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KUMASI

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

**SAFE CONSTRUCTION OF APPENDAGES TO RESIDENTIAL
BUILDINGS - A CASE STUDY OF KANESHIE AWUDOME**

ESTATE, ACCRA – GHANA

By

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A Thesis Presented To the Department Of Building Technology
College Of Architecture and Planning Kwame Nkrumah University Of
Science And Technology In Partial Fulfilment Of The
Requirement For The Degree Of

Master of Science in Construction Management Programme

NOVEMBER, 2013

DECLARATION

I declare that this work or no part has been submitted to the University or to any other organisation for the purpose of assessment, publication or for any other purpose. But with the references and acknowledgements cited in the work, I confirm that the content of this work is the result of my own efforts and no other person.

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ABSTRACT

The term “appendages ” in the building industry refers to after construction activities such as addition or alterations and such structures are normally attached to the external envelope posing threat not only to the occupants but also passers-by and the properties as a whole. In addition to numerous threats posed by the built environment on community safety, the rapid growth of appendages has long been a major problem in Ghana. Interestingly, associated empirical studies have been rare, even though much has been said on this topic. The objective of this study is to assess the extent of the appendages and also, to establish the actual effects of the appendages on residential buildings with the view of developing a framework to aid in the design and safe construction of these appendages to residential buildings. Using random sampling technique, 100 household questionnaires were distributed to residents of the study area from a population of 754 houses. Eighty of them were retrieved and this represented a response rate of 80%. The data was analysed using descriptive statistic and means scores. The findings indicated that 86% of the houses surveyed at Kaneshie Awudome Estate have some form of appendage. The findings also indicated that, growth in population, mismatch between architectural design and actual needs of the owners, commercialisation of the facilities, were some important factors that led to the construction of the appendages to the residential buildings. With the effects posed by the appendages, lighting and ventilation, deface of building, devalue of buildings were some of the major effects. On safe design and construction of the appendages, it became clear that, provision of access roads, adequate lighting and ventilation, were some of the measures needed to

be taken. It is recommended that, Building Inspectors should be given the needed mandate to monitor the various suburbs. Accra Metropolitan Assembly (AMA) should liaise with various assembly members. It is further suggested that, The AMA should make it mandatory to landlords to follow the framework for safe design and construction of the appendages. The researcher is of the view that, this study will provide insights for the powers that be and the general public in addressing the problem of unsafe construction of appendages to residential buildings.



ACKNOWLEDGEMENT

My first and foremost thanks and appreciation goes to **DR EMMANUEL ADINYIRA**, a senior lecturer at the Department of Building Technology and also the examination officer of the Department for his dedicated supervision and relevant suggestions offered throughout the study. This indebtedness owe him cannot be emphasised. Again, to **PROFESSOR JOSHUA AYARKWA** and also the Head of Building Technology Department for his assistance provided in terms of suggestions, guidance and encouragement throughout the research process. This inspiration will forever remain. I am also grateful to my mother, **MADAM TUBOR ADZO BEDZO** and all my siblings Enam, Peace and Reuben for their moral support for helping me to complete this thesis.

I also wish to express my special thanks and appreciation to **MR BENEDICTUS LARRY AGBO**, Headmaster of ST. Michael & All Angels Anglican Basic School, Korle-Gonno, Accra for his support, encouragement and advice. Again, I wish to express my sincere gratitude to **MR JACOB SEBUAFOR**, Chief Building Inspector at Accra Metropolitan Works Department for his time, guidance and word of encouragement. May the Almighty God richly bless him and add more years to his years. Also, to my two field assistants **MR JAMES KWAKU TUMTI** and **MR PIUS OSEI** for their time and effort.

I also wish to thank my course mates Joyceline Annoa Asante, Benjamin Gbeve, William Tei-Kpoti, Francis Adu-Gyamfi, Godwin Acquah, Kofi Agyekum and Bernard Appiah.

Finally, my gratefulness to **ALMIGHTY GOD**.

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DEDICATION

This Dissertation is dedicated to **AHADZIE-SOGLIE ASIWOME, AHADZIE-SOGLIE AGBEKO, AHADZIE-SOGLIE AGBEMOR, MADAM TUBOR ADZO BEDZO and MADAM AGARTHA AHADZIE.**

KNUST



TABLE OF CONTENTS

	Page
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
CHAPTER ONE: GENERAL INTRODUCTION	
1.1 Background to the Study	1
1.2 Problem statement	4
1.3 Aim of the study	5
1.4 Objectives of the Study	5
1.5 Significance of the Study	5
1.6 Scope of the Study	6
1.7 Research Methodology	6
1.8 Outline of the Research	7
1.9 Summary	8
CHAPTER TWO: LITERATURE REVIEW	

2.1 Introduction	9
2.2 Residential Buildings	9
2.2.1 Global Conditions of Residential Buildings	10
2.2.2 Conditions of Residential Buildings in Ghana	14
2.2.3 Conditions of Residential Buildings in Accra	17
2.3 Building Appendages	21
2.3.1 Global Perspective of Appendages	21
2.3.2 Proliferation of Appendages	22
2.3.3 Categories of Appendages to Residential Buildings	23
2.3.4 Types of Appendages	24
2.3.5 Causes of Appendages to Residential Buildings	25
2.3.6 Effects of appendages to Residential Buildings	27
2.4 Health and Safety of Buildings	28
2.4.1 Designing and Planning Stage	28
2.4.2 Construction stage of the Appendages	32
2.4.2.1 Shoring During Construction	32
2.4.2.2 Scaffolding and Hoarding During Construction	34
2.5 Legislation on Appendages	35
2.5.1 Building Ordinance	35
2.5.1.1 Section 24 of Building Ordinance	36
2.5.1.2 Section 26 of Building Ordinance	37
2.5.2 National Building Regulations	38

2.5.3 Bye-Laws of Accra Metropolitan Works Department	40
2.6 Summary	42
CHAPTER THREE: RESEARCH METHODOLOGY	
3.1 Introduction	44
3.2 Research Design	44
3.3 Population and Sample	45
3.4 Sample Size Determination	46
3.5 Design of Research Instrument	47
3.6 Data Collection	49
3.6.1 Questionnaire	49
3.6.1.1 Question Types	50
3.7 Data Analysis	50
3.8 Summary	51
CHAPTER FOUR ANALYSIS AND DISCUSSION OF RESULTS	
4.1 Introduction	52
4.2 Background Information on Respondents	52
4.2.1 Number of Years Lived in the House	52
4.2.2 Ownership and Acquisition	53
4.2.3 Position of Respondents in the House	54
4.3 Characteristics of Houses Surveyed	55
4.3.1 Number of Units (Rooms) in the House	55
4.3.2 Types of Dwelling Lived in	56

4.4 Appendages identified in the Survey	57
4.5 Causes of Appendages to Residential Buildings	60
4.5.1 Population Growth	62
4.5.2 Mismatch Between Architectural Design and Actual Needs	63
4.5.3 Ineffective Implementation of Planning Legislations Control	63
4.5.4 Poor Building Management	64
4.5.5 Commercialisation of Facilities	64
4.6 Effects of Appendages to Residential Buildings	65
4.7 Critical Factors to be Considered at Design Stage	67
4.8 Critical Factors to be Considered at Construction Stage	69
4.9 Construction Activities Undertaken with Number of Times	71
4.10 Summary	72
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	
5.1 Introduction	73
5.2 Research Objectives	73
5.2.1 Objective One: To Assess the Extent of Appendages to Residential Buildings at Awudome Estate	73
5.2.2 Objective Two: To Establish the Critical Effects of Appendages on Residential Buildings at Awudome Estate	75

5.2.3 Objective Three: To evaluate the adequacy of relevant clauses in the existing National Building Regulations (1996) L. I 1630 and other bye-laws towards safe construction of appendages

76

5.2.4 Objective Four: To develop a framework for the design and safe construction of appendages to residential buildings

5.3 Recommendations 81

BIBLIOGRAPHY 83

APPENDIX A QUESTIONNAIRE

89

LIST OF ILLUSTRATIONS

LIST OF TABLES Page

Table 2.1 Housing Stock and Deficit	17
Table 2.2 Urban Agglomerations: Population Size and Growth Rate for Accra, Ghana	19
Table 4.1 Ownership Status of the Houses Surveyed	54
Table 4.2 Acquisition of the Houses	53
Table 4.3 Type of Appendages Observed	60
Table 4.4 Ranking of Causes by Respondents	62
Table 4.5 Ranking of Effects on the buildings	66
Table 4.6 Ranking Effects on the Occupants	67
Table 4.7 Critical Factors to be Considered at Design Stage	69

KNUST

LIST OF FIGURES

Page

Figure 2.1 Types of Dwelling	15
Figure 2.2 Informal Settlement	18
Figure 2.3 Formal Settlement	18
Figure 2.4 Hierarchy of Building Factors for Safety	30
Figure 4.1 Number of Years Respondent has Lived in the House	53
Figure 4.2 Positions of Respondents in the House	55
Figure 4.3 Rooms or Units the House Contain	56
Figure 4.4 Types of Dwelling	57
Figure 5.1 Framework for design and safe construction of appendages.	79

CHAPTER ONE

GENERAL INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Many people across the length and breadth of the globe hold the opinion that buildings do not exist in isolation but they represent various levels of action and interaction between people and their surroundings. On one hand, they can be expressions of creative impulse and on the other simple statements of functional need (Watt, 1999). Buildings serve as a shelter for man and his belongings. For the building to serve its purpose, a shelter should not just only be weatherproof and comfortable, but must also be safe. Safety, as defined by the World Health Organization (WHO, 1998) “is a state in which hazard and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and well-being of individuals and the community.” But some of these buildings lost their basic functions when additional features are constructed without recourse to the right procedure. These additional features are known as appendages.

Appendages create tremendous problems for the occupants as well as the community. Safety measures adopted do not affect the occupants only but also, the passers-by and the general public as a whole (Ho *et al.*, 2001). This situation is particularly relevant to densely populated cities in the world and Ghana is no exception. Most houses in well laid-out environments in the cities are engulfed with appendages. Any kind of failure of an appendage can affect many people and thus be disastrous. Appendages here refer to ‘after construction’ addition or alterations and such structures are normally attached to the external envelope posing threat not only

to occupants but also passers-by and the properties as a whole. In addition to numerous threats posed by the built environment on community safety, the rapid growth of appendages has long been a major problem in the world and Ghana is no exception. Even though, much had been said on this topic, associated empirical studies have been rare. This present study tries to explore the safety measures employed during the design and construction of these appendages with the extent of their effects on residential buildings at Kaneshie-Awudome Estate, Accra.

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The most populated city in Ghana is Accra where most compact buildings can be found. Accra has many estate buildings but the research is focus on Kaneshie Awudome estate. These building works which are usually done after construction without taking safety measures into consideration pose serious problems to the community because they constitute structural or fire risks endangering safety of life or property. There have been cases where construction of appendages have collapsed, resulting in tragic loss of lives. The chaotic situation caused by the appendages obstructing fire escape routes will lead to great casualties in case of fire. Also, construction of appendages constitute nuisance or cause inconvenience to the public, such as water seepage and obstruction of light and air (Li, 2003)

Again, appendages lead to deterioration of the environment, such as pollution of water courses by discharge of trade effluents, accumulation of rubbish on the appendages and unpleasant appearance of the building (Li, 2003). Exacerbation of the situation will contribute to the degeneration of the area into a slum. And finally,

appendages render good building management difficult and often obstruct the day-to-day maintenance as well as major repairs to a building.

With regards to issues relating to Government policies and regulations on safety of buildings, clause 15 of the National Building Regulations (1996) L. I 1630 states that “no part of a building, including porch, verandah or other projections (with the exception of the eaves), shall be constructed as to extend beyond the building line of any street upon which the building may front, adjacent or adjoin unless otherwise authorized by the District Planning Authority”. Section 2 of the same clause also stated that, “the eaves of any building which abuts upon any street shall not project into the street more than 600mm beyond the face of the wall of the building and shall be at a height level of not less than 3 metres above the ground.”

Further, Clause 16 prohibits appendages when it outlined that “No building shall be constructed such that any part of it cuts and projects above an imaginary line from the building line on the opposite side of the street at ground level so as to produce an angle of 45 degrees to the horizontal, except in an accordance with permission granted by the District Planning Authority. Building regulations aim to ensure the health and safety of people in and around buildings by setting functional requirements for the design and construction of the buildings (Stephen and Christopher, 2005).

However, some of these appendages have been constructed without recourse to the appropriate means of obtaining the needed permission/permit which can guarantee the safety measures to be adopted before constructing the appendages. Against this backdrop where landlords are constructing appendages with impunity, the

government alone cannot deal with this situation in the city due to resource limitations in terms of human and finance. Therefore; enforcement of strict laws must be prioritized to avert the alarming rate of the appendages to the residential buildings. Even though, the study is unique to Kaneshie Awudome Estate of Accra-Ghana, it is hoped that many developing countries will find the findings useful towards the enforcement of strict laws on safe construction of appendages.

1.2 PROBLEM STATEMENT

Against the background information presented, the main research problem has been identified and the focus is on Kaneshie Awudome Estate. The Estate was regarded as the best place to live in as it was a well laid-out environment devoid of commercial activities. But owing to population increase in recent times, many owners have done extensions to the original plan of the building. All these extensions have been done to accommodate more family members and also, some even converted the original use of the building to commercial use. All these extensions are carried out without employing safety measures and this practice contributed largely to the dangers of construction of appendages in the area.

With this trend of occupants constructing appendages to their buildings without employing the necessary safety measures, there is therefore the need for empirical studies to provide valuable insight into the formulation of effective building safety policy. Also, the knowledge of this study will help in finding practical solutions in dealing with the situation.

Again, there is no information on the effects of constructing appendages to residential buildings and finally, there are no practical steps to streamline these post construction activities.

1.3 AIM OF THE STUDY

The study aimed at proposing a framework to aid in the safe construction of appendages to residential buildings.

1.4 OBJECTIVES OF THE STUDY

The research seeks to undertake these specific objectives:

1. To assess the extent of appendages to residential buildings at Awudome estate.
2. To establish the actual effects of appendages on residential buildings at Awudome estate.
3. To evaluate the adequacy of relevant clauses in the existing national building regulations (1996) L 1 1630 and other bye-laws towards safe construction of appendages.
4. To propose a framework for the design and safe construction of appendages to residential buildings.

1.5 SIGNIFICANCE OF THE STUDY

There would be the need to add on to existing structures and the significant of the study is to try as much as possible to avoid the springing up of slums in the country

with specific reference to the study area. Also, to maintain well laid out and structured communities in the country. Finally, to ensure that safety standards are employed during the construction of these appendages by resorting to safe construction methods in order to promote well laid out community.

1.6 SCOPE OF THE STUDY

The study focused on external features of buildings at Kaneshie Awudome estate, Accra and also, it is limited to residential buildings. The study area shares boundaries with Bubiashie at west, North Kaneshie at the north, South Kaneshie at the south and Avenor/Industrial Area at the east all within Accra Metropolis of Ghana.

1.7 RESEARCH METHODOLOGY

In addressing the key research objectives presented above, an appropriate methodology was employed that helped in data collection, analysis and interpretation of the findings for the benefits of the stakeholders as well as other researchers. The collection of the data was based on both primary and the secondary sources. A desk study had been carried out on related literature with reference to types of appendages, causes of appendages and effects of appendages to the residential buildings. A preliminary survey was carried out to validate the information from the desk study. Also, field study was carried out to ascertain the physical characteristics of the buildings on the number of appendages. Following this, closed ended questionnaire was developed for collecting data from the study area to ascertain the causes of appendages, effects of appendages on residential buildings. The next aspect

of the research focused on the analysis, using descriptive statistics and mean score techniques from Statistical Package for Social Sciences (SPSS), which actually helped collate data gathered. Quantitative methodology has predominantly been applied owing to the fact that, the findings were expressed in the form of figures, tables, charts, graphs and the like towards an insight into the safe construction of appendages.

1.8 OUTLINE OF THE RESEARCH

The study has been organized into five chapters.

Chapter one is the general introduction of the study and it is categorised into:

- introduction to the study which consists of background to the study, statement of the problem and the significant of the study;
- research goals which contain the aim, objectives and the scope of the study; and finally;
- the methodology and the guide to the study.

Chapter two deals with a thorough review of the related literature for the research with the emphasis on the safe construction of appendages to residential buildings, their effects on the residential buildings and establishment of safety measures.

Chapter three gives a vivid account of the methodology to be used for collecting data, the compliance assessment tool, questionnaire design and development, the determination of sample size and administration of the questionnaires. The other part of the chapter is devoted to data processing and analysis.

The focus of **chapter four** is the core part of the study and it consists of analysis of data and its discussions expressed in texts, figures, tables, charts, graphs and the like.

Chapter five gives a summary of the major findings followed by the conclusions and recommendations taking into considerations the aim and objectives of the research.

1.9 SUMMARY

The introduction of the study comprising of the goals of the study, the methodology to be employed and the guide to the study has been presented in this chapter.



CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The chapter deals with related literature on the conditions of building as well as the issues of safe construction of appendages to residential buildings. The construction of appendages is as old as mankind, and it is without doubt that some of these appendages are not constructed properly to guarantee safety and health of the occupants. The review of the related literature will provide an insight as well as background knowledge related to the research topic. Four important areas of interest are identified. These are residential buildings, building appendages, health and safety of buildings and finally, legislation on construction of appendages with the summary of the chapter presented at the end.

2.2 RESIDENTIAL BUILDINGS

A building can be defined as a structure or edifice that is built for human habitation. In general, buildings can be used in various ways. For example, people may carry out business (as retailing), work (as offices) or in other cases live (house) in buildings. Actually, “residential buildings “ refers to buildings that are used for residential purposes, that has rooms or suite of rooms of different kinds that are purposely designed as a residence and are generally occupied by more than a household.

Buildings play an important role in determining a city’s sustainability. However, much of the academic and policy attention has been on the design and construction

of new developments, the part played by existing building stock has been largely ignored (Jackson, 2003). In fact, new developments comprise only a small portion of the overall building stock throughout the world and, therefore, whether the existing buildings are properly managed matters a great deal in a sustainable built environment. For instance, healthiness of the buildings has a strong bearing on the occupants' wellbeing. Moreover, buildings improperly managed and maintained eventually run into dilapidation, resulting in excessive depreciation which undermines the economics sustainability of the built environment. Even worse, the problems of building dilapidation bring about premature redevelopment (Hong Kong Home Affairs Department, 2010).

With regards to this thesis, the scope of residential buildings is limited to buildings at Kaneshie Awudome Estate with their external features. It is hoped that the construction of appendages to these residential buildings pose serious problem in urban areas because, safety measures might not have been employed during their construction. Hence, collapse of any of these appendages can lead to much more serious consequences.

2.2.1 GLOBAL CONDITIONS OF RESIDENTIAL BUILDINGS

Globally, the conditions of residential buildings vary from one country to another. Due to time limit for the thesis, some selected cases will be looked at. The construction of appendages to residential buildings has been a common phenomenon in many cities throughout the world. For many years, the housing environment has been acknowledged as one of the main settings that affect the human health. Living and housing conditions are the basis of many factors influencing residential health

(Jackson, 2003). Indoor air quality, home safety, noise, humidity and mould growth, indoor temperatures, lack of hygiene and sanitation equipment, and crowding are some of the most relevant possible health threats to be found in dwellings.

According to the Building Department of Hong Kong, the usage age of any building is in the range of 50 to 80 years on average (Building Department, 2000). As at 2005, there were about 39,000 private buildings in Hong Kong, 13,000 of which were over 30 years old. It is believed that in the next ten years, the number will increase to 22,000. Based on this trend, if buildings are not properly maintained and kept in good conditions, they will become threat to city environment after some years. A recently survey carried out by the Building Department of Hong Kong, about half of the residential buildings in Hong Kong have shading devices like, overhang, sidefins and balcony.

These attitudes expose the building facades to the problem of weathering and shorten the life span of the building (Lee, 1997). In a study by (Wong *et al.*, 2006) he points out that, the decay process of buildings is anticipated to accelerating. This rate of deteriorating can be attributed to some factors. The first and foremost is the fact that, property owners lack the knowledge of building defects and the understanding on the importance of building maintenance. They are also not aware of the safety of buildings that they normally undertake alteration works which may invariably cause damage to the building structure. Again, the aspect of proper building management is always ignored so that complex problems concerning building maintenance cannot be efficiently solved. Finally, humid weather, polluted environment and acid rains are common things in Hong Kong which can erodes the concrete and steel bars in the buildings.

There has been another dimension to this phenomenon such that unauthorised appendages have become common features that can be found on most of the residential buildings in Hong Kong. This practice has become a threatening factor to building safety. According to Housing Planning and Lands Bureau (2001b), there have been about 800,000 of such structures and also, 10,000 new ones constructed every year. This practice could even become worse if care is not taken to remedy the situation.

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In another development, building safety is a highly complex and multi-faceted issue and if not addressed properly, the problem will only get more serious as Hong Kong's building stock continues to grow old. Dilapidated concrete spalling, unauthorised or abandoned signboards, windows installed with substandard workmanship or lacking proper maintenance, illegal alterations to internal and external structures, etc. are urban time bombs waiting to strike and cause injuries and fatalities. In January, 2010 a building collapsed at 45J Ma Tau Wai road which claimed four lives of the residents of the building and two seriously injured (Hong Kong Building Department, 2011). This incident has set off the alarm that the Government and the whole community must take action now to arrest building decay.

In Hong Kong, there are currently 4,000 buildings aged 50 years or above and it is estimated that the number will increase by 500 each year. The Buildings Department's inspection after the 45J Ma Tau Wai Road incident revealed that although buildings aged 50 years or above are generally structurally safe, one in four of them have maintenance and repair problems, while the buildings survey carried

out by the Urban Renewal Authority of 7,000 buildings aged 30 years or above in support of the Urban Renewal Strategy Review finds out that 20% of these buildings are in dilapidated conditions of various degrees.

Since then, they are more or less well maintained by a combination of a low rate of new construction and high refurbishment rates. The refurbishment part is higher than the new building part and this tendency will continue for the coming 30 years. According to (Meikle and Connaughton, 1994), the key questions for the construction industry are; how to maintain the existing stock of housing in habitable condition and how to design and deliver adaptable and maintainable new housing.

The crucial indicator is the state of degradation of the different components of the stock. If the older cohorts are in bad state, which implies that, a high average lifetime is a disadvantage. If, on the contrary, the older cohorts not only survived longer, but are also in better shape (because better built), a high average age of the building stock is an asset. A global assessment carried out by the UN-HABITAT (2010) on conditions of residential buildings shows that 828 million or 33% of the urban population of developing countries resides in slums. In sub-Saharan Africa alone, 62% of the urban population resides in such settlements. Such large concentrations of slums in which inhabitants live in inequitable and life threatening conditions impose enormous burden on city authorities that are often cash-strapped and lack the institutional and technical capacity to provide even the most basic of urban services. These settlements are also known for their atmosphere of fear and violence (Bloom *et. al.*, 2008).

It is in recognition of the challenges posed by the springing up of slums, that Target 7.d of the Millennium Development Goals (MDGs) seeks to significantly improve the lives of at least 100 million slum dwellers by the year 2020 (UN-HABITAT, 2003a). Given that this target is very modest and hardly makes a dent on the magnitude of slums so it addresses only 12% of current slum dwellers in developing countries. Inferring from the above situations, it can be seen that conditions of buildings vary from one city to another and the various measures each city authority tries to adopt in order to address the situation.

2.2.2 CONDITIONS OF RESIDENTIAL BUILDINGS IN GHANA

Generally, housing is one of the most important basic needs in every society and it constitutes a major component of household wealth, especially for low income households, and no doubt, housing wealth is increasingly gaining importance in the Ghanaian economy.

Since Ghana's independence, provision of housing has remained central to the development agenda. Various policies, programs and institutions have sought to address issues such as land tenure, land title regulation, and provision of affordable housing units to the working population.

However, a number of these housing strategies were negatively affected by lack of funds, poor macroeconomic environment and lack of private sector participation. Thus, compared with other advanced countries, Ghana's housing industry remains rudimentary (Bank of Ghana Policy Briefing, 2007).

In the Policy Briefing Paper by Bank of Ghana which was released in June, 2007 on the Housing Industry in Ghana: "Prospects and Challenges", categorised dwellings

into 10 as; rooms in a compound, the separate house or the detached house, semi-detached house, several huts/buildings, improvised house or kiosk/container, living quarters attached to shop, camps or tent, hotel or hostel, flat or apartment, and other. The paper also gave insight into the conditions of buildings in both urban and rural areas which were based on the findings from the 2000 population and housing census by the Statistical Services. It came to light that 45% of Ghanaian households live in ‘compound houses’. The second most common dwelling type in all regions (except the Volta Region (44.7%) where it was the predominant housing type) was ‘Separate or detached house’ (24.1%). ‘Semi-detached house’ (15.2%) ranked third among types of dwelling units in Ghana. ‘Flat or apartment’ was ranked fourth in the country (4.2%) and in urban localities (7.2%). The figure below shows the breakdown of the various dwellings identified

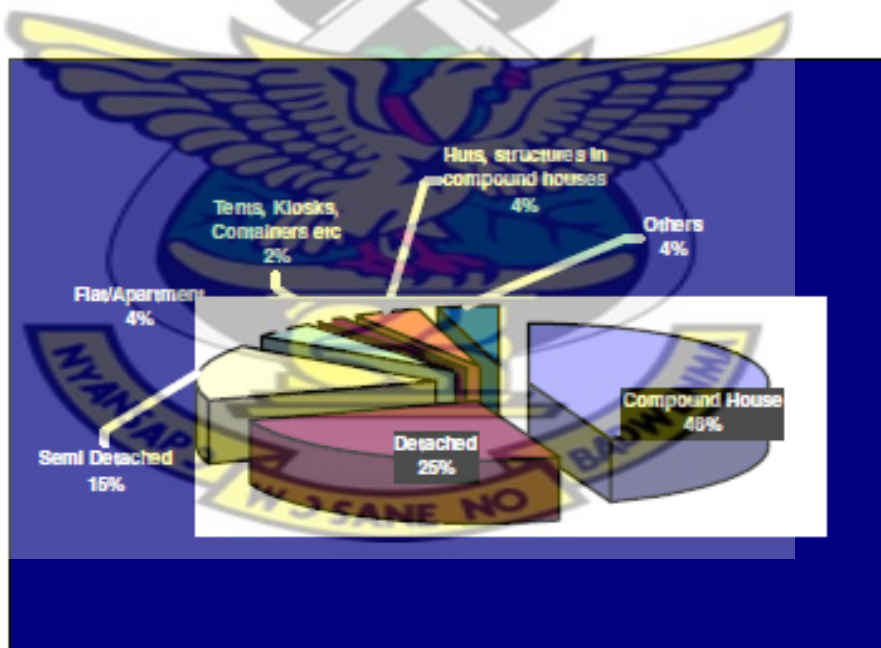


Figure 2.1 Types of Dwelling

Types of Dwelling in Ghana (based on 2000 Population and Housing Census Data)

Source: Ghana Statistical Service (2002)

The Census further revealed that Households or individuals occupying ‘Improvised house (kiosk/container) and living quarters attached to a shop’ were mainly located in urban areas such as Accra and Kumasi. This problem is attributable to rural-urban migration. In Greater Accra, for example, these improvised houses (kiosks and containers) are often used for both commercial and residential purposes.

This number of housing units compared with number of households indicated overcrowding conditions in most houses. On the average, about 8.7 persons live in each house in Ghana. Ashanti Region recorded the highest percentage of housing stock in the country (15.1%) which corresponds to its high population. Although Greater Accra recorded a lower share of housing stock (13.2%) compared with Kumasi, its urban share of housing stock was about 80%. Against this backdrop and given the intercensal population growth rate of 2.7% per year, it is projected that Ghana’s population could swell with an additional 5,773,522 persons between 2000 and 2010.

Assuming an average household size of 5.1 persons and that a separate unit of housing is required for each 1.7 households, then, *ceteris paribus*, an additional 665,920 houses would be required to meet the population’s demand for the same period. Therefore, the required increment in housing needs for each respective year would be as estimated in Table 2.1

Table 2.1: Housing Stock and Deficit

Year	Estimated Population	Estimated Number of Households	Estimated Housing Requirement	Yearly Incremental Requirement
2001	19,422,705	3,808,374	2,240,220	58,896
2002	19,947,118	3,911,200	2,300,706	60,486
2003	20,485,690	4,016,802	2,362,825	62,119
2004	21,038,804	4,125,256	2,426,621	63,796
2005	21,606,852	4,236,638	2,492,140	65,519
2006	22,190,237	4,351,027	2,559,428	67,288
2007	22,789,373	4,468,505	2,628,532	69,105
2008	23,404,686	4,589,154	2,699,502	70,970
2009	24,036,613	4,713,061	2,772,389	72,887
2010	24,685,601	4,840,314	2,847,244	74,855

Source: 2000 Population Census and Authors' Calculations

Source: 2000 Population Census

2.2.3 CONDITIONS OF RESIDENTIAL BUILDINGS IN ACCRA

Ghana (especially its capital, Accra), like other developing countries, faces a housing shortage, which is worsened by the rural-urban migration. The government alone is unable to be a direct provider of housing. From 1987, the government shifted the housing sector's focus from direct involvement in the provision of housing to facilitating access by the private sector to various resources required for housing development.

Accra is a city of contrasts, with wealth and poverty existing side by side. For example, the following pictures depict such a contrast in an area of Accra called “Sodom and Gomorrah”.



Figure 2.2 Informal Settlement

Above are pictures of informal settlement in a part of Accra called “Sodom and Gomorrah”

Source: Ghanaweb, 2011

There is a sharp contrast between the above pictures and those below. The pictures below are that of East Airport Estate.



Figure 2.3 Formal Settlement.

Above are pictures of well-laid out environment also located in Accra.

Source: Ghanaweb, 2011

Accra is representative of the smaller cities, which characterize sub-Saharan Africa, which are faced with problems of increasing metropolitan population and over-pressured infrastructure and public services. Accra, which contains about 25% of all people living in towns or urban areas of Ghana, has a population of about 1.8 million and it is growing at an estimated rate of 2.3% annually (Habitat, 2001b). However, the growth rate calculated by Habitat (2001a) as shown in Table 2.2 below is much higher: it is given as 3.6% for 2005-2015. Although in the same projections, Accra's share in the country's urban population decreases from 25.5% in 2000 to 23.9% in 2015.

Table 2.2: Urban Agglomerations: Population Size and Growth Rate for Accra, Ghana.

Estimates and Projections (thousands)							Annual Growth Rate (%)			Share in country's urban population (%)		
1985	1990	1995	2000	2005	2010	2015	1985-1995	1995-2005	2005-2015	1985	2000	2015
1180	1385	1649	1976	2383	2873	3410	3.4	3.7	3.6	28.3	25.5	23.9

Source: Habitat (2001a)

Accra has experienced rapid urbanization since the early 1980s, as the formerly stagnant economy recovered somewhat after the implementation of the Economic Recovery Programmed (Yankson and Gough, 1999). Rapid urbanization in the developing world is threatening health, the environment and urban productivity and protecting the urban environment is fast becoming a necessity rather than a luxury (Bartone *et al.*, 1996). They further noted that, cities are the powerhouse of economic

growth, with 80% of Gross Domestic Product (GDP) growth in developing countries expected from cities in the 1990s, but the environmental implications of such growth need to be assessed and managed better.

Most of the people living in African cities are poor and urban conditions and amenities reflect their own and their country's poverty, and that environmental problems which might affect only the poor in other parts of the world are part of the daily lives of most West African urban residents (Peil, 1994). Apart from the low affordability of occupants, another reason is that people have been used to live in poor living environment that they do not care about building maintenance although it may improve the safety and conditions of the building (Chan, 2003). The last four decades have brought remarkably little progress in improving housing and living conditions in most urban centers of Africa, Asia and Latin America (Hardoy and Satterthwaite, 1997). According to them, when judged against their official responsibilities in urban areas, Third World governments have failed in at least four of their most fundamental tasks:-

- ◆ *to provide the legislative and regulatory system to protect citizens from exploitation by landlords and employers*
- ◆ *to ensure that all citizens can find adequate accommodation and access to basic services.*
- ◆ *to protect the urban environment from contamination by life-threatening and health-threatening pathogens and pollutions, and*
- ◆ *to allocate the costs of implementing these tasks among those who benefits from urban locations, urban labour-forces and government-provided infrastructure and services.*

The above points are relevant for Accra, where despite some effort on the part of the government, traces of the above-mentioned concerns are prevalent in the city of Accra. There is a lack of fundamental research on housing and health in the context

of current urbanization trends, which have “not been well understood in terms of both the positive and the negative impacts on health and well-being (Lawrence, 2000). The pictures of “Sodom and Gomorrah” in the previous page gave an indication that there is still work to be done to ensure that all citizens find adequate and decent accommodation.

2.3 BUILDING APPENDAGES

According to biological context, an appendage is an external body part, or a prolongation which stems from the body of an organism and such prolongation could be the limbs. It is a general term that covers any of the homologous body parts that may extend from a body segment. An appendage can be regarded as the additional or subsidiary part existing on, or added to, something which can generally still function if the appendage has never existed or is later provided or grown, or will still perform a primary function if the appendage is removed. Inferring from the definitions above an appendage in the construction context is any post construction activities that extend a main building. These appendages together with the main building form the building envelope.

2.3.1 GLOBAL PERSPECTIVE ON APPENDAGES

Construction of appendages to residential buildings has been a common practice in many cities in the world and Accra is no exception yet different cities adopt different methods and approaches to solving the problem. These post construction activities are carried out without employing the safety measures to ensure safety of the occupants and the passers-by (Lai and Ho, 2001). The following areas will be looked

at in line with the proliferation, categories, types, causes, effects and the growth of the appendages at Kaneshie Awudome Estate.

2.3.2 PROLIFERATION OF APPENDAGES

The importance of housing cannot be over-emphasized. In fact, Habitat (2001a) states that the housing is now universally recognized as a human right and efforts to implement this right must be strengthened and accelerated. According to (Lai, 1998) people with small means who could not afford high rents are the squatters in the cities. As (Goodchild, 1997) puts it, habitat is of obvious importance and it is central to the comfort and convenience of residents. Habitat (2001a) gives an indication of the dimension of the issue of urbanization thus:

“The world has entered the urban millennium. Nearly half of the world’s people are now city dwellers and the rapid increase in urban population is expected to continue, mainly in developing countries. This historic transition is being further propelled by the powerful forces of globalization...”

Ghana is no exception to such urbanization and in recent years, there has been an influx of people to the urban areas, as people in rural areas flock to the main cities in search of employment opportunities and the chance for a better life.

The urbanization trend as well as population growth has put severe pressure on the existing stock of infrastructure, such as housing, water and electricity, sanitation and waste disposal services. Housing has been one of the areas severely hit and the government alone has not been able to provide enough of it to meet increasing demand and this problem has brought about the proliferation of the appendages to the residential buildings in the city for more space for habitation.

A housing study conducted between Ghana Real Estates Developers Association (GREDA) and the Government of Ghana in 1999 revealed that the annual housing requirement in Ghana is estimated between 110,000 and 140,000 units per annum whereas production is only about 30,000 units per annum (Business Watch, 2002 and Trade partners UK, 2002). This findings attest to the fact that, the housing deficit now stands well over one million houses meanwhile, the current annual supply is however, between 30,000 and 40,000 with the private sector providing 95% and the government only 5%.

In 2000, there were about 800,000 appendages existing in the 60,000 blocks of private buildings in Hong Kong, and an estimated 10,000 new post construction activities will be undertaken every year (Hong Kong Government, 2005). The problem of unsafe appendages has already claimed at least 20 lives and 135 injuries in the decade from 1990 to 2001 (Yiu *et al.*, 2004). In 2003 the building department estimated the number of appendages to residential buildings in Hong Kong to about 750 000.

2.3.3 CATEGORIES OF APPENDAGES TO RESIDENTIAL BUILDINGS

An appendage is a general term used to describe post building works. It may even cover other kinds of structures that can be found on residential buildings in Ghana.

According to (Lai and Ho, 2001), appendages can be categorised into three types in functional terms:

Type 1: advertisement sign boards projecting from external walls or resting on roof tops and satellite discs for television and mobile phones.

Type 2: improvised measures to enhance the amenities of property, such as canopies above windows, flower racks.

Type 3: structures to create space for human habitation.

Appendages can be constructed in many different areas, such as the building façade, internal or external common areas and the rooftop. Post construction works found on residential buildings in Hong Kong could be summarized as follows (Davison, 1990; Leung and Yiu, 2004):

1. Cages, canopies, metal flower racks and any projection from the external walls of a building;
2. Canopies and structures that project over government land, pavements, or lanes;
3. Structures on rooftops, flat roofs, yards, or light wells;
4. Metal supporting frames for air-conditioning plants and cooling towers;
5. Alterations to means of escape;
6. Subdivision of approved units in multi-storey residential and industrial buildings; and
7. Unauthorised changes of use which may or may not include illegal structures.

2.3.4 TYPES OF APPENDAGES

Actually, there are many types of structures that can fall within the ambit of appendages to the residential buildings. Other elements such as those inside the buildings are not observable during the site inspections therefore will be excluded.

The following are the summary of the most common types of appendages found in residential buildings:

- Solid Canopy
- Light-weight canopy projecting by exceeding 500mm
- Light-weight canopy projecting by less than 500mm
- Solid extension
- Flower rack
- Drying rack
- Metal frame
- Air-conditioner frame
- Metal cage

The sum of the above mentioned components attached to the external wall of the buildings will be calculated as the total number of appendages of residential buildings. This research focused on the solid extensions.

2.3.5 CAUSES OF APPENDAGES TO RESIDENTIAL BUILDINGS

Hong Kong is one of the most densely populated cities in the world, with 6,420 persons per square kilometer on average as at the end of June, 2005 (Hong Kong Government, 2005). In such a congested city, the majority of people are living in tiny flats. The cramped living environment boosts the incentive of property owners to maximize their space and amenities by constructing unauthorized appendages. (Lai and Ho, 2001) reinforce the idea that the existence of unauthorized appendages reveals the inadequate supply of space in urban land in Hong Kong.

In addition, some of the economic incentives to build appendages to structures in private property are identified in the study of (Lai and Ho, 2001). It is pointed out

that the mismatch between architectural design and actual needs or preferences of occupants is a catalyst leading people to build illegal structures. It means that due to the dissatisfaction of people on the original design or layout of the units, they may tend to re-design the units according to their personal preferences.

Considering the economical perspective of the homeowners, it can be analysed that under the demand-supply paradigm. Under perfect market conditions, the number of appendages constructed should be “determined” by the market through both demand and supply forces (Li, 2003). As the construction of appendages are economic goods which may generate services and additional space for property owners, owners will continue building unauthorized appendages until reaching the point that the marginal cost of production equals to the marginal revenue generated by that particular unit of unauthorized appendages. That is to say, if the owners find that there is potential benefit, no matter it is monetary or non-monetary, of constructing unauthorized appendages, they will tend to produce that particular unit of unauthorized appendages in order to capture the marginal benefit and maximize their utility level. And the underlying questions that one might ask may be how safe are these appendages constructed in order to guarantee the safety and health of the occupants and the passers-by.

Although the existence of unauthorised appendages may provide certain extent of benefits or services to the property owners, they may induce a lot of building safety problems to the society. Since the effects of unauthorised appendage on the structural and safety performance of buildings cannot be easily observed instantly after the construction of unauthorised appendages, people may not be aware of the harmfulness of unauthorised appendages. They tend to neglect the hidden problems

until accidents really occur. And all these harmfulness and safety measures that have to be employed in the construction of the appendages are the main concern of the writer.

2.3.6 EFFECTS OF APPENDAGES TO RESIDENTIAL BUILDINGS

Due to the advanced construction technology, residential buildings in Hong Kong nowadays normally consist of 20 to 40 storeys. One may imagine that even if a small piece of object falls from this height, such as a debonded mosaic tile from the external wall, fatal consequences may be resulted (Leung and Yiu, 2003).

(Lai and Ho, 2001) address four implications about how the existence of unauthorised appendages affects the safety and conditions of the buildings, which include:

1. Loading implications—the construction of appendages will impose an additional loading to the buildings. A collapse of any structure whether authorized or unauthorized to alteration or addition may lead to fatal accidents.
2. Fire risk implications--- Some of the unauthorised appendages may obstruct the means of escape requirements under the Buildings Ordinance, potential fire hazards will be induced. These unauthorised appendages make firefighting rescue more difficult when fire hazards occur. One of the most significant types is rooftop structure in single-staircase buildings. When a fire breaks out in the building, occupants have no means to escape to the rooftop and wait for rescue.
3. Visual and aesthetics implications –Appendages which may not be visually consistent with the original design and appearance of the building, the visual and aesthetics aspects of the building will be negatively affected. This makes the building

environment looks untidy. Also, occupants of the neighbouring environment will be unhappy with the situation and complain to the Building Authority.

4. Lighting and ventilation – For a building to be appropriate for living, lighting and ventilation are two important considerations. However, unauthorised appendages which project from the external walls such as canopies and hanging iron cages may block natural lighting and ventilation. It is particularly relevant in office and residential buildings in which certain areas of prescribed windows have to be provided to habitable rooms (Lai and Ho, 2000).

2.4 HEALTH AND SAFETY OF BUILDINGS

Health and safety of the residential buildings is the prerequisite of any serious government as far as the built environment is concern and it is no doubt that this has been given prominent in the safe construction of the appendages such that, they are constructed with proper safety measures in place.

2.4.1 DESIGNING AND PLANNING STAGE

“Safety” implies a condition free from exposure to danger, injury or loss, while the term “safe” implies freedom from danger (Hunter, 1992). Similarly, issues of safety in buildings also offer occupants freedom from hazards or risks. Many accidents can be controlled when their causes are identified and understood. Sometimes accidents occur even under safe conditions due to reasons such as poor design, poor construction, misuse or a lack of maintenance.

To meet the cultural, social, and physical requirements of the residents, and to provide a safe dwelling to shelter them from the hazards that may impact from their environment, a house must be properly designed and constructed (Jackson, 2003),. In another development, (Lathrop, 1989) stated that a reasonable level of life safety in building for fire safety should provide the following conditions such as:

- ◆ *early warning of fire*
- ◆ *adequate exits without dependence on any person to permit the prompt escape of occupants in case of fire and other emergency*
- ◆ *exits with sufficient capacity for the size, shape and occupancy of the facility*
- ◆ *clear, unobstructed and unlocked exits*
- ◆ *clearly marked exits and routes of escape to prevent confusion*
- ◆ *adequate lighting and alternative exit arrangements*

The purpose of creating a building is to provide an improved environment for individuals, organizations, and communities (Holliday, 1997). It is a common belief of ours. Paradoxically, the problems of building disrepair and unauthorized appendages have long been the eyesores of the cityscape in Accra, like many other developed cities. The relationship between the safety attributes and various aspects of building factors is then mapped together to develop a hierarchy of building factors. (Van Erdewijk, 1988) stipulated that there were different categories of architectural elements, each of which was involved in accidents in a particular way. (Heimplaetzer and Goossens, 1991) confirmed the role of architectural features in the causation of accidents in the built environment. Therefore, building design should play an important role in building safety. Echoed by (Al-Homoud and Khan, 2004), apart from misuse and the lack of maintenance, poor design is one of the causes of building-related accidents. In this regard, building factors are grouped into two categories, namely Design and Management.

Below is the hierarchy of building factors for safety and conditions assessment for the various buildings under consideration;

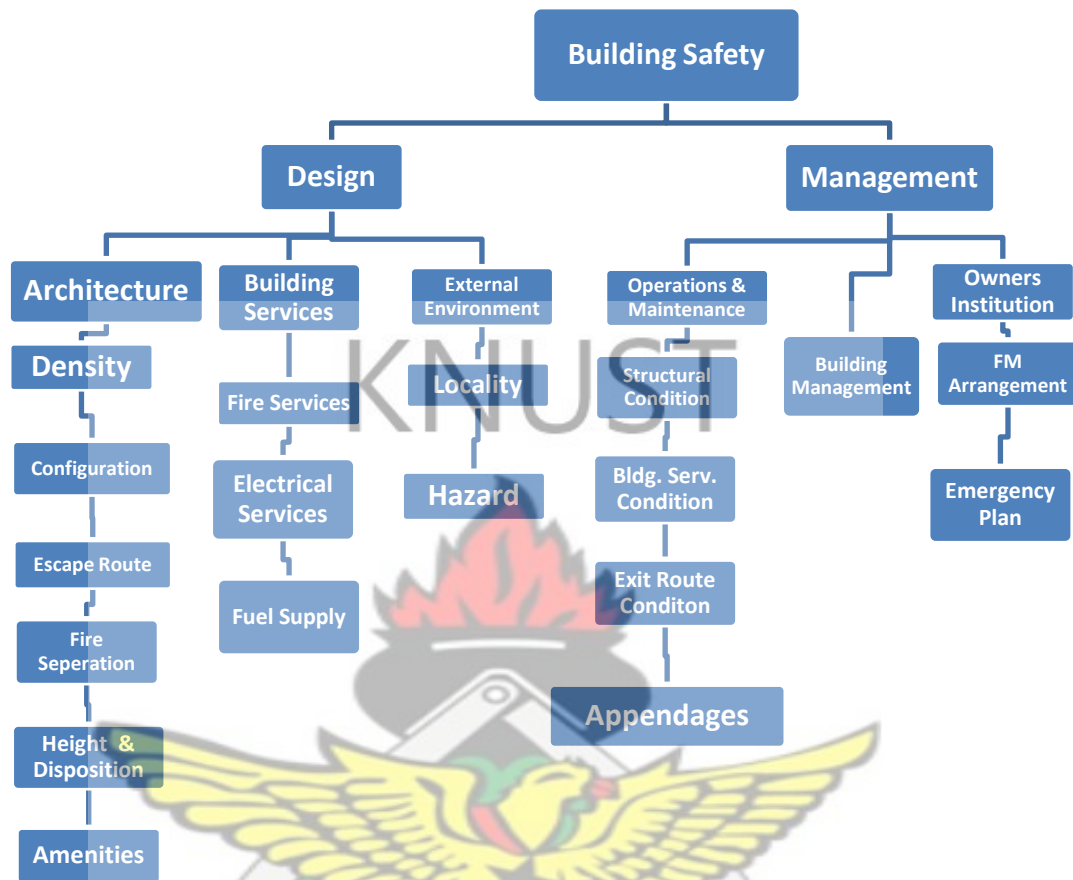


Figure 2.4. Hierarchy of Building Factors for Safety and Conditions Assessment

Source: Assessing Safety Measures in Residential Buildings in Saudi Arabia

The Design factors include three categories (Architecture, Building Services, and External Environment), which are further divided into 11 sub-categories. Architecture deals with the fire risk of buildings and the provision of the means of escape and means of access for fire-fighting and rescue in case of fire. Also, this category is assessed in respect of the measures against falling objects. For example, the provision of utility platforms and covered walkways at the street level can reduce the risk caused by falling objects.

The design of Building Services, such as fire services, electrical installations, and fuel supply, also has a direct influence on the safety of users or occupants of buildings. As for the External Environment, hazards like the presence of a petrol filling station in the neighbourhood will be highlighted. Also, the location of buildings relative to certain civil services, like a fire station, is considered in this category. With regard to these design aspects, the safety issues of buildings can be addressed at the outset of a project. The largest challenge in the field of housing and health seems to be the collection of clear and straightforward evidence. As housing and health is always affected by a variety of factors, disentangling and assessing the impact of housing conditions on health is not an easy subject. As opined by (Ranson, 1991) “housing and health is not and never will be an exact science.”

Likewise, building factors under Management are grouped into two categories (Operations & Maintenance and Building Management), which in turn are sub-divided into seven sub-categories. Maintenance the inspection and upkeep of various building fabrics and services; Operations refers to the tidiness and integrity of the exit routes and appendages to the building. Building Management, regarded as the software for improving the safety and condition of buildings, embraces strategic issues such as owner's institution, arrangements of facilities management, emergency preparedness, and post-occupancy evaluation.

With the addition of appendages to the residential buildings, the designing and the planning factors should be considered to ensure health and safety of the occupants at the construction stage. The dire consequences of building neglect have been reflected

in fatal accidents of fallen external renderings, spalling concrete pieces, and collapsed misused canopies. From 1990 to 2002, accidents related to unauthorised appendages resulted in at least 21 deaths and 135 injuries (Leung and Yiu, 2004). Thus, the pitfalls in our living environment threatening the occupants and the public have been revealed. The design should carefully consider whether the construction of the appendages needs to be elevated to safeguard occupants. In addition, to being influenced by other non-housing factors, crowding and noise exposure are also related to the design and layout of the dwelling (Fuller-Thomson *et al.*, 2000)

To reiterate, it is very important to consider the safety of the occupants when post construction activities are being done. Added to that, the appendages should be constructed safely in order to guarantee the safe construction practices.

2.4.2 CONSTRUCTION STAGE OF APPENDAGES

With regards to the construction stage of the appendages to the residential buildings, some vital factors must be taken into consideration so as to ensure the safety of the occupants of the building as the construction progresses. The following are some of the major issues to be looked at; shoring, scaffolding and hoarding. It is believed that, when these provisions are made before the commencement of the project, safety of the occupants of the buildings will be guaranteed.

2.4.2.1 SHORING DURING CONSTRUCTION

Shoring is a general term used in construction to describe the process of supporting a structure in order to prevent collapse so that construction can proceed. The phrase can also be used as a noun to refer to the materials used in the process. In relation to buildings, it is used to support the beams and floors in a building while a column or

wall is removed. In this situation vertical supports are used as a temporary replacement for the building columns or walls. It can also be used in trenches such that, the systems provide safety for workers in a trench and speed excavation. In this case, shoring should not be confused with shielding. Shoring is designed to prevent collapse where shielding is only designed to protect workers when collapses occur. In concrete structures, shoring is also referred to as falsework, provides temporary support until the concrete becomes hard and achieves the desired strength to support loads.

The incorporation of appendages to apartment buildings is a matter of necessity, correction, and convenience. They can be authorized or not depending on how structurally safe they are or how adequately egress they are constructed. There are many techniques of shoring and each technique has its advantages, the choice of any given shoring technique must take into considerations the safety and health of the occupants at the construction stage of the appendages such that it will not limit free movements of the occupants. Concerning buildings, any of the followings can be employed: raking shore, hydraulic shoring for trenches, piles and lagging for foundations, beam and plate, soil nailing, continuous flight augering.

According to Hong Kong Building Department (2011) the classification of appendages shall cover those erected in the common parts and the external walls of the building, as well as those on the external ground, open space, gardens, playgrounds, private streets and access roads etc. It further stated that, the construction of the appendages should not be unstable, should not put the parent structure under distress, and should not constitute serious environmental nuisance or health hazard. Safety measures shall be provided during the construction of the

appendages to safeguard the workers, occupants and the public as well as adjacent properties.

2.4.2.2 SCAFFOLDING AND HOARDING DURING CONSTRUCTION

Scaffolding is a temporary structure used to support people and material in the construction or repair of buildings and other large structures. It is usually a modular system of metal pipes or tubes, although it can be from other materials. Bamboo is frequently used in some countries. The purpose of a working scaffold is to provide a safe place of work with safe access suitable for the work being done.

In another development, the National Building Regulations, (1996) L.I.1630 also highlighted on Hoarding, Scaffolding and Temporary structures as it states at clause 49 that:

1. The design and construction of hoarding, scaffolding and other temporary structures shall comply with regulation 35 on general load-bearing structures.
2. All hoarding whether used for enclosing a building in the course of construction or for any other purpose shall be constructed of approved materials.
3. If in the opinion of the District Planning Authority a construction work may constitute a source of danger to the public, it may request the works to be enclosed in a hoarding and finally,
4. In all construction works where work is carried out at a height above ground and requires the use of scaffolding, the scaffolding shall comply with the Factories, Shops and Offices Act. 1970. (Act 328).

2.5 LEGISLATION ON APPENDAGES

The legislations on the construction of appendages are established to regulate the built environment in accordance with the existing National Building Regulations, 1996 L.I. 1630 of the country in conjunction with The Local Government Act, 1993 (Act, 462) as well as the world at large and also, to provide for other connected purposes. The other aspect of the legislation on the construction of appendages also takes into consideration the bye laws of the Accra Metropolitan Assembly (Works Department).

2.5.1 BUILDING ORDINANCE

The building ordinance is a statutory law which is applicable to all building works in the city of Hong Kong. According to (Li, 2003), the ordinance shall also be applied to the safety of land adjacent to buildings and construction sites. This ordinance has an exception for the government construction like buildings and buildings owned by the Government together with public housing provided by the housing society.

According to the law, “Building works includes any kind of building construction; site formation works, ground investigation in the scheduled areas, foundation works, repairs, demolition, alteration, addition and every kind of building operation, and includes drainage works”. Under present legislation, newly completed private buildings are required to be inspected by the Buildings Department of Hong Kong to ensure that buildings are built in compliance with stipulations and requirements of the Buildings Ordinance before occupation permits can be issued to the developers.

However, no provision about regular building inspection is laid on property owners to take the initiative role.

Further, section 14 of the building ordinance at chapter 123, stipulates that, the building authority shall give an approval and also consent before the commencement of any construction works. Therefore any building work in contravention to this stipulation is considered as unauthorised appendages which invariably do not conform to the safety measures during the construction since, permit for construction might not have been sought.

2.5.1.1 SECTION 24 OF BUILDING ORDINANCE

Under this ordinance, there are four sub-sections in Section 24 of the Building Ordinance: Section 24, Section 24A, Section 24B and Section 24C. These sub-sections give power to the Building Authority to cope with any building works incompliant with legal requirements under different circumstances without prejudice and its heading in the ordinance is “Order for demolition, removal, or alteration of building, building works or street works”.

The Building Authority is empowered by the Ordinance to serve demolition, removal or alteration orders on owners of buildings or building works which contravene the Ordinance. Owners are required to resume their properties back to the status approved by the Authority, or in some cases, subject to the satisfaction of the Building Authority. This section also states the power vested on the Building Authority in every case to specify the time within which the demolition, alteration or

work required by such order shall be commenced and completed. (Li, 2003) points out that the objective of this section is to give power to the Building Authority to order a person responsible for the said defects to carry out remedial works to remove the source of danger. (Li, 2003) further points out that, the enactment of Section 24 appears to ensure the safety of buildings or buildings works, the authority should also implement regulations to protect safety of the public so that a safe living environment can be ensured and provided.

This assertion by (Li, 2003) attests to the fact that most of the post construction activities are not carried out safely which pose threat to the occupants and the passers-by. Therefore, there is the need to construct the appendages to the buildings safely by employing all the safety measures during the construction period to ensure free movement of the occupants as well as their safety.

2.5.1.2 SECTION 26 OF BUILDING ORDINANCE

This building ordinance consists of two parts, namely: Section 26 and 26A. These ordinances gave additional powers to the Building Authority to deal with those building works that are contravening the ordinance. Section 26 copes with dangerous buildings while Section 26A is about defective building works, providing alternative ways for the Building Authority to take action on structures which are perceived as dangerous or defective. In the actual sense, Section 26 is entitled “Dangerous buildings”. Under this section, “dangerous” can be defined as:

“Where in the opinion of the Building Authority any building has been rendered dangerous or liable to become dangerous by fire, wind, rain, dilapidation, use, lack of fire escapes or any other cause, the Building

Authority may by order in writing served on the owner declare such building to be dangerous or liable to become dangerous.”
(Subsection 1
of Section 26 of the Buildings Ordinance)

Although there is no clear indication that unauthorized appendages are the same as dangerous building works, the authority may also remove the unauthorized appendages relying on the “risk to the public” condition (Li, 2003). Section 26 prescribes all buildings and appendages in Hong Kong, providing other means for the Building Authority to deal with different buildings or structures. For example, it implicitly indicates the power of the Building Authority to handle unauthorized appendages which are structurally unsafe to the buildings and may constitute danger to the public (Li, 2003). With this trend of constructing unsafe structures to the residential buildings which may be demolish later, it is advisable to construct these appendages safely to save life and property.

2.5.2 NATIONAL BUILDING REGULATIONS

The National Building Regulations of Ghana is the statutory document that deals with the construction activities in the country as Clause 1 of the document stated categorically that, these Regulations shall apply to the erection, alteration or extension of a building as defined in these regulations unless otherwise provided in these Regulations. Clause 2 of the document further stated that, any person who intends to;

- a. erect any building; or
- b. make any structural alteration to any building; or
- c. execute any works or install any fittings in connection with any building

shall apply in Form A specified in Part 1 of Schedule 1 to these Regulations to the District Planning Authority of the district where the buildings, structure or work is or is intended to be and shall submit in duplicate the relevant plans with the Form.

Clause 3 of the document also deals with issuance of building permit to the prospective clients as it stated that; the applicant under regulation 2 of the document shall satisfy the District Planning Authority that he has good title to the land relevant to the plans. On the second aspect of Clause 3, it stated that, No approval shall be granted to any applicant who does not have a good title to the land, and, for the purposes of this regulation, good title shall be in accordance with a certificate issued by the Chief Registrar of Land Titles or any other agency so authorized.

Inferring from the three clauses discussed above, it became clear that the building regulations has not dealt much with the construction of the appendages to residential buildings. And also, the drastic measures that should be taken against those who do not obtain permit before undertaking the construction activities. Clause 7 of the document points out that, The District Planning Authority to which plans have been submitted may in the exercise of its power under section 64(1) of the Local Government Act, 1993 (Act 462), grant the building permits in Form B specified in Schedule 1 Part III to these Regulations and may attach to the permit any conditions with respect to the proposed building or works that is not inconsistent with these regulations including the condition that be required by the District Planning Authority from time to time as the building or work progresses.

The next regulation is the follow up on the permit which is the Clause 8 stating that, where a person submits an application for a building permit, the District Planning Authority shall notify him within 7 days of the receipt of the application and shall

within a period of 3 months thereafter notify the applicant whether the application is granted or refused. On the contrary, any applicant who has not been informed of the grant or refusal of the application may after the expiry of the 3 months commence development on the basis that the application is acceptable to the District Planning Authority.

This assumption that after 3 months of submission of a permit is an indication that it has been accepted by the authorities in the document gave rise to unsafe construction of the appendages to the residential buildings since most of the times, permits are not granted before the clients undertake their construction activities. This trend contravenes the building regulations since an approval has to be given before the commencement of any project.

According to the National Building Regulations, a qualified building inspector shall carry out regular inspections of any project at every stage of the development to ascertain whether the materials as well as proper building safety measures are been employed but the reality on the ground is those inspection are not carried out at each stage of the project which actually brought about construction of unauthorised appendages as well as unsafe construction of these appendages.

2.5.3 BYE-LAWS OF ACCRA METROPOLITAN AUTHORITY

Bye-Laws refer to law of local or limited application passed under the authority of a higher law specifying what things may be regulated by the bye-laws. It can also refer to the internal rules of an organization in order to regulate its own affairs. According to National Building Regulations (1996) L.1 1630, there should be a qualified building inspector to oversee inspection of all projects within the metropolis and the

bye-laws of the Accra Metropolitan Assembly also enumerated some functions of the Building Inspector as:

- ◆ inspects daily construction work in line with the regulations
- ◆ assists public to have insight into permit related concerns
- ◆ involved in the processing of building permits
- ◆ knowledge in the keeping administration, retrieval of permit records (Archives)
- ◆ writes site inspection reports
- ◆ provides inspection reports necessary for issuance of certificate for habitation
- ◆ represents the assembly in law courts
- ◆ prosecutes offenders of the building laws at the law courts
- ◆ oversees or initiates demolitions and general enforcement actions
- ◆ acts as a liaison between stakeholders in the building regulatory fraternity
- ◆ have insight and apply provisions in the building regulations and related laws

Section 52 of Local Government Act, 1993 (Act, 462) gives an account on the enforcement in respect of unauthorised development where it states clearly that, where a physical development has been or is being carried out without a permit contrary to this Act; or conditions incorporated in a permit are not complied with, a District Planning Authority may give written notice in such form as may be prescribed by regulations to the owner of the land requiring him on or before a date specified in the notice to show cause in writing addressed to the District Planning Authority why the unauthorised development should not be prohibited, altered, abated, removed or demolished.

Finally, section 62 of Local Government Act, 1993 (Act, 462) gives an insight into how bye-laws can be made by various assemblies when it states that, a District Planning Authority may make building bye-laws within the scope of national building practices prescribed by law and these bye-laws may be made with respect to the district generally or with respect to particular areas, buildings or works in the district and shall in particular make provisions for-

- a. the control of the construction of buildings, streets, boardings, fences and signboard;
- b. the execution of work on and in relation to existing buildings, structures and streets;
- c. drainage and sanitation;
- d. the removal or abatement of obstructions and nuisance; and
- e. matters referred for the guidance of District Planning Authorities in the Second Schedule to this Act.

With deep insight into these bye-laws in the Local Government Act, 1993 (Act 462), it became clear that, the various Assemblies caved their bye-laws from the Local Government Act, 1993 to suit their jurisdictions with regards to construction activities.

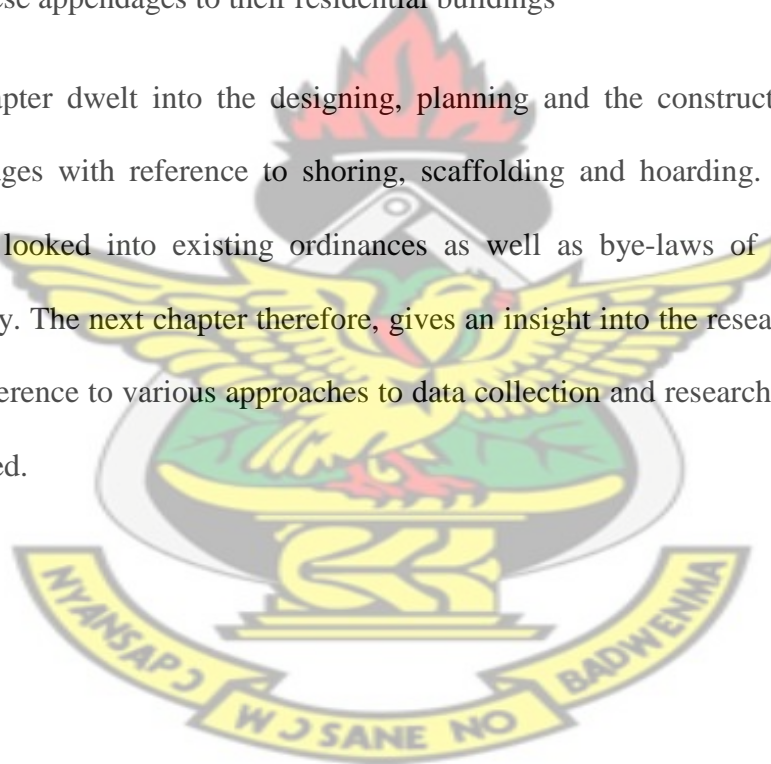
2.6 SUMMARY

The chapter has reviewed literature on residential buildings and global conditions of residential buildings as well as conditions of residential buildings in Ghana and Accra as a whole for a deeper understanding of the nature of residential buildings across the globe. The chapter has also revealed that the situation of building

appendages in the construction industry around the globe is on the increase as the global perspective on the appendages with its proliferation has been on the high rise.

The chapter has also taken a closer look at the various categories of appendages, the types, their causes and effects with their health and safety implications on the occupants, the passers-by and the buildings as a whole. The literature has also revealed that very little has been done in terms of research on the safe construction of appendages to residential buildings in the Ghanaian construction industry. Notwithstanding, this chapter has also revealed the benefits the landlords derived from these appendages to their residential buildings

The chapter dwelt into the designing, planning and the construction stage of the appendages with reference to shoring, scaffolding and hoarding. And finally, the chapter looked into existing ordinances as well as bye-laws of the metropolitan assembly. The next chapter therefore, gives an insight into the research methodology with reference to various approaches to data collection and research instrument to be employed.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The aim of this chapter is to explain how the data for the research was approached, collected and analysed. Generally, to achieve the aim of a study, one of the important areas to consider is the kind of method that is adopted (Naoum, 2001). For this reason, a case study methodology was used for this research. A case (Kaneshie Awudome Estate) was chosen and analysed. Case studies are frequently used in professions and fields of practical activities such as architecture, planning and environmental engineering. A case is a phenomenon of some kind, which emerges in a limited context and determined in social, spatial or temporal terms (Johansson, 2001). In this thesis, the case is spatially determined since it is a specific housing area. The Kaneshie Awudome Estate was selected for its uniqueness. The analysis of the data collected can be done in two distinct ways, the quantitative and the qualitative. This quantitative analysis pertains to the use of computer to analyse quantitative materials with their results in percentages and absolute numbers whilst the qualitative deals with the examination of the responses collected and comparing the findings with existing theories or information (Twumasi, 2001)

3.2 RESEARCH DESIGN

According to (Panneerselvam, 2010), a research design provides a complete guideline for data collection for any given dissertation. In another development, (Mouton and Marais, 1990) also opined that, a research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine

relevance to the research purpose with economy in procedure. From these definitions it can be seen that the research design implies that critical decisions should be taken before embarking on the study in order to avoid mistakes. Questionnaires were administered to the residents in the study area to elicit views on the issues identified in the research objectives.

3.3 POPULATION AND SAMPLE

Population is the sum total of objects, events or individuals that have common characteristics (White, 2004).). The “total collection of individuals or objects that form the basis or the focus of the research” whereas the sample is the selected part or a subset of the population selected by either probability or non-probability methods (Pretorius, 1995). A research is generally conducted to make inferences about the population. The population boundaries were limited to the Kaneshie Awudome estate with houses population being 754 (Housing and Population Census, 2000), based on the catchment area to be covered. A sample size from this population has been taken for the study. In all, a sample size of 100 houses has been chosen for this study based on the Kish Formula. The application of the Kish formula is illustrated in the next sections. Random sampling method was used as it sought to eliminate all bias in the collection of data. It also eliminates pre-judging of the results before the research has been conducted. The random sampling method was chosen such that each member of the sample frame has the equal chance of being selected or chosen for the study.

3.4 SAMPLE SIZE DETERMINATION

To determine the minimum sample size that is representative of the population, the KISH FORMULA (1965) which gives a procedure for calculating minimum sample size has to be applied. **The formula works as follows:**

$$n = \frac{n^1}{(1 + n^1/N)}$$

Where,

n = Sample size

N = Total number of houses in the locality

$$n^1 = S^2/V^2$$

V = the standard error of sampling distribution = 0.05

S^2 = the maximum standard deviation of the population

Total error = 0.1 at confidence interval of 95%

$$S^2 = P(1 - P) \quad \text{where } P = 0.5$$

$$= 0.5(1 - 0.5)$$

$$= 0.25$$

P = the proportion of the population elements that belong to the defined region.

$$\text{Since } n^1 = S^2 / V^2$$

$$= 0.25 / 0.05^2$$

$$n^1 = 100$$

$$N = 754$$

$$n = \frac{100}{(1+100/754)}$$

$$n = \frac{100}{1.1326}$$

$$n = 88.3$$

$$\sim 89$$

Adding 10% for non-responsiveness;

$$\frac{10}{100} \times 89 = 9$$

$$\text{Sample size} = 89 + 9 = 98$$

Therefore 100 questionnaires were administered to 100 different houses

3.5 DESIGN OF RESEARCH INSTRUMENT

In order to achieve the aim and objectives of the research, well-structured closed-ended questionnaires were designed to gather information from respondents in the study area of Accra Metropolis. These questions were ethical and feasible. The wordings were without bias and the questions provided multiple choice options which gave the respondents the opportunity to present their ideas by way of selecting from the options provided. Close-ended questionnaires were used because (Glasow, 2005) has indicated; close-ended questions are easy for respondents to answer and it

also help researchers to analyze their data easily. (Salant *et al.*, 1994) were also of the view that closed-ended questions with unordered choices, for example the multiple choice questions are useful for ranking items in order of preference. Further, (Fowler *et al.*, 1995) opined that close-ended questionnaires are used to gauge the respondents' ability to provide informed responses or to identify respondents who believe they are informed and compare their responses to those who do not believe they are informed.

(Mcintyre, 1999), (Fowler *et al.*, 1995) and (Salant *et al.*, 1994) further insisted that researchers must avoid questions that ask the respondent for data they could not or do not have, including questions that assume the respondent knows something about the subject and more so personal questions. Objectionable statements that reflect the researcher's bias and questions that require difficult calculations should similarly be avoided in the case of wording of questionnaires. They observed that questions with predisposition type, either for or against a particular perspective should be avoided, because such questions may be leading or may include assumptions that may not be true.

(Twumasi, 2001) also asserted that "In constructing a questionnaire, the field problems must be outlined and the objectives specified. Each objective should give the researcher a clear focus in order to formulate relevant questions. They must be clearly stated and functionally specific. The language must be clear; ambiguity must be avoided. The questions must be framed in a socially – acceptable way"

3.6 DATA COLLECTION

Data collection is a term used to describe a process of preparing and collecting data and purpose of these processes is to obtain information to keep on record, to make decisions about important issues, and to pass information on to others. The data sources were classified into primary sources and secondary sources. Primary sources provided original data and latest information for the research through the use of questionnaires and physical inspection which were adequately used in gathering data for the research. The secondary sources were journals, books and thesis from libraries, articles and journals published on the internet. According to (Madger, 1967), questionnaire and interviews are the valuable data collecting instruments for research work. Even though, the two methods can be employed, one of these methods can be adopted in the collection of the data.

3.6.1 QUESTIONNAIRE

A questionnaire is a series of well-formulated questions to probe and obtain statistically useful information from the respondents about a given topic.

When properly constructed and responsibly administered, questionnaires become a vital instrument by which statements can be made about specific groups or people or entire populations (Panneerselvam, 2010). Self-administered questionnaire were used because of the ease of gathering information quickly from people and in a short period of time and without intimidating the respondents. Some of the advantages of using self-administered questionnaires proposed by (Twumasi, 2001), include; the efficiency in collecting statistically quantifiable information; it is an efficient method

in the sense that many respondents can be reached within a short space of time. Also, (Ahadzie, 2007) suggested that, this process of distribution and retrieving of the questionnaires in person was taken for two reasons; first, to make sure that the questionnaires gets to the intended recipients and secondly, to help improve the response rate. The respondents consist of the residents of Kaneshie Awudome estate which is the study area.

3.6.1.1 QUESTION TYPES

The two main types of question formats used in a questionnaire are an open-ended format and close-ended format ((Panneerselvam, 2010). In the open-ended type of question, the researcher writes the answer of the respondent verbatim. In this type, there is no pre-coded classification of answers to the question. In a close-ended or pre – coded form of questionnaire construction, the researcher sets questions and at the same time, he provides all possible answers he expects to obtain from the respondents. When this happens, it is easy for the respondents to respond to the appropriate answer. In this research, although the two forms of questions were used, the pre – coded format was used more than the open – ended format since quantitative analysis would be the main form of analysis proposed for the project. They were also mostly used to make their answering easier for the respondents.

3.7 DATA ANALYSIS

The information collected from the survey was checked for accuracy. The results were then analyzed using descriptive statistics and mean score statistical techniques. Descriptive statistics is a powerful statistical tool that describes the main features of

the data collected quantitatively. They provide simple summaries about samples and measures in the form of percentages, graphics, central tendencies (mean, median, mode, maximum, minimum and standard deviation), and frequency distributions (Trochim, 2006).). This was used in analysing the data because it simply presents what a data shows and presents quantitative data in manageable form. The mean score is a central tendency that shows the average estimate of a distribution of values. It was used in analysing a 4 point Likert rating scale: 1 = not important, 2 = slightly important, 3 = important, 4 = very important in the household questionnaire responses and finding. The mean score of each variable was calculated using the formula: $MS = \left[\frac{\sum (fxs)}{N} \right]$. Where **MS** is the mean score, f is the frequency of the responses to each rating (1 – 4), s is the score given to each variable by the respondents (ranges from 1 to 4) and N is the total number of responses concerning that factor.

SPSS Version 16 (Statistical Package for the Social Sciences) software was the computer software used in the analysis. SPSS provides a broad range of capabilities for the entire analytical process. All data and information from the questionnaires were entered into SPSS Version 16 program for statistical analysis in order to obtain the necessary results to report on.

3.8 SUMMARY

This chapter dealt with the various processes involved under methodology with regards to gathering of data, design of research instrument as well as sample size determination. The chapter also described the processes involved in the analysis of the data gathered. The next stage is to analyse and discuss the results obtained.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter deals with the analysis and discussion of collected data using Statistical Package for Social Science (SPSS) and the statistical techniques employed for the analysis were descriptive statistics in the forms of frequencies, standard deviations and means score. The chapter also presented the results of analysis and discussions in the forms of texts, figures, tables and the likes and concluded with the summary of the analysis of the results.

4.2 BACKGROUND INFORMATION ON RESPONDENTS

Actually, it is very important to have a fair idea of the respondents who have answered the questionnaire so as to situate their responses within context. The results from the findings were analysed based on the following characteristics; number of years lived in the house, ownership and acquisition, position of the respondents to ascertain his/her authority and the like.

4.2.1 NUMBER OF YEARS LIVED IN THE HOUSE

The number of years a resident has lived in the household under survey indicated his/her ability to provide reliable information on the questions asked. Majority of the respondents included in this research (87%) lived in their various houses for a period of 31 – 40 years whilst just 1% of the respondents have lived in their house for a period exceeding 40 years. Those who lived in the house below 10 years, below 20

years and below 30 years had 4% each. This development has led the researcher to believe that respondents were in a position to adequately provide answers to the questions that were asked since they have lived in the house for a longer period of time and have also witnessed many modifications of the houses during their stay in the house. Figure 4.1 indicates the results that were gathered from the survey.

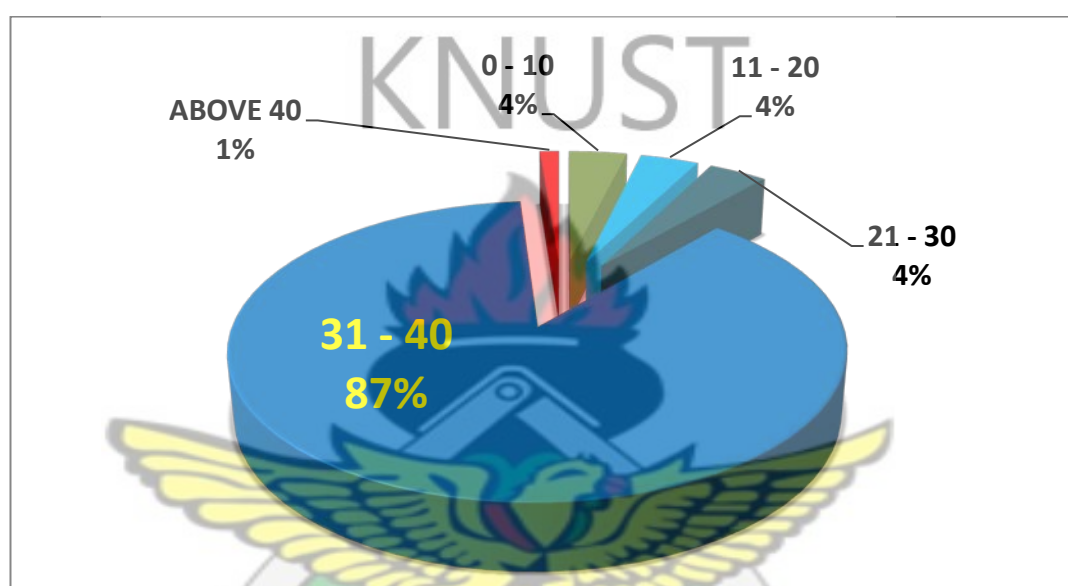


Figure 4.1 Number of Year's Respondent has lived in the House

4.2.2 OWNERSHIP AND ACQUISITION

The results indicated that there were more owners (93.8%) than tenants (6.2). Of the owners however 93.8% of the respondents indicated they inherited the property, 5.0% said they bought the houses from the State Housing Corporation while 5.0 % indicated purchasing the houses from others other than the State Housing Corporation. 2.5% of the respondents however indicated other areas where they acquired the houses. Table 4.1 and 4.2 shows the acquisition as well as the mode of acquisition of the houses respectively.

Table 4.1 Ownership Status of the Houses Surveyed

Variables	Frequency	Percent	Cumulative Present
Tenant	5	6.2	6.2
Owner	75	93.8	93.8
Total	80	100	

Table 4.2 Acquisition of the Houses

Variables	Frequency	Percent	Cumulative Present
Purchased from SHC	4	5	5
Inheritance	70	87.5	92.5
Purchased from private person	4	5	97.5
Others	2	2.5	100
Total	80	100	

4.2.3 POSITION OF RESPONDENT IN THE HOUSE

This question was included as it gives an idea about the authority a respondent has and the reliability of their responses. With the 80 household questionnaires that were retrieved after the administration, 75 respondents representing 93.8% of the respondents said they are the heads of the household whilst 5 respondents representing 6.2% of the respondents were tenants in the houses surveyed. Figure 4.2 illustrates this finding.

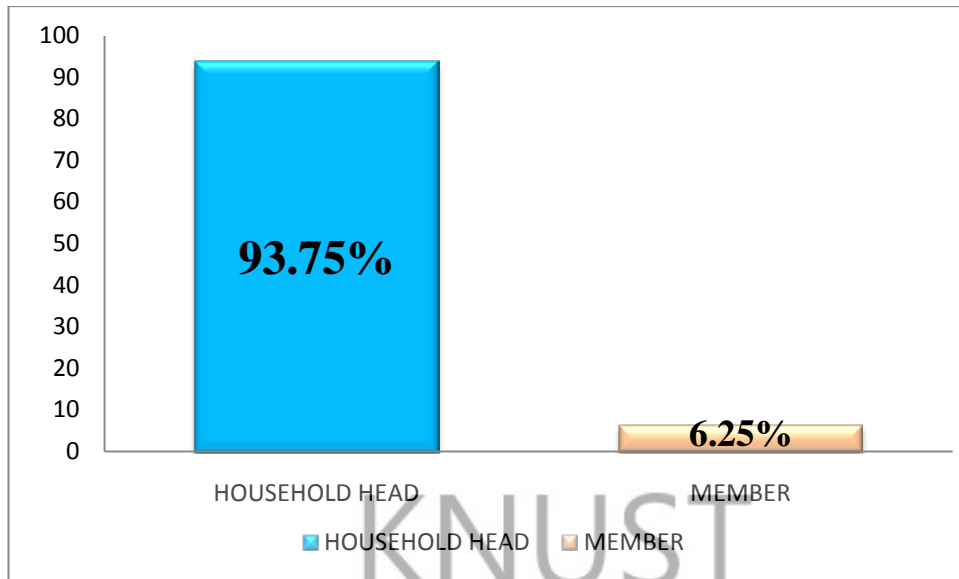


Figure 4.2 Positions of Respondents in the House

4.3 CHARACTERISTICS OF HOUSES SURVEYED

The characteristics of various houses that have been surveyed refer to the features that make the houses recognizable and each got different characteristics that make it very unique to the research. The following are some of the characteristics of the houses; number of units/rooms in the house and type of dwelling,

4.3.1 NUMBER OF UNITS (ROOMS) IN THE HOUSE

The houses originally built by the State Housing Corporation consisted of mostly three bedrooms and a hall with toilet, bathroom and kitchen. Findings from the survey however indicated that there are now varying number of units ranging from a minimum of one-room which represented 1%, two-rooms representing 2%, three-rooms representing 2%, four-rooms representing 3%, five-rooms representing 3%, six-rooms representing 3% and finally 86% representing above-six rooms.. This was

due mainly to extensions and modifications that have gone on over the years. The results in Figure 4.3 indicate the range of the units of the houses surveyed.

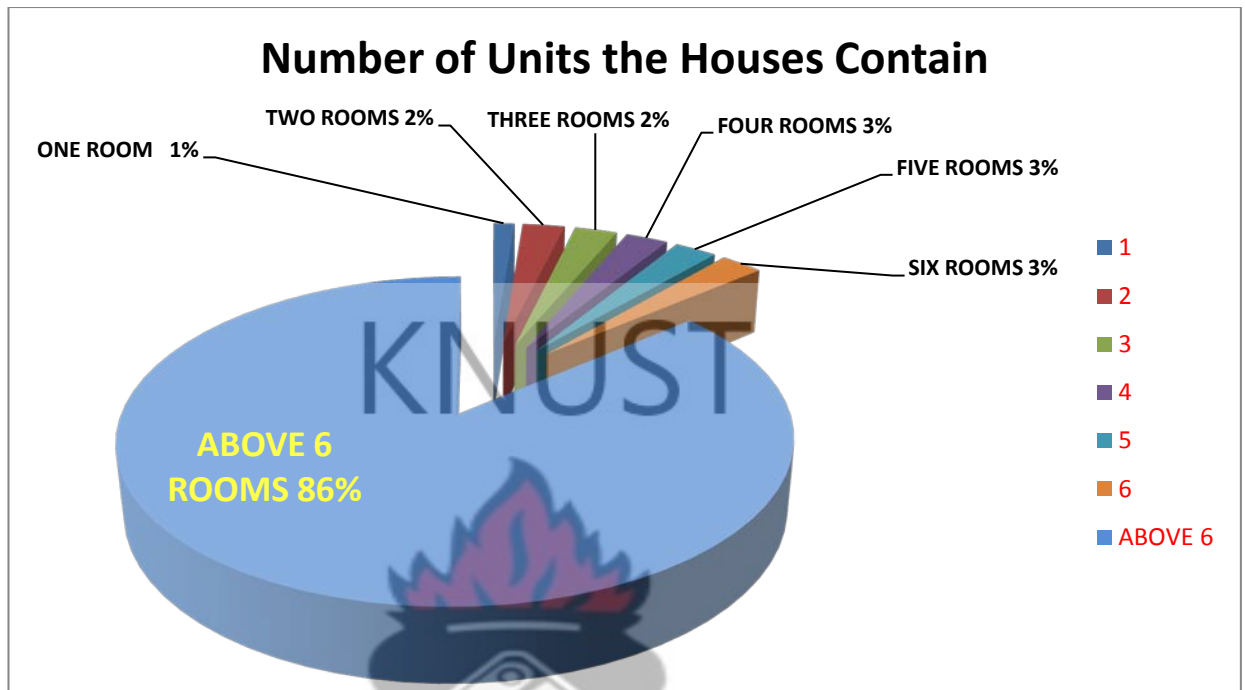


Figure 4.3 Rooms or Units the Houses Contain

4.3.2 TYPES OF DWELLING

The type of dwelling question has been asked the respondents in order to ascertain the degree to which the additions of the solid extensions to the residential buildings have been in the increase in the estate. The results from Figure 4.4 below are a great indication of the extent to which the appendages have been added to the existing buildings. Separate house which represented 6% of the respondents lived in the separate house which has been the original plan of the houses. But due to the post construction activities, many have converted the design of the buildings. Those living in the flats constituted the greater percentage as high as 94% of the houses surveyed during the questionnaire administration.

The results paint a picture that most houses have some form of appendages added. This also means that, these construction activities were carried out without taking into consideration the safety and health issues of the occupants. The implications are that it will be very difficult for the Government to reverse this trend of unsafe construction of these appendages to the existing buildings.

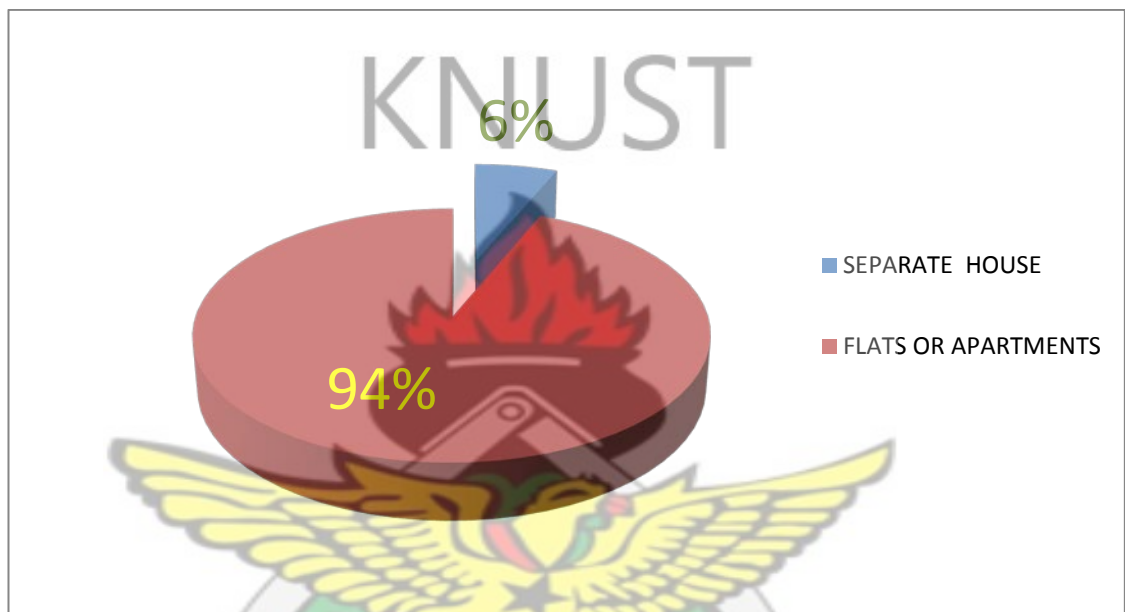


Figure 4.4 Types of Dwelling Lived in

4.4 APPENDAGES IDENTIFIED IN THE SURVEY

After the analysis, it was realized by the researcher that Drying Rack and Flower Rack had the highest percentage of being present in the houses surveyed with a percentage of 100% as all the houses surveyed had a number of drying racks and flower racks attached to the buildings. This was not surprising as in all the houses visited people wash their clothes and had to dry them and for aesthetics reasons all grew flowers. This is followed closely by Light – weight canopy projecting exceeding 500mm with a percentage of 93. 8%.

The main focus for this research which is the solid extensions which got a percentage of 88.8% which is an indication that truly, the construction of the appendages have been on the increase in the estate.

The least observable appendage among all the houses surveyed was Air – conditioner frame with a percentage of 43.9%.

Out of this high rate of solid extensions, only few of the clients have obtained permit and when asked why they have not obtained permit, the respondents have given some reasons. Statistic means of importance is carried out to determine whether the respondents consider some of those reasons to be important or otherwise. While, the mean ranking establishes the importance of some of these issues, it also provided a clearer picture of the concerns raised. (Ahadzie, 2007). The ranking of these variables are determined by putting together the sample size, the sample mean, the standard deviations and the standard error of each of these variables. This sample mean, according to (Saunders *et al.*, 2007), plays an important role during sampling by making inferences about the population based on sample information. Standard deviation according to (Ahadzie, 2007) is the statistical tool that measures the dispersion around the sample mean. Further, (Ahadzie, 2007) indicated, these values of standard deviation of the sample mean is a measure of how representative a sample is likely to be to the population. A large standard deviation (relative to the sample mean) suggests that the values of standard deviation are widely spread out from the sample mean. This means that, there is a lot of variability between means of the sample. Small standard deviations on the other hand, suggest that the values of standard deviation are more tightly clustered around the sample mean. This is an

indication that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population (Ahadzie, 2007).

On the issues of not obtaining permit, respondents ranked first (1st) cumbersome process as the most important reason for not obtaining permit by the respondent. The second (2nd) and third (3rd) important reasons were delays in granting permit and high application fees. On the contrary, the respondents ranked seventh (7th) the following: ambiguities in the building ordinance, due to technical terms used in the building ordinance, no provision of regular building inspection by the building inspector and due to complex nature of the built environment. With this regard, it can be seen that many clients do not obtain permit due to the fact that the processes involved in the issuance of the permit have been the stumbling block for many clients to apply for permit before undertaking any construction of appendages to their residential buildings. Owing to this negative rate of respondents not obtaining permit attest to the fact that, the safety standards have largely been compromised such that, safety measures to be adopted in order to ensure safe construction of the appendages have not been followed.

Table 4.3 summarizes the statistics by the type of the Appendages that were observed in the residential buildings that were surveyed at Kaneshie Awudome Estates.

Table 4.3 Type of Appendages Observed.

Appendages	Variables	Frequency	Cumulative Frequency
Solid Canopy	Present	68	85
	Not Present	12	100
Light-weight canopy projecting by exceeding 500mm	Present	75	93.8
	Not Present	5	100
Light-weight canopy projecting by less than 500mm	Present	72	90.
	Not Present	8	100
Solid extension	Present	71	88.8
	Not Present	9	100
Flower rack	Present	80	100
	Not Present	0	100
Drying rack	Present	80	100
	Not Present	0	100
Metal frame	Present	72	90
	Not Present	8	100
Air-conditioning frame	Present	35	43.8
	Not Present	45	100
Metal cage	Present	46	57.5
	Not Present	34	100

4.5 CAUSES OF APPENDAGES TO RESIDENTIAL BUILDINGS

Respondents were given the chance to identify variables that they perceive constitute the possible causes of the proliferation of the Appendages to residential buildings.

This was done by respondents ranking the causes on a Likert rating scale of 1 to 4.

The four – point Likert scale was given as;

1 = **Not Important** 2 = **Slightly Important**

3 = **Important** 4 = **Very Important**

There was no allowance for respondents to provide neutral answers other than whether a variable was Important or not. The mean score as well as the standard deviations of each variable was calculated using the Statistical Package for Social Sciences (SPSS) and the results analyzed as follows. A variable with a higher mean was given a higher ranking than the others with a lower mean. In cases where the means of two variables are the same, the standard deviation was considered for those two variables. The variable with a lower standard deviation is this time ranked higher as it deviates little from the mean than its counterpart. Table 4.4 shows the various ranking of the perception of the respondents on the causes of Appendages to residential buildings.

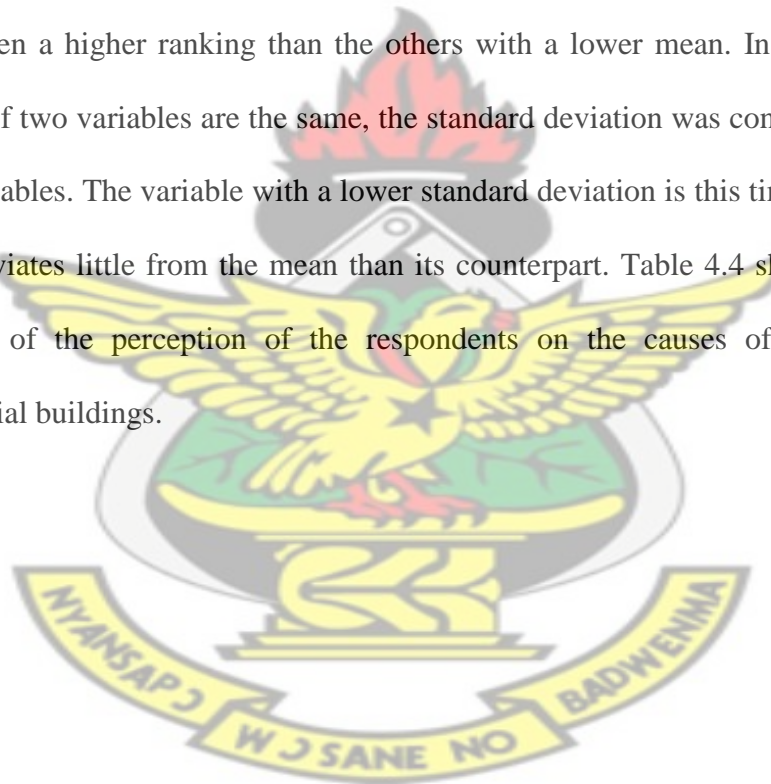


Table 4.4 Causes of Appendages to Residential Buildings

Variables	Mean	Standard Deviation	Ranking
Growth in population	3.72	0.87	1st
Mismatch between architectural design and actual needs of the owners	3.62	0.656	2nd
Commercialization of facilities	3.44	3.44	3rd
Potential benefits to be derived from the little space available	3.38	0.933	4th
Difficulties in obtaining permits	3.15	3.15	5th
Lack of developing land	3.18	3.18	6th
Lack of amenities	1.48	1.48	7th
Inadequacy of space	2.02	1.018	8th
Lack of knowledge of the building regulations	1.78	1.78	9th
Poor building management	1.79	1.79	10th
Ineffectiveness in the Implementation of planning legislations and development control measures.	1.70	0.877	11th

4.5.1 POPULATION GROWTH

Most of the respondents agreed that the most important cause of the proliferation of Appendages to residential building is population growth. With a Mean Score of 3.72, population growth was the highest ranked cause proposed by the residents of Awudome Estates. Indeed, the importance of population growth on the proliferation of Appendages to residential buildings at Kaneshie Awudome Estates cannot be over emphasized as (Owusu and Tamakloe, 1992) explicitly states that despite the increase in the population size in Accra, the number of rooms available has not kept

pace with the growth rate. They go on further, thus; “About 38 percent of 120 of the number of buildings surveyed in 1992 have 3 to 6 additional rooms”.

4.5.2 MISMATCH BETWEEN ARCHITECTURAL DESIGN AND ACTUAL NEEDS

It is not surprising that the next important cause of the proliferation of the phenomenon of appendages agreed on by the respondents is the mismatch between architectural design and actual needs of the owners (MS = 3.62). This cause can easily be linked with the desires and actual needs of the people as most people are likely to effects changes to their houses if such houses do not meet their needs. (Lai and Ho, 2001) reinforce the idea that the existence of unauthorised structures reveals the inadequate supply of space in urban land in Hong Kong.

4.5.3 INEFFECTIVE IMPLEMENTATION OF PLANNING LEGISLATIONS AND DEVELOPMENT CONTROLS

The respondents indicated that the ineffectiveness in the implementation of planning legislations and development control measures is the least important cause of the proliferation of the construction of appendages to residential buildings. This was evident with a Mean Score of 1.7 which was ranked 11th among the causes that were outlined in questionnaire that was administered. This was also apparent as most of the residents knew nothing about the existence of the building regulation let alone to know how it is being implemented.

4.5.4 POOR BUILDING MANAGEMENT

Not so surprising also, the residents identified poor building management as the second least important building management with a Mean score of 1.79. This point can be linked closely to the ineffectiveness in the implementation of planning regulations and the effectiveness of development control measures. The likely hood implications are that, the planning regulations and the control measures are not strictly adhered to since many landlords have been carrying out these post construction activities without regard to the planning regulations.

4.5.5 COMMERCIALISATION OF FACILITIES

Most of the respondents ranked the commercialization of the facilities as significantly important cause in the proliferation of the Appendages to residential buildings. This can be seen clearly from its mean score of 3.44 which clearly beats the average mean of 2. (Li, 2003) reinforces this view of the author when he states that to look into the existence of Appendages from an economic perspective; it can be analyzed under the demand-supply paradigm. Under perfect market conditions, the number of appendages constructed should be “determined” by the market through both demand and supply forces. As appendages to buildings are economic goods which may generate services and additional space for property owners, owners will continue building structures until reaching the point that the marginal cost of production equals to the marginal revenue generated by that particular unit of appendages. That is to say, if the owners find that there is potential benefit, no matter it is monetary or non-monetary, of constructing an Appendage, they will tend to

produce that particular unit of appendage in order to capture the marginal benefit and maximize their utility level.

4.6. EFFECTS OF APPENDAGES ON RESIDENTIAL BUILDINGS

The questionnaire that was administered also solicits from the respondents, views on the negative effects of Appendages to residential buildings with particular reference to the Kaneshie Awudome Estates. This was also carried out in the form of a Likert Scale of 1 to 4 which gave the respondents the chance to rank the effects that were provided them. The results were analysed based on the Mean Score of each variable using the Statistical Package for Social Sciences determination as stated. It became clear that the respondents ranked first (1st) lighting and ventilation as the most important effect of the appendages on the buildings and it is not surprising when they ranked second (2nd) and third (3rd) effects on the buildings as: they deface the building and they devalue the buildings. In a study by (Wong *et al.*, 2006), the researcher agrees with him as he pointed out that, the decay process of buildings is anticipated to accelerating. This rate of deteriorating can be attributed to some factors. The first and foremost is the fact that, property owners lack the knowledge of building defects and the understanding on the importance of building maintenance. They are also not aware of the safety of buildings that they normally undertake alteration works which may invariably cause damage to the building structure. The respondents ranked eighth (8th) negatively affected the visual and aesthetics aspects of buildings.

With regards to the effects of these appendages on the occupants, the rankings have been done by the respondents as: poses health hazards by blocking ventilation access as the first (1st) which is closely followed by causing injury and prevention of adequate lighting as the second (2nd) and third (3rd). The least ranked effects has been impeding access of the service providers which got eighth (8th). The rankings are an indication that the construction of these appendages to the buildings has serious effects on the buildings as well as the occupants. To meet the cultural, social, and physical requirements of the residents, and to provide a safe dwelling to shelter them from the hazards that may impact from their environment, a house must be properly designed and constructed (Jackson, 2003), the writer also shares this view. Results as well as the various rankings of the variables obtained from the analysis are provided in Table 4.5 and 4.6

Table 4.5 Effects of Appendages on Residential Buildings

Effects on the Buildings	Mean	Standard Deviation	Ranking
Lighting and ventilation will be affected	3.75	0.626	1st
They deface the building	3.6	0.836	2nd
They devalue the building	3.4	0.396	3rd
They disturb structural stability of the building	3.4	0.989	4th
Obstructs the means of escape during fire outbreaks	3.21	1.015	5th
Imposition of an additional loading on the building	3.19	1.032	6th
Firefighters and ambulances may find it difficult to locate places	2.08	1.065	7th
Negatively affected the visual and aesthetics aspects of the buildings	1.56	0.979	8th

Table 4.6 Effects on Occupants due to the Construction of Appendages to Residential Buildings

Effects on the occupants	Mean	Standard Deviation	Ranking
Poses health hazards by blocking ventilation access	3.60	0.866	1 st
Causes injury to occupants	3.56	0.869	2 nd
Prevention of adequate lighting to occupants	3.55	0.840	3 rd
Causes injury to passers – by	3.46	0.899	4 th
Too much pressure on the utilization of the available facilities	3.39	0.974	5 th
Overcrowding of the occupants in the available rooms owing to the construction of the appendages	3.25	0.907	6 th
Impedes access of service providers	1.85	1.020	7 th
Impedes access by the fire service in times of fire outbreak	1.76	1.022	8 th

4.7 CRITICAL FACTORS TO BE CONSIDERED DURING THE DESIGN STAGE OF THE APPENDAGE

The standard deviation less than 1.0 is usually an indication that there is consistency in agreement among the respondent in their responses (Ahadzie, 2007). To this end, almost all the factors that are needed to be considered during the designing stage of the appendages had their standard deviations to be less than 1.0 with the exception of only one factor that had its standard deviation to be more than 1.0, which is “clearly marked routes of escape to prevent confusion”. This development attests to the fact that there was consistency in agreement among the respondent that those factors are necessary during the designing of the appendages to the residential buildings.

On the health and safety related issues, respondents ranked adequate lighting and ventilation first (1st) as the most important factor to be considered when designing the appendages to the residential buildings. The second (2nd) and third (3rd) important factors were considered to be evacuation of the occupants to another residence and provision of access roads to the rooms. The tenth (10th) ranked factor was to ensure the safety of the occupants during designing of the appendages.

For the fact that provision of adequate lighting and ventilation, evacuation of the occupants and provision of access roads to the rooms emerged as the top three rankings of the respondents is an indication of their importance as factors to be considered in order to ensure safe construction of the appendages to the residential buildings.

In the Ghanaian built environment, health and safety issues of the occupants are not considered during the designing and construction of the appendages. It became clear that those factors were not catered for at the time of designing and construction even though the respondents ranked them high but admitted that they did not provide those factors. Table 6 below shows the factors with their rankings

Table 4.7 Critical Factors to be Considered when Designing Appendages

Variables	Mean	Standard Deviation	Ranking
Adequate lighting and ventilation to the rooms.	3.66	0.674	1 st
Evacuation of occupants to another residence	3.65	0.677	2 nd
Provision of access roads to the rooms	3.54	0.871	3 rd
Early warning signs of danger	3.51	0.842	4 th
Adequate exits without dependence on anyone	3.44	0.869	5 th
Exits with sufficient capacity of size and shape	3.31	0.922	6 th
Alternates exits arrangements	3.25	0.907	7 th
Clearly marked routes of escape to prevent confusion	2.94	1.035	8 th
Clear, unobstructed and unlocked exits	1.74	0.910	9 th
Ensuring the safety of the occupants during designing of the appendages	1.68	0.925	10 th

4.8 CRITICAL FACTORS TO BE CONSIDERED DURING CONSTRUCTION OF THE APPENDAGES

Ranking as defined by (Fowler *et al.*, 1995) is a comparison among given options, within pairs of options, by cardinality of importance i.e. first, second, third, fourth or that scores items one at a time using a common scale which also determines the importance of that factor. In another development, (Adnan *et al.*, 2007) also asserted that to analyse data on ordinal scale like the **Likert scale 1-4**, the application of importance index is also suitable. The question is related to some critical factors that are needed to be considered during construction of the appendages and the

respondent were given some factors on the scale of very important to not important to rank in order to determine how these critical factors can influence their decisions during construction of the appendages to ensure safe construction measures on site. On the issues of critical factors that are needed to be considered when constructing the appendages to the residential buildings, the respondent ranked first (1st) provision of shoring as the most important factor to be considered. The second (2nd) and third (3rd) important issues were provision of scaffolds and provision of covered walkways during construction of the appendages. The least ranked factor in the table is ensuring the safety of the occupants during construction which got tenth (10th). For the fact that provision of shoring, provision of scaffolds and provision of covered walkways for the occupants emerged within the first three rankings of the factors is an indication of their importance in addressing the issues of safe construction of the appendages to residential buildings.

To react proactively, the owners of the houses surveyed think that provision of shoring and scaffolds couple with covered walkways is the option and this is the fact that they are directly involved to ensure safe construction of the appendages. Table 4.7 shows the various rankings of the factors.

Table 4.8 Critical Factors to be Considered During Construction of Appendages.

Variables	Mean	Standard Deviation	Ranking
Provision of shoring	3.65	0.731	1st
Provision of scaffolds	3.61	0.384	2nd
Provision of covered walkways during construction of the appendages	3.41	0.924	3rd
Covering of open trenches and drains	3.41	0.924	3rd
Provision of alternate routes	3.41	0.990	5th
Inspection of the site by officials from Accra Metropolitan Assembly	3.38	0.946	6th
Free movements of the occupants	3.34	0.913	7th
Inspection of the site by official from Public Works Department	3.31	0.922	8th
Inspection of the site of by assemblyman	3.25	0.907	9th
Ensuring the safety of the occupants during construction	2.49	1.035	10th

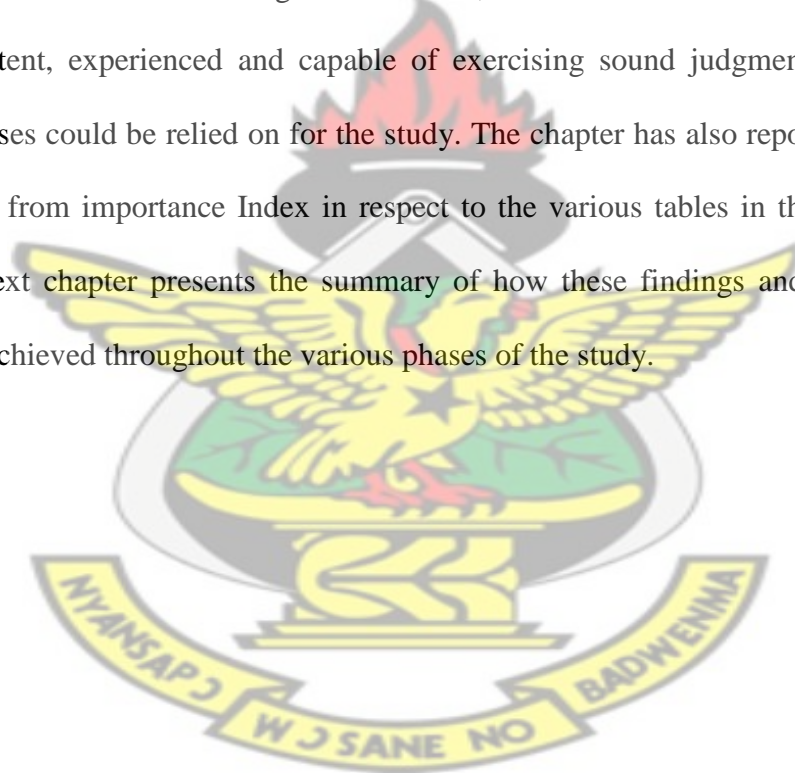
4.9 CONSTRUCTION ACTIVITIES UNDERTAKEN WITH NUMBER OF TIMES

This question was included as it sought to find out the construction activities that were undertaken by the respondents. The responses given were an indication that most of the respondents have undertaken some construction activities. Out of 80 questionnaires that were retrieved, a total of 76 respondents which represented 95.0% have undertaken some construction activities after occupying the building. It is only 4 respondents which represented 5.0% have not undertaken any construction activities. The followed up question on the number of times these construction activities were carried out, 69 respondents which represented 90.8% stated that they

carried out these construction activities ranging from 1-5 times, while 7 of the respondents representing 9.2% carried out their construction activities ranging from 6-10 times.

4.10 SUMMARY

This chapter has presented the analysis and discussions of the results obtained from the collected data. The responses from the respondents have been analysed using descriptive statistics. Among other reasons, it concluded that the respondents were competent, experienced and capable of exercising sound judgment and that their responses could be relied on for the study. The chapter has also reported the ranking results from importance Index in respect to the various tables in the questionnaire. The next chapter presents the summary of how these findings and the conclusion were achieved throughout the various phases of the study.



CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The aim of this research has been to study the safe construction of appendages to residential buildings and to accomplish this aim, a number of objectives were set. This very chapter revisited the objectives to bring into light the extent to which the aim of the study has been achieved throughout the various levels of the study. The chapter also deals with the summary of findings, conclusions and some recommendations by the researcher based on the findings of the study. Finally, specific recommendations are also presented in the chapter.

5.2 RESEARCH OBJECTIVES

The specific research objectives served as the very guidelines in achieving the purpose of the study. The various responses to these objectives have been enumerated below.

5.2.1 OBJECTIVE ONE

TO ASSESS THE EXTENT OF APPENDAGES TO RESIDENTIAL BUILDINGS AT AWUDOME ESTATE.

This very objective has been achieved through the extensive review of some related literature on the extent of appendages to residential buildings in Ghana and other countries and household questionnaires. After reviewing the literature, it became

evident that, there were many appendages existing in private buildings in Ghana with specific reference to Kaneshie Awudome Estate and other places like Hong Kong where 60,000 blocks got appendages with an estimated 10,000 new post construction activities to be undertaken every year. After the survey at the Awudome estate, it became clear that flower rack and drying racks were prevalent in all the houses surveyed and this finding attests to the fact that all the occupants wash their cloths and also, beautify their houses. Even though, other appendages have also been identified in the surveyed, the main focus for this thesis is solid extensions with 88.8% prevalent rate. This high rate of solid extension can be attributed to the growth in the population as this variable has been ranked by the respondents as the first among the variables under the causes of appendages to residential buildings. It became evident that, despite the increase in the population size in Accra, the number of rooms available has not kept pace with the growth rate.

However, urbanization coupled with population growth, mismatch between architectural design and actual needs of the owners of the buildings, commercialization of the facilities, potential benefit to be derived from the little space available and lack of developing land are fact that led to the construction of appendages to residential buildings. Others think that, the original design of the building does not suit their taste or does not meet the modern structures as such, their desire to add or change the face of the building by undertaking solid extensions of the buildings. Some were also of the view that, gains will be made when the facility is commercialized in addition to other benefits to be derived from the little space available have long-term gains on the property.

Further, the surveyed also revealed the following which contributed to appendages on the residential buildings: solid canopy, light-weight canopy projecting by

exceeding 500mm, light-weight canopy projecting by less than 500mm, metal frame, air-condition frame and metal cage.

It was also found that, the quest of most landlords in meeting their basic responsibility of providing shelter for their dependants and others seeking accommodation in the city have allowed most of them to undertake construction of appendages without having knowledge about the industry, especially in area of safe construction of appendages and measures to be taken.

5.2.2 OBJECTIVE TWO

TO ESTABLISH CRITICAL EFFECTS OF APPENDAGES ON RESIDENTIAL BUILDINGS AT AWUDOME ESTATE.

This second objectives has also been addressed by reviewing the related literature and administering household questionnaire to the respondents on the effects on the buildings as well as the occupants. The literature revealed that, many factors accounted for the effects of the appendages on residential buildings and the occupants. Within the related literature and the household questionnaire to 100 respondents out of which 80 have been retrieved, it became clear that these appendages have serious effects on the building and the occupants. Among the variables outlined, the respondents ranked lighting and ventilation as the most effect of the appendages on the buildings which is followed closely by the fact that, the appendages deface the building and in another breadth, devalue the building. Aesthetics is a very vital functional requirement of every building and as such should not be toiled with. In situation where these appendages are all over the building made it ugly and unattractive.

Findings from the literature also attest to the fact that, these appendages are not visually consistent with the original design and invariably affect the visual and aesthetics aspects of the building.

On the issue of the effects of these appendages on the occupants, it poses health hazards by blocking ventilation access and this has been ranked by the respondents as the most effect on the occupants of the building. This variable is followed by causing injury to the occupants and prevention of adequate lighting to occupants as the second and third important variables that have been ranked. On this note, for a building to be appropriate for living, lighting and ventilation are two important considerations (Yung, 2006), as such, a house must be properly designed and constructed to shelter the occupants.

5.2.3 OBJECTIVE THREE

TO EVALUATE THE ADEQUACY OF RELEVANT CLAUSES IN THE EXISTING NATIONAL BUILDING REGULATION (1996) L 1 1630 AND OTHER BYE-LAWS TOWARDS SAFE CONSTRUCTION OF APPENDAGES.

This objective has also been fulfilled by evaluating the various clauses in the National Building Regulations, (1996) L 1 1630 as well as the Bye-Laws of the Metro Works Department of Accra on the construction activities pertaining to appendages on residential buildings.

Within the National Building Regulations and the Bye-Laws of the Accra Metro Works Department which has direct oversight responsibilities for all development

projects in the metropolis, clauses 2, 3 and 4 of the National Building Regulations made it categorically clear that clients should obtain permit before undertaking any construction activities. On the contrary, there has been an assumption within the regulations that upon submission of an application within 3 month, the client can commence the project with the basis of being approved by the authorities.

Meanwhile, “ Clause 16 of the National Building Regulations prohibits Unauthorised Appendages and this clause has been dealt with under the background to the study in chapter one. With these ambiguities in the regulation, it made it clear what causes unsafe construction of appendages on the residential buildings owing to the fact that, the necessary safety measures will not be employed. Section 10 of clause 3 also made it clear that there should be a differentiation between new work and existing work. The requirement for the provision of scaffolding, hoardings and temporary structures have also been captured under clause 49 when it made it clear that these provisions should conform with the Factories, Shops and Offices Act, 1970, (Act 328).

Accra Metropolitan Assembly also enumerated on some bye-laws but the focus is on building issues therefore, the attention will be based on the functions of the Building Inspector. His duties:- inspects daily construction work in line with the regulations, assists public to have insight into permit related concerns, involved in the processing of building permits, knowledge in the keeping administration, retrieval of permit records (Archives), writes site inspection reports, provides inspection reports necessary for issuance of certificate for habitation, represents the assembly in law

courts, prosecutes offenders of the building laws at the law courts, oversees or initiates demolitions and general enforcement actions, acts as a liaison between stakeholders in the building regulatory fraternity and have insight and apply provisions in the National Building Regulations and related laws.

In conclusion, the construction of appendages to residential buildings have been dealt with in the National Building Regulations as well as the bye-laws but most of the clients do not follow the lay down specifications concerning the building activities and such they do not comply with the safety measures spelt out in the bye-laws and the National Building Regulations.

5.2.4 OBJECTIVE FOUR

TO PROPOSE A FRAMEWORK FOR THE DESIGN AND SAFE CONSTRUCTION OF APPENDAGES TO RESIDENTIAL BUILDINGS.

Against the backdrop of the findings from the study, the following steps have been formulated as the framework to ensure safe construction of appendages to the residential buildings during the design and construction stage. Below is figure 5.1 which shows the framework for the design and safe construction of appendages to residential buildings.

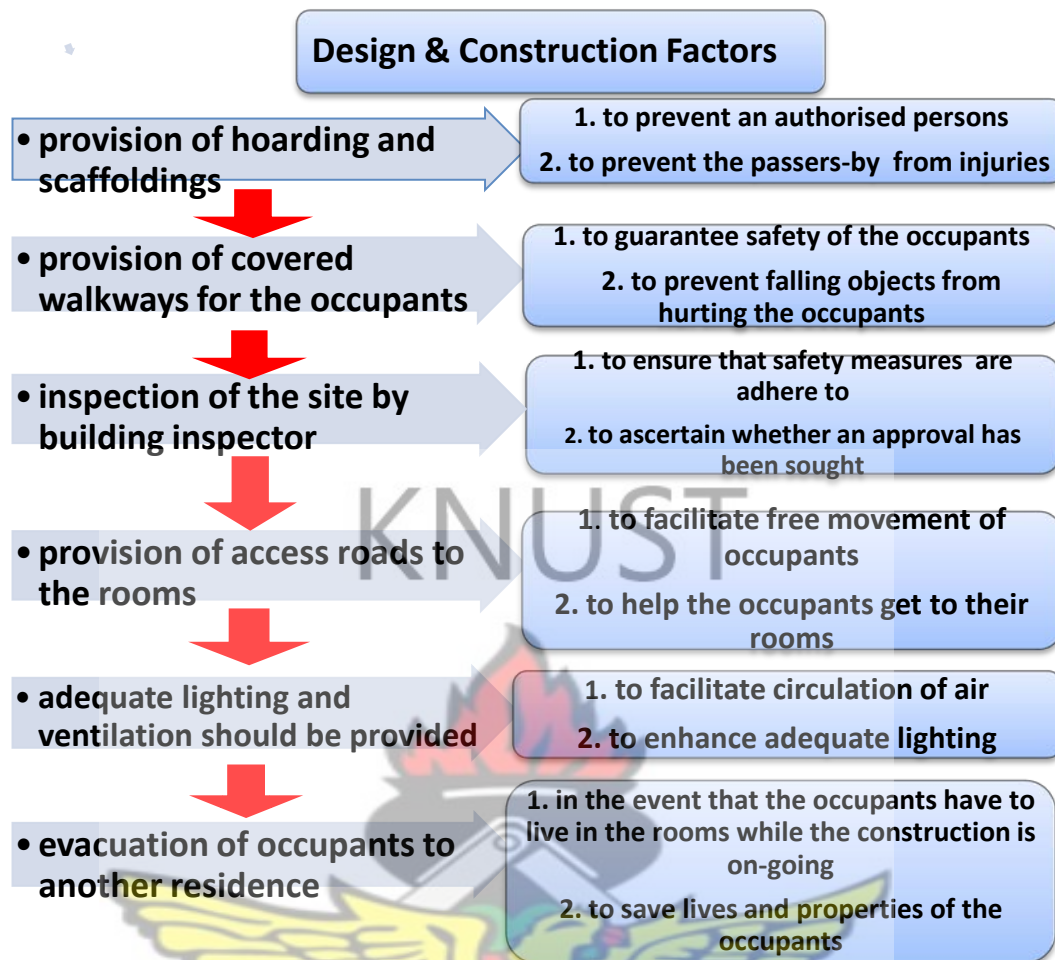


Figure 5.1 above shows the framework for critical factors during the design and safe construction of appendages to residential buildings.

The findings below gave birth to the formulation of the framework above that will ensure safety standards for the safe design and construction of the appendages to the residential buildings such that, this last objective has been fulfilled by analysing various issues concerning critical factors to be considered for the design and safe construction of appendages to residential buildings with the concerns on the safe design and construction measures to be employed. These analyses were carried out using the Statistical Package for Social Sciences (SPSS) where some of the identified factors were ranked using one sample statistics means of importance and Importance

Index. From the analysis and discussions in chapter 4, the following findings and conclusions were drawn.

On the issues of these critical factors, the respondents ranked provision of hoarding as the most important factor. This development can be attributed to the fact that, it will prevent children and unauthorized people from coming to the site when the project is on-going to avoid accidents. The next to this factor were provision of scaffolds and provision of covered walkways for the occupants. These factors were ranked the second and third important factors to be considered. The provisions of these factors are also crucial during the construction since there will be the need to work above a certain height where there will be the need for scaffolds. And also, the safety of the occupants will be assured when covered walkways are provided during the construction of the appendages to the residential buildings since they have not been evacuated to any new residence.

In another development, finding regarding the designing of the appendages indicate that, adequate lighting and ventilation has the higher rate among the variables as the respondents ranked it as the most important factor to be considered during the design stage of the appendages. The prerequisite of any building is to ensure the health and safety of people in and around buildings by setting functional requirements for the design and construction of the buildings (Stephen and Christopher, 2005). The findings also indicate that evacuation of the occupants to another residence and provision of access roads to the rooms were ranked as the second and third most important factors to be considered. When these variables were ranked using the Importance Index, it turned out that the respondents considered them important to influence decisions during the design stage. The next factors to the above ones were provision of early warning signs and provision of adequate exits without dependence

on anyone to escape in times of any disaster. In conclusion, the critical factors to be considered have been greatly compromised as a result of drive for social and economic behaviour by both the tenants and the landlords. There is also the fact that, you can ensure safety of an individual but it behooves on that individual to take extra care to avoid accidents.

5.3 RECOMMENDATIONS

The study aims at developing a framework that will aid in the design and safe construction of appendages to residential buildings. As a result, specific objectives were set out to give direction and also help realise the aim of the study. In view of the findings from the objectives, the following recommendations have been given regarding the issues discussed.

- ❖ Building Inspectors from the recognized institutions should be given the needed mandate to monitor the various suburbs to ensure that unauthorized appendages are not added to the existing buildings such that safe construction measures will not be followed.
- ❖ The issuance of the permit before any construction work should be strictly adhered to since this will enable the officials at the office to inspect the design and also check the safety measures of the design before approving the permit.
- ❖ The Accra Metro Works Department should liaise with various assembly members in conjunction with unit committee members to ensure that, no construction activities are done within their catchment area without following the safety measures.
- ❖ The landlords should also be educated on the need to follow the safe construction measures of these appendages and the dangers associated with it. And

they should be made to provide the necessary safety measures at the site before the commencement of the work.

- ❖ The Accra Metro Works Department should make it mandatory to landlords that the framework for design and safe construction of the appendages to the residential buildings should be adhered to in order to ensure safe construction of the appendages.
- ❖ Since the safety measures involved both the contractor and the landlords, there should be an education on the framework to help both parties to be abreast with the new developments in the construction industry regarding safe construction of appendages to residential buildings such that, these safety standards should be employed to the latter.
- ❖ The implementation of this framework will also help monitor the use of safety materials and this will enhance safety awareness, which will in turn leads to safe construction and successful project.
- ❖ The assumptions in the regulations as well as the bye-laws regarding building permits should be looked at so as to eliminate if not all unauthorised appendages to residential buildings.
- ❖ The bye-laws of the assemblies should be made available at any bookshop so as to help the public get access to related issues on building control.
- ❖ Further research on the topic should be categorised into high-risk appendages and low-risk appendages of residential buildings.

It is believed that when the above framework is followed, the safe construction of the appendages to residential buildings will be realized and the built environment will be safe.

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APPENDIX A

SAFE CONSTRUCTION OF APPENDAGES TO RESIDENTIAL BUILDINGS- A CASE STUDY OF KANESHIE AWUDOME ESTATE, ACCRA-GHANA

QUESTIONNAIRE TO RESIDENTS

This questionnaire is only for academic purpose. It will help the researcher produce a research report as part of his course in the **Kwame Nkrumah University of Science and Technology, Kumasi**. Your response will be treated confidentially. Please, answer the questions as frankly as possible.

Please tick(✓) where appropriate. Where the space provided is not enough, you may write under the line provided or at the back of the page.

A. QUESTIONNAIRE CONTROL

1. Questionnaire No: House No:
.....
Region..... Metro.....
Date.....

B. BACKGROUND INFORMATION

2. How many years have you lived in the the house?
0 – 10 [] 11 – 20 [] 21 – 30 [] 31 – 40 [] above 40 []
3. What is the ownership status?
Tenant: [] Owner []
4. If owner, how was the house acquired?
A. Purchased from State Housing Cooperation. []
B. Inheritance []
C. Purchased from private person []
D. Others (Please Specify).....
5. What is your position in the house?
Household Head [] Member: []
6. What is the number of units (rooms) the building contains?
1 [] 2 [] 3 [] 4 [] 5 [] 6 [] above 6 []

C. CONDITIONS OF RESIDENTIAL BUILDINGS

7. Which type of dwellings do you live in?

- A. Compound ☐ []
- B. Separate house or the detached house ☐ []
- C. Semi-detached house ☐ []
- D. Several huts/buildings ☐ []
- E. Improvised house or kiosk/container ☐ []
- F. Living quarters attached to shop ☐ []
- G. Camps or tent ☐ []
- H. Hotel or hostel ☐ []
- I. Flat or apartment, ☐ []
- J. Others ☐ []

8. How many residents live in the house?

- 1 – 3 ☐ [] 4 – 6 ☐ [] 7 – 9 ☐ [] 10 – 12 ☐ [] 13 – 15 ☐ [] above 15 ☐ []

9. Do you carry regular maintenance on the building?

- Yes ☐ [] No ☐ []

10. Have you added any appendages to the original structure?

- Yes ☐ [] No ☐ []

D. PROLIFERATION OF APPENDAGES TO RESIDENTIAL BUILDINGS

11. Please indicate the type and number of appendages that are present in the house.
(Please, tick as many as apply)

- Solid Canopy ☐ [] No:
- Light-weight canopy projecting by exceeding 500mm ☐ [] No:
- Light-weight canopy projecting by less than 500mm ☐ [] No:
- Solid extension ☐ [] No:
- Flower rack ☐ [] No:
- Drying rack ☐ [] No:
- Metal frame ☐ [] No:
- Air-conditioning frame ☐ [] No:
- Metal cage ☐ [] No:

E. CAUSES AND EFFECTS OF APPENDAGES ON RESIDENTIAL BUILDINGS

12. What brought about construction of these appendages? (Please, rank based on the following scores)

1 = Not Important 2.= Slightly Important 3= Important 4= Very Important

ITEM	CAUSES	SCORE			
		1	2	3	4
A	Growth in population				
B	Lack of amenities				
C	Difficulties in obtaining permits				
D	Commercialization of facilities				
E	Lack of developing land				
F	Poor building management				
G	Lack of knowledge of the building regulations				
H	Inadequacy of space				
I	Mismatch between architectural design and actual needs of the owners				
J	Potential benefits to be derived from the little space available				
K	Ineffectiveness in the implementation of planning legislations and development control measures.				

13. What are some of the negative effects of these appendages on the buildings as well as the occupants? (Please, rank based on the following scores)

1 = Not Important 2.= Slightly Important 3= Important 4= Very Important

ITEM	EFFECTS	SCORE			
		1	2	3	4
ON BUILDING					
A	They deface the building				

B	They devalue the building				
C	They disturb the structural stability of the building				
D	Imposition of an additional loading on the building				
E	Obstructs the means of escape during fire outbreaks				
F	Negatively affected the visual and aesthetics aspects of the buildings				
G	Lighting and ventilation will be affected				
H	Firefighters and ambulances may find it difficult to locate places				

ON OCCUPANTS					
A	Poses health hazards by blocking ventilation access				
B	Causes injury to occupants				
C	Impedes access by the fire service in times of fire outbreak				
D	Impedes access of service providers				
E	Causes injury to passers – by				
F	Prevention of adequate lighting to occupants				
G	Too much pressure on the utilization of the available facilities				
H	Overcrowding of the occupants in the available rooms owing to the construction of the appendages				

F. HEALTH AND SAFETY DURING CONSTRUCTION OF APPENDAGES

14. The following are some critical factors to consider when designing the appendages to the residential buildings. (Please, rank based on the following scores)

1 = Not Important 2 = Slightly Important 3 = Important 4 = Very Important

ITEM	FACTORS	SCORE			
		1	2	3	4
A	Provision of access roads to the rooms				
B	Adequate lighting and ventilation to the rooms.				
C	Evacuation of occupants to another residence				
D	Early warning signs of danger				
E	Adequate exits without dependence on anyone				
F	Exits with sufficient capacity of size and shape				
G	Clear, unobstructed and unlocked exits				
H	Alternates exits arrangements				
I	Clearly marked routes of escape to prevent confusion				
J	Ensuring the safety of the occupants during designing of the appendages				

15. The following are some critical factors that needed to be considered during construction of the appendages to the residential buildings. (Please, rank based on the following scores)

1 = Not Important 2 = Slightly Important 3= Important 4= Very Important

ITEM	FACTORS	SCORE			
		1	2	3	4
A	Provision of scaffolds				
B	Provision of hoarding				
C	Provision of alternate routes				
D	Provision of covered walkways during construction of the appendages				
E	Inspection of the site by official from AMA				
F	Free movements of the occupants				
G	Inspection of the site of by assemblyman				

H	Inspection of the site by official from PWD				
I	Covering of open trenches and drains				
J	Ensuring the safety of the occupants during construction				

G. LEGISLATIONS ON CONSTRUCTION OF APPENDAGES

16. Have you ever undertaken any construction activities after occupying the building?

Yes: [] No: []

If yes, how many times?

17. Have you obtained permit for the construction activities you carried out?

Yes: [] No: []

18. If yes, from which office?

A. Accra Metropolitan Assembly

B. Department of Town and Country Planning

C. Public Works Department

d. Others (Please, Specify).....

19. How long did it take for the application to be processed and permit issued?

1-3 Months [] 3-6months [] 6 month-1yr [] 1yr- 3yrs []

20. How were you informed of the success of your application?

A. By mail []

B. By e-mail []

C. By phone []

D. Others (Please, Specify).....

21. Considering the acquisition of permit for the construction of the appendages, what are some of the reasons why many people do not obtain the permits? (Please, rank based on the following scores)

1 = Not Important 2.= Slightly Important 3= Important 4= Very Important

ITEM	REASONS	SCORE			
		1	2	3	4
A	Lack of awareness / education				
B	Corrupt civil servants				
C	Cumbersome process				
D	High application fee				
E	Inadequate information supplied				
F	Delays in granting permit				
G	Ambiguities in the building ordinance				
H	Due to technical terms used in the building ordinance				
I	No provision of regular building inspection by the building inspectors				
J	Due to complex nature of the built environment				

NB: *An appendage in the construction context is any post construction activities that extend from the main building, eg: cages, canopies, flower racks, solid extensions, drying racks, metal frames, air-conditioner frames, projected burglar proofs.*