [b] Yes available but not adequate, [c], no, not available, and analysed with Excel spreed sheet - in the form of Descriptive statistics and expressed in the form of frequencies tables, and percentages assist answered RQ 1,2,3,4, and 5 respectively.
4. What do the discussions in Research Questions 1, 2, and 3 suggest about the fire safety preparedness of the universities concerned?	Analytical conclusions based on research questions 1,2,&3 gave a typical understanding of the fire safety preparedness	4. **Reviewing themes:** At this stage the researcher ensured themes were useful and	**3. Field Observation Checklist – C:** this Checklist - C was designed to gather data on the availability and adequacy of the EE and its related requirement (as identified in the literature), and mandated by LI required of Lecture halls and laboratories,

	situations on grounds	accurate representations of the data through comparison of themes against the research questions. 5. **Defining and Naming Themes:** Having obtained the final list of themes, each theme was critically examined named better, and explained for easy comprehension of the data. 6. **Writing up**: The researcher described how often the themes came up and what they mean with examples from the data as evidence. Finally the researcher concluded by explaining the key issues which addressed each theme and how the analysis answered the research	Libraries, Department offices, and Administration blocks of the universities studied (refer to appendix C3 for details). The counts/data on the Emergency exits and its related requirement gathered into clusters as; [a] Yes Available, [b] Yes available but not adequate, [c], no, not available), and analysed with Excel software- in the form of Descriptive statistics and expressed in the form of frequencies tables, and percentages assist answered RQ 1,2,3,4, and 5 respectively. **4. Field Observation Checklist –D:** This checklist –D (refer to appendix C4 for details), was designed, and collated data on the availability and adequacy of the Emergency exits its related requirement required of halls of residence (as identified in the literature) and mandated by LI. The counts/data gathered as; Yes [Available] or No [Not available] and analysed with Excel spreed sheet in the form of Descriptive statistics expressed in the frequencies tables, and percentages aid answered RQ 1,2,3, 4, and 5 respectively. **WRITE–UP:** The researcher expressed facts obtained in percentages, bar charts and cross tabulation, synchronized the key issues that emerged, and how the analysis addressed the research questions and inferences made.
5. How, in the views of the study's participants, can the fire safety preparedness of the universities in the Central Region be improved to safeguard lives and property?	Means and standard deviations		

		questions and inferences made.	

Chapter Summary

This chapter has described the research design used, the study area, the target population, the sampling procedure, the data collection instruments, the data collection procedures and the data processing and analysis. The chapter has provided information on the methodological design used to answer Research Questions 1 to 5. The chapter involved a mixed-methods research design to investigate the FSP of the three public universities by collecting data through quantitative (i.e. semi-structured questionnaire and field observation checklist) and qualitative (i.e. interview guide). Quantitave Data were collected from 174 HoDs and analysed with the aid of descriptive statistical methods such as frequency tables, bar and pie charts, percentages, means and standard deviations. The SPSS software package was used to process the quantitative data that was gathered with the semi-structured questionnaire and observation checklist. The quantitative data was also complemented with the use of the field observation checklist through the physical inspections of established fire safety measures required of public departmental facilities as mandated by the L I 1724 of GNFS). Data obtained on the physical inspection and counts were analysed with the aid of descriptive statistical methods such as frequency tables, percentages, and means. Excel spread sheet was used for the analysis of the data.Then, qualitative data were obtained from all the three fire safety officers who were interviewed. The responsibities of the HoDs made them well-equipped to provide rich data. The data from the interview guide were thematically analysed.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This Chapter presents the results and discussion of the study. The presentation is organised in two parts. The first part presents the demographic characteristics of respondents/participants. The second part focuses on the results and discussion in line with the research questions posed namely; What fire safety measures are in place at public universities in the Central Region of Ghana?; How do public universities in the Central Region of Ghana ensure compliance with fire safety measures? What challenges do public universities face in the Central Region of Ghana in their attempts to comply with fire safety preparedness measures put in place by the authorities at their institutions? What is the state of fire safety preparedness of the concerned universities? and, How can fire safety preparedness of universities in the Central Region of Ghana be improved to safeguard lives and property?

Demographic Characteristics of HoDs

Out of the 174 respondents (academic and non-academic HoDs) who were given questionnaires to be involved in the study, 149 questionnaires were retrieved from the HoDs. This represents a return rate of 85.6%. This was due to the COVID-19 pandemic at the time of data collection which made it difficult to reach out to some of the respondents and some other respondents were indisposed at the time of data collection. Out of the 149 Heads of Departments who served as respondents for the study, 39 representing 26.0% were females and 110 representing 74% were males. This is illustrated in Figure 4.

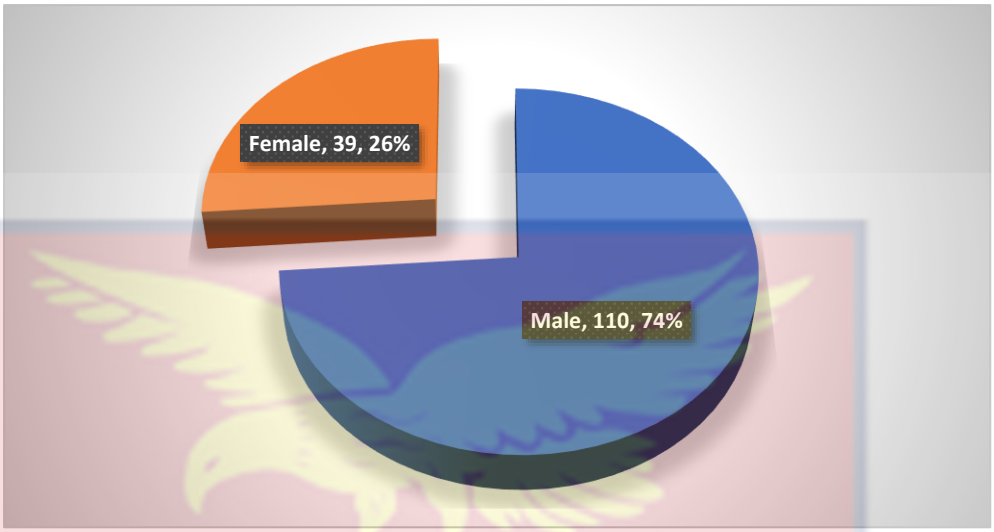


Figure 4: *Gender distribution of respondents*

Source: Field data, Amegbor Kwashie (2020)

It is clear that the participation of males (74.0%) was more than the females (26.0%). This points to the fact that Heads of Department in the public universities in the Central Region are largely males. In terms of the distribution of respondents from the three public universities engaged in the study, 64.0% (N=95) of the respondents were from UCC, 25.0% (N=37) were from the UEW-Winneba campus, and 11.0% (N=17) were from CCTU, as illustrated in Figure 5.

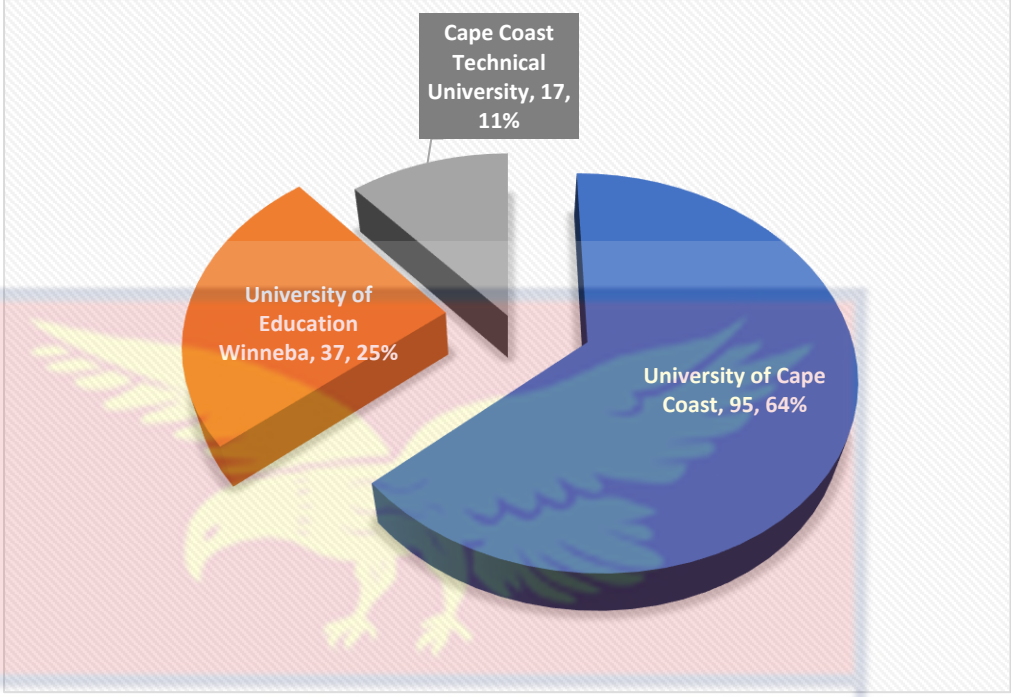


Figure 5: *Distribution of public universities in the Central Region engaged in the study*

Source: Field data, Amegbor Kwashie (2020).

As illustrated in Figure 5, the majority of heads of departments who participated in the study were from UCC (64.0%), followed by the UEW-Winneba campus (25.0%) and the least being 11.0% (N=17) from CCTU. Thus the number of departments in UCC was more than that of the UEW-Winneba campus and CCTU.

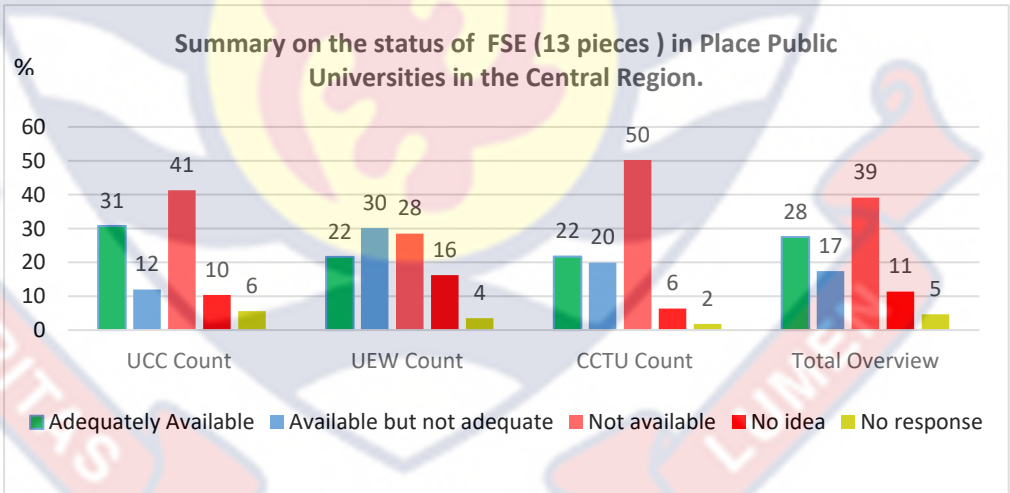
Demographic Characteristics of the Fire Officers

Interview sessions were held with three (3) fire safety officers who were also involved in the study. All the three fire safety officers who were involved in the study were males. Also, one fire safety officer was selected from each of the institutions; UCC, UEW and Cape Coast Technical University. Two (2) of the fire safety officers (UEW and CCTU) doubled as security officers. Again, it was realized that the fire safety officers who were involved in the study had worked between 6-15 years in their various institutions.

Fire Safety Measures (FSMs) in place at Public Universities

Research Question 1: What fire safety measures (FSMs) are in place at public universities in the Central Region (CR) of Ghana?

This research question sought to find out the fire safety measures (FSMs) in place in the three Public Universities in the CR of Ghana. Specifically, the question was to determine the availability, adequacy or otherwise of fire safety equipment, fire emergency exits and their condition, and the fire safety signage in the three Public Universities involved in this study. For the purposes of an orderly presentation, the findings of this research question are presented and discussed under the three headings, namely fire safety equipment, fire emergency exits; their condition and fire safety signage. Figure 6 presents the responses from the HODs of the various universities on the fire safety measures (FSM) that are in place in their institutions.



N=149 Source: Field data, Amegbor Kwashie (2020)

Figure 6: *Findings of FSE established in the UCC UEW-w and CCTU*

As shown in Figure 6 above, the 149 HoDs responses show that FSE was generally inadequate in all the departments in the three universities studied. For example, approximately 28.0% (n=41) of the HoDs' indicated that FSE was available and adequate, 17.0% (n=26) available and not adequate, 39.0%(n=58)

not available, 11.0% (n=17) no idea, and finally 5.0%(n=7) no responds respectively**.** This finding implies that 17.0% of the departments engaged in the study did not have sufficient FSE, 39.0% completely have no FSE to fight fire outbreaks, 11.0%, and 5% respectively appears uncertain on the availability of FSE in their departments. In light of this finding, one can opine that most of the departments in the three Public Universities in the CR of Ghana are exposed to fire risk and not in the position to safeguard lives and properties in an unexpected fire disaster.

Clearly, the inadequacy of FSE in the Universities engaged in this study indicates their non-compliance with GNFS LI 1724 of 2003. According to GNFS LI 1724 of 2003, all public facilities must have adequate FSE. It is worth noting that out of the 13 FSE identified in the literature as key in firefighting, only three, namely fire extinguishers (65.0%, n=97), a reliable water supply (58.0%, n=87), and the fire telephone numbers (54.0%, n=81) appeared to be available in most of the departments (see Appendices D1: Table 3 for further insight).

Analysis of Interview Sessions held with the Fire Safety Officers

The qualitative data collected through interviews with officers from three Public Universities engaged in the study corroborates the quantitative data from the HODs. For example, two out of the three fire safety officers (FSOs) interviewed stated that the FSE in their universities were inadequate. These disclosures are, for example, captured clearly in the words of Fire Safety Officer 2 (FSO 2) as follows:

... some equipment are not adequate and functional. For example, the hose reels, hydrants, emergency alarm systems, and smoke detectors. (FSO 2).

On the other hand, the third FSO could not pass judgment on the adequacy of the FSE in his university. The participants' inability to pass a value judgement on whether their FSE was adequate or not probably may be due to fear of exposing the university in question or lack of information.

Analysis of field Observation Sessions held in the various Institutions

To triangulate the quantitative and qualitative data, field observation checklist A (refer to Appendix C1) was developed to observe the availability and adequacy of the FSE in place in some randomly selected departments of the public universities studied. Table 3 presents the results of the observation sessions held in the various departments in UCC, UEW and CCTU on the availability and adequacy of the FSE in their institutions.

Table 3: Results of field observation checklist on FSE on some Departmental facilities of UCC, UEW-w and CCTU

Types of FSE observed (as identified in the literature and stated below)	Summary on the FSE in some departments facilities observed at UCC UEW-w and CCTU		
Fire hydrants, Heat detectors, Smoke detectors, Smoke control system, Fire extinguishers, sand buckets, fire evacuation alarm, fire escape ladders, reliable water supply, sprinkler supply, hose reel, fire service telephone number and Fire blankets	Inst. facilities observed	Availability of FSE f (%) Yes	No	Total Count (premises observed)
	UCC	122 (11.30%)	337 (31.20%)	459 (35)
	UEW-w	152 (14.10%)	301 (27.90%)	453 (35)
	CCTU	34 (3.20%)	133 (12.30%)	167 (13)
	Total overview	308 (29%)	771 (71%)	1079 (83)

Source: FSE Field data, Amegbor Kwashie (2020)

In all, a total of 83 premises were observed (refer to table 3 and Appendix D2 –Table 3, for further insight) to determine the availability and adequacy of the 13 pieces of FSE required to be in place according to the fire safety literature. The results indicated that 29.0% (n=24) of the premises had FSE in place whilst 71.0% (n=59) of the premises had no FSE. Thus, to a very high extent, these field observation findings corroborate both the quantitative and qualitative findings.

Table 4 presents the results of views of HoDs on the availability and adequacy of Emergency Exits (EEs) in UCC, UEW-w, and CCTU.

Table 4: Results of HoDs' views of the Availability and Adequacy of Emergency Exits (EEs) in UCC, UEW-w, and CCTU

HoDs' signals on availability and adequacy of EEs in some Department Facilities (as identified in the literature) studied.

Set of facilities studied	HoDs Responses	UCC Ave Count (%)	UEW Ave Count (%)	CCTU Ave Count (%)	Total Ave Count (%)
Lecture Halls/Laboratories Libraries, Lecturers', Offices, and Admin Blocks/Offices	Yes, and Adequate	27 (29)	11 (30)	6 (32%)	44 (29.5%)
	Yes, but not adequate	35 (36%)	14 (39%)	8 (44%)	56 (37.5%)
	Not Adequate	22 (23%)	7 (18%)	3 (19%)	32 (22%)
	No idea	5 (5%)	4 (9%)	0 (0%)	9 (6%)
	No response	6 (6%)	2 (4%)	1 (4%)	8 (6%)
	Total responses	95 (100%)	37 (100%)	17 (100%)	149 (100%)

Source: Status of EEs Field data, Amegbor Kwashie (2020)

From Table 4, the HoDs indicated that EEs was generally inadequate in all the departments in the three public universities (UCC,UEW-W, and CCTU) studied. The data presented in Table 4 clearly shows that, generally, only an

average of about 30.0% of the departmental facilities (i.e. lecture halls/lab, libraries, lecturers' offices, administration and blocks/offices) of the three public universities had adequate EEs. On institutional bases, the revelation from Table 4 indicated that, 29.0%, 30.0%, and 32.0% of the HoDs in UCC, UEW-W, and CCTU respectively responded 'yes', that EEs were available and adequate in their department facilities. Similarly, 36.0%, 39.0%, 44.0% respectively of the HoDs in UCC, UEW-W, and CCTU indicated that, EEs were available but not adequate. On the contrary, 23.0%, 18.0%, and 19.0% of the HoDs in UCC, UEW-W, and CCTU respectively indicated that, there were no EEs available in their department facilities. Furthermore, 5.0%, 9.0%, and 0.0% of the HoDs in UCC, UEW-W, and CCTU indicated respectively that, they had no idea of EEs available, and not only that, 6.0%, 4.0%, and 4.0% of the HoDs in UCC, UEW-W, and CCTU respectively did not respond, possibly because they were uncertain on the availability of EEs in their department facilities studied. This data somehow indicates a breach of the fire safety legislative instrument 1724 of 2003 of GNFS, requiring facilities such as public buildings to have EEs.

After establishing the availability and adequacy of in the various EEs departmental facilities, follow-up questions were posed to HoDs during the interviews conducted on the three FSOs and finally field observation checklist was conducted for further insight on the conditions (i.e. related accessories required) of the EEs. Thus, follow-up questions sought to find out conditions such as functional emergency escape light systems, clear labelling of fire assembly points, no grills/burglar-proof windows, unobstructed emergency exit doors, clear labelling of emergency exit routes, and fire emergency evacuation

maps on key exit doors, as required by GNFS LI 1724 of 2003. Figure 7 presents the views of HoDs on the conditions of the emergency exits explored.

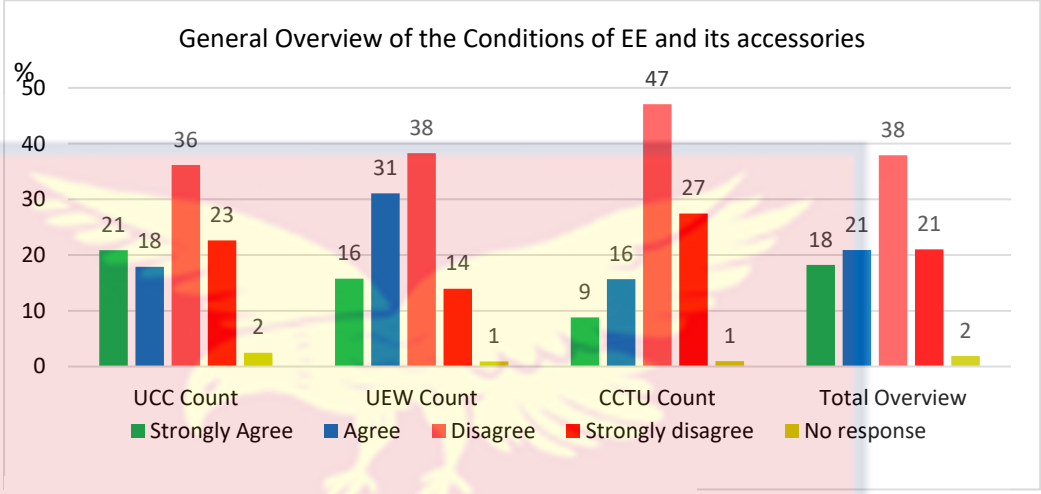


Figure 7: *Findings on HoDs' views of the condition of EEs explored.*

Source: Field data, Amegbor Kwashie (2020)

The findings of this follow-up questions item show that out of the approximately 30.0% of the facilities that had adequate EEs, 18.0% and 21.0% (i.e. in sum 39.0%) of the HoDs strongly agreed and agreed respectively that, the emergency exits were in good conditions as required by GNFS LI 1724 of 2003. On the contrary, 38.0%, 21.0% and 2.0% (i.e. in sum 61%) indicated disagreed, strongly disagreed, and no response respectively that, the EEs' related accessories were in good condition. Refer to Figure 7 for summary findings (see Appendix D4: Table 5 for details). The importance of having EEs in public facilities have been advanced in the literature on fire safety. For example, according to Delcea, Cotfas, and Paun (2018), a proper EEs help to reduce evacuation time and the number of casualties in the event of emergencies such as fires. Likewise, Liu, Chen, Tian, Wang, and Li (2020) assert that when a fire disaster occurs, effective evacuation of people and property largely depends on good emergency exits.

Analysis of Interview Sessions held with the Fire Safety Officers

In terms of the qualitative data, the responses of the three FSO interviewed in the study indicated that EEs and their condition were inadequate in most of their departments. For example, the three FSOs had these to say:

> *... we have emergency exits(EEs) and routes in place, yet they are inadequate. EEs and routes are just a few. The university not long ago identified and made some additional EEs points… (FSO 1).*
>
> *... the overall status and condition of EEs on [our] premises may be rated at 40% in terms of availability and adequacy. The new premises of the university have EEs, as compared with most of the old premises, which do not. A few of the old residential halls that have EEs are ..., which have their EEs always locked, perhaps due to robbery threats. The [new] hostel and new administration block ... have adequate EEs and generally the required FSM in place (FSO 2)*
>
> *Our buildings have EEs on most of their premises. Our development officer has been asked by management to make sure that any new buildings have EEs and that exits should be installed in the few old buildings without EEs (FSO 3).*

As captured in the extracts above, these findings confirm that the EEs were neither in good condition nor adequate and called for improvement, despite the evidence that a few functional EEs were in place.

Analysis of Observation Sessions held in the various Institutions

The findings of the observation conducted at the lecture halls, laboratories, libraries, department offices, and administration blocks in the three

public universities as shown Table 6, and Appendix D5: Table 6 essentially confirmed the findings generated through the quantitative data (questionnaire) and the qualitative data (interviews). Thus, only 24% (70/297) of the facilities observed had EEs and related accessories in place. This means that the majority (76%) of the facilities observed did not have appropriate escape routes as required by GNFS LI 1724 of 2003. Therefore this revealing situation might lead to high level of casualties and property damage in the event of unexpected emergencies (Delcea, Cotfas, & Paun, 2018).

Table 5: Results of Observation checklist C on the condition of EEs

Summary findings on EE (as identified in the literature) available in department facilities

Overview of condition of FEE (as identified in the literature and stated below)	Institution Observed	Lec halls & labs f (%)		Libraries f (%)		Dept. offices f (%)		Admin blocks/offices f (%)		Total premises f (%)
		Yes f (%)	No f(%)	Yes f(%)	No f (%)	Yes f(%)	No f (%)	Yes f (%)	No f (%)	
Functional FEE doors, FEE map on each exit door, Clear labelling of emergency exit (EE) routes, EE door ways are unobstructed, Windows are free of grills/burglar-proofing, Functional emergency escapes light systems, and Clear labelling of fire assembly points).	UCC	16(5)	47(16)	16(5)	33(11)	10(3.4)	58(20)	12(4)	35(12)	227(76.4)
	UEW	2(1)	12 (4)	3(1)	11(4)	1(0.3)	13(4)	4(1)	3(1)	49(16.3)
	CCTU	3(1)	4(1)	2(1)	5(2)	0(0)	0(0)	1(0.3)	6(2)	21(7.3)
Total frequency (%)		**21(7)**	**63(21)**	**21(7)**	**49(17)**	**11(3.7)**	**71(24)**	**17(5.3)**	**44(15)**	**297(100)**
Result obtained		Only 24% of the facilities observed had EEs and its related accessories in placed. This means that the majority 76% of the departments observed did not have appropriate EEs as required by GNFS LI 1724 of 2003.								

Source: EEs and its accessories Field data, Amegbor Kwashie (2020).

In line with research question one, the researcher sought to determine the availability and adequacy of FSS and notices as required by GNFS LI 1724 of 2003 and international fire safety standards. As indicated in the literature, fire safety signage (FSS) and notices are widely used in buildings to provide general information and safety messages to occupants to assist them to access the building (Hui, 2011). Insights from the self-administered questionnaire, semi-structured interviews, and field observation checklist were employed to assess the availability and adequacy of FSS and notices as required by GNFS LI 1724 of 2003 and international fire safety standards. Table 6 presents the views of HoDs on the status of fire safety signage and notices in the various departments in the universities.

Table 6: Findings on the status of FSS and notices in place at some departments explored in UCC, UEW, and CCTU

Findings of FSS in some Department Facilities Studied UCC, UEW-w, & CCTU					
Set of Facilities engaged	HoDs' Responses	UCC Ave Count (%)	UEW-w Ave Count (%)	CCTU Ave Count (%)	Total Overview Ave Count (%)
Lecture halls/Labs, Library, Lectures' offices, Administration Block/Offices	Yes, Adequate	18 (19.0)	3 (7.0)	3 (19.0)	24 (16.0)
	Yes, but not adequate	27 (29.0)	15 (41.0)	7 (38.0)	49 (33.0)
	Not Adequate	35 (37.0)	14 (38.0)	7 (38.0)	55 (37.0)
	No idea	8 (8.0)	4 (11.0)	0 (0.0)	12 (8.0)
	No response	7 (7.0)	1 (3.0)	1 (4.0)	9 (6.0)
	Total responses	95 (100)	37 (100)	17 (100)	149 (100)

Source: Field Data, Amegbor Kwashie (2020)

Table 6 indicates that, the HoDs signalled that FSS and notices were basically insufficient in all the departments in the three universities studied. The data presented, evidently shows that, generally, out of the 149 HoD respondents, 16.0% (n=24) said "yes", FSS and notices were available and adequate, and 33.0% (n=49) said "yes", FSS and notices were available but not adequate. Surprisingly, 37.0% (n=55) said there were neither FSS nor notices in place in their department,

and 8.0% (n=12) neither had any idea of the availability of FSS nor idea on the notices in their departments. Finally, 6.0% (n=9) did not respond, perhaps due to the fear of exposing their departments on the non- availability or inadequacy of FSS. The data presented in Table 6 revealed (refer to Appendix D6: Table 6 for details), clearly shows that, generally majority of the lecture halls, laboratories, libraries, lecturers' offices, and administration blocks/offices had inadequate or no FSS in place. This finding contradicts the fire safety standards and LI 1724 of 2003 of GNFS. Insufficient FSS and notices endangers evacuation process of occupants, instructional materials, tools and equipment of the facilities. For instance, in the event of a fire disaster, the lack of adequate signage might increase occupants' fear and panic, leading to higher numbers of casualties and property damage.

Analysis of Interview Sessions held with the Fire Safety Officers

The results of the semi-structured interviews also suggested that there was inadequate FSS and notices. This is evidenced by some statements from the three FSOs interviewed:

> *Our FSS and notices posted on its three campuses (i.e. South, Central, and North). This signage serves as a tool for communication about the dangers and prohibitions with regards to fire.*
>
> *In all, I rate the university about 90%–98% for the signage and notices (FSO 4).*
>
> *In the case of UCC, FSS and notices are found at vantage positions of the university's premises and yards. However, I admit that the signage is somewhat inadequate (FSO 3).*

Similarly, the CCTU facilities, generally have inadequate signage in place (FSO 2).

The findings of the self-administered questionnaires and semi-structured interviews, as revealed by the excerpts above, all confirmed the results of the field observations conducted to observe the availability and adequacy of FSS and notices in lecture halls, laboratories, libraries, halls of residence, lecturers' offices, and administration blocks/offices. These premises were purposely selected because of their fuel loads and the human activities they host on a daily basis. They were also conveniently selected, since not all the rooms within these premises were available at the time the study was conducted due to the COVID -19 pandemic, which led to a partial shutdown of the universities.

Analysis of Observation Sessions held in the various Institutions

Generally, the results also revealed that inadequate FSS and notices were in place. In all, 35 premises of the three public universities were observed with the aid of checklist B (refer to appendix C2). The data were analysed as indicated in Table 8. The results indicated that out of the 35 premises observed, only 4 out of the 35 premises representing 11.0% had adequate, and 31 out of the 35 premises representing 89.0% had inadequate FSS and notices in place respectively. This finding indicates that these facilities are at risk, as the lack of adequate signage contradicts GNFS LI 1724 of 2003, which regulates fire safety in public learning institutions.

In conclusion, the findings of the self-administered questionnaire, semi-structured interviews and field observations all indicate that there were inadequate

FSS and notices on the premises of UEW-Winneba, UCC, and CCTU. In line with these findings, Peleg (2010) explains that FSS and notices appropriately displayed can reduce the number of fatalities should a crisis occur. In the light of this finding, the administrators of the universities studied need to attend to the situation to avoid possible signage and notice miscommunication among students and staff and rescue teams in the processes of evacuating and gaining access to the premises, respectively, in the event of a fire emergency.

Table 7 presents the results of the observation checklist on the FSS and notices in place at the three public universities' facilities studied.

Table 7: Results of Observation Checklist on FSS and Notices in place at the three public universities' facilities studied

Types of facility observed	Findings on FSS and Notice in place some department of public universities observed in the C/R			
Lecture halls and Labs, library, Lectures' offices and Admin. Block/Offices of the three public Univ. in C/R.	Institution engaged	Availability of FSS		Total premises observed
		Adequately Yes f (%)	Yes , but not adeq. f (%)	
	UCC	0 (0%)	20 (57%)	20
	UEW-w	4 (11%)	6 (17%)	10
	CCTU	0 (0%)	5 (14%)	5
	Total responses	4 (11%)	31 (89%)	35

Source: FSS and notices Field data, Amegbor Kwashie (2020).

The researcher investigated the following FSMs in place at public universities in the Central Region of Ghana: *fire safety equipment, fire emergency exits and their condition,* and *fire safety signage,* all of which are required by safety-related legislative instruments. Quantitative (i.e. using a self-administered questionnaire and observation checklist) and qualitative (i.e. using semi-structured interviews) data collections were conducted at three public universities in the

Central Region of Ghana, and the data were analysed to explain the availability and adequacy of FSMs.

The analysis of the quantitative (refer to Tables 3, 5, 6, & 7, and figure 6, 7, 8, & 9 respectively) and qualitative data showed that the FSMs in place at the studied public universities in the Central Region of Ghana were generally inadequate during the study. These findings confirm those of many other studies (Amoako 2015; Kachenje, Nguluma, & Kihila, 2010; Makachia, Gatebe, & Makhonge, 2014; Sankey & Omole, 2014) on the causes of fire disasters in schools in Tanzania, Kenya, Nigeria, and Ghana. The study identified unavailable or insufficient fire safety equipment and facilities as factors causing fire disaster and property loss in learning institutions in Africa. The findings were also in line with Akomah and Kotey (2018), which showed non-compliance with safety rules and regulations in public senior high schools in the Cape Coast Metropolis in the Central Region of Ghana. As a result, Akomah and Kotey (2018) recommended that government or school authorities should ensure that adequate FSMs are provided on school premises to help safeguard lives and property. Where schools cannot provide FSMs for financial reasons, they should ask their alumni and parent–teacher associations to assist.

These findings align with the existing literature and emphasize that administrators of learning institutions should implement the FSMs that have been mandated and not view it (FSMs) as a written policy or legislative instrument. Full commitment is required to ensure that fire safety decisions are made and

requirements met to help safeguard lives and properties in the event of a fire disaster (Petersen, 2008).

How Public Universities ensure compliance with the FSM

Research question 2: How do the public universities in the Central Region of Ghana ensure compliance with the FSMs identified in Research Question (RQ)1?

The aim of this research question was to explore how the public universities in the region ensure compliance with the FSMs. The responses of the 149 HoDs were explored quantitatively. In addition, semi-structured interviews were conducted with the FSOs of the three public universities. Table 8 presents the views of HoDs on the measures taken by universities to ensure compliance with FSMs.

Table 8: Measures taken by universities to ensure compliance with FSMs

Ways of Ensuring Compliance	Mean	SD	Interpretation
Periodic drills/training for users of facilities.	2.63	.97	Agreed
Regular orientation programmes on fire safety protocols for users of facilities.	2.94	.87	Agreed
Prompt updating of fire extinguishers	2.93	.97	Agreed
Provision of fire safety guidelines brochure to all users of departmental premises.	1.75	.94	Disagreed
Regular and uninform inspections of the departments' premises.	2.03	.96	Disagreed

Source: Field data, Amegbor Kwashie 2020

Scale:

1= Strongly Disagree; 2= Disagree,

3= Agree, 4= Strongly Agree

Mean of means = 2.46

Mean of Standard Deviation = .94

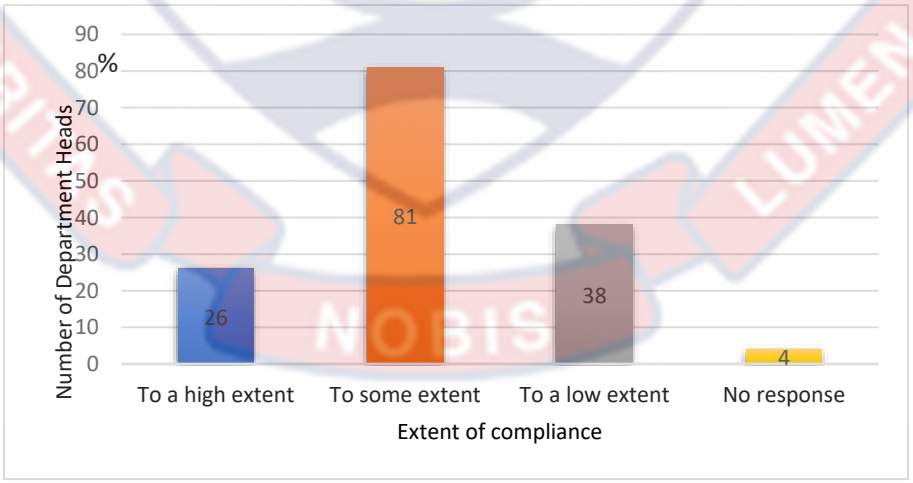
Table 8 sought to find out the the measures taken by universities to ensure compliance with FSMs. The means and standard deviation were obtained based on the responses recorded for each of the items on the questionnaire that were given to the HoDs. A mean of means of 2.46 and a mean of standard deviation of .94 were realized. This means that the majority of the HoDs agreed to most of the statements that were posed to them about the measures taken by the universities to ensure compliance with FSMs. Further discussions of individual items are presented in the paragraphs below.

From Table 8, the HoDs agreed (with mean scores of 2.63, 2.94, and 2.93) that their universities organise periodic drills/training for occupants and users of their facilities, promptly replace their fire extinguishers, and organise regular orientation programmes for users of their facilities on fire safety protocols, respectively. Some HoDs disagreed (with mean scores of 1.75 and 2.03) that there were regular and uniform inspections of the departments' premises and also disagreed that the universities provided a fire safety guidelines brochure to all users of the departments' premises. The high standard deviation of .97 achieved for periodic drills/training for users of facilities and prompt updating of fire extinguishers indicated that there were variations in the responses recorded for those items. Yet, it still holds that the majority ot the HoDs agreed to these statements.

Although the results are reasonably positive, the mean scores fall below the agreed decision rule of 3.00 to 4.00 ('strongly agree'). Thus, it might be argued that the universities' efforts to ensure compliance with the FSMs (i.e. providing periodic drills/training for users of their facilities, promptly replacing fire

extinguishers, and providing regular orientation programmes on fire safety protocols) were relatively good. However, it is necessary to further ensure strict compliance in the three universities studied. In addition, the HoDs disagreed with the statements that the universities conducted regular and uninform inspections of the departments' premises and provided a fire safety guidelines brochure to all users of the departments' premises, with mean scores of 1.75 and 2.03, respectively. Given these findings, it is also safe to say that the HoDs signalled a lack of strict compliance with the FSMs. These findings align with the statement of Kwateng, a public relations officer of the GNFS, that the increase in fire outbreaks in Ghana is largely due to the disrespect of fire safety rules and regulations (Ghana News Agency, 2019). Similarly, Peleg (2010) posits that since it is virtually impossible to avoid mass disasters such as fire, it is necessary for stricter compliance mechanisms, especially regular and uninforms inspections of premises and the provision of a fire safety guidelines brochure to all users of premises to help reduce the impact of disasters.

Figure 8 presents the extent to which users comply with fire safety measures.



Source: Field data, Amegbor Kwashie 2020

Figure 8: *Extent to which users comply with fire safety measures*

As a follow-up to the findings presented in Table 8, a questionnaire item was developed (with response options of 'A. to a high extent', 'B. to some extent', 'C. to a low extent', and 'D. no response') to explore the extent to which the HoDs thought the users of their departmental facilities complied with the FSMs. This investigation was crucial in gaining a general understanding of compliance at the various departments. Out of the 149 HoD respondents, 17.0% (n=26) indicated that there was a high extent of compliance, 54.0% (n=81) indicated that there was compliance 'to some extent', 26.0% (n=38) indicated that there was compliance 'to a low extent', and 3.0% (n=4) did not respond, perhaps because they were unsure of the FSMs and compliance situation at their institutions. Thus, most of the HoDs indicated that compliance with the FSMs at the time of the study was slightly above average (i.e. 54.0%, n=81/149). This suggests that the fire safety compliance culture was good.

These findings resonate in many ways with the literature review, which showed that Ghana has developed institutional frameworks and has enacted legislation (such as LI 1724 of GNFS) which, among other things, seeks to guarantee the cooperation and coordination of key stakeholders (students, staff, administrators, and GNFS) in avoiding fire disaster. Unfortunately, compliance is still not optimal, and this results in increased exposure of national assets to avoidable fire disasters (Owusu-Sekyere et al., 2017). Relatedly, Melvin (2018), opined that many fire cases could have been prevented if the Ghanaian public firmly adhered to mandatory fire safety rules and measures.

Analysis of Interview Sessions held with the Fire Safety Officers

The findings of the semi-structured interviews corroborated the quantitative findings regarding compliance with FSMs. The three FSO indicated that their universities generally ensured compliance through awareness and orientation programmes and fire drills, yet they indicated that there was room for improvement. This claim is evidenced by the following excerpts from the semi-structured interviews presented below.

> *To ensure compliance in UEW-Winneba, we have so far given the education needed through orientations and drills to deal with fire and its usage, ……. until the arrival of fire officers. Furthermore, regarding compliance level, I would say there is still room for improvement, because people behave differently once they bear the name 'student'. Generally the compliance level in the university is about 50%. Honestly, there is more to be done to ensure total compliance (FSO 4).*

Regarding the situation at CCTU, FSO 2 indicated that:

> *…the school often takes advantage of official gatherings to create awareness of the need for fire safety. In conclusion, he posited that CCTU's fire safety compliance level may be described as good, but it could be better (FSO 2).*

Regarding the situation in UCC, FSO 3 responded that:

> *…as part of the university administration's effort to ensure compliance, they procure required FSE systematically; and they*

ensure that orientation, drills, and sensitization programmes are done as many times as required, that fire station vehicles are fuelled for patrols, and that recommendations made by the UCC station unit are addressed (FSO 3).

The findings from Table 8, Figure 8, and the excerpts of the interviews show that majority of HoD's and the three FSOs stated that the universities are making a conscious effort to ensure compliance. Yet, in the view of FSO 2, the *compliance level may be described as good, but it could be better,* and according to FSO 4, *there is more to be done to ensure total compliance.* These signals corroborate the findings of Agyekum et al. (2017) and Akomah and Kotey (2018) that a lack of strict compliance with mandated FSMs increases the risk of fire outbreaks at public senior high schools in developing countries such as Ghana. Weak fire safety compliance in the public universities studied may have resulted in an increased exposure of these national assets to avoid fire disasters.

Challenges Public Universities Face in their Attempt to Comply with the Fire Safety Preparedness Measures Put in Place by the Authorities of their Institutions

Research question 3: What challenges do the public universities in the Central Region of Ghana face in their attempt to comply with the fire safety preparedness measures put in place by the authorities of their institutions?

Following on from the results indicating inadequate FSE, EEs, FSS and notices, and fire safety compliance in the public universities in the Central Region of Ghana, RQ3 investigated the challenges these public universities face in their

attempt to comply with the FSP measures put in place by the authorities of their institutions. This section presents and discusses the findings derived from the quantitative analysis of the responses of the 149 HoDs, and the qualitative analysis of the semi-structured interviews conducted with the three FSOs. Table 10 presents the views of the HoDs on the challenges public universities face in their effort to comply with FSMs.

Table 9: Challenges Public Uviversities Face in their Effort to Comply with FSMs

Challenges	Mean	SD	Interpretation
Inadequate human resources to educate users of our facilities on fire safety protocols	3.14	.89	Agreed
Inadequate financial investment in fire safety measures	3.02	.76	Agreed
Mismatch between the capacity of facilities and the number of users (e.g. overcrowding of offices and lecture halls)	3.03	.81	Agreed
Inferior fire safety equipment	1.92	.86	Disagreed
Lack of fire safety policy	1.51	.89	Disagreed
Lack of commitment to fire safety protocols by users	3.37	.84	Agreed

Source: Field data, Amegbor-Kwashie (2020)

Scale:

1= Strongly Disagree; 2= Disagree,

3= Agree, 4= Strongly Agree

Mean of means = 2.67

Mean of Standard Deviation = .84

From Table 9, a mean of means of 2.67 and a mean of standard deviation of .84 were achieved on the challenges public universities face in their effort to comply with FSMs. The means and standard deviation were obtained based on the responses recorded for each of the items on the questionnaire that were given to the HoDs. This means that the majority of the HoDs agreed to most of the statements that were posed to them about the challenges public universities face in their effort to comply with FSMs. Details of the individual items are presented in the paragraphs below.

Table 9 presents the quantitative results. The interpretation of Table 9, as in the case of Table 8, is guided by a decision rule. This rule specifies that mean scores from 3.50 to 4.40 and 2.50 to 3.40 indicate that respondents 'Strongly agreed' and 'Agreed', respectively, with the statements regarding fire safety compliance challenges, while scores from 1.50 to 2.40 and 0.50 to 1.40 indicate that they 'Disagreed' and 'Strongly disagreed'.

Table 9 shows that all 149 HoD's who participated in the study agreed with mean scores of 3.02, 3.03, 3.14, and 3.37, that their universities faced challenges in their attempts to comply with the FSP measures. These challenges included inadequate financial investment in FSP measures, a mismatch between the capacity of their facilities and the number of users (e.g. overcrowding at offices and lecture halls), inadequate human resource to provide education for users of their facilities regarding fire safety protocols, and a lack of commitment to fire safety protocols among users. The high standard deviation of .89 achieved for inadequate human resources to educate users of our facilities on fire safety protocols indicated that

there were variations in the responses recorded for those items. Yet, it still holds that the majority ot the HoDs agreed to these statements. Furthermore, some of the HoD's disagreed (with mean scores of 1.51 and 1.92) that the universities lacked fire safety policies and had inferior fire safety equipment in place.

Together, these findings suggest that some of the challenges that impede the universities' attempts to ensure compliance none of the HoDs strongly agreed (with mean scores ranging from 3.50 to 4.40) with the statements; rather, they agreed with most of the statements (with mean scores ranging from 2.50 to 3.40) that these obstacles were indeed hindering their attempts to comply, as indicated in Table 9. Thus, perhaps the challenges were not major obstacles to the universities' attempts to ensure compliance. Based on these results, one could argue that the challenges that impede the universities' attempts to ensure compliance are not unmanageable. However, more commitment among administrators might be required to help address the challenges.

Analysis of Interview Sessions held with the Fire Safety Officers

To summarise, Table 9 indicates a number of points that the majority of the HoDs agreed were challenges preventing the three universities' attempts to be current in terms of FSP. Additionally, these findings were largely corroborated by the majority of the FSOs interviewed. Excerpts from their statements that confirm these challenges are provided below. FSO 2 indicated that:

> *the lack of fire safety policy guidelines to direct the UEW-Winneba campus fire safety operations is a challenge'. 'I must say it has been drafted and submitted to the university management for further*

actions. For example, the administration of UCC put together a drafted Fire Safety Policy Guideline in 2016. Although a very good initiative, it is still waiting for approval. Similarly, CCTU unfortunately is yet to have fire safety policy guidelines to guide its fire safety operations'. The UEW-Winneba campus has spelled out fire safety rules and regulations, yet not everything is being adhered to by all the users (i.e. some students and staff) of the university facilities. ... In general, the compliance level with the FSMs in place is about 50% (FSO 4).

In relation to human resource challenges, Fire FSO 4 expressed the view that*:*

*'UEW-Winneba campus needs extra staff to help safeguard lives and properties'***.** Nevertheless, he admitted that*: 'the available human resources should be managed, because the school's management is not in a position to pay for extra hands' (FSF 4).*

Finally, FSO 4 disclosed that*:*

'UEW-Winneba campus needs additional fire safety equipment and material resources to help safeguard lives and property'. He agreed that*: 'although management has done well by providing some of the materials needed, more is still required'*.

Concerning the situation at UCC, FSO 3 pointed out that*:*

'another challenge impeding compliance is the absence of strategies to compel staff and students to comply with the FSMs in place'.

Although the school has some rules and regulations, I believe stricter measures are needed to compel students and staff to comply. He said that*: 'during hall week celebrations, for instance, some students play with fire extinguishers despite the orientation they receive regarding fire safety.'* Additionally, FSO 3 indicated that*: 'several students do not take drills and orientation programmes seriously, let alone participate in sufficient numbers for the intended purposes to be realized'.*

Another challenge at UCC is careless use of electricity by some staff and students in certain premises of the university. Fire incidents on campus are mostly caused by electricity-related problems. A key example is when a fire due to an overload of electrical sockets destroyed the property of the College of Agriculture. The office where the fire began had only one electrical socket powering computers, printers, a freezer, and other electrical appliances, which goes against fire safety regulations. The fire incident could also be attributed to a poor electrical wiring system with regards to space and electric appliances meant for the office (FSO 3).

Concerning other potential causes, FSO 3 believes that*: 'a weak/old electrical wiring system on the old premises of the university is the major cause of fire outbreaks on campus. For example, the College of Agriculture blocks, or possibly the entire Science block of the university, need total refurbishment' (FSF 3).*

In addition, the inability to ensure strict compliance with the FSMs could explain why some students misuse fire extinguishers and other equipment during hall week celebrations on campus. It is hoped that authorities will put strict measures in place by surcharging students to this effect in future (FSO 3).

Furthermore, there are some challenges with compliance with FSMs at Sam Jonah Library. That is, the alley/lane around the outer perimeter of the library is completely inaccessible to fire. Part of the alley/lane has been blocked by parked vehicles and other impediments. Another example is that Valco Hall, Casford Hall, Oguaa Hall, and ATL Hall do not have enough alleys to allow fire fighters access to the inner and outer perimeters of the hall. Fortunately, some of the new blocks and premises have alleys/lanes around them. Unfortunately, the new administration at the new site of the UCC, for instance, has no alley for fire fighters to access its inner perimeter, even though the outer perimeter has an alley around it (FSO 3).

Furthermore, the social science departments and science block have no alley for fire fighter access. In addition, the exit from the science block has been blocked with metal gates to prevent burglaries. This also affects compliance with fire safety requirements. For example, blocked access alleys and delayed access of fire service crews and fire fighters had consequences for the last fire incident at the science

block in December 2019 (FSO 3). Aside from the problems of access for fire fighters, there is overcrowding in some offices and lecture and residential halls. Rooms designed for three people are occupied by six people in some residential halls. Some administration spaces were not designed for office usage, yet they are used as offices and overcrowded with personnel and office equipment (FSO 3).

Speaking on the situation at CCTU, FSO 2 shared the view that*:*

the school needs enough personnel to safeguard its property against fire outbreaks. He indicated that the university has insufficient human resources to effectively monitor compliance with the fire safety protocols and fire risk activities. 'I wish we had a senior fire safety officer to be directing us on the modern trends of fire safety… I wish we had enough fire safety equipment in all the lecture halls, workshops, and offices. The university management has always had the desire to get all the necessary FSE, but due to financial constraints, the university is always challenged', he said.

In sum, these excerpts from the interviews with the FSOs revealed that fire safety policy guidelines were not operationalised to direct fire safety activities effectively at the three institutions studied. Numerous problems were identified, including the nonexistence of strategies to compel staff and students to comply with the FSMs in place, inadequate FSE, careless use of electricity by staff and students on certain premises, misuse of FSE by students, poor participation of students and staff in drills and orientation programmes, old premises inaccessible to fire fighters,

overcrowding in some offices and lecture and residential halls, financial constraints, and insufficient personnel to safeguard lives and property against fire outbreaks. The interview findings confirm the quantitative findings discussed above and reveal the challenges public universities in the Central Region face in their attempt to comply with FSMs.

Altogether, the concerns of the HoDs and FSO indicate that the university leadership should be more committed to equipping departments appropriately to ensure full compliance with fire safety rules and regulations. This, however, conforms to the widely held view that one of the major challenge institutions and schools face in attempting to comply with the mandatory FSMs is a lack of leadership commitment (Hope, 2016; Mwangi, 2016; Nunoo, 2017; Owusu-Sekyere et al., 2017; Russell, 2019; United States Fire Administration (USFA), 2015). According to Carr (1932), the collapse of social protection rules (i.e. noncompliance with fire safety requirements) leads to disaster.

GNFS believes that many of the fires in schools could have been prevented if the Ghanaian public (i.e. administrators, staff, and students) adhered to mandatory fire safety rules and measures (Melvin, 2018). Besides, GNFS's believes that Ghanaians' non-compliance with fire safety requirements have caused many of the fires in schools, the United Nations International Strategy for Disaster Reduction (UNISDR) has found clear signals that perhaps developing countries with weak governance (i.e., leadership) systems are more defenceless and less resilient to disaster risks such as fires (United Nations Office for Disaster Risk Reduction, 2013, 2015). All these assertions, point to the fact that, one of the key

challenges to full compliance with the mandatory FSMs in public schools is weak or ineffective leadership commitment to ensuring compliance (Melvin, 2018). Although it must be admitted, however, that efforts have been made to safeguard lives and property of the university studied (FSOs, 2, 3, & 4).

What the Discussions Suggest About the Fire Safety Preparedness (FSP) of the Universities

Research question 4: What are the fire safety preparedness (FSP) of the universities concerned?

The aim of this research question was to determine the FSP of the universities concerned. The findings related to RQs 1, 2 and 3 regarding the FSP of the universities were as follows:

To begin with, RQ 1 explored the FSMs in place at the public universities in the Central Region of Ghana. The related discussion suggests that the FSMs (i.e. FSE, EEs, and their condition, and FSS, all of which are commonly recommended in the literature) in the public universities' departments are generally inadequate (refer to Tables 3, 4, 5, 6 and 7 and Appendices D1, D2, D3, D4, D5, D6, and D7). The findings obtained from the qualitative studies suggest that the availability and adequacy of FSE in the departments explored was inadequate. In the quantitative findings, 41/149 (28.0%) HoDs pointed to the same inadequacy of FSE in the departments studied.

Therefore, the qualitative and quantitative findings all confirmed that there was inadequate FSE installed at the universities' departments. In addition, the majority of the HoDs and FSOs admitted that the FSE and related facilities in their

departments were generally inadequate at the time of the study. These findings call for adequate FSE and facilities to be put in place in the departments. Admittedly, however, there were also some fairly positive indicators. For example, many HoDs (65.0%, n=97) indicated that their departments had fire extinguishers, 58.0% (n=87) access to a reliable water supply, and 54.0% (n=81) reported the availability of fire telephone numbers at their department. Nevertheless, 28.0% (n=41/149) of the HoD respondents implied that there is room for improvement in terms of the installation of FSE in departments across the public universities studied. These findings suggest that the universities concerned are not adequately prepared in terms of FSE. The findings align with Nadzim and Taib's (2014) argument that school buildings require further improvement in terms of both active and passive fire protection systems. For instance, adequate fire equipment should be provided to schools, and management should frequently inspect and maintain fire protection equipment.

Secondly, the discussion with regard to RQ 2 intended to explore how public universities in the Central Region of Ghana ensure compliance with the FSMs**.** The responses to this item (as indicated in Table 8) show that the HoDs agreed that their universities organise periodic drills for the occupants and users of their facilities, promptly update their fire extinguishers, and organise regular orientation programmes on fire safety protocols for the users of their facilities. Nonetheless, some HoDs disagreed that regular and unexpected inspections of the departments' premises were conducted and that the university offered a fire safety guidelines brochure to all users of the departments' premises. Even though the

results were reasonably positive in terms of compliance with FSMs, none of HoDs involved in the study strongly agreed with any of the statements regarding compliance with FSMs Hence, it may be argued that the efforts of the universities to ensure compliance with the FSMs were relatively good. However, it is necessary to further ensure strict compliance in the three universities studied. The HoDs also disagreed that the universities conducted regular and uninform inspections of the departments' premises and provided a fire 'safety guidelines brochure to all users of the departments' premises (with mean scores of 2.03 and 1.75, respectively).

Concerning RQ 2, the researcher further explored the extent to which users of the departments complied with the FSMs. With this, 54.0% (n=81) of the HoDs confirmed that there was compliance 'to some extent' (refer to Figure 9 for details). This indicates that compliance with FSMs in the various universities' departments was generally slightly above average. This finding suggests that fire safety compliance may be good but could be better. For this reason, efforts to ensure compliance with the FSMs identified in RQ1 must be improved in the departments that were studied.

The findings from the semi-structured interviews corroborated the quantitative results. For example, FSO 4 attested to the fact that *'generally, ensuring compliance at their university was average, and there is more to be done to ensure total compliance'*. In addition, FSO 2 confirmed that *'the university's fire safety compliance level may be described as good, but could be better'*. Table 9, Figure 8, and the findings of the interviews all suggest that the majority of HoDs

and the three FSOs agree that the universities are making a conscious effort to ensure compliance.

The HoDs' and FSOs' responses show that the universities ensure compliance with FSMs to some extent. Although the analysis suggests that the universities are doing fairly well to ensure compliance, the statements of FSO 2 show that more to be done to ensure total compliance. To conclude, the universities concerned are partially fire safety prepared with regard to compliance. On this point, one can agree with Hassanain (2006), who opined that school administrators, in consultation with the local fire safety department and in cooperation with teachers and HoDs must ensure compliance with FSMs in schools. This suggestion, if implemented, may help to ensure total compliance with the FSMs.

Again, with regard to RQ 4, the discussion in RQ 3 aimed to explore the challenges the public universities in the Central Region of Ghana face in their attempts to comply with the FSP measures put in place by the authorities of their institutions. The HoDs' and FSOs' responses to this item suggest that leadership should be more committed to equipping the various departments appropriately to ensure full compliance with the fire safety rules and regulations. For example, some of the challenges universities faces in their attempt to comply with the FSMs are indicated in Table 9. These findings were largely corroborated by the majority of the fire safety officers interviewed. In brief, it was discovered that fire safety policy guidelines are not operationalized to direct fire safety activities effectively, there are no strategies in place to compel staff and students to comply with FSMs, FSE is inadequate, electricity is used carelessly by staff and students on certain

premises, students misuse fire safety equipment, students' and staff's participation in drills and orientation programmes is often not encouraging (refer to the interview excerpts related to Research Question 2 for details). These interview findings confirm the quantitative findings (refer to Table 9). These results, however, endorse the widely held view that one of the major challenges institutions face in attempting to comply with mandatory FSMs is a lack of leadership commitment (Hope, 2016; Mwangi, 2016; Nunoo, 2017; Owusu-Sekyere et al., 2017; Russell, 2019; United States Fire Administration (USFA), 2015). These challenges may all point to a need for leadership commitment to operationalize FSMs as mandated by fire safety legislative instruments. They also suggest that the universities concerned are readily fire safety unprepared against any unforeseen fire disaster. Possibly based on this concern, Hassanain (2006) also suggested that school principals should establish and implement fire safety programs that place a strong emphasis on fire safety education and ensure that regulations pertaining to fire safety are communicated to staff and that staff adhere to these regulations.

To summarize, RQ 4 sought to explore what the discussions in RQ 1, 2, and 3 (*i.e. regarding the FSMs in place, how public universities ensure compliance with the FSMs identified in RQ 1, and the challenges the public universities face in their attempt to comply with the FSP measures put in place by the authorities of their institutions, respectively*) to ascertain the FSP of the universities concerned. The findings imply that the three universities are generally fire safety unprepared, as there seem to be inadequate FSMs in place (discovered in RQ 1), public universities' ensuring of compliance was generally good but could be better (as

discovered in RQ 2), and, finally, leadership should be more committed to equipping the various departments appropriately to ensure full compliance with the fire safety rules and regulations (discovered in RQ 3). The discussions and suggestions in RQ 1, 2, and 3 align with the studies by Mugiti (2012), Gichuru (2013), and Mwangi (2009), which indicated that schools are not yet prepared for fire disaster risk reduction. These developments and concerns in learning institutions perhaps prompted Mike (2021), in his article 'Fire safety measures for schools', to advise school directors that 'Fire safety is important and should be taken seriously in an academic environment', and directors should inform their subordinates how to react in the event of an emergency and make sure that everyone has a firm understanding of the school FSMs in place before a fire crisis occurs. Ndeto and Kaluyu (2016) also warned the administrators of schools that the effects of fire disasters will always depend on how fire safety prepared the universities, staff, and students concerned are. Ndeto and Kaluyu (2016) further noted that university buildings are one type of government asset that should be protected due to the important role they play as temporary communal meeting places for staff, students, and communities.

How Fire Safety Preparedness (FSP) can be Improved to Safeguard Lives and Property

Research question 5: How can fire safety preparedness (FSP) of the universities in the Central Region be improved to safeguard lives and property?

The objective of this research question was to assess the strategies to improve the FSP of public universities in the Central Region of Ghana. The views of the HoDs are presented in Table 10.

Table 10: Findings on the Strategies to Improve the FSP of Public Universities

Strategies	Mean	SD	Interpretation
Organise seminars/workshops for heads of departments on how to ensure fire safety preparedness.	3.81	.56	Strongly agreed
Budget yearly for adequate investment in fire safety equipment and facilities and fire safety training activities.	3.89	.61	Strongly agreed
Make equitable financial provision for fire safety equipment and facilities and fire safety awareness creation and drill activities.	3.92	.60	Strongly agreed
Conduct regular fire risk assessments of university buildings.	3.85	.55	Strongly agreed
Organise obligatory and regular orientation for staff and students of the university at least twice a year.	3.82	.57	Strongly agreed
Organise mandatory fire safety drills/training on how to anticipate and respond to fire disasters for users of the university buildings at least twice a year.	3.94	.61	Strongly agreed
Direct new students and employees to official fire safety policies and provide them with basic fire safety induction training before their studies or employment begin(s).	3.74	.63	Strongly agreed
Build new fire-proof university buildings.	2.99	.93	Agreed

Build collaboration among institutions and organisations within the university community to allow resource sharing during crises.	3.87	.75	Strongly agreed

Source: Field data, Amegbor-Kwashie (2020)

Scale:

1= Strongly Disagree; 2= Disagree,

3= Agree, 4= Strongly Agree

Mean of means = 3.76

Mean of Standard Deviation = .65

Table 10 sought to find out the strategies to improve the FSP of public universities in the Central Region of Ghana. A mean of means of 3.76 and a mean of standard deviation of .65 were achieved. The means and standard deviation were obtained based on the responses recorded for each of the items on the questionnaire that were given to the HoDs. This means that the majority of the HoDs strongly agreed to most of the statements that were posed to them about the strategies to improve the FSP of public universities. Details of the individual items are presented in the paragraphs below.

The results in Table 10 shows that the 149 HoD respondents strongly agreed (with mean scores of 3.74, 3.81, 3.82, 3.85, 3.87, 3.89, 3.92, and 3.94) with the statements regarding strategies to improve the FSP of the public universities in the Central Region. A few respondents agreed (with a mean score of 2.99) that, in future, the university should invest in building new fire-proof buildings. The high standard deviation of .93 achieved for the university should invest in building new fire-proof buildings indicate that there were variations in the responses recorded

for those items. Yet, it still holds that the majority ot the HoDs agreed to these statements. The HoDs' responses to the statements on strategies to improve FSP in the public universities under study are arranged here in order of the perceived importance or priority of those strategies according to the respondents, that is, from highest (3.74) to lowest (3.94). The results indicated that almost all the HoDs strongly agreed that the universities must (1) organise seminars/workshops for HoDs on how to ensure FSP, (2) conduct regular fire risk assessments of university buildings, (3) organise obligatory and regular orientation programmes on FSP for all students and staff of the university at least twice a year, (4) budget yearly for adequate investment in FSP and facilities and fire safety training activities, (5) make financial provision (departmentally) for FSE and facilities and fire safety awareness creation and drill activities, (6) organise mandatory fire safety drills/training at least twice a year to inform users of the university buildings how to anticipate and respond to fire disasters, (7) direct new students and employees to official fire safety policies and provide them with basic fire safety induction training before their studies or employment begin(s), and (8) build collaboration among institutions and organisations within the university community to enable resource sharing during crises.

These strategies are in agreement with the findings of Ndeto and Kaluyu (2016), whose study 'Factors Influencing Fire Disaster Management and Preparedness: A Case of Primary Schools in Makueni County, Kenya' suggested that more emphasis should be placed on training school stakeholders in fire disaster preparedness and providing fire safety support resources to combat fire disasters in

primary schools. Based on Ndeto and Kaluyu's (2016) recommendation, and in relation to the views of the HoD's presented in Table 10, one could argue that if more emphasis is placed on fire safety awareness creation, budgets for fire safety equipment and facilities, and fire safety training activities organised by management, public universities' fire safety preparedness will be improved.

Analysis of Interview Sessions held with the Fire Safety Officers

The findings from the HoDs were largely confirmed by the views of the majority of the fire safety officers who were interviewed. As evidence of this claim, excerpts from responses given by the fire safety officers regarding strategies for improvement are presented below:

> Speaking about the findings of a fire safety risk assessment of UCC's premises, FSO 3 said that*: 'the 'fire safety engineering systems of most old building blocks (i.e. laboratories, lecture and residential halls, and office premises) and some of the new building blocks of the university appeared not meet the local fire safety requirement.'* He suggested that, *'they should be redesigned and refurbished to meet the local (i.e. GNFS legislative instruments 1724) and international fire safety standards'.* Additionally, he shared the view that, *'outcomes of the fire risk assessment obtained by the UCC Fire Station/Unit must be communicated not only to HoDs but also to staff and students through sensitization workshops for better understanding of the fire safety situation of the department*

concerned'. Likewise, he added that, *'most of the old or traditional residential halls, offices, lecture halls, and laboratories do not have adequate FSE. Therefore, I suggest that the university administration, Fire Safety Unit and HoDs concerned must team up and equip the departments impartially, whether old or new'.*

Fire safety education is required continuously to prepare the minds of students and staff and also equip them with the basic fire safety skills required to put out fires before security personnel or fire safety officers get to the scene for further aid (FSO 4).

FSO 3 believes that, *'the university's fire safety team must collaborate with the hall managers of the various residential halls and train their porters/wardens well enough so that they can better understand the need for fire safety. They should advocate for students' compliance with the fire safety rules and regulations, and similarly, the hall manager must empower the porters to warn students who put residential halls' facilities at fire risk' (FSO 3*).

Regarding the efficiency of human resources that is needed to ensure strict implementation of FSMs in schools, the GNFS-UCC fire station recommends that, *'each university in Ghana have a fire station with qualified personnel instead of employing nonprofessionals to manage their fire safety operations. Comparatively, engaging GNFS employees may also save the universities money, since that they are paid by the government of Ghana' (FSO 3).* Similarly, FSO 2

suggested that, *'the university must engage fire safety consultants or employ professional fire safety officers to guide and coach us'.*

Speaking further on how to improve fire safety preparedness, FSO 4 posits that, *'fire is a killer and that there is a need for individuals to support the GNFS to ensure fire safety compliance in homes, organizations, and learning institutions, which may help reduce fire incidents in Ghana'*. He added that, *'management should continue to support the Security and Fire Safety Directorate in any way possible to help fight the battle with fire' (FSO 4). The management of every university should coordinate with GNFS and government together install fire service branches on each public university campus. This may benefit either both the universities or governments for not overburden in installing fire service station all by themselves. These fire service stations on universities campuses could extend their assistance to the secondary and basic schools within their communities (FSO 4).*

Furthermore, FSO 3 suggested that, *'security cameras should be installed at higher risks areas and computerized to alert the fire station/office to possible actions endangering departments' premises during and after work for cautionary and preventive actions'.* Also in the view of FSO 2, *'fire safety equipment must be provided for all the university premises/departments'*.

In terms of effort, FSO 3 observed that, *'UCC as a public entity is doing its best to procure fire safety equipment and also ensure compliance by providing fuel for the Fire Station Unit's patrol vehicles. However, it appears that some departments and residential halls have been left behind. It is very important that fire safety materials, resources, and equipment are distributed equitably to safeguard lives and the property of the university; (FSO 3).*

In addition, in terms of training, the UCC Fire Station helps train students in cardiopulmonary resuscitation (CPR), the management of wounds, and other first aid treatments to equip students to conduct first aid on victims before the arrival of ambulance services or fire service crews. To allow for effective drills to be conducted, training aids such as dummies for demonstration should be provided by the university, since the government does not provide such materials (FS O 3).

According to FSO 2, *"the management of the university must embrace suggestions to help improve the fire safety preparedness of the university in a timely manner, irrespective of other equally important or more pressing needs"*. In the view of FSO 3, *"to safeguard lives and the university's property effectively and efficiently, top level personnel of GNFS should be co-opted into the university's management to play advisory roles, in the same way that the security personnel are co-opted"*. He added that *"UCC's Fire Safety Policy*

Guideline, drafted in 2016, must be completed and operationalized to guide and ensure the enhancement of the FSMs put in place" (FSO 3).

In general, the views of the FSOs regarding strategies to improve the FSP of public universities are the same as those of the HoDs, as evidenced by the extracts above. For example, the FSOs recommended that the universities must (1) redesign and refurbish some of the old laboratories, lecture and residential halls, and office premises to meet local and international FSMs/standards, (2) operationalise the drafted fire safety policy guidelines, (3) include GNFS senior personnel in universities' management to allow them to play a more effective advisory role regarding fire safety matters, and (4) embrace suggestions to help improve FSP in a timely manner, irrespective of other equally important or more pressing needs.

In summary, the views of the HoDs and FSOs discovered through the quantitative and qualitative explorations are in line with the works of scholars such as Mwangi (2009), Mugiti (2012), and Gichuru (as cited by Ndeto & Kaluyu, 2016), who stated that schools are not well prepared for fire disaster risk reduction. Furthermore, Akali, Khabamba and Muyinga (as cited by Ndeto & Kaluyu, 2016) observe that little has been done to prepare schools for fires. Therefore, as noted in Chapter 2, Peleg (2010) recommends well-organised fire precaution measures that can significantly reduce the number of fire-related fatalities in learning institutions. Schools that are well prepared for fire disasters will respond better in real-time emergencies and will be less exposed to the risk of fire outbreaks (Finkelstein &

Finkelstein, 2018). To this end, the views of the HoD's and FSO's of the public universities in the Central Region of Ghana, as presented in Table 10, the interview excerpts, and field observations conducted have indicated a strong advocacy for improvement of FSP in these public universities.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the study, findings, conclusions and recommendations for administrators, heads of departments (HoD), and other stake holders at learning institutions on the need for fire safety preparedness (FSP). This chapter also includes suggestions for further research.

Summary

This study explored Fire Safety Preparedness (FSP) at the University of Cape Coast (UCC), University of Education, Winneba (UEW-w) and Cape Coast Technical University (CCTU), three public universities in the Central Region of Ghana. This study was proposed against the backdrop of a lack of empirical evidence on FSP at public universities, despite the fact that alarming fire incidents threaten homes and public institutions each year. Indeed, the three universities studied here are not free from such threats, and fires are a serious concern for the general public and administrators of learning institutions. Understanding FSP is necessary to enable administrators, HoDs and related stakeholders of higher learning institutions to identify obstacles to achieving FSP and avoid unexpected fire disasters. This may necessitate fire risk assessments of all departmental facilities and updates to fire safety measures (FSMs). Moreover, it may be necessary to raise the confidence of students and staff in their ability to extinguish unwanted fires, and may also need to partake in drills to practice safe evacuation of the university buildings before the Ghana National Fire Service (GNFS) arrives

to avoid or reduce possible fatalities. In pursuit of this research aim, the following five research questions were formulated;

1. What fire safety measures are in place at public universities in the Central Region of Ghana?
2. How do public universities in the Central Region of Ghana ensure compliance with fire safety measures identified in Research Question 1?
3. What challenges do public universities in the Central Region of Ghana face in their attempts to comply with fire safety preparedness measures put in place by the authorities at their institutions?
4. What are the fire safety preparedness of the concerned universities?
5. How can the fire safety preparedness of universities in the Central Region of Ghana be improved to safeguard lives and property?

The convergent parallel mixed-methods design was adopted. The study design was chosen because it not only draws on the strengths of both quantitative and qualitative methods of exploration but also ensures research triangulation for more dependable findings. In total, 149 HoDs comprising of 127 academic HoDs and 22 heads of halls of residence, main libraries and administration (i.e. non-academic staff) of the three universities and one FSO at UCC, UEW-w and CCTU respectively (i.e. three FSOs) participated in the study. The study adopted the census approach, according to which all individuals in the study population were contacted for data collection. During the quantitative data collection stage, which lasted 45 days at UEW-w, UCC and CCTU campuses, questionnaires were administered to HoDs sampled for the study with the help of two research

assistants. The questionnaires were administered and collected from 12 August – 25 September 2020. The COVID-19 pandemic led to partial closures of higher learning institutions and the suspension of instructional and administrative activities in Ghana and across the globe. However, despite this, 86% of the questionnaires were collected and processed with the aid of SPSS computer application software. The quantitative data derived from self-administered questionnaires were analysed using descriptive statistics in the form of frequency tables, bar and pie charts, cross tabulation and mean and standard deviations to facilitate statistical inferences.

The quantitative data were supplemented with analysis of qualitative data in the form of insights from semi-structured, open-ended interviews with three university FSOs and a field observation checklist conducted at the three institutions. The semi-structured interviews were first coded and subsequently transcribed. The transcribed data were then cleaned by correcting errors in grammar without distorting the meanings. The data was subsequently classified according to the five research questions posed. The key findings of the study are as follows.

Key Findings

In terms of the fire safety measures in place, it was realized that, some fire safety equipment were available. However, fire safety equipment such as: the hose reels, hydrants, emergency alarm systems, and smoke detectors were neither functional nor adequate. Also, fire emergency exits (FEE) at the lecture halls/laboratories, libraries and offices such as: functional emergency escape light systems, clear labelling of fire assembly points, grills/burglar-proof windows, unobstructed emergency exit doors, clear labelling of emergency exit routes, and fire emergency evacuation maps on key exit doors, were available but inadequate as required by GNFS LI 1724 of 2003. Yet, some of these fire emergency exits were not in proper condition. Again, fire safety signages (FSS) and notices were available at the lecture halls/laboratories, libraries and offices; but were inadequate.

Concerning how public universities in the Central Region of Ghana ensure compliance with fire safety measures, it was realised that, the three public universities organise periodic drills for students, and staff; promptly replace fire extinguishers and organise regular orientation programmes on fire safety protocols for users of their facilities to ensure compliance with Fire safety regulations. In addition to these strategies meant to ensure compliance, most HoDs indicated that at the time of the study, compliance with FSMs was slightly above average. This suggests that fire safety compliance culture was adequate, but could be improved. In addition, the three FSOs at UCC, UEW-w and CCTU stated that their universities generally ensured compliance through awareness and orientation programmes and fire drills.

Also, it was realised that, the universities faced challenges in their attempts to comply with Fire Safety Preparedness (FSP) measures. These challenges included inadequate financial investment in FSP measures, capacity of their facilities and the number of users (e.g., overcrowding in offices and lecture halls), inadequate human resources for providing education for users of their facilities regarding fire safety protocols and a lack of commitment to fire safety protocols among users. Excerpts from interviews with the FSOs at UCC, UEW-w and CCTU also revealed that fire safety policy guidelines were not operationalised to effectively direct fire safety activities at the three institutions studied. Numerous problems were identified, including the non-existence of strategies to compel staff and students to comply with established Fire Safety Measures (FSMs), inadequate fire safety equipment (FSQ), careless use of electronic gadgets by staff and students at certain locations, misuse of fire safety equipment by students, poor participation by students and staff in drills and orientation programmes, old buildings that are inaccessible to fire fighters, overcrowding in some offices, lecture halls and dormitories, financial constraints and insufficient personnel to safeguard lives and property against fire outbreaks**.** One of the key obstacles to full compliance with mandatory FSMs at public universities is weak or ineffective leadership commitment to ensuring compliance. However, it must be recognised that some efforts have been made to safeguard lives and property.

Again, the findings that emerged from the analyses related to Research Questions 1, 2 and 3, suggest that, the Fire Safety Preparedness (FSP) of the three universities studied here is inadequate, as the Fire Safety Measures (FSMs) that are

in place are insufficient (discovered in Research Question 1). Also, public universities were sufficiently compliant with fire safety measures; however, they could improve compliance (as discovered in Research Question 2). Finally, university administrators should be more committed to providing departments with the support necessary to ensure full compliance with fire safety rules and regulations (discovered in Research Question 3).

In terms of the measures that should be taken to improve fire safety preparedness at universities to safeguard lives and property, the FSOs indicated that, universities must (i) organise seminars and workshops for HoDs on how to ensure Fire Safety Preparedness (FSP), (ii) conduct regular fire risk assessments of university buildings, and (iii) organise obligatory and regular orientation programmes on FSP for all students and staff of the university at least twice a year. Again, the FSOs at UCC, UEW-w and CCTU recommended that universities (i) redesign and refurbish some of the old laboratories, lecture halls, dormitories and offices to meet local and international Fire Safety Measures (FSMs) standards, (ii) operationalise established fire safety policy guidelines, (iii) include senior GNFS personnel in university management decisions so that they can play a more effective advisory role regarding fire safety matters and (iv) embrace suggestions to help improve FSP in a timely manner irrespective of other equally important or more pressing needs of the universities.

Conclusions

The following conclusions could be drawn from the findings of the study. It can be concluded that, Fire Safety Equipment (FSE), Emergency Exits (EEs) and

Fire Safety Signage (FSS) at these three public universities in the Central Region of Ghana were inadequate. The conditions of the EEs were not appropriate in all the three public universities in the Central Region of Ghana. These raise a lot of questions. Perhaps, the university authorites and administrators do not make sufficient budget provisions to cater for fire safety measures during their budgets. It could also be that, the university authorities/administrators do not place much importance on the fire safety measures.

It can be concluded that public universities ensured compliance with the FSMs as enshrine by the LI 1724 of GNFS. This presupposes that, the public universities made efforts to ensure compliance to fire safety measures although these fire safety equipment were neither adequate and some fire emergency exits were even not in proper conditions as identified earlier. It is unclear how maximum compliance to FSMs can be ensured whilst there are deficits in terms of FSE, FEE, and FSS. This implies that the public universities need to do more in order to ensure compliance with the FSMs.

Also, it can be concluded that, the universities faced challenges in their attempts to comply with Fire Safety Preparedness (FSP) measures. It was identified that capacity of their facilities and the number of users (e.g., overcrowding in offices and lecture halls) was a challenge faced by the public universities in their attempt to comply with fire safety preparedness measures. This implies that, the university authorities do not consider the capacity of their facilities to contain or accommodate the number of users in their departments, schools and halls of residence. Again, facility users' negligence and weak leadership commitment from

HoDs and top level management as is their duty among others were some other challenges that impeded compliance with FSMs. This presupposes that both facility users and top management of the various departments, schools and halls were not committed to ensuring fire safety preparedness measures.

In reference to the discussions in Research Questions 1, 2, and 3 and the suggestions regarding Fire Safety Preparedness (FSP) of universities, one may determine that the three public universities were generally unprepared for a fire outbreak. Thus, adequate Fire Safety Measures (FSMs) have not been established, hence putting lives and public properties in danger on a daily basis. Although it emerged compliance of public universities was generally satisfactory but could be improved.

Finally, one could deduce from participants views on improvement of FSP, that regardless of the pressing needs that the public universities may have, it is important to undertake frequent fire risks assessments through patrols on building facilities and equipment. Again, it could be that top level management are not enlightened on their level of safety preparedness for prompt update and remedial purposes to meet both local and international fire safety standards.

Recommendations

Based on the findings and conclusions, this study makes the following recommendations:

1. It is imperative that university administrators and entire university communities establish Fire Safety Measures (FSMs) to help safeguard lives and property against unpredicted fires as required by local and international fire safety laws

and regulations. Therefore, this study recommends that: university administrators and management should commit fully to meeting fire safety standards and requirements through unbiased budget provisions to various departments. In addition, because safety cannot be compromised, university administrators and management should release funds in a timely manner to address inadequate FSMs irrespective of inevitable financial challenges confronting the public universities; university administrators and management should create a common communication platform (e.g., an email thread or WhatsApp group chat) dubbed Safety First for Occupants and Property of Public Universities (SFO & PPU) to form stronger bonds between university alumni, GNFS, National Disaster Management Organization (NADMO), Non-governmental agencies, students and parents, staff groups and associations and the neighboring communities. Such bonds will result in social capital for resource mobilisation and discussions on issues threating lives and the property of the universities, with the aim of developing capacity to prevent fire outbreaks and respond appropriately to disasters; and the three public universities must organise periodic drills and training for occupants and users of their facilities, promptly replace expired fire extinguishers and organise regular orientation programmes on fire safety protocols.

2. The HoDs agreed that their universities organise periodic drills and training for occupants and users of their facilities, promptly replace expired fire extinguishers, and organise regular orientation programmes on fire safety protocols for users of their facilities. Administrators, HoDs and FSOs at each

university take the following steps: operationalise established fire safety policies to ensure stricter compliance with fire safety rules and regulations; create awareness programmes, workshops, and orientations for staff, students and university communities to ensure full compliance with established fire safety policies; rejuvenate the patrol units of various public universities to help conduct weekly risk assessments on facilities to ensure stricter compliance with the FSMs in place, which will in turn help avoid further exposure of university property to fire disasters risks and provide brochures with fire safety guidelines to all users of the universities to help them understand the guidelines and reduce the impact of disasters

3. Also, university administrators and management should be more committed to provision of appropriate FSE and educating staff and students of departments to ensure full compliance with fire safety rules and regulations. It is also recommended that university management be more committed to securing additional funds and other needed resources to support the sustainability of the implementation of FSMs by taking the following steps: Rejuvenate resource mobilisation units at public universities to mobilise related machines, manpower, materials, methods, and money (the 5 M's) from governmental and non-governmental agencies locally and internationally to continuously improve fire safety preparedness; build social capital in and around public university communities to help mobilise machines, manpower, materials, methods and money to foster a culture of fire safety preparedness; allocate 5% of departmental internally generated funds towards the full realisation of fire safety

preparedness at public universities; and combine GNFS resources (i.e., man, materials and machines) with those of the universities fire safety preparedness operations.

4. The discussions accompanying Research Questions 1, 2, and 3 indicate that universities are not properly prepared for an unforeseen fire disaster, which places public assets in danger on a daily basis. Therefore, this study recommends that university leadership should review and operationalise their fire safety policies to educate management, HoDs, students, staff and university communities about the effective and efficient execution of fire safety operations to modern standards.
5. The FSOs and HoDs suggested that in order to improve safety preparedness at public universities, university leadership should: restructure and renovate nearly all old laboratories, lecture halls, dormitories and offices to meet local and international fire safety standards; involve senior GNFS personnel in university management decisions to allow them to play a more effective advisory role regarding fire safety matters; and conduct compulsory fire drills departmentally at least once annually because departments that are prepared for fire disasters will respond better in real-life emergencies and will be less exposed to the risk of fire outbreaks.

Suggestion for Further Research

This research has provided insight into the fire safety preparedness (FSP) of three public universities in the Central Region of Ghana and has outlined the actual steps stakeholders need to take to safeguard lives and property. Further

studies should evaluate FSP at public universities with the aim of pressuring university leadership to address FSP shortcomings, overcome challenges on the ground and devise strategies to guard against avoidable fire risks to help prolong the serviceable live span of facilities of public universities.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR HEADS OF DEPARTMENTS OF UEW, UCC AND CCTU

This questionnaire is meant to help investigate the fire safety preparedness of public universities in the Central Region of Ghana. The information collected will be treated confidentially and will be used for this study only. You are kindly requested to provide your candid responses to the questions asked.

SECTION A: YOUR DEMOGRAPHIC CHARACTERISTICS

Please tick [√] the appropriate box to indicate your response for items 1–3.

1. Gender: (a) Male [ ] (b) Female [ ]
2. Your university (a) UCC [ ] (b) UEW [ ] (c) CCTU [ ]
3. Which department do you head? (Please write to indicate) …….

SECTION B: FIRE SAFETY MEASURES IN PLACE AT YOUR DEPARTMENT

4. Please tick [√] the appropriate box to indicate the availability and adequacy of the following fire safety equipment in your department.

Fire safety equipment in my department	**Available**		**Not available**	**No idea**
	Adequate	But not adequate		
Fire hydrants				
Heat detectors				
Smoke detectors				
Smoke control systems				
Fire extinguishers				
Sand buckets				
Fire evacuation alarm				
Fire escape ladders				
Reliable water supply				
Sprinkler systems				
Hose Reels				
Fire services telephone numbers				
Fire blankets				

Additional fire safety equipment in your department (***please state***)
……
……
…….

5. Please, have you ever been given an orientation about the fire safety measures in place at this university? (a) Yes [ ] (b) No [ ]

6. Please, have your department (i.e. teaching staff, students, administrators) ever been given an orientation about the fire safety measures in place at this university?
   (a) Yes [ ] (b) No [ ]
7. Please tick [√] the appropriate box to indicate the availability and adequacy of **emergency exits** in the following facilities in your department.

There is/are emergency exits at our:	**Yes**		**No**	**No idea**
	Adequate	But not adequate		
lecture halls/laboratories				
library				
lecturers' offices				
Administration offices				

8. Please tick the appropriate box to indicate your level of agreement or disagreement to the following statements concerning fire safety measures in place at your department.

In my department, there is/are:	**Level of agreement or disagreement**			
	Strongly agree	**Agree**	**Disagree**	**Strongly disagree**
Fire emergency evacuation map on each exit door				
Clear labelling of emergency exit routes				
Unobstructed emergency exit doors				
No grills/burglar-proof windows				
Clear labelling of fire assembly points				
Functional emergency escape light systems				

Additional fire safety measures in place (***please state***)

……

……

……

9. Please tick [√] the appropriate box to indicate the availability and adequacy of fire safety signage (signs and notices) in the following facilities.

There are fire safety signage (signs and notices) **at our:**	**Yes**		**No**	**No idea**
	Adequate	But not adequate		
lecture halls/laboratories				
library				
lecturers offices				
administration offices				

SECTION C: HOW UNIVERSITY'S ENSURE COMPLIANCE WITH THE FIRE SAFETY MEASURES IDENTIFIED

10. Please tick [√] the appropriate box to indicate your level of agreement or disagreement with statements regarding how your department ensure compliance with the fire safety measures in place?

My department ensures compliance with the fire safety measures in place through:	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
Organising periodic drills/training for users of our facility				
Regular orientation programmes for users of our facilities on our fire safety protocols				
Prompt update of fire extinguishers				
Providing fire safety guidelines brochure to all users of the department's premises.				
Regular and uninform inspections of the department's premises.				

Additional means on how your department ensures compliance with the fire safety measures in place (***please state***)

……
……
……

11. To what extent do you think users of your department comply with the level of fire safety measures in place?
    (a) To a high extent [ ] (b) To some extent [ ] (c) To a low extent [ ]
12. Do you think the university is doing its best to ensure general compliance of fire safety measures in place? (a) Yes [ ] (b) No [ ] (c) Undecided [ ]

SECTION D: CHALLENGES THE PUBLIC UNIVERSITIES FACE IN THEIR ATTEMPT TO COMPLY WITH THE FIRE SAFETY MEASURES

13. Please tick [√] to indicate your level of agreement or disagreement with the following statements about the challenges public universities face in their attempt to comply with the fire safety measures.

Challenges public universities face in their attempt to comply with the fire safety measures	Strongly agree	Agree	Disagree	Strongly disagree
Inadequate human resource to provide education for users of our facilities on fire safety protocols				
Inadequate financial investment in fire safety measures				
Mismatch between the capacity of our facilities and the number of users (e.g. overcrowding at offices and lecture halls)				
Inferior fire safety equipment				
Lack of fire safety policy				
Lack of commitment to fire safety protocols by users				

Additional challenges your universities face in their attempt to comply with the fire safety measures (***please state***)

……
……
……..

SECTION E: STRATEGIES TO BE ADOPTED TO IMPROVE ON THE FIRE SAFETY PREPAREDNESS OF YOUR UNIVERSITY

14. Please tick [√] the appropriate box to indicate your level of agreement or disagreement to the following strategies that could be adopted to improve the fire safety preparedness of this university.

Strategies that could be adopted to improve the fire safety preparedness of this university	Strongly agree	Agree	Disagree	Strongly disagree
Organise seminars/workshops for heads of departments on how to ensure fire safety preparedness.				
Budget yearly for adequate investment in fire safety equipment and fire safety training activities.				
Make equitable financial provision for fire safety equipment, and fire safety awareness creation and drill activities.				
Do regular fire risk assessments on university buildings.				
Organise obligatory and regular orientation programmes on fire safety preparedness for all students and staff of the university at least twice a year.				

Organise mandatory fire safety drills/training for users of the university buildings on how to anticipate and respond to fire disasters at least twice a year.				
Direct new students and employees to official fire safety policies and provide them with basic fire safety induction training before their studies or employment begin(s).				
Build new fire proof university buildings in future				
Build collaboration among institutions and organisations within the university community for resource reciprocity during crises.				

Additional strategies that could be adopted to improve the fire safety preparedness of your university **(*please state*)**

……
……
……

APPENDIX B: INTERVIEW GUIDE FOR FIRE SAFETY OFFICERS AT UEW, UCC AND CCTU

UNIVERSITY OF CAPE COAST

INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

This interview guide is meant to help the researcher investigate the **fire safety preparedness of the public universities in the Central Region of Ghana**. Your rights and privileges as a research participant are clearly defined in the consent form (NB: *Participants need to complete the consent form before the interview*). You are kindly requested to provide your candid responses to the questions asked.

Interview Questions:

1. To begin with, please tell me how long you have been at your current position?
2. Please briefly tell me what your responsibilities as the fire safety officer of this institution are?
3. How do you identify fire risks within the university's facilities?
4. What are the fire safety measures in place to help reduce fire hazards at your university?
   - ✓ *Ask whether the fire safety measures have been spelt out in a policy guideline.*
5. Are users (students, teaching and non-teaching staff) of the university's facilities aware of the fire safety measures you have in place? *Why do you say so?*
6. How adequate are the fire safety measures you have in place at your university?

Ask about the adequacy of specific measures such as:

- ✓ *Fire extinguishers,*

- ✓ *Fire detection and warning systems,*
- ✓ *Fire warning lighting systems,*
- ✓ *Fire signage and notices, and*
- ✓ *Emergency escape route layout.*

7. What measures has your university put in place to ensure that people comply with the university's fire safety measures?
8. How would you describe the compliance level with regards to the fire safety measures the university has in place?

   Ask about the compliance level in the:

   - ✓ *Residence halls,*
   - ✓ *Lecture halls,*
   - ✓ *Libraries, and*
   - ✓ *Offices.*

9. What challenges does the university face in its attempt to comply with the fire safety measures?

   Ask about:

   - ✓ *Policy gaps,*
   - ✓ *Human resources,*
   - ✓ *Material resources, and*
   - ✓ *Compliance-related issues.*

10. Generally, how would you describe the fire safety preparedness of your university?
11. In your view, what do you think can be done to improve the fire safety preparedness of your university?
12. Please, is there anything else you would like to add?

Thank you for participating in this study.

APPENDIX C (1): OBSERVATIONAL CHECK LIST - A

The researcher will observe the following physical basic fire equipment/facilities in the university departments.

Name of premise …… Date …….

Fire safety equipment in department(as identified in the literature)	**Available**		
	Yes		**No**
	a	**b**	**C**
Fire hydrants			
Heat detectors			
Smoke detectors			
Smoke control systems			
Fire extinguishers			
Sand buckets			
Fire evacuation alarm			
Fire escape ladders			
Reliable water supply			
Sprinkler systems			
Hose Reels			
Fire services telephone numbers			
Fire blankets			

KEY: (a)Yes, and adequate (b)Yes, but not adequate (c) No

APPENDIX C (2): OBSERVATIONAL CHECK LIST- B

The researcher will observe the following physical Fire Safety Signage (as identified in the literature). Please tick [√] the appropriate box to indicate the availability and adequacy of fire safety signage (signs and notices) in the following facilities.

There are fire safety signage (signs and notices) at our:	**Yes**		**No**
	Adequate	But not adequate	
Lecture halls/laboratories			
Libraries			
Halls of residences			
Lecturers offices			
Administration offices			

APPENDIX C (3): OBSERVATIONAL CHECK LIST - C

The researcher will observe the following physical emergency Exits (as identified in the literature). Please tick the appropriate box to indicate whether the following components related to **fire safety emergency exits** are present in each of the university premises specified.

Buildings	Date …… Name of University ……															
	Lecture halls & laboratories				Libraries				Department offices				Administration block			
Fire Emergency Exits	**Availability**				**Availability**				**Availability**				**Availability**			
	a	**b**	**C**	**d**	**a**	**B**	**c**	**d**	**a**	**b**	**c**	**d**	**a**	**b**	**c**	**d**
Emergency exit doors																
Fire emergency evacuation map on each exit door																
Clear labelling of emergency exit routes																
Emergency exit door ways are unobstructed																
Windows are free of grills/burglar-proofing																
Functional emergency escape light systems																

Clear labelling of fire assembly points																

KEY: (a)Yes, and adequate (b)Yes, but not adequate

(c) No (d) No idea (e) no response

APPENDIX C (4): OBSERVATIONAL CHECK LIST –D

The researcher will observe the following physical emergency Exits (as identified in the literature). Please tick the appropriate box to indicate whether the following components related to **fire safety emergency exits** are present in each of the university premises specified.

Buildings	Name Hall of Residence ……. Location …….. Date …….				
Fire Emergency Exits and related requirements (in Halls of Residence	Availability				
	A	b	c	D	e
Emergency exit doors					
Fire emergency evacuation map on each exit door					
Clear labelling of emergency exit routes					
Emergency exit doors are unobstructed					
Windows are free of grills/burglar-proofing					
Functional emergency escape light systems					
Clear labelling of fire assembly points					
Overcrowding halls of residence					

KEY: (a)Yes, and adequate (b)Yes, but not adequate

(c) No (d) No idea (e) no response

APPENDIX D(1): Findings on Fire Safety Equipment in Place (as identified in the literature).

TABLE 3

Types of Fire Safety Equipment	Response	UCC	UEW	CCTU
		Count	Count	Count
Fire hydrants	Adequately Available	42	6	2
	Available but not adequate	12	13	4
	Not available	21	7	7
	No idea	13	11	3
	No response	7	0	1
Heat detectors	Adequately Available	11	3	2
	Available but not adequate	13	14	0
	Not available	53	9	12
	No idea	11	8	3
	No response	7	3	0
Smoke detectors	Adequately Available	37	9	1
	Available but not adequate	16	11	4
	Not available	29	8	12
	No idea	11	6	0
	No response	2	3	0
Smoke control system	Adequately Available	12	3	1
	Available but not adequate	10	8	2
	Not available	38	11	13
	No idea	21	10	1
	No response	14	5	0
Fire extinguishers	Adequately Available	68	20	9
	Available but not adequate	16	15	8
	Not available	8	1	0
	No idea	0	1	0
	No response	3	0	0
Sand buckets	Adequately Available	24	14	7
	Available but not adequate	14	11	1
	Not available	47	8	7

	No idea	6	3	1
	No response	4	1	1
Fire evacuation alarm	Adequately Available	38	6	4
	Available but not adequate	6	10	2
	Not available	37	9	10
	No idea	11	12	1
	No response	3	0	0
Fire escape ladders	Adequately Available	6	3	4
	Available but not adequate	9	7	3
	Not available	68	22	8
	No idea	4	4	2
	No response	8	1	0
Reliable water supply	Adequately Available	63	17	7
	Available but not adequate	21	11	10
	Not available	8	6	0
	No idea	3	1	0
	No response	0	2	0
Sprinkler supply	Adequately Available	4	0	0
	Available but not adequate	8	10	3
	Not available	56	18	14
	No idea	19	7	0
	No response	8	2	0
Hose reel	Adequately Available	20	5	0
	Available but not adequate	8	15	1
	Not available	46	11	13
	No idea	14	6	1
	No response	7	0	2
Fire service telephone number	Adequately Available	55	16	10
	Available but not adequate	7	8	3
	Not available	25	6	3
	No idea	7	7	1

	No response		1	0	0
Fire blankets	Adequately Available		0	2	1
	Available but not adequate		8	12	3
	Not available		74	21	12
	No idea		8	2	1
	No response		5	0	0
Required 13 pieces of FSE	Summary / General Overview of Fire Safety Equipment In Place Public Univ. In The C/R				
Required Fire **Safety Equipment (as identified in the literature).**		UCC	UEW	CCTU	TOTAL
	Response	Count (%)	Count (%)	Count (%)	Count (%)
	Adequately Available	380 (31)	104 (22)	48 (22)	532 (27)
	Available but not adequate	148 (12)	145 (30)	44 (20)	337 (17)
	Not available	510 (41)	137 (28)	111 (50)	758 (39)
	No idea	128 (10)	78 (16)	14 (6)	220 (11)
	No response	69 (6)	17 (4)	4 (2)	90 (5)
	Total responses	1235(100)	481(100)	221 (100)	1937(100)

APPENDIX D (2): FINDINGS ON OBSERVATION CHECK LIST - FIRE SAFETY EQUIPMENT IN PLACE PUBLIC UNIVERSITIES IN THE C/R OF GHANA

Cross tabulation - TABLE 4

Types Of Fire Safety Equipment(as identified in the literature)	Institution engaged	f (%)		
		Availability		Total premises observed
Fire hydrants		YES	NO	
	UCC	11 (13.20%)	24 (29%)	35
	UEW-W	11 (13.20%)	24 (29%)	35
	CCTU	0 (0)	13 (15)	13
	TOTAL	**22**	**61**	**83**
Heat detectors		YES	NO	
	UCC	9 (10.70%)	27 (32.10%)	36
	UEW-W	0 (0%)	35 (41.70%)	35
	CCTU	0 (0%)	13 (15.50%)	13
	TOTAL	**9 (10.70%**	**75 (89.30%)**	**84**
Smoke detectors		YES	NO	
	UCC	12 (14.30%)	24 (28.60%)	36
	UEW-W	17 (20.20%)	18 (21.40%)	35
	CCTU	5 (6%)	8 (9.50%)	13
	TOTAL	**34**	**50**	**84**
Smoke control system		YES	NO	
	UCC	2 (2.40%)	33 (39.60%)	35
	UEW-W	1 (1.20%)	34 (41%)	35
	CCTU	1 (1.20%)	12 (14.40%)	13
	TOTAL	**4**	**79**	**83**
Fire extinguishers		YES	NO	
	UCC	27 (32.10%)	9 (10.70%)	36
	UEW-W	33 (38.10%)	1 (1.20%)	34

	CCTU	11 (13.10%)	2 (2.40%)	13
	TOTAL	**71 (83.30%)**	**12 (14.30%)**	**83**
		YES	NO	
	UCC	2 (2.40%)	33 (39.80)	35
Sand Buckets	UEW-W	2 (2.40%)	33 (39.80)	35
	CCTU	3 (3.60)	10 (12%)	13
	TOTAL	**7**	**76**	**83**
		YES	NO	
	UCC	8 (9.60%)	27 (32.50%)	35
Fire evacuation alarm	UEW-W	13 (15.70%)	22 (26.50%)	35
	CCTU	1 (1.20%)	12 (14.50%)	13
	TOTAL	**22**	61	83
		YES	NO	
	UCC	1 (1.20%)	35 (42.20%)	36
Fire escape ladders	UEW	0 (0%)	35 (42.20%)	35
	CCTU	0 (0%)	12 (12.50%)	12
	TOTAL	**1 (1.20%)**	82 (96.60%)	83
		YES	NO	
	UCC	25 (30.10%)	11 (13.30%)	36
Reliable water supply	UEW-W	34 (40.10%)	0 (0%)	34
	CCTU	8 (9.60%)	5 (6%)	13
	TOTAL	**67 (79.80%)**	16 (19.20%)	83
		YES	NO	
	UCC	0 (0%)	35 (42.20%)	35
Sprinkler supply	UEW-W	0 (0%)	35 (42.20%)	35
	CCTU	0 (0%)	13 (15.70%)	13
	TOTAL	**0 (0%)**	**83 (100%)**	**83**
		YES	NO	
	UCC	9 (11%)	26 (31.70%)	35
Hose reel	UEW-W	7 (8.50%)	28 (34.10%)	35
	CCTU	0 (0%)	12 (14.60%)	12
	TOTAL	**16 (20%)**	**66 (80%)**	82
		YES	NO	

Fire service telephone number	UCC	16 (19.50%)	18 (22%)	34
	UEW-W	33 (40.20%)	2 (2.40%)	35
	CCTU	5 (6.10%)	8 (9.80%)	13
	TOTAL	**54 (65.80%)**	**28 (34%)**	82
Fire Blankets		YES	NO	
	UCC	0 (0%)	35 (42.20%)	35
	UEW-W	1 (1.20%)	34 (41%)	35
	CCTU	0 (0%)	13 (15.70%)	13
	TOTAL	1 (1%)	82 (99%)	83
Fire Safety equipment & accessories	Grand total	308 (29%)	771 (71%)	1079

General Status on Observation check list on Fire safety equipment (as identified in the literature)in place the three public universities in the C/R	Summary			
	Institution engaged	**f (%) Availability**		Total Count (premises) observed
		Yes	No	
	UCC	122 (11.30%)	337 (31.20%)	459 (35)
	UEW-W	152 (14.10%)	301 (27.90%)	453 (35)
	CCTU	34 (3.20%)	133 (12.30%)	167 (13)
	General Status	308 (28.60%)	771 (71.40%)	1079 (83)

Source: Fire Safety Equipment Field data, Amegbor Kwashie (2020)

APPENDIX D (3): Detailed Findings on Emergency exits (as identified in the literature) in the Various Facilities of the Departments Engaged in the Study in UCC, UEW-w, and CCTU

TABLE 5

		Your University		
		UCC	UEW	CCTU
	RESPONSE	Count	Count	Count
Lecture Halls/Labs	Yes, and adequate	28	13	3
	Yes, but not adequate	37	19	7
	No	19	3	6
	No idea	4	0	0
	missing values	7	2	1
	Total	95	37	17
Libraries	Yes, and adequate	28	9	10
	Yes, but not adequate	38	11	7
	No	16	6	0
	No idea	7	9	0
	missing values	6	2	0
	Total	95	37	17
Lecturers' Offices	Yes, and adequate	24	10	2
	Yes, but not adequate	28	12	7
	No	30	12	7
	No idea	4	1	0
	missing values	9	2	1
	Total	95	37	17
Admin Blocks/Offices	Yes, and adequate	29	12	7
	Yes, but not adequate	35	15	9
	No	24	6	0
	No idea	5	4	0
	missing values	2	0	1
	Total	95	37	17

Overall facilities studied	Summary / General Overview On The Status Of Emerg. Exit (As Identified In The Literature)				
	RESPONSE	UCC	UEW	CCTU	Total Overview
		Count (%)	Count (%)	Count (%)	Count (%)
	Yes, and adequate	109 (29)	44 (30)	22 (32)	175 (29)

	Yes, but not adequate	138 (36)	57 (39)	30 (44)	225 (38)
	No	89 (23)	27 (18)	13 (19)	129 (22)
	No idea	20 (5)	14 (9)	0 (0)	34 (6)
	missing values	24 (6)	6 (4)	3 (4)	33 (6)
	Grand total responses	380 (100)	148 (100)	68 (100)	596 (100)

Source: Status of emergency Field data, Amegbor-kwashie (2020)

APPENDIX D (4) - DETAILED FINDINGS ON CONDITIONS OF EMERGENCY EXIT (AS IDENTIFIED IN THE LITERATURE) IN SOME FACILITIES OF THE DEPARTMENTS IN UCC, UEW-W, AND CCTU

TABLE 6:

In my department, there is/are:	HoDs' response on the level of agreement or disagreement on the Conditions of EE and its accessories (as identified in the literature)	Your University		
		UCC	UEW	CCTU
		Count	Count	Count
Fire emergency evacuation map on each exit door	Strongly Agree	12	2	2
	Agree	11	11	2
	Disagree	50	20	6
	Strongly disagree	20	4	7
	missing values	2	0	0
	Total	95	37	17
Clear labelling of emergency exit routes	Strongly Agree	36	10	2
	Agree	13	12	1
	Disagree	25	10	9
	Strongly disagree	20	5	5
	missing values	1	0	0
	Total	95	37	17
Unobstructed emergency exit doors	Strongly Agree	16	6	2
	Agree	30	17	5
	Disagree	34	11	6
	Strongly disagree	11	3	4
	missing values	4	0	0
	Total	95	37	17
No grills/burglar-proof windows	Strongly Agree	13	7	2
	Agree	25	17	5
	Disagree	27	6	8
	Strongly disagree	27	6	2
	missing values	3	1	0
	Total	95	37	17
Clear labelling of fire assembly points	Strongly Agree	32	7	1
	Agree	14	10	2
	Disagree	33	16	10
	Strongly disagree	15	3	3
	missing values	1	1	1
	Total	95	37	17
	Strongly Agree	10	3	0
	Agree	9	2	1
	Disagree	37	22	9
	Strongly disagree	36	10	7

Functional emergency escape light systems	missing values		3	0	0
	Total		95	37	17
Summary/General Overview					
General Overview on the Conditions of EE and its accessories (as identified in the literature)	Response	UCC	UEW	CCTU	Total Overview
		Count (%)	Count (%)	Count (%)	Count (%)
	Strongly Agree	119 (21)	35 (16)	9 (9)	163 (18)
	Agree	102 (18)	69 (31)	16 (16)	187 (21)
	Disagree	206 (36)	85 (38)	48 (47)	339 (38)
	Strongly disagree	129 (23)	31 (14)	28 (27)	188 (21)
	missing values	14 (2)	2 (1)	1 (1)	17 (2)
	Grand total responses	570 (100)	222 (100)	102 (100)	894 (100)

APPENDIX D (5): Detailed findings on Observation checklist C.

Fire Emergency Exits and its accessories (as identified in the literature) in placed some departments in UCC, UEW-Winneba, and CCTU observed.

TABLE 7

Fire Emergency Exits and its accessories available	Institutions	Lecture halls & labs f (%)		Libraries f (%)		Dept. offices f (%)		Admin blocks f (%)		Total premises
		Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	
Emergency exit doors	UCC	6 (18.8)	3 (9.4)	6 (18.7)	1 (3.1)	1 (3.1)	8 (25)	5 (15.6)	2(6)	32
	UEW	0 (0)	2(28.6)	1(14.3)	1 (14.3)	0 (0)	2(28.6)	1(14)	0(0)	7
	CCTU	1 (33)	0 (0)	1 (33)	0 (0)	0 (0)	0 (0)	0 (0)	1(33)	3
	Total	**7 (17)**	**5 (12)**	**8 (19)**	**2 (5)**	**1 (2)**	**10 (24)**	**6 (14)**	**3(7)**	**42**
Fire emergency evacuation map on each exit door	UCC	0 (0)	9 (27.3)	0 (0)	7 (21.2)	0 (0)	10 (30.0)	0 (0)	7 (21.2)	33
	UEW	0 (0)	2 (28.6)	0 (0)	2 (28.6)	0 (0)	2 (28.6)	0 (0)	1 (14.3)	7
	CCTU	0 (0)	1 (33.3)	0 (0)	1 (33.3)	(0)	0 (0)	0 (0)	1 (33.3)	3
	Total	**0 (0)**	**12 (28)**	**0 (0)**	**10 (23)**	**0 (0)**	**12 (28)**	**0 (0)**	**9 (21)**	**43**
Clear labelling of emergency exit routes	UCC	0 (0)	9 (27.3)	1 (3.0)	6 (18.1)	0 (0)	10 (30.3)	0 (0)	7 (21.2)	33
	UEW	1 (14.3)	1 (14.3)	0 (0)	2 (28.6)	0 (0)	2 (28.6)	1 (14)	0 (0)	7
	CCTU	0 (0)	1 (33.3)	0 (0)	1 (33.3)	0 (0)	0 (0)	0 (0)	1 (33.3)	3
	Total	**1 (2)**	**11 (26)**	**1 (2)**	**9 (21)**	**0 (0)**	**12 (28)**	**1 (2)**	**8 (19)**	**43**
Emergency exit door ways are unobstructed	UCC	6 (18.8)	3 (9.4)	6 (18.8)	1 (3.1)	6 (18.8)	3 (9.4)	5 (15.6)	2 (6.3)	32
	UEW	0 (0)	2 (28.6)	1 (14.3)	1 (14.3)	0 (0)	2 (28.6)	1 (14.3)	0 (0)	7
	CCTU	1(333)	0 (0)	1 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (33.3)	3
	Total	**7 (17)**	**5 (12)**	**8 (19)**	**2 (5)**	**6 (14)**	**5 (12)**	**6 (14)**	**3 (7)**	**42**
Windows are free of	UCC	4 (12.1)	5 (15.2)	2 (6.1)	5 (15.2)	2 (6.1)	8 (24)	1 (3)	6 (18)	33
	UEW	0 (0)	2 (28.6)	0 (0)	2 (28.6)	0 (0)	2 (28.5)	0 (0)	1 (14)	7

grills/burglar-proofing	CCTU	0 (0)	1 (33.3)	0 (0)	1 (33.3)	0 (0)	0 (0)	0 (0)	1 (33)	3
	Total	**4 (9)**	**8 (19)**	**2 (5)**	**8 (19)**	**2 (5)**	**10 (23)**	**1 (2)**	**8 (19)**	**43**
Functional emergency escapes light systems	UCC	0 (0)	9 (28.1)	0 (0)	7 (21.9)	0 (0)	10 (31.3)	0 (0)	6 (18.8)	32
	UEW	0 (0)	2 (28.6)	0 (0)	2 (28.6)	0 (0)	2 (28.6)	0 (0)	1 (14.3)	7
	CCTU	0 (0)	1 (33.3)	0 (0)	1 (33.3)	0 (0)	0 (0)	0 (0)	1 (33.3)	3
	Total	**0 (0)**	**12 (29)**	**0 (0)**	**10 (24)**	**0 (0)**	**12 (29)**	**0 (0)**	**8 (19)**	**42**
Clear labelling of fire assembly points	UCC	0 (0)	9(28.1)	1 (3)	6 (18.8)	1 (3)	9 (28.1)	1(3.1)	5 (15.6)	32
	UEW	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14)	1 (14.3)	1 (14.3)	0 (0)	7
	CCTU	1 (33.3)	0 (0)	0 (0)	1 (33)	0 (0)	0 (0)	1 (33.3)	0 (0)	3
	Total	**2 (5)**	**10 (24)**	**2 (5)**	**8 (19)**	**2 (5)**	**10 (24)**	**3 (7)**	**5 (12)**	**42**
Fire Emergency Exits and its accessories	**Grand total f (%)**	**21 (7)**	**63 (21)**	**21 (7)**	**49 (16.5)**	**11 (4)**	**71 (24)**	**17 (5.7)**	**44 (14.8)**	**297**
Summary of the Fire Emergency Exits and its accessories(as identified in the literature) in placed departments in UCC, UEW-Winneba, and CCTU	UCC	16 (5.4)	47 (15.8)	16 (5.4)	33 (11.1)	10 (3.4)	58 (19.5)	12 (4.0)	35 (11.8)	227
	UEW	2 (0.7)	12 (4.0)	3 (1.0)	11 (3.7)	1 (0.3)	13 (4.4)	4 (1.3)	3 (1.0)	49
	CCTU	3(1.0)	4 (1.3)	2 (0.7)	5 (1.7)	0 (0.0)	0 (0.0)	1 (0.30)	6 (2.0)	21
	Total f (%)	21 (7.1)	63 (21.2)	21 (7.1)	49 (16.5)	11 (3.7)	71 (23.9)	17 (5.7)	44(14.80)	297
Overview of result		**Only 24% of the facilities observed had fire emergency exits (FEE) and its related accessories in placed. This means that the majority 76% of the departments observed did not have appropriate FEE as required by GNFS LI 1724 of 2003.**								

Source: Fire Emergency Exits Field data, Amegbor- Kwashie (2020)

APPENDIX D (6): Detailed findings on Status of Fire Safety Signage in Some Facilities of some departments in UCC, UEW-Winneba, and CCTU.

TABLE 8

Fire Safety Signage in the Following Facilities.	HoDs' Responses on the availability and adequacy of fire safety signage (signs and notices)	Your University		
		UCC	UEW	CCTU
		Count	Count	Count
Lecture Labs	Yes, Adequate	17	1	1
	Yes, but not adequate	30	15	9
	No	25	19	6
	No idea	15	1	0
	missing values	8	1	1
	Total	95	37	17
Library	Yes, Adequate	17	2	8
	Yes, but not adequate	29	14	6
	No	34	13	3
	No idea	8	7	0
	missing values	7	1	0
	Total	95	37	17
Lectures' offices	Yes, Adequate	11	1	1
	Yes, but not adequate	20	15	4
	No	53	15	11
	No idea	3	4	0
	missing values	8	2	1
	Total	95	37	17
Administration Block/Offices	Yes, Adequate	28	7	3
	Yes, but not adequate	30	17	7
	No	27	9	6
	No idea	6	4	0
	missing values	4	0	1
	Total	95	37	17

Summary/General Overview on Fire Safety Signage in the Following Facilities

General Overview on the on Fire Safety Signage in the Lecture Labs, Library, Lectures' offices,Administration Block/Offices (as identified in the literature)	**Response**	**UCC**	**UEW**	**CCTU**	**Total Overview**
		Count	Count	Count	
	Yes, Adequate	73 (19)	11 (7)	13 (19)	97 (16)
	Yes, but not adequate	109 (29)	61 (41)	26 (38)	196 (33)
	No	139 (37)	56 (38)	26 (38)	221 (37)
	No idea	32 (8)	16 (11)	0 (0)	48 (8)
	missing values	27 (7)	4 (3)	3 (4)	34 (6)
	Grand total responses	380 (100)	148 (100)	68 (100)	596 (100)

Source: **Status of Fire Safety Signage** Field Data, Amegbor-Kwashie (2020

Appendix D (7): Detailed findings on Observation Check List - B: on Fire Safety Signage and Notice in place departments in UCC, UEW-Winneba, and CCTU in the Central region of Ghana.

Table 9. **Count**

Types Of Facilities	**Institution Engaged**	**Frequency(f)& %**		**Total Remises Observed**
		Adequately Yes	**Yes but not adequate**	
Lecture halls/lab	UCC	0 (0%)	4 (100%)	4
	UEW-WIN	1 (50%)	1 (50%)	2
	CCTU	0 (0%)	1 (100%)	1
	TOTAL	**1 (17%)**	6 (83%)	7
Libraries	UCC	0 (0%)	4 (100%)	4
	UEW-WIN	1 (50%)	1 (50%)	2
	CCTU	0 (0%)	1 (100%)	1
	TOTAL	**1 (17%)**	**6 (83%)**	7
Halls of residence	UCC	**0 (0%)**	**4 (100%)**	4
	UEW-WIN	**0 (0%)**	**2 (100%)**	2
	CCTU	**0 (0%)**	**1 (100%)**	1
	TOTAL	**0 (0%)**	**7 (100%)**	7
Lecturers' offices	UCC	0 (0%)	4 (100%)	4
	UEW-WIN	1 (50%)	1 (50%)	2
	CCTU	0 (0%)	1 (100%)	1
	TOTAL	**1 (17%)**	**6 (83%)**	7
Administration blocks/offices	UCC	0 (0%)	4 (100%)	4
	UEW-WIN	1 (50%)	1 (50%)	2
	CCTU	0 (0%)	1 (50%)	1
	TOTAL	**1 (17%)**	**6 (83%)**	7
Fire Safety Signage and Notice in place	**Grand total**	**4(11%)**	**31 (89%)**	**35**
Average Fire Safety Signage and Notice in place the three public Univ in C/R.	**Institution Engaged**	**Adequately Yes f (%)**	**Yes but not adequate f (%)**	**Total Premises Observed**
	TOTAL	**0.8 (11%)**	**6.2 (89%)**	**7**

Source: Fire Safety Signage and notices Field data, Amegbor- Kwashie (2020)

APPENDIX E (1): RELIABILITY TEST RESULTS

Item 10: Reliability Statistics	
Cronbach's Alpha	No of Items
.890	5

Item10-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Organising periodic drills/training for users of our facility	9.60	12.300	.801	.856
Regular orientation Programmes for users of our facilities on our fire safety protocols	9.40	12.800	.641	.885
Prompt update of fire extinguishers	10.20	14.200	.775	.883
Providing fire safety guidelines brochure to all users of the department's premises	8.80	9.200	.942	.812
Regular inspections of the department's premises	9.20	9.700	.742	.880

Item 13: Reliability Statistics	
Cronbach's Alpha	N of Items
.539	5

Item13-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted

Inadequate financial investment in fire safety measures	9.80	4.700	.077	.624
Mismatch between the capacity of our facilities and the number of users (e.g. overcrowding at offices and lecture halls)	9.60	2.800	.298	.571
Inferior fire safety equipment	8.60	4.300	.701	.372
Lack of fire safety policy	8.80	3.700	.854	.252
Lack of commitment to fire safety protocols by users	8.80	5.200	.120	.564

Item 14: Reliability Statistics	
Cronbach's Alpha	No of Items
.844	9

Item 14-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Organise seminars	12.50	9.667	.743	.808
Budget	12.50	9.667	.743	.808
Make equitable	12.50	9.667	.743	.808
Do regular fire risk assessment	12.50	9.667	.743	.808
Organise obligatory orientation	12.00	12.667	.000	.857
Organise mandatory	12.50	11.000	.348	.848
Direct new student	12.75	9.583	.915	.795
Build new fire	12.25	8.917	.496	.854
Build collaboration	12.50	11.000	.348	.848

APPENDIX F (1): LETTER OF INTRODUCTION

Letter 1

UNIVERSITY OF CAPE COAST
OFFICE OF THE REGISTRAR
DIRECTORATE OF LEGAL, CONSULAR & GENERAL SERVICES

Telephone: +233-(0)3321 32480 3 Direct: +233 (0)3321 33214
Telex: 2552, UCC, GH
Telegrams & Cables: University, Cape Coast
Fax: +233 (0)3321 32484
E-mail: registrar@ucc.edu.gh
vc_ucc@yahoo.com
In case of reply please quote:

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref:

Your Ref:

7th August, 2020

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

The bearer of this letter **Samuel K. Amegbor (EO/HET/18/0004)** is an M.Phil. student of the Institute for Educational Planning and Administration (IEPA) of the University of Cape Coast.

Mr. Amegbor requires some data/information from you for the purpose of writing his thesis titled ***Fire Safety Preparedness of Public Universities in the Central Region of Ghana*** as requirement of M.Phil. degree programme.

Kindly give him the necessary assistance that he requires to enable him gather the information he needs.

Counting on your usual cooperation.

Thank you.

Mrs. Alberta Yaa Graham
AG. DIRECTOR, DLCGS

APPENDIX F (2): LETTER OF INTRODUCTION

UNIVERSITY OF CAPE COAST
OFFICE OF THE REGISTRAR
DIRECTORATE OF LEGAL, CONSULAR & GENERAL SERVICES

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref.

Your Ref:

7th August, 2020

UNIVERSITY OF EDUCATION
REGISTRAR'S OFFICE
12 AUG 2020
P. O. BOX 25, WINNEBA

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

The bearer of this letter Samuel K. Amegbor (EO/HET/18/0004) is an M.Phil. student of the Institute for Educational Planning and Administration (IEPA) of the University of Cape Coast.

Mr. Amegbor requires some data/information from you for the purpose of writing his thesis titled *Fire Safety Preparedness of Public Universities in the Central Region of Ghana* as requirement of M.Phil. degree programme.

Kindly give him the necessary assistance that he requires to enable him gather the information he needs.

Counting on your usual cooperation.

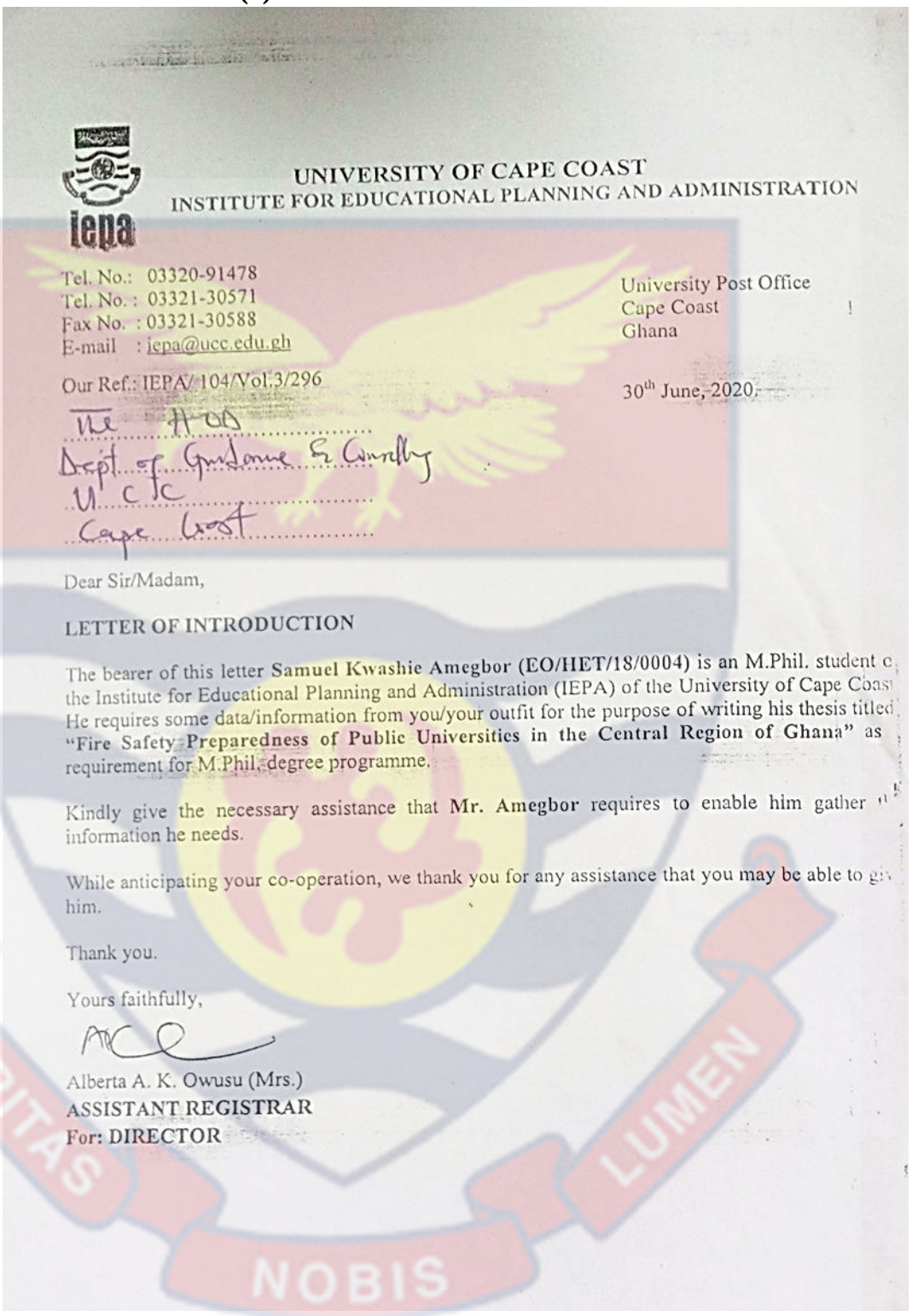
Thank you.

Mrs. Alberta Yaa Graham
AG. DIRECTOR, DLCGS

(2) DR-HR
DR-ACA
Referred for n.a
13/08/20

(3) PA - DR's Sec
Pls contact the applicant to come for discussion.
14/08/2020

APPENDIX F (3): INTRODUCTION LETTER FROM IEPA



UNIVERSITY OF CAPE COAST
INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

iepa

Tel. No.: 03320-91478
Tel. No.: 03321-30571
Fax No. : 03321-30588
E-mail : iepa@ucc.edu.gh

University Post Office
Cape Coast
Ghana

Our Ref.: IEPA/104/Vol.3/296

30th June, 2020.

The Head
Dept. of Guidance & Counselling
U C C
Cape Coast

Dear Sir/Madam,

LETTER OF INTRODUCTION

The bearer of this letter **Samuel Kwashie Amegbor (EO/HET/18/0004)** is an M.Phil. student o the Institute for Educational Planning and Administration (IEPA) of the University of Cape Coas He requires some data/information from you/your outfit for the purpose of writing his thesis titled **"Fire Safety Preparedness of Public Universities in the Central Region of Ghana"** as requirement for M.Phil. degree programme.

Kindly give the necessary assistance that **Mr. Amegbor** requires to enable him gather information he needs.

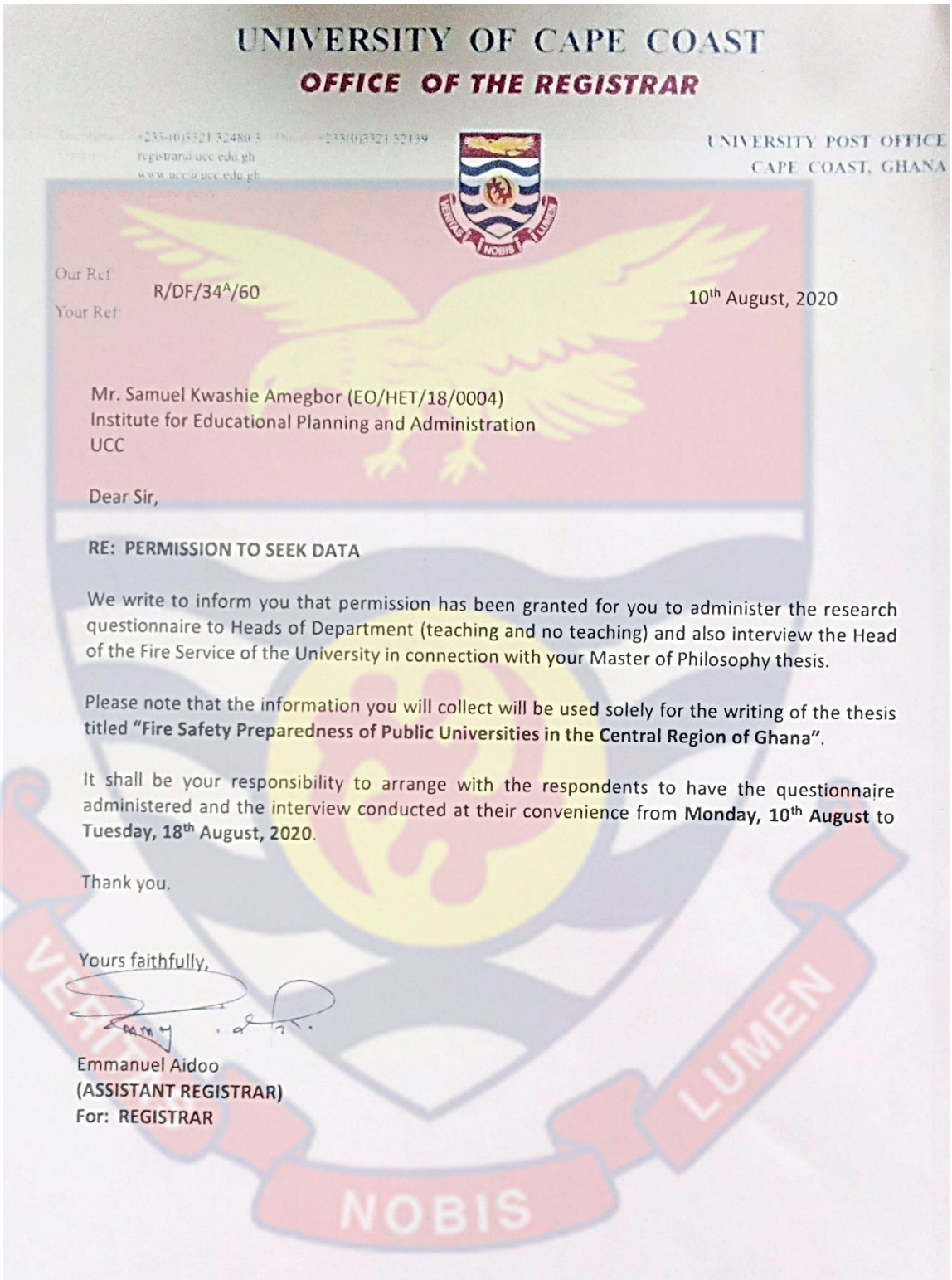
While anticipating your co-operation, we thank you for any assistance that you may be able to gi him.

Thank you.

Yours faithfully,

Alberta A. K. Owusu (Mrs.)
ASSISTANT REGISTRAR
For: DIRECTOR

APPENDIX F (4): PERMISSION LETTER



UNIVERSITY OF CAPE COAST

OFFICE OF THE REGISTRAR

+233-(0)3321 32480 3 +233(0)3321 32139
registrar@ucc.edu.gh
www.ucc.edu.gh

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref: R/DF/34^A/60

Your Ref:

10th August, 2020

Mr. Samuel Kwashie Amegbor (EO/HET/18/0004)
Institute for Educational Planning and Administration
UCC

Dear Sir,

RE: PERMISSION TO SEEK DATA

We write to inform you that permission has been granted for you to administer the research questionnaire to Heads of Department (teaching and no teaching) and also interview the Head of the Fire Service of the University in connection with your Master of Philosophy thesis.

Please note that the information you will collect will be used solely for the writing of the thesis titled **"Fire Safety Preparedness of Public Universities in the Central Region of Ghana"**.

It shall be your responsibility to arrange with the respondents to have the questionnaire administered and the interview conducted at their convenience from **Monday, 10th August** to **Tuesday, 18th August, 2020**.

Thank you.

Yours faithfully,

Emmanuel Aidoo
(ASSISTANT REGISTRAR)
For: REGISTRAR

APPENDIX F (5): CONSENT FORM – 1

UNIVERSITY OF CAPE COAST
INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION
CONSENT FORM

Introduction

You are invited to participate in the research aimed at investigating the **Fire safety preparedness of public universities in the Central Region of Ghana.**This research is conducted by Amegbor Kwashie Samuel a Master of Philosophy in Administration in Higher Education student of IEPA, UCC.

Confidentiality and Anonymity

This study shall be anonymous - I will not be collecting or retaining any information about your identity. The records of this study shall be kept strictly confidential – the research records will be kept in a locked file, and all electronic information will be coded and secured using a password-protected file stored in the clouds. I will not include any information in any report I may publish that would make it possible for you to be identified

Your Rights as a research respondent/participant

The decision to participate in this study is entirely yours. You may refuse to take part in the study at any time. You have the right not to answer any single question, as well as to withdraw completely from the study at any point during the process. You also have the right to request that I should not use any of your response in the research. You have the right to ask questions about the study and to have those questions answered by me before, during and after the research. If you have further questions and/or concerns, please feel free to contact me at amekwasam@gmail.com or via mobile phone on 0208857850/0554222494.

Consent

I have read and understood the information provides on this consent form, I certify that I am above 18 years age, and indicate my willingness to voluntarily take part in this study.

Participant/Respondent
Date: 07/07/2020
Signature: .....

Researcher
Date: 07-07-2020
Signature: .....

APPENDIX F (6): CONSENT FORM – 2

UNIVERSITY OF CAPE COAST

INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

CONSENT FORM

Introduction

You are invited to participate in the research aimed at investigating the **Fire safety preparedness of public universities in the Central Region of Ghana.**This research is conducted by Amegbor Kwashie Samuel a Master of Philosophy in Administration in Higher Education student of IEPA, UCC.

Confidentiality and Anonymity

This study shall be anonymous - I will not be collecting or retaining any information about your identity. The records of this study shall be kept strictly confidential – the research records will be kept in a locked file, and all electronic information will be coded and secured using a password-protected file stored in the clouds. I will not include any information in any report I may publish that would make it possible for you to be identified

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Consent

I have read and understood the information provides on this consent form, I certify that I am above 18 years age, and indicate my willingness to voluntarily take part in this study.

Participant/Respondent

Date: 28-07-2020

Signature.....

(UEW-WINNEBA CAMPUS)

Researcher

Date: 28-07-2020

Signature.....

APPENDIX F (7): CONSENT FORM – 3

UNIVERSITY OF CAPE COAST
INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION
CONSENT FORM

Introduction

You are invited to participate in the research aimed at investigating the **Fire safety preparedness of the public universities in the Central Region of Ghana.** This research is conducted by Amegbor Kwashie Samuel a Master of Philosophy in Administration in Higher Education student of IEPA, UCC.

Confidentiality and Anonymity

This study shall be anonymous - I will not be collecting or retaining any information about your identity. The records of this study shall be kept strictly confidential the research records will be kept in a locked file, and all electronic information will be coded and secured using a password-protected file stored in the clouds. I will not include any information in any report I may publish that would make it possible for you to be identified

Your Rights as a research respondent/participant

The decision to participate in this study is entirely yours. You may refuse to take part in the study at any time. You have the right not to answer any single question, as well as to withdraw completely from the study at any point during the process. You also have the right to request that I should not use any of your response in the research. You have the right to ask questions about the study and to have those questions answered by me before, during and after the research. If you have further questions and/or concerns, please feel free to contact me at amekwasam@gamail.com or via mobile phone on 0208857850/0554222494.

Consent

I have read and understood the information provides on this consent form, I certify that I am above 18 years age, and indicate my willingness to voluntarily take part in this study.

Participant/Respondent

Date: 13/08/2020

Signature.....

(UCC)

Researcher

Date: 13 – 08 – 2020

Signature.....