

**FIRE RISK VULNERABILITY IN INFORMAL SETTLEMENTS
THE CASE OF ASHAIMAN**

AKWASI OWUSU SARPONG

10357601



**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MPhil
GEOGRAPHY AND RESOURCE DEVELOPMENT DEGREE.**

JUNE, 2013

DEDICATION

This piece is dedicated to my loving Mom, Mercy Oteng, for her never-ending support, encouragement, and love that have sustained me throughout my life.



DECLARATION

I, Akwasi Owusu Sarpong, hereby declare that this thesis is my own original work and has not been presented for a degree in any other University, and all sources of material used for this thesis have been duly acknowledged by means of complete references.

.....
AKWASI OWUSU SARPONG
(STUDENT)

.....
DATE

.....
PROF. JACOB SONGSORE
(PRINCIPAL SUPERVISOR)

.....
DATE

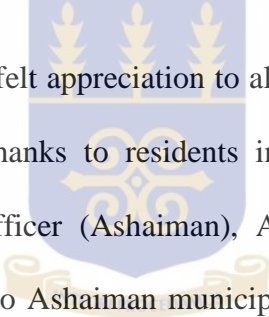


.....
DR. KWABENA AWERE-GYEKYE
(CO-SUPERVISOR)

.....
DATE

ACKNOWLEDGEMENT

There are a number of people without whom this thesis might not have been written and to whom I am greatly indebted. I would therefore like to convey my sincerest gratitude to the following individuals for providing me with the inspiration to embark on my M.Phil candidature. First and foremost, I would like to express my deep sense of gratitude to my supervisor Professor Jacob Songsore, who shepherded me through the bulk of the work. His invaluable intellectual guidance and constructive comments were vital to the development of this thesis. Prof, your valuable contributions will always be treasured. I would also like to thank my co-supervisor, Dr. Kwabena Awere-Gyekye; his generous, intelligent and practical feedback given with good humour was always valued and appreciated. I am very much honoured to have sat under your tutelage.



I would also like to express my heartfelt appreciation to all those who supported and assisted me during the field research. Special thanks to residents in the various communities, NADMO Officials, Acting Municipal Fire Officer (Ashaiman), Assembly men, and most importantly Felicia Amanor who introduced me to Ashaiman municipality. Finally, I would also like to use this platform to extend my sincerest gratitude to my family; I would never have reached this point without their unflinching support, inspiration and encouragement. Special thanks go to Dr. Martin Oteng-Ababio, Susana Oteng and Sophia Acheampong for their invaluable support and encouragement rendered for the development of this thesis. I am particularly grateful to Dr. Oteng-Ababio, my Uncle, and Ebenezer Amankwa, a colleague, for reading through portions of my work. Such opportunities are rare.

ABSTRACT

Ghana, like most developing countries is undergoing rapid urbanization. This rapid increase in the urban population has exerted severe pressure on most cities' limited infrastructure, the consequence of which includes the mushrooming of informal and slum communities. In the main, most dwellers in these settlements have become vulnerable to a wide range of disaster risks particularly fire hazards largely because of the poorly constructed makeshift dwellings. The study was concerned with the level of fire risk vulnerabilities within one such community - Ashaiman, one of the biggest informal settlements in Ghana, and identifies some coping strategies the residents employ to mitigate their conditions.

The study employed multiple research methodologies - structured household questionnaire, key informant interviews, focus group discussions, direct observations, the use of the GPS and the analysis of results using the Pearson's Chi-square test - in pursuance of the objectives set. The findings have revealed that illegal connection of electricity for domestic and commercial purposes is a major cause of fire incidence in the community which also has its antecedent to a state policy that does not permit the connection of the national grid to "illegal structures". The situation has been exacerbated by the use of wooden planks in construction. The non-existence of fire hydrants within the research localities was also identified and highlighted.

In the midst of their current circumstances, many residents resort to relying on the benevolence of their relatives, friends, the community as well as ethnic associations among other non-governmental and community-based/faith-organizations to hold back some of their predicaments emanating from the incessant fire incidences. Others have also ingeniously resorted to the use of sand to douse out fires. The study recommends regularization and on-site redevelopment of the settlement as part of the measures to address the current situation.

TABLE OF CONTENTS	PAGE
DEDICATION	i
DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF PLATES	xi
LIST OF BOXES	xii
LIST OF APPENDICES	xiii
LIST OF ABBREVIATIONS AND ACRONYMS	xiv
CHAPTER ONE: GENERAL INTRODUCTION	1
1.1 Introduction	1
1.2 Statement of the Problem	3
1.3 Literature Review	7
<i>1.3.1 Urbanization in Ghana</i>	7
<i>1.3.2 The Proliferation of Informal Settlements</i>	13
<i>1.3.3 Linking Urbanization and Risk Accumulation</i>	16
<i>1.3.4 Infrastructure Deficiency in Informal Settlements</i>	16
<i>1.3.5 Housing the Low-Income Sector in the Urban Space</i>	18
1.4 Conceptualizing the Causes of Fire Incidences	19
1.5 Objectives of the Study	27
<i>1.5.1 Specific Objectives</i>	27
1.6 Research Questions	28

1.7 Hypothesis	28
1.8 Operational Definitions	28
<i>1.8.1 Vulnerability</i>	28
<i>1.8.2 Hazard</i>	29
<i>1.8.3 Risk</i>	29
<i>1.8.4 Disaster</i>	29
<i>1.8.5 Disaster Risk</i>	29
<i>1.8.6 Disaster Risk Reduction</i>	29
1.9 Research Methodology	30
<i>1.9.1 Sampling Design for Questionnaire Survey</i>	32
1.9.2 Qualitative Research Methods	34
<i>1.9.2.1 Key Informant Interviews</i>	34
<i>1.9.2.2 In-depth Interviews</i>	35
<i>1.9.2.3 Focus Group Discussions (FGD)</i>	35
<i>1.9.2.4 Direct Observation</i>	36
1.9.3 Secondary Sources of Data	36
1.10 Analysis of Data	37
1.11 Organization of the Study	38
1.12 Limitations of the Study	39
CHAPTER TWO: ASHAIMAN: THE GROWTH OF AN INFORMAL SETTLEMENT ..	40
2.1 Introduction	40
2.2 The Genesis and Growth of Ashaiman	40
2.3 The Demographic Dynamics of Ashaiman	44
2.4 The Role of Ashaiman within the Urban Economy	46
2.5 Fire Incidence in Ghana: (A Retrospective View)	49

2.6 Summary	54
CHAPTER THREE: HOUSING AND SERVICE DELIVERY IN ASHAIMAN	56
3.1 Introduction	56
3.2 The Housing Development in Ashaiman	57
3.3 Infrastructure Services in Ashaiman	58
3.3.1 Water Supply	58
3.3.2 Sanitation and Drainage	63
3.3.3 Solid Waste Disposal.....	64
3.3.4 Road Infrastructure	65
3.3.5 Electricity Provision.....	67
3.4 Summary	68
CHAPTER FOUR: EXPLORING THE VULNERABILITIES OF ASHAIMAN TO FIRE INCIDENCES	70
4.1 Introduction	70
4.2 The Demographic Characteristics of Respondents	70
4.3 Assessing the Severity of Fire Incidences.....	77
4.4 Building Material for Construction.....	82
4.5 Energy Sources	85
4.6 Behavior/Attitude of Respondents.....	89
4.7 Determinant of Household Fire Vulnerability.....	91
4.8 The Impact of Fire Outbreaks in Ashaiman.....	94
4.9 Summary	96
CHAPTER FIVE: COPING WITH FIRE INCIDENCE AT ASHAIMAN.....	97
5.1 Introduction	97
5.2 The Role and Coping Strategies of the Community	97

5.3 Evaluating the Current Institutional Arrangements	101
5.3.1 Official Institutions involved in Fire Risk Reduction	101
5.3.2 Official Response to Fire Incidence in Ashaiman	105
5.4 The Role of NGOs	108
5.5 Managing Fire Outbreaks in Ashaiman, On Whose Terms?	109
5.6 Summary	110
CHAPTER SIX: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	112
6.1 Introduction	112
6.2 Summary of Findings	112
6.2.1 Identify, Categorize and Map Fire Risk Vulnerability in Ashaiman	112
6.2.2 Conditions and Processes which enhance Risk Accumulation	114
6.2.3 Coping Strategies by Residents	116
6.3 Conclusions	118
6.4 Recommendations for Policy Consideration	118
6.4.1 On-Site Redevelopment of Informal Areas	119
6.4.2 Regularizing Informal Settlements	120
6.4.3 Public Education on Fire Safety	122
6.4.3.1 Community Watch: Formation of Community Fire Volunteers	122
6.4.3.2 Community-Based Approach to Disaster Mitigation	122
6.4.3.3 Enforcing Fire Safety Regulations	123
6.5 Future Research Suggestion	123
REFERENCES	124

LIST OF FIGURES

Figure	Page
1.1 Conceptualizing Causes of Fire and its Impact.....	21
2.1 Domestic Fire Incidences in Ghana (2000-2011).....	53
2.2 Domestic Fire Incidences in GAMA (2000-2011).....	54
3.1 Location of Fire Hydrants using GPS.....	61
4.1 Categorization of the Vulnerable Groups.....	78
4.2 Community Disparities in terms of their Vulnerability.....	79
4.3 Ashaiman Fire Risk Map.....	82
4.4 Materials used in Roofing of Informal Dwellings.....	85
4.5 Energy Source of Lighting	86
4.6 Modes of Electricity Connection.....	87
4.7 Source of Fuel for Cooking.....	89
4.8 Smoking Patterns of Households.....	90

LIST OF TABLES

Table	Page
1.1 Trends in Urban Population Growth in Ghana.....	9
1.2 Population Distribution of Sampled Communities in Ashaiman.....	33
1.3 Computation of Number of Respondents in each Community.....	34
2.1 Showing Population Growth in Ashaiman.....	45
2.2 Number of Public and Private Schools in Ashaiman.....	47
2.3 Total No. of Fire Outbreaks in Ghana and their Estimated Cost.....	52
3.1 Sources of Water by Residents.....	59
3.2 Accessibility of Houses by Fire Tenders.....	67
4.1 Gender Distribution of Respondents.....	71
4.2 Respondent Position in a Household.....	72
4.3 Marital Status of Respondents.....	72
4.4 Age Distribution of Respondents.....	73
4.5 Religious Conviction of Respondents.....	73
4.6 Ethnic Background of Respondents.....	74
4.7 Educational Background of Respondents.....	75
4.8 Household Composition and Size.....	76
4.9 Cross Tabulation Matrix of Respondents' Demographic Characteristics and Vulnerability to Fire Incidence.....	77
4.10 Cross Tabulation Matrix of Household Characteristics and Level of Fire Vulnerability.....	93

LIST OF PLATES

Plate	Page
1.1 High Residential Density in Ashaiman.....	7
1.2 Bird's-Eye View of Taboo Showing Residential Apartments.....	30
1.3 Pictures of Indigenous and Upgraded Sections of Tulaku.....	31
3.1a Fire Hydrant Used as Garbage Collection Point.....	62
3.1b Fire Hydrant Used as Point for the Store of Waste Water.....	62
3.2a Fire Hydrant Used as 'Stands' for the Sale of Electrical Appliances.....	63
3.2b Fire Hydrant used as Provision Stands.....	63
3.3 Poor Drainage System within Dwellings.....	64
3.4 An Illegal Dumping Site In-Close Proximity to Wooden Structures.....	65
3.5 A Picture of Ashaiman Depicting the Only Accessible Road Within the Entire Tulaku Community.....	66
4.1 A Typical Informal Dwelling Constructed from Wooden Planks at 'Taboo' Area.....	83
4.2 Informal Dwellings Built with Corrugated Iron Sheets.....	84
4.3 The Use of Corrugated Aluminium Sheets in Roofing of Informal Dwellings.....	85
4.4 Scenes of Suspected Illegal Connections.....	88
4.5 Depicts One of the Crowded Home-Based Economic Activities which Employ Charcoal as Source of Energy.....	89
4.6 Aftermath of Fire Outbreak in Tulaku which Rendered Hundreds of People Homeless.....	95
5.1 Residents Knocking Down Structures to Create Fire Breaks.....	99
5.2 The Aftermath of the Fire Outbreak in Tulaku-December 2011; Residents Collect Burnt Iron Sheets for Use in Reconstructing their Houses.....	100
5.3 Residents Reconstruct their Burnt Houses.....	101
5.4 Fire Hydrants used as Garbage Collection Point.....	106

LIST OF BOXES

Box		Page
5.1	Ashaiman: GNFS Educates Community.....	104
5.2	Ashaiman, Tema New Town Markets have no Hydrants.....	107

LIST OF APPENDICES

Appendix	Page
1 Household Survey: Questionnaire on Fire Risk Vulnerability in Informal Settlements.....	140
2 Institutional Interview: Ghana Fire Service	148
3 Institutional Interview: Environmental Protection Agency.....	150
4 Institutional Interview: National Disaster Management Organization.....	151
5 Institutional Interview: Electricity Company of Ghana.....	153
6 Institutional Interview: Ashaiman Municipal Assembly.....	155
7 Interview Guide for Focus Group Discussion.....	156
8 Community Profile of Ashaiman.....	157

LIST OF ABBREVIATIONS AND ACRONYMS

ADPC	Asian Disaster Preparedness Center
ASHMA	Ashaiman Municipal Assembly
BHC	Building for Housing and Construction
DREF	Disaster Relief Emergency Fund
EPA	Environmental Protection Agency
ERP	Economic Recovery Programme
FDI	Foreign Direct Investment
FEMA	Federal Emergency Management Organization
FGD	Focus Group Discussion
GAMA	Greater Accra Metropolitan Assembly
GhAB	Ghana Association of Bankers
GHAFUP	Ghana Federation of the Urban Poor
GHIE	Ghana Institute of Engineers
GIA	Ghana Institute of Architects
GNA	Ghana News Agency
GNFS	Ghana National Fire Service
GPS	Global Positioning System
GREDA	Ghana Real Estate Developers Association
GSS	Ghana Statistical Service
GIPC	Ghana Investment Promotion Centre
GWCL	Ghana Water Company Limited
IMF	International Monetary Fund
NADMO	National Disaster Management Organization
NGO	Non-Governmental Organization

PDG	People's Dialogue on Human Settlements
SAP	Structural Adjustment Programme
SHC	State Housing Corporation
SMC	Supreme Military Council
SUF	Slum Upgrading Facility
TAMSUF	Tema Ashaiman Metropolitan Slum Upgrading Fund
TDC	Tema Development Corporation
TTC	Tema Traditional Council
UN-ISDR	United Nations International Strategy for Disaster Reduction
UNFPA	United Nations Population Fund
WHO	World Health Organization

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

The world is undergoing the largest wave of urban growth in history. Available statistics shows that more than half of the world's 6.6 billion people live in urban areas, crowded into 3 percent of the earth's land area (Angotti, 1993; UNFPA, 1993). The proportion of the world's population living in urban areas, which was less than 5 percent in 1800 increased to 47 percent in 2000 and is expected to reach 65 percent in 2030 (United Nations, 1900; 1991). These unprecedented rates of rapid urbanization in developing countries are occurring as a result of high rates of natural population increase in cities, in addition to migration from rural areas to urban areas (Brunn and William, 1983; Duijsens, 2010). A good majority of people from the rural communities are moving to the urban centres in search of job opportunities, better infrastructure among others. However, the formal production of low-cost housing has fallen far behind the demand, with the result that much of the increase in urban population has been accommodated informally (and often illegally), either in self-help settlements on city outskirts or inner-city tenements (WHO, 1987). Estimates of the proportion of the urban population living in informal settlements vary, from 26 percent (Boraine et al., 2006) to 33 percent (UN-Habitat, 2007).

Sub-Saharan Africa is therefore confronted with the challenge of rapid urbanization in the context of economic stagnation, poor governance and fragile public institutions (Cheru, 2000). This rapid urban growth has brought with it a host of complex problems, including unemployment and underemployment, a growing informal sector, deteriorating infrastructure and service delivery capacity, overcrowding, stiff competition for land, environmental degradation and acute housing shortage. These rapid rates of urban growth have meant that, each year, more and more people in

urban areas of developing countries must be housed. According to Hussain (1978:98-104), the fundamental need of man that influences his physical, psychological, social as well as economic well-being and where he builds significant capabilities for discharging his duties and obligations is in acute shortage particularly in cities of developing countries (Gilbert and Ward, 1992:125). The result is that, majority of urban residents have no alternative but to live illegally in self-built settlements or in dilapidated tenements and informal settlements.

Ghana, like most countries in Sub-Saharan Africa, is undergoing rapid urbanization, with massive growth of its metropolitan areas. The inability of cities in the country to provide adequate shelter and urban services for the growing populations as well as sufficient opportunities for economic advancement has resulted in burgeoning informal settlements in both inner cities as well as in the urban periphery (Giddings, 2009). The inability of the city authorities to deal with the housing supply shortages and the low levels of housing affordability, have directly contributed to the development of slums and informal settlements, such as Usher Town, Nima, Teshie, Labadi, Maamobi, Old Fadama and Ashaiman (Konadu-Agyemang, 2001). According to Pharoah (2009), informal settlements occupy an ambiguous legal position. They are however home to the poorest and most marginalized urban populations. Due largely to the inadequately managed urbanization processes coupled with lack of effective urban planning measures, poor governance and so forth, urban residents have become vulnerable to a range of disasters particularly fire outbreaks (due to poorly constructed makeshift shelters), severe weather events and flooding (Lerise and Kiunsi, 2004) in the city of Accra and other densely populated areas.

An analysis of disaster impacts in informal settlements shows that fire causes the greatest loss of life and property. Response to fires, especially in informal settlements continues to be a daunting task. This is largely due to the lack of publicly provided fire fighting systems including the lack of

water sources to douse fires, dense building concentrations, flammable building materials (untreated wood, plastic and cardboard), lack of access roads, and haphazard electricity connections. Further, the lack of resources to upgrade preparedness and response skills coupled with poor infrastructural development have resulted in a growing risk of large scale, multiple structure fires in informal settlements, thus contributing to their vulnerability (ADPC, 2004; DREF, 2011). The ultimate objective of this thesis is to examine the factors that have increased exposure and vulnerability of residents in informal dwellings to fire hazards. In so doing, it aims to contribute to knowledge on the conceptualization and drivers of risk in urban areas in Africa and draws out lessons for prescriptive risk reduction interventions both in Ghana and elsewhere.

1.2 Statement of the Problem

One of the most pressing issues facing the world today is rapid urbanization and its impact on communities, cities, economies and policies. Over the past decades, the level of urbanization has increased in all the major geographical regions of the world. It is however projected that in the next fifty years, two thirds of humanity will be living in towns and cities and a large part of this growth will take place in the form of informal settlements. According to estimates of the United Nations, almost 1 billion people, or 32 percent of the world's population live in slums and informal settlements, the majority of them in the developing world. However, the number of these slum dwellers worldwide is projected to rise over the next 30 years to about 2 billion (World Bank, 2008; UN-Habitat, 2003).

Ghana, like most developing countries has witnessed unprecedented urban growth over the last few decades. This rapid increase in urban population concentration has been seen in the nation's biggest cities like Accra and Kumasi. Accra in particular has witnessed tremendous growth as a metropolitan area since the country gained independence in 1957. From a population of less than

half a million people in 1960, Accra now has more than 3.0 million persons and is comprised of ten administrative divisions (Mills-Tetteh, 2008).

The main drivers behind this massive urbanization in our cities are high rate of natural population increase, rural-urban migration and the reclassification of rural areas as urban (Akrofi, 2006; Songsore, 2004). A good number of people are moving in substantial numbers from the rural areas to the urban centres in search of better employment opportunities, educational opportunities, entertainment facilities, better social amenities (electricity, good roads) and other infrastructure which conceivably do not exist in most rural communities (Nguluma, 2003; COHRE, 2004). Poverty and lack of gainful employment in the rural areas drive large numbers of people to cities for work and livelihood. Mostly, these migrants lack the ability to succeed in the cities due to lack of skills, education and decent housing (Yap, 1995). According to Atuahene (2004), they often become victims of the city's wrath and they pose a daunting problem to policy makers.

Thus as Ghana continues to urbanize, strong demand is driving up the value of land, making it difficult for the poor to find affordable space in desirable location. Out of necessity, many of the poor, tend to rent 'rooms' or build 'shacks' on marginal lands spreading the growth of informal settlements. In most cases, these makeshift "dwellings" are erected on private land that is "invaded" or most likely unused public lands. As expected, their stay then tends to be illegal, without secured property rights, and they invariably face constant threat of eviction and relocation. As it turns, tenure insecurity is a part of the price poor urbanites pay for access to housing. This is particularly so as the poor migrants have very limited options as to where to live because their savings are not sufficient to live in the healthy environment of formally planned colonies (Jha, 1986). They also have little understanding of municipal expectations and procedures to own a house in the city (NiiKondo, 2010).

This situation creates a major housing demand and aggravates the existing housing situation in the city. According to Owusu (2011), rapid urbanization and urban growth have made housing one of the critical challenges facing city dwellers especially in Accra. The rapid urban population growth has outpaced the ability of city authorities to provide for housing and other infrastructural services. This situation is often attributed to deficiency and weakness of national and city-level policies and strategies with respect to housing development. The city of Accra in particular has today become the spectacle of multifarious problems such as overcrowding and congestion, poverty, inadequate housing, high rate of unemployment and underemployment, crime and other forms of delinquency (Twumasi-Ankrah, 1995). This is because the provision of affordable housing to lower-income groups has not matched the rapid growth of the population. Besides, most households have very low incomes which will not afford them housing within the city. Many urban dwellers are therefore compelled to seek shelter in informal settlements that have been constructed using temporary materials such as timber off-cuts and wattle as exhibited in the Ashaiman Township.

The literature provides ample evidence that living conditions in these settlements are often horrendous and pose significant risks to the inhabitants (Swanepoel and De Beer, 2006:5). Additionally, water supply, sewage and drainage, paved roads, lighting and electricity supply, public transport and garbage disposal are often not available, which creates health and safety hazards (Nguluma and Lupala, 2000). In addition, most human excrement and household waste are dumped into rivers and streams and this also contributes to a serious health risk. Above all, the rate of fire incidences in such communities is quite alarming and horrendous.

A host of factors cause fire within these communities. Studies have alluded to the temporary materials that are used in the construction of these informal dwellings including wooden planks,

plastic, cardboard and corrugated iron sheets which tend to increase resident's vulnerability to fire (Napier and Margot 2002; Saff, 1996:235; quoted in Darkwa, 2006:1; Chung and Hill, 2002). References have also been made to resident's reliance on cheap and hazardous sources of energy and light with emphasis on the usage of candles, gas, stoves, fossil fuels and most significantly illegal electricity connection which also heighten the risk of these settlements to fire (Warren, 2006).

Napier and Margot (2002) highlighted the fact that the lack of adequate services has meant that people are obliged to use these potentially hazardous fuel sources. The lack of proper roads, problem of inaccessibility and perhaps the dense nature of the area (overcrowded conditions) make it easy for fire to spread between dwellings, makes residents vulnerable and limits the ability for emergency services to reach affected areas in case of disasters (Godwin et al., 1997:151). Plate 1.1 shows a bird's eye view of the study area depicting its congested nature.

According to Holloway (2006), these factors contribute to the vulnerability of informal settlement dwellers, leaving them less able to protect themselves against the recurrent threats of fire. Yet, these developments are happening at a time when it is generally acknowledge that "No country in the industrial age has ever achieved significant economic growth without urbanization" (UNFPA, 2007). It is a period when increased urban population allows for an expansive division of labour that draws on the creative talents and entrepreneurial skills of many, especially the vulnerable group. In these circumstances, the problem is how the new entrants will be properly housed. What generates and accumulates risk conditions in the places of abode? To what extent are the communities served with infrastructural services and what is being done to improve these services? How are the people responding to these conditions and more importantly, how can the regulatory framework be shaped to reduce the potential risks associated with the settlement?

Plate 1.1 High Residential Density in Ashaiman



Source: Field Survey, 2012

Admittedly, very little empirical research has been done to identify the fire risk profile in informal settlements in Ghana and examine the role of urban planning actions or (inactions) and policies in creating the current vulnerabilities. In an attempt to fill this gap, the study examines the vulnerability of Ashaiman to fire risks and also explores some of the coping strategies used by residents to minimize their vulnerability. This is intended to complement earlier studies in the area but which were mainly skewed in favour of environmental sanitation hazards. The challenge of the future is to comprehensively address the issues and holistically fashion out appropriate solutions.

1.3 Literature Review

1.3.1 Urbanization in Ghana

Globally, more people now live in urban centres than in rural areas and this trend is expected to continue (WaterAid, 2008). The exponential growth of the global population and the increasing rate at which societies are urbanizing presents a monumental challenge to all major cities of the

developing world. The growth of urban populations is happening at a rate many times faster than the capacity to plan, build and manage urban settlements to meet this demand (Beattie et al., 2010). The recent developments of world urbanization have visibly shown that, the fastest rates of growth in urban population have been in developing countries (Barke and O'Hare, 1991:216; O'Heara, 1999:16). According to O'Heara (1999:15-16), population increase in the urban centres of developing countries will continue to be distinguishing a demographic trend of the next century. The growth of urban population in these countries is claimed to have proceeded at extraordinary rates often compressing into decades the process that has taken centuries in developed countries (Wossen, 2002).

It is however generally and increasingly accepted that urbanization is an inevitable phenomenon. In developed countries, urbanization has been a consequence of industrialization and rapid economic development. By contrast in the developing countries of Latin America, Africa and Asia, urbanization has occurred as a result of high natural urban population increase and massive rural to urban migration (Brunn and Williams, 1983:4). Rapid urbanization in recent decades has resulted in an enormous increase in the proportion of Ghana's population residing in urban centres with a corresponding increase in the number of urban settlements in the country (Baaberejir, 2009). This rapid spate of urbanization is however not different from that of other Sub-Saharan African countries (Awudu, 2009). According to a survey conducted by GSS (2000), the urban population increased from 23% in 1960 to almost 44% in 2000 (see Table 1.1). During the same period, the number of urban settlements in the country increased from 98 in 1960 to 364 in 2000, accommodating a total urban population of nearly 8.3 million representing 43.9 percent of the national total of 18.9 million.

Table 1.1: Trends in Urban Population Growth in Ghana (1960 to 2000)

Year	Total Population	Percentage Urban	No. of Urban Settlements
1960	6,744,234	23.0	98
1970	8,555,211	28.9	135
1984	12,296,081	31.3	203
2000	18,912,079	43.9	364

Source: GSS, 2000

The rising level of urbanization in the country has generally been ascribed to demographic factors of rural-urban migration and natural increases within urban centres (Songsore, 2003). The enthusiastic urban industrial development programme of Kwame Nkrumah triggered the creation of economic opportunities in the cities and made them great attractions that set off massive rural-urban migration (Baaberejir, 2009). Natural increase in population has also been an important factor responsible for the overall growth of population in both rural and urban areas in the country mainly after independence when migrations to these towns were becoming more long-term and permanent with wives accompanying husbands (Songsore, 2003).

The growth of cities and towns in Ghana has therefore created both opportunities and enormous difficulties. While urbanization in and out of itself is not inherently problematic, the pace and sheer scale of urbanization has, in many places, far exceeded the government's capacity or willingness to provide basic amenities to city residents, including adequate housing, water, electricity and sanitation. According to Baabereyir (2009), rapid population growth is therefore seen as a key challenge in Ghana and appears to be a starting point for many other problems in the cities. The rapid increase in the urban population is exerting pressure on the city's limited

infrastructure and services. Currently, the size of the urban population coupled with the massive urban expansion has a vast implication for housing, infrastructure and the urban environment.

Moreover, services for maintaining the urban environment such as the provision of affordable housing, water, sanitation and waste disposal are overstretched leading to unsanitary environmental conditions in the city. In effect, the city is therefore faced with a plethora of environmental problems such as slum development. Housing and land market have not kept pace with the rapid urban growth and consequently shelter is not affordable to the poor. Most people therefore resort to live in makeshift dwellings in informal settlements (Van-Horen, 2004). According to Owusu (2011), data available on the scale of the urban housing need indicate an overall hefty deficit in the housing stock which has resulted in the creation of vast urban informal settlements where thousands and sometimes millions of urban residents live in sub-standard housing conditions and lack access to adequate shelter, urban infrastructure and services.

Ghana over the past decades has made tremendous efforts to address the housing problems facing the country. The long series of government overthrows has also witnessed different housing policies being implemented with every new government. Several periods within the post-independence era (1950s-early 1980s), the structural adjustment and economic liberalization era (mid 1980s-early1990s) and finally the post-structural adjustment and economic recovery era (mid 1990s-present) were characterized by distinct political and socio-economic developments which produced different patterns of urbanization with different implications for housing supply and demand in Ghana. For instance, the immediate post-independent era (late 1950s to early-1980s) marked the period which can be described as active and direct involvement of the state in the provision of mass housing. It was during this time that the two main state institutions (State Housing Corporation and the Tema Development Corporation) were formed to address housing

issues. The TDC was created with the special purpose of producing residential units in the rapidly growing Tema Township as part of a major industrialization drive. The Tema Development Corporation dealt largely with the acquisition of Tema land, and created legislations to this effect for residential construction. Moreover, while the Tema Development Corporation (TDC) focused on Tema, the State Housing Corporation (SHC) worked in the regions across Ghana. The SHC constructed about 24,000 single household dwellings between 1957 and 1990 (Tipple and Korboe, 1998).

Similarly, other interventions by the state-owned financial establishment which include the Bank for Housing and Construction (BHC) and the First Ghana Building were instituted to provide financial support for public housing delivery. The active involvement of the state in housing provision is also noticeable during the period of the 1970s under the military regimes. This period was however characterized by the construction of low-cost houses in districts and regional administrative capitals under the Supreme Military Council (SMC) regime of General I.K. Acheampong.

With reference to the economic crisis which began in the late 1960s through the 1970s and peaked in the early 1980s, Ghana embarked on the World Bank/IMF supported Economic Recovery Programme (ERP) and Structural Adjustment Programme (SAP) to restore macro-economic stability and growth in 1983 (Nugent, 2004). Government housing policy took a dramatic departure from that of the preceding decades mainly geared towards facilitating and creating an enabling environment for private sector participation in housing delivery. A good number of policy documents on housing since the mid-1980s emphasized the role of the private sector in housing delivery. The appearance onto the Ghanaian housing market by the Private Real Estate

companies such as the Ghana Real Estate Developers Association (GREDA) was manifested during this period.

As a result of economic stability and growth, enhanced macro-economic conditions and incentives for foreign investors, the Ghanaian market was opened to global capital and investments. Nevertheless, the spatial impact of economic liberalization and influx of global capital and investments has not been uniform, favouring large metropolis such as Accra. Information from the Ghana Investment Promotion Centre (GIPC) on foreign direct investment (FDI) in Ghana disclosed that on the average over 80 percent of all non-mining FDI is concentrated in the Greater Accra region. This circumstance made the city attractive to rural-urban migrants and foreign donors. This period also witnessed rapid urban growth and outwards expansion of the city as well as the escalation of the housing crisis in the country (Owusu, 2011).

The period surrounding the post-ERP/SAP era (early 1990s to date) witnessed the emergence of the forces of liberalization and globalization, and the continuous expansion of large Ghanaian cities like Accra and Kumasi (Konadu-Agyemang 2001; Grant and Nijman 2002; Grant and Yankson 2003; Yeboah 2003; Owusu 2008, 2010; Grant 2009). The housing industry was therefore characterized by the sharp rise in land prices and property prices particularly in the urban centres such as Accra, Tema, Kumasi and Takoradi. Due to the high land and property prices, private real estate developers have consistently targeted middle and upper classes of residents and non-resident Ghanaians in the diaspora especially in Europe and North America. The sudden increase in rent resulted in the sharp increase in density levels in low-income settlements of the city as increasing numbers of low-income Ghanaian residents are priced out of the land and housing market (Owusu, 2011). Government policy on housing over the years has remained unchanged since the ERP/ SAP era. For instance, the Draft housing policy 2009

emphasizes the need to create an enabling environment to strengthen the private sector participation in housing delivery for low-income groups. This development is unlikely to materialize without appropriate incentives to the private sector. This is due to the fact that, the private sector has never played any meaning role in housing delivery for the urban poor (ISSER, 2008).

1.3.2 The Proliferation of Informal Settlements

Informal settlements are known as 'ranchos' in Caracas, 'callampas' and 'campamentos' in Chile, favelas in Rio de Janeiro, 'barriadas' and 'pueblos jovenes' in Lima, 'villas miserias' in Buenos Aires, 'colonias proletarias' in Mexico City, 'barong-barongs' in Manila 'Kwettits' in Rangoon, 'gecekond'u' in Instabul, and 'bidonvilles' in French (Dwyer, 1975, p.3, note)

The proliferation of informal settlements is fast becoming the core setback associated with the expansion of cities in less developed countries. The increasing social segregation of housing in low-income countries has resulted in the dramatic growth of informal settlements, the entrenchment of poverty, the concentration of violence and social problems and growing health problems (Perlman and Sheehan, 2007). Given the high rents in the city centres and rapidly developing peri-urban areas, the resident poor and new migrants to the city have little alternative but to rent rooms in slum neighbourhoods or to construct shanties in hazard prone areas.

Several attempts have been made to appreciate the underlying factors that influence the development of these settlements. Informal settlements are typically the product of the urgent need for accommodation by low-income city dwellers who are already burdened with precarious livelihood strategies. Generally, informal settlements lack a legal tenure and inadequate building structures, have illegal subdivision of buildings and experience endemic poverty, criminality and

social exclusion (Tsenkora, Badyina and Potsiou, 2008). Such settlements are characterized by unguided housing densification and spatial disorderliness that hinder the provision of basic services such as potable water and access to roads. The increasing number, size and density subjects residents in these settlements to disasters such as fire and disease outbreak. For instance, increasing housing density has resulted in poor sanitation, improper solid waste disposal, vehicular inaccessibility in case of an emergency such as fire accidents and low level of service provision in terms of education, health and security. All these together may compound into increased exposure to health, economic and environmental risks among urban dwellers (Lerise et al., 2004).

The advent of informal settlements has been attributed to the inability of governments to provide affordable housing to low-income groups, particularly in the largest urban centres of developing countries (Abrams, 1964; Turner 1977). According to Payne (1997), what seems to be the inability of governments to control or regulate land through direct action may be a reflection of the strong demand for land as much as a lack of government commitment or capacity to act. Again, rising cost and delays in the execution of formal land transactions have also been blamed for the proliferation of informal settlements in most countries (Macedo, 2000).

A clear definition of an informal settlement is hardly available. Various synonymous words have been used in literature to refer to informal settlements. These consist of spontaneous, irregular, unplanned, marginal and squatter settlements. According to different regions of the world, informal settlements can be defined in various ways depending on the planning and legal framework of the region where it exists (Odunuga, 2009). Mason and Fraser (1998) also argue that, informal settlements are dense settlements comprising communities housed in self-constructed shelters under conditions of informal or traditional land tenure. Srinivas (2005)

described informal settlements as characterized by unauthorized use of vacant public or private land, illegal subdivision and rental of land, unauthorized construction of structures and buildings, reliance on low cost and locally available scrap construction materials and absence of restrictive standards and regulations. Nabutola (2004), defines an informal settlement as a dwelling unit put up without the authority of the owner of the land, usually without a formal design and without conforming to any specifications as to laid down rules and regulations, planning standards, generally accepted methods of workmanship, construction and is more often than not temporary.

Gilbert and Gugler (1987) also highlighted that, informal settlements are characterized by illegal occupation of land, shelter built through self help, low-income households and absence of infrastructure and services. The UNSTAT (2005), defines informal settlements as first and foremost, areas where a group of housing units have been constructed on land to which the occupants have no legal claim to or occupy illegally and secondly as unplanned settlement and areas where housing is not in compliance with current planning and building regulations.

In a nutshell, the core of these definitions is that any settlement that does not have a legal plan from an appropriate planning authority is termed an informal settlement. However, an important phrase in all the definitions illustrated by authors above indicates that, all informal settlements lack the requisite permit or legal titles for the use of the land (Odunuga, 2009). It has been estimated that one third of the urban population in developing countries today do not have access to adequate housing and lack access to safe water and sanitation. These people live in overcrowded and unserviced informal settlements, often situated on marginal and dangerous land (UN-Habitat, 2003).

1.3.3 Linking Urbanization and Risk Accumulation

Rapid urbanization has resulted in the emergence of disasters in urban areas. This is a result of the overwhelming demographic pressures on social services, scant attention to hazards in the development process, weakness in governance and inadequate awareness of risk among the urban population. The combination of these factors increases the scale of potential destruction and human suffering. Most migrants travel from the rural areas to the urban centres in search of job opportunities. Those migrants who move to the urban centres are mainly the poor groups and are not able to acquire land to put up good structures. They are forced to settle on non-commissioned lands such as earthquake prone zones, flood plains, hill slopes and others without the consent of city authorities. The migrants then become vulnerable to disasters through poor sanitary conditions, improper waste disposal among others. A majority of urban residents are vulnerable because of the conditions in which they live and inadequate coping strategies. Hence, hazards such as floods, fires and industrial accidents easily cause disasters (PMO, 2004)

1.3.4 Infrastructure Deficiency in Informal Settlements

Informal settlements have long been excluded from regular access to the benefits of urban development, including public services, infrastructure, public space and collective facilities. Public authorities such as the police or fire services, hospital and other social services are usually deficient in these communities. Very little attention is given to informal settlers in terms of provision of infrastructure and other services enjoyed by city dwellers. According to Rajack (2005), it appears, national infrastructural services are relatively high as compared to informal settlements. Many informal settlement dwellers suffer from lack of basic utilities and infrastructure in their communities. For example, outdoor pit-latrines are the main toilet facilities in these areas. Many dwellings in informal settlements do not have access to electricity although

the very few who have are mostly not necessarily through formal channels. In most cases people resort to illegal connections and wire-tapping because residents cannot afford the costs of power installations in informal settlements.

Again, because of the unplanned nature of these settlements, paved roads and footpaths are often very rare. Generally pathways are narrow and earthen and get easily eroded during the rainy season, making mobility within informal settlements perilous and problematic (Yu, 2002). It is however believed that the absence of basic infrastructure and services in informal settlements hinder the growth and development of the informal sector enterprises. Deprived communities in informal settlements, characterized by the absence of safe water, sanitation, solid waste collection and disposal, electricity connection and other neighbourhood amenities translate into squalid and unhealthy living conditions, reduces residents' productivity and employment options and also increases resident vulnerability to risk (Kessides,1997).

In the midst of an increasing urban population, there is inadequate supply of housing and infrastructural services for the teeming population, as a result the existing infrastructure and housing are overstretched, while unsanitary living conditions characterized by filthy environment, unclean ambient air, stinky and garbage filled streets and sub-standard houses continue to dominate the urban landscape in Ghana. The concentration of more people in urban areas of the country has brought more pressure on the land space for the production of food, infrastructure, housing and establishment of industries. A vast majority of residents in informal settlement communities suffer from the supply of basic infrastructure and housing. However, statistics show that majority of urban residents in the country fall within the low-income groups and this group happens to be the most vulnerable group to prevalent environmental problems. They also suffer

from the consequences of absence of inappropriate urban planning and management systems and thus live in disaster prone areas within the city (Daramola and Ibem, 2010).

1.3.5 Housing the Low-Income Sector in the Urban Space

Rapid urbanization in the developing world is the most unprecedented phenomenon of the world's development in the past few decades. The pace of urbanization has exceeded many developing cities' capacity to absorb the needs of a growing population, despite all innovations and efforts (UN-Habitat, 2008). This propagation has therefore resulted in the emergence of low-income informal settlements both in the inner-city and on the outskirts. One of the key challenges confronting urbanization in sub-Saharan Africa is inadequate housing especially among low-income settlers (Owusu, 2011). According to Alder (1995), the supply of housing that is affordable to lower-income groups and built to even minimum standards has not matched the rapid growth of the population. Most urban dwellers have relatively low incomes to enable them to afford descent accommodation in the urban environment. A vast majority of urban dwellers are absorbed in the informal sector (Mohanty, 2003). According to Daramola and Ibem (2010), the domination of the national economy by the informal sector that is characterized by subsistence economic activities known for low productivity and income, operating in unregulated and uncompetitive markets outside government approved guidelines has far-reaching implications for sustainable economic development.

A huge percentage of businesses operating in the informal settlement in urban areas in Ghana hardly pay tax, have no financial records, do not form part of government statistical records, and have limited or no access to formal credit facilities (Tshikotshi, 2009). The urban poor lack access to affordable, tenured, serviced land, appropriate housing, shelter financing, targeted and sustainable subsidies and the means to provide their own shelter (Van-Horen, 2004). The sector

provides employment, helps the poor to make a living, builds up capital assets and thus helps alleviate poverty. The growth of informal sector activities is directly linked to the growth of informal settlements (Mohanty, 2003). High proportions of low income dwellers are engaged in informal sector activities for their source of livelihood.

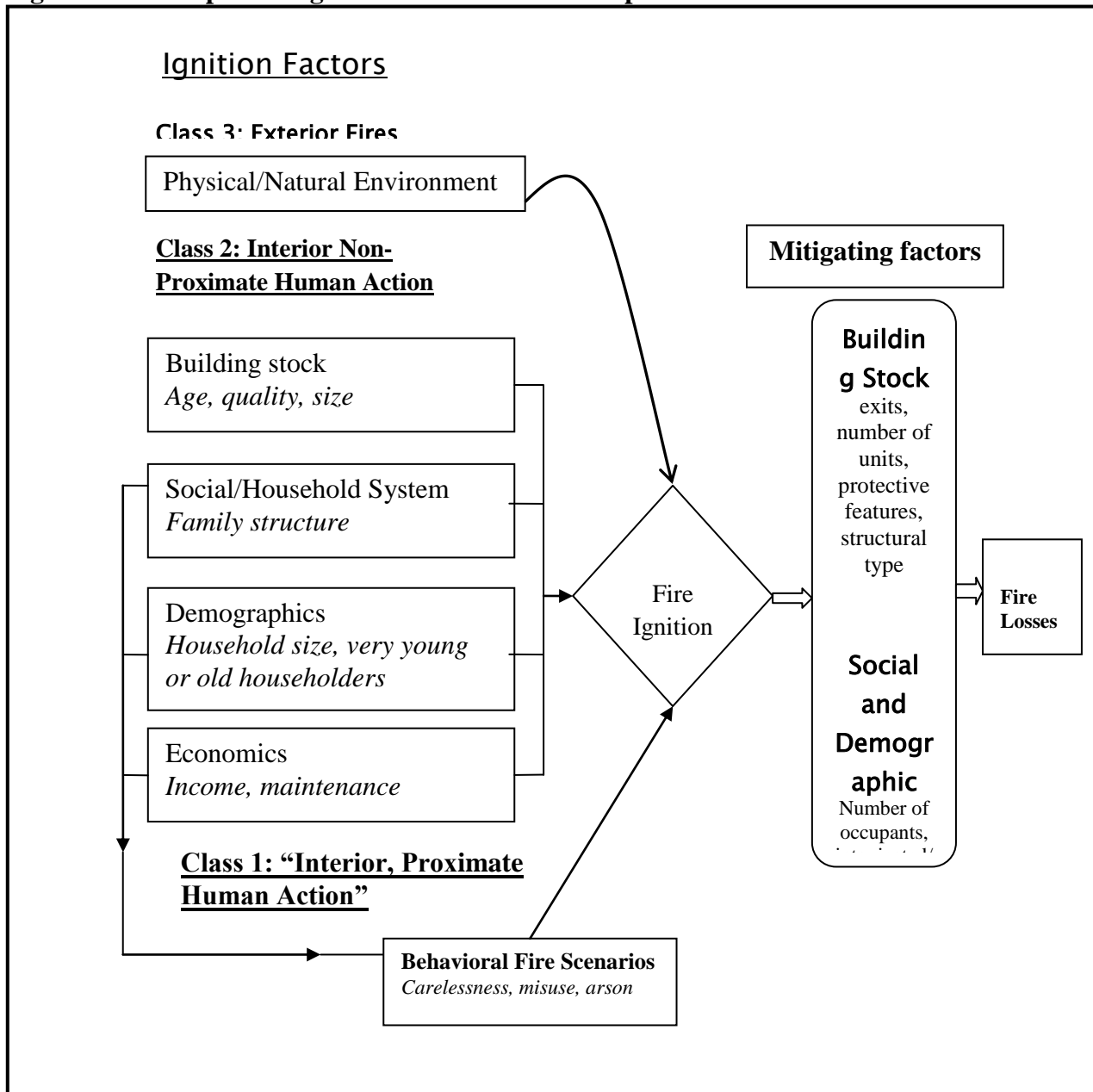
1.4 Conceptualizing the Causes of Fire Incidences

Ghana often faces a range of disaster events including floods, droughts, landslides, fires and other man-made hazards. The physical vulnerability of the population and infrastructure is compounded by recent increasing economic vulnerability. Thus, the lack of infrastructure, limited opportunities for planning and the rapid urban growth have greatly increased the vulnerability of the country's major population and economic centres (ADPC, 2004). One of such hazards has been the incidence of urban fires which have become so devastating, especially in densely populated areas, public buildings, and markets. Recent major fire disasters that have occurred within the metropolis including the 'Abuja Slum' and other major markets (Makola, Agboghloshie, Kantamanto, Mallam) suggest that a lot has to be done to tackle fire disasters in the country (Daily Graphic, Thursday, July 18, 2013). Such a project cannot be undertaken within an empirical vacuum; the causes and severity of such fire incidences must be ascertained to inform any policy initiative.

Jennings (1996), attempts to conceptualize the complex interrelationships between environmental, structural, and human factors as they relate to fire. He emphasizes that greater understanding of the role played by socioeconomic factors is critical for at least two reasons: First, they are known to be powerful predictors of the incidence of fire in different types of neighbourhoods. In other words, the economic status of a population has a direct relationship to its residential characteristics. For example, the location of one's place of abode depends also on the affordability of rent among other things. It is also a truism that the rate at which fire spreads within a residential

area depends on the composition of the structure. Second, Jennings claims that socioeconomic and environmental factors outweigh fire suppression factors, such as fire department resources, in determining losses from fires. These losses include both loss of property and death among humans including the injured.

Jennings' conceptual model of fire initiation and fire loss appears in Figure 1.1. The model identified three classes of initiation factors of fire. For fires originating indoors which he terms class 1 and class 2 fires, the model depicts an interaction between four socioeconomic factors: characteristics of the building stock, characteristics of the social or household system, household demographics, and household economic factors. These interactions can lead to fire ignition indirectly, with no immediate human action, or directly, through human carelessness, misuse of equipment, or intent (arson). In this direction, Jennings for example contends that a building stock made up of wooden planks and roofed with thatch becomes more susceptible to fire than those made of blocks. Additionally, it can be inferred from Jennings submission that areas which have witnessed several illegal electricity connections will most probably suffer from more fire incidences than those properly connected.

Figure 1.1 Conceptualizing Causes of Fire and its Impact

Source: Jennings, 1996

According to Jennings, the socioeconomic factors associated with fire incidences can be examined from three different levels: the level of the neighbourhood, the level of the household and the level of the individual. At the neighbourhood, he argues that the quality of the neighbourhood is tied to variations in fire rates, or the well-being of a residential neighbourhood is tied to the quality of its housing stock. The quality of this stock however can be diminished by the interrelated processes

of fire and household density. Jennings gives several reasons why poor neighbourhoods are more vulnerable to the threat of fire than other neighbourhoods. First, the presence of household density coupled with low income levels in poor residential areas discourage building owners and tenants, who often engage in survival livelihoods, from investing in their buildings particularly in terms of maintenance. The withdrawal of routine maintenance services seriously erodes the quality of the housing units in those buildings, increasing the risk of fire from inadequately maintained building stock and electrical systems. Additionally, Jennings further sees arson as a significant cause of fires and fire casualties in many low-income areas.

Contributing to the debate, Gunther (1981) addresses the relevance of income for understanding how different neighbourhoods are affected by arson. During his studies in Toledo, he found that among all the fire incidences studied, the relationship between income and incendiary or suspicious fires was the most dramatic. His study reveals that, areas with low income experienced about 100 to 120 incendiary or suspicious fires per 100,000 people as compared to 55 to 70 per 100,000 people in high income areas. In addition to the problem of poor maintenance and arson, the quality of a neighbourhood can also affect fire safety in another way. Since crime rates tend to be higher in low-income neighbourhoods, households may improvise ways of making their homes safer by barring access through doors, windows and pathways. The danger is that in the event of fire, barred windows and blocked doorways and passage ways make it harder for those inside a burning building to get out (Fahy and Norton, 1989). In such circumstances, fire-related injuries and deaths are likely to be higher than they would normally be, given the nature and severity of a particular fire.

At the household level, Jennings maintains that the factors pertinent to fire rate include the quality of individual housing units, their affordability to residents and the social structure of the

households that reside in them. In most cases, housing quality and housing affordability are closely related. The cost of a housing unit whether for sale or for rent, is priced according to the quality of the unit given its location, amenities, services among others, with the effect that higher income households can generally afford to live in higher quality units than lower income households. In exploring the close connection between these concepts, income is seen as the primary determinant of the quality of housing for most households. In many urban areas, households with low incomes live in the oldest and most run-down portion of the city's housing stock. Currently, the general condition of most central city housing continues to deteriorate and the number of households living in inadequate units in these areas increases.

Without doubt living in an old, poorly maintained housing unit raises a household's risk of experiencing a fire for several reasons. First, Jennings points out that to ensure a safer city, older home appliances, plumbing and electrical systems need adequate maintenance over their useful lives to ensure their continued safe operation. The absence of this increases the risk of mechanical malfunction and the possibility of a fire within the community. Secondly, the electrical wiring in many older houses poses a fire risk. According to Jennings, many of the reasons which account for this include the fact that older wiring was not designed to carry the electrical loads upon it by modern appliances, such as microwave ovens, televisions, stereo equipments and excessive loads may lead to electrical fires. Similarly, many residents tend to compensate for a newly built house's inadequate electrical systems by running illegal connections and placing excessive demands on limited electrical outlets, strategies which according to Jennings may also overload a socket or a circuit and ignite an electrical fire.

Housing affordability is another factor that affects a household's fire risk. Households are "shelter poor" if they are not able to make their rent payment, they do not have enough left over to cover

other basic needs, such as adequate food, clothing and other household necessities. Shelter poverty can affect a household's fire risk in several ways. For example, the lack of truly "disposable" income means that households are unlikely to invest in fire protection devices such as a fire extinguisher or other fire fighting equipments. Munson and Oates (1983) refer to this as the "positive income elasticity of demand for fire safety", in which the higher a household's income the more money it is willing to spend on fire safety. Shelter poverty can thus affect a household fire risk if it cannot afford to make utility payment. If one or more of a household utilities are shut off, the household is likely to compensate with other less fire-safe devices. For example, if a household is disconnected from electricity for non-payment of bills, it is more likely to use candle as a substitute.

Apart from the physical and economic conditions such as the quality and affordability of a housing unit that can initiate fires, Jennings also highlights other social factors related to household structures. The household characteristics most often include the presence of single parent households (usually headed by females), the presence of children, the presence of elderly persons and household crowding. The relevance of single parent household for increased fire risk for example is tied to the presence of children in the home. Generally, single parent households are related to increased fire risk in two main ways. First, single parent households tend to be less affluent than two-parent households since there is only one income if the parent is not receiving support from other sources. These households are at greater risks of experiencing a fire for all the reasons generally associated with low-income households. Secondly, a single parent household normally has less flexibility to deal with household and child care contingencies. Kraizer et al. (1990) found out that children in urban areas were left unattended more often than rural or

suburban children. Some parents make arrangements with neighbours or relatives for their children to turn to in the case of an emergency.

Jennings also makes a case for fire risk associated with leaving children home alone which also extends to cases where an adult is home, but children are unsupervised. In both of these cases, fire risk is higher due to children's curiosity about fire and their propensity to play with matches, lighters, and other fire-related materials. The limited life experiences of children make them unable to comprehend the enormity of careless actions involving fire. This submission is further strengthened by Gunther's study, which reveals that children playing with fires are a greater problem in low income neighbourhoods than in other neighbourhoods (Gunther, 1981). It must be pointed out that all things being equal, low income households are less able to afford or access quality and reliable daycare and their children spend time at home by themselves, increasing their fire risk. Single parent households have an additional challenge in that only one adult is available to respond to a child care crisis should one arise. Given the serious fire risk associated with leaving children at home alone, adequate attention must be paid to the availability and affordability of quality day care and after school programs.

On the elderly, Jennings argues that the nature of the risk they face is two-fold. First, they may be exposed to greater risk than the population at large, and second, they may be less able to escape a fire due to physical or mental limitations. Elderly persons are at greater risk of experiencing fires because everyday activities, especially cooking, can become more dangerous if a person's physical or mental capabilities decline. This risk of fire is compounded for persons who are on medications that make them less alert or for those who smoke and drink alcohol alone. It however remains to be seen if low-income elderly persons are more at risk than other elderly persons of experiencing or being injured or killed in a residential fire. Another important household variable

when studying the relationship between socioeconomic variables and fire rates especially in the informal settlements is overcrowding; often defined as more than one person per room in a dwelling unit. Jennings (1996) suggests that the more people there are in a household the greater the wear and tear on a dwelling unit's mechanical systems and this may increase the risk of fire. Another possibility he contends is that, "overcrowding" is another indicator of poverty, one that taps a dimension of poverty not accounted for in other measures.

Suffice to state that although how overcrowding affects the rate of fire incidence is not well established, the impact of overcrowding on fire injury and death is well known (Jennings, 1996; Oteng-Ababio and Osman 2012; Oteng-Ababio and Sarpong, 2012). It is common for low-income families to deal with the lack of affordable housing by doubling up in homes with extended family members or friends. It goes without saying that by increasing the number of people in a given household, the number of potential victims of a fire also rises. In other words, the more people there are in a household, the more difficult it can be to get everyone out of a burning unit. This is especially true for households with very young or very old household members who may be unable to escape flames or smoke on their own. At the individual level, Jennings enumerated several risk factors which include carelessness, smoking, alcoholism and drug abuse, education levels, and the type of housing tenure. Some studies for example have shown that cigarette smoking is inversely related to income, so low-income households more arguably are at greater risk from fires caused by careless smoking (Jennings, 1996; Fahy and Norton, 1989). Closely related to the issue of careless smoking is alcoholism and drug abuse. All things being equal, intoxicated persons are at greater risk of falling asleep while smoking and improperly discarded cigarettes are a dangerous ignition source (Oteng-Ababio and Sarpong, 2012).

Contributing to the debate, Fahy and Norton (1989) identifies low levels of education as a factor to fire risk and suggests that those with little education are less likely to “*grasp the full import of public fire education messages*”. Another variable identified to be associated with fire rates is housing tenure. Munson and Oates (1983) suggest that by virtue of owning homes, owner-occupiers have a tendency to better maintain their homes, thereby reducing the likelihood of mechanically-caused fires. They also tend to be more careful in their everyday routines, reducing the likelihood of cooking, smoking, or other types of fires that result from human carelessness.

It must be stated that although Jennings model identifies several causes of fire incidences, it is difficult to say which one is responsible for a particular fire incident. Indeed, the tendency is for multiple of factors culminating in a particular fire incident. This is more likely the case in informal settlements where for example, the residents’ presence at that particular location is engineered by poverty in the first place, which could also be as a result of many factors such as social, economic, political or physical. This study thus adapts Jennings model to examine the incidences of fire at Ashaiman with the bid to identifying the major factors that have led to the accumulation of risk factors and therefore the vulnerability level of the community.

1.5 Objectives of the Study

The main objective of the study is to examine the level of fire risk vulnerabilities within the study area. This is to help develop and strengthen institutions, mechanisms and capacities to build resilience to fire hazards and disaster risk reduction in general.

1.5.1 The Specific Objectives are:

- i. To identify, categorize and map fire risk vulnerabilities within the study area and level of awareness among the residents.

- ii. To identify conditions and processes which enhance risk accumulation and possible actualization of fire disaster risk.
- iii. To identify and evaluate coping strategies among the residents.
- iv. Make recommendations for policy consideration to help reduce fire risk vulnerabilities.

1.6 Research Questions

On the basis of the stated specific objectives, the research sought to address the following questions.

- i. Who are the vulnerable groups within the communities?
- ii. Why are certain groups more vulnerable than others?
- iii. What are the contributing factors for their vulnerabilities?
- iv. What coping strategies do the urban poor adopt?

1.7 Hypothesis

- i. There is no variation in socioeconomic/household characteristics and the incidence of fire.
- ii. There is a variation in socioeconomic/household characteristics and the incidence of fire.

1.8 Operational Definitions

1.8.1 Vulnerability

Vulnerability according to Du Toit (2009) is principally a significant concept in understanding the risks faced by informal settlement dwellers. Vulnerability is defined as the susceptibility to physical or emotional attack or harm. It encapsulates the conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of a community to the impact of hazards (Gencer, 2007).

1.8.2 Hazard

According to the United States Federal Emergency Management Agency (FEMA), hazard can be defined as “events or physical conditions that have the potential to cause fatalities, injuries, property damage, infrastructural damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss” (Coppola, 2007: 24).

1.8.3 Risk

Risk is defined as a situation involving exposure to danger (McKean, 2005). “It is explained as the possibility of harmful consequences or expected losses resulting from interactions between natural or human-induced hazards and vulnerable conditions. However, in the field of hazards and disaster research, risk is commonly expressed as the product of hazards and vulnerability” (Gencer, 2007).

1.8.4 Disaster

A Disaster is defined as “a serious disruption of the functioning of a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources”(UN/ISDR, 2004, 2:3).

1.8.5 Disaster Risk

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over specified future time period (UN/ISDR, 2009).

1.8.6 Disaster Risk Reduction

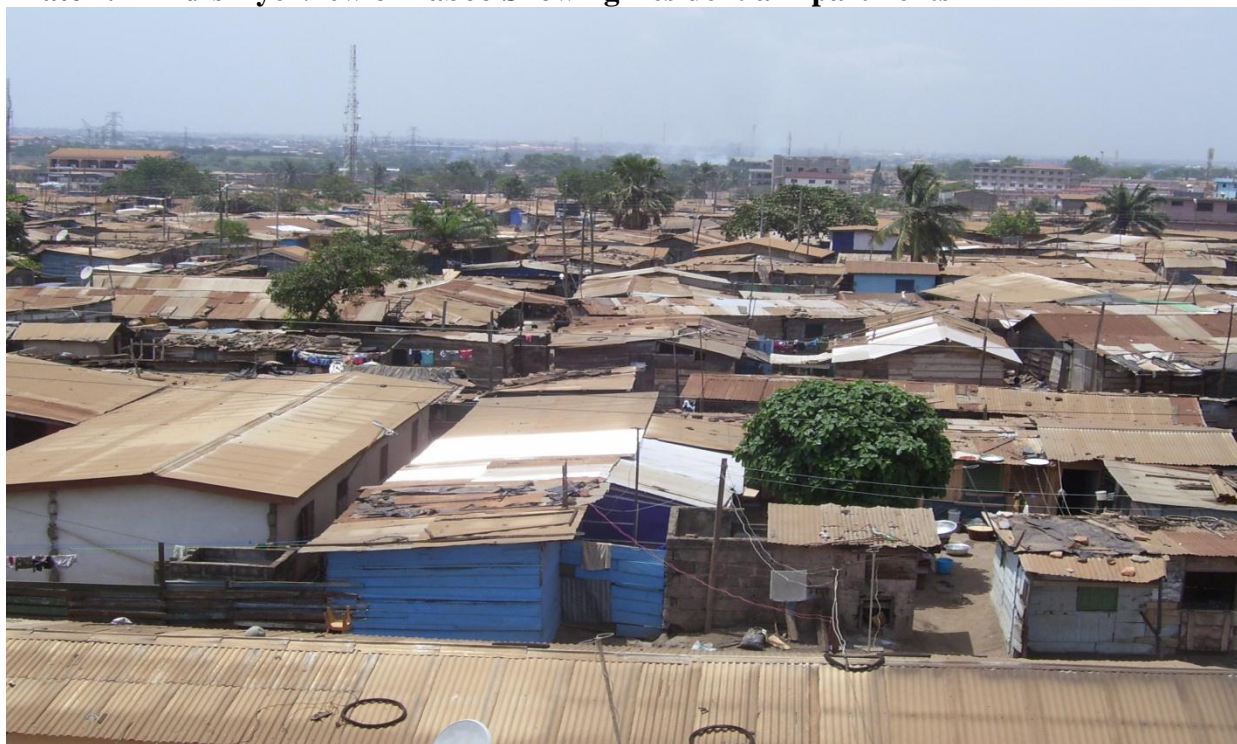
The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters including through reduced exposure to hazards, lessened

vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (UN/ISDR, 2009).

1.9 Research Methodology

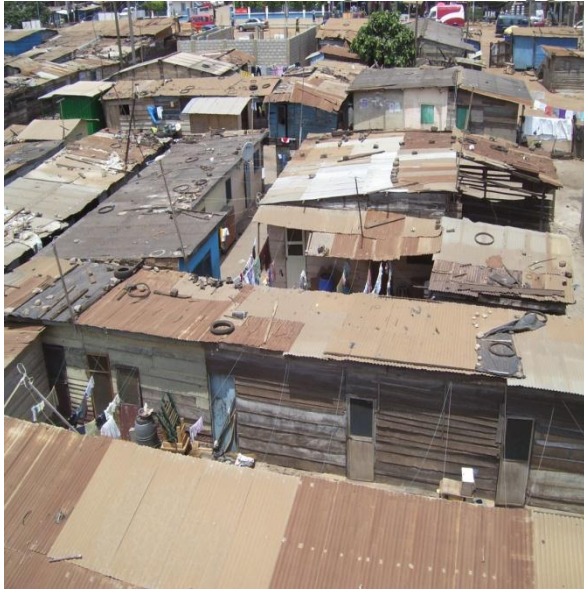
The study was conducted in the Ashaiman Municipal Area which was part of the Tema Municipal Assembly until 2008 when it was given an independent administrative autonomy. The target population for this study comprised of residents within the municipality, specifically households in two research localities. These two research localities exhibit contrasting characteristics. That is, “Taboo” as its name depicts in the Akan word meaning ‘wooden planks’ has developed organically with most of the structures made of wooden planks (see Plate 1.2).

Plate 1.2 Bird’s-Eye View of Taboo Showing Residential Apartments



Source: Field Survey, 2012

Unlike Taboo, Tulaku has benefitted from slum upgrading facility, a project initiated by UN-Habitat Slum Upgrading Facility in Ghana. Plate 1.3 presents indigenous part of Tulaku and a section of the upgraded settlement.

Plate 1.3 Pictures of Indigenous and Upgraded Sections of Tulaku

Source: Field Survey, 2012

In order to achieve the objectives of the study, both primary and secondary sources of data were used. Primary data were collected from sampled household heads within the two research locations using semi-structured questionnaire (see Appendix 1 for the household questionnaire used in the survey). The main issues that were addressed in the design of the questionnaire included the respondents' educational background, socio-economic and cultural background as well as their demographic characteristics. The questionnaire also sought to find possible causes and effects of fire hazards as well as information on some coping strategies by residents. Qualitative research methods such as key informant interviews, in-depth interviews, focus group discussions and direct observations were also vital and utilized to get more in-depth knowledge on issues that emerged. The study also employed the use of the GPS in mapping the exact locations of fire hydrants as well as other fire hazard attributes (building material type, building density, accessibility etc.) within the study area.

1.9.1 Sampling Design for Questionnaire Survey

The study employed both quantitative and qualitative research methods. According to Petrusевич (2005), the combination of quantitative and qualitative research methods helps the researcher to paint the full picture of the study. A household survey was undertaken within the two research localities. Broadly, the study employed stratified sampling to classify respondents into fire victims and non-fire victims. The fire victims were engaged through purposive sampling by obtaining their background information from the NADMO office in Ashaiman. Systematic sampling was employed in the selection for non-fire victim households for the questionnaire survey, where samples were drawn from three enumeration areas. For purposes of this, every 4th house was systematically picked for interviewing. In each house, the head of the household was nominated for the interview, simply because they are very knowledgeable in issues concerning households. However, in the absence of heads of household, any other elderly member of the household was nominated and interviewed. As such, a “household” in this instance is defined as a group of people within a house who eat from the same pot. A whole host of factors including the absence of clear boundaries separating residential communities and the unplanned nature of the settlements for the two selected research communities precluded the use of systematic sampling for selecting the participating households. Again, because the sampling units are heterogeneous in nature, every household within the community had an equal chance of being selected. Table 1.2 present the population of the study locations.

Table 1.2 Population Distribution of Sampled Communities in Ashaiman

Name of Community	Enumeration Area Number	Number of Houses	Number of Households	Number of Males	Number of Females	Total Population
Old Tulaku	002	130	446	934	941	1875
New Tulaku	003	94	346	753	733	1486
Taboo	004	284	958	2283	2279	4562
Total	-	508	1750	3970	3953	7923

Source: GSS, 2000

From table 1.2, there are 1875, 1486 and 4562 people living in Old Tulaku, New Tulaku and Taboo respectively. However, in terms of percentage distribution; the total number of people living in Old Tulaku constitutes 25 percent of the entire population whilst those living in New Tulaku represent 20 percent and the remaining 55 percent resides in Taboo. This implies that our sample for this study should also have the same proportions irrespective of the sample size. Since the population is very large we employ the sample reduction approach by Cochran (1963). According to Cochran (1963), in sample surveys involving very large population, the formula below is appropriate to yield a representative sample for proportions.

$$n = \frac{Z^2 pq}{e^2} \quad (1)$$

Where n is the sample size, Z^2 is the desired confidence level, (e.g., 95%) that is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q is 1-p. For the purpose of this study, p and q denote the proportion of males and females respectively (i.e. 50% each). Furthermore, this study targets a 95% confidence level and $\pm 7.5\%$ precision. The value for Z is found in statistical tables which contain the area under the normal curve, which is 1.96 for 95%. Using the Cochran model, the resulting sample size is represented by;

$$n = \frac{1.96^2(0.50)(0.50)}{(0.075)^2} = 172 \quad (2)$$

Table 1.3 Computations of Number of Respondents in each Community

Community	Formulae	No. of Respondents	Sampling Method
Old Tulaku	<i>Proportion in Sample</i> 0.25*172	43	
New Tulaku	<i>* Total Sample</i> 0.20*172	34	<i>Systematic sampling</i>
Taboo	0.55*172	95	

Source: Field Survey, 2012

Table 1.3 presents the number of respondents that would be selected from each community. The study locations have been subdivided into three areas. Old Tulaku, constituting 25% of the total population with 446 households, New Tulaku, with 346 households constituting 20% of the total population, and Taboo, with 958 households (55% of the total population). Based on their respective proportions, the estimated total sample size (172 households) was further divided among the three communities. From Table 1.3, 43, 34 and 95 questionnaires were administered in Old Tulaku, New Tulaku and Taboo respectively.

1.9.2 Qualitative Research Methods

1.9.2.1 Key Informant Interviews

To complement the information obtained from the local respondents with a more official view, key informant interviews were conducted among some policy makers within and outside the community. According to Patton (1987:95), key informants are respondents who are knowledgeable and articulate, with deep insights that assist the researcher in understanding what is happening. Issues concerning the policies and practices surrounding the management of

informal settlements, the underlying factors that influence the development of these settlements including the planning and legal framework in which they exist and operate formed the kernel for discussions. Other issues concerned with the policy framework for disaster risk reduction, the incidence, frequency and severity of fire, causes of fire, challenges with fire management within informal settlements as well as possible interventions towards solving these challenges were further explored. A list of stakeholders interviewed included officials from the Fire Service, National Disaster Management Organization (NADMO), Environmental Protection Agency (EPA), Electricity Company of Ghana (ECG), Ghana Water Company Limited, Ashaiman Municipal Assembly (ASHMA) and other Non-Governmental Organizations (NGOs). These stakeholders as far as this thesis is concerned played an important role and were very instrumental in addressing some of the issues that emerged from the research.

1.9.2.2 In-depth Interviews

In-depth interviews were conducted among some individuals within the focus group. According to Boyce (2006), in-depth interviews provide much more detailed information than what is available through other data collection methods, such as survey.

1.9.2.3 Focus Group Discussions (FGD)

Focus group discussion (FGD) as a method of data collection was conducted among a selected set of participants to discuss issues and concerns based on a list of key themes drawn up by the researcher/facilitator (Kumar, 1987). According to Grosh and Glewwe (2000), the goal of focus groups is to elicit the insights and experiences of the participants and to stimulate discussions on areas that would not come to light without the interaction of the group. To achieve this, focus group discussions were organized among fire victims and non-fire victims in the two localities.

These groups were of varying sizes, ranging between 5 - 10 members to ensure maximum participation.

1.9.2.4 Direct Observation

Direct observation has also been one of the most significant ways to collect data from the field. Observations were conducted by physically visiting the field and assessing the condition of different infrastructures (water source, road access, housing, solid waste, drainage) and also determining the physical vulnerability within the selected communities. The purpose of this exercise was to supplement information gathered from the respondents. During this research activity, photographs of some vulnerable conditions (wooden shacks, scenes of suspected illegal electricity connection) within the communities which can potentially trigger fire were also captured.

1.9.3 Secondary Sources of Data

Secondary sources of data collection were also utilized to gather data to supplement responses that were acquired from the questionnaire. A review of secondary data sources including both published and unpublished materials, articles, journals, internet resources, periodicals, international reports, working papers, governmental report and newspaper publications were used. Documents containing information on the genesis of informal settlements, data on historical patterns of fire risk, data on informal dwellings fire, policy framework for disaster risk reduction, demographic data as well as the housing policy were exceptionally good sources of secondary data that were utilized.

1.10 Analysis of Data

The spatial data were digitized into ARC/GIS coverages and the rest of the data obtained from the survey were analyzed using the Statistical Programme for Social Sciences (SPSS) version 18 and Microsoft Excel 2007. Cluster analysis, preferably K-Means cluster analysis was employed in this study. By way of definition, cluster analysis is a technique used to classify cases into groups that are relatively homogeneous within themselves and heterogeneous between each other, on the basis of a defined set of variables (Everitt et al., 2001). With the aid of variables which were specified, cluster analysis helped in identifying the various vulnerability groups within the community. Additionally, it helped in identifying which of the two research communities was more vulnerable to fire, which helped in the policy recommendation for disaster risk reduction. The technique also assisted in identifying conditions which enhance risk accumulation within the community that is looking at the factors or causes of fire within the communities.

The chi-square test was used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories. Do the numbers of individuals or objects that fall in each category differ significantly from the number you would expect? Is this difference between the expected and observed due to sampling error, or is it a *real* difference? In this study, we sought to test difference between socioeconomic/households factors and the incidence of fire. The level of significance (the point at which you can say with 99% confidence that the difference is not due to chance alone) is set at 0.01. The chi-square formula used on these data is:

$$X^2 = \frac{(O-E)^2}{E^2} \quad (1)$$

Where 'O' is the observed frequency in each category, 'E' is the expected frequency in the corresponding category

Degrees of freedom (df) refers to the number of values that are free to vary after restriction has been placed on the data. The degrees of freedom here are defined as $N - 1$, the number in the group minus one restriction.

1.11 Organization of the Study

Sequentially, this thesis has been organized in six chapters to give logical meaning to the study conducted. The first chapter presents a general introduction to the study. It presents, among other things, the problem statement, conceptual framework, research objectives, research questions and the organization of the study. This chapter also contains the literature review which has been organized around the following themes: urbanization in Ghana, the proliferation of informal settlements, linking urbanization and risk accumulation, infrastructure deficiency in informal settlements and lastly housing the low-income sector in the urban space. This chapter further discusses the research design and methodology of the research. The methodology provides a detailed explanation about the processes and stages implemented during the study. In furtherance of this, the chapter details the design of the research, data requirements, data collection methods, sampling techniques and tools chosen for gathering information from the communities studied.

The second chapter presents the background of the study area by highlighting the genesis and growth of Ashaiman, the demographic dynamics of Ashaiman, the role of Ashaiman within the urban economy and a historical review of the fire incidence in Ashaiman. Chapter three of this thesis also looks at the housing and service delivery in Ashaiman. It captures the infrastructural facilities as they exist within the municipality. Chapters four and five present the analysis of both quantitative and qualitative data. Finally, the summary of the entire research, conclusions and recommendations made are presented in chapter six of this thesis.

1.12 Limitations of the Study

Generally, the study was limited by both time and financial constraint. However, one of the principal limitations that engulfed the development of this thesis is particularly the difficulty in obtaining data at the local level. Because Ashaiman is a newly established municipality, majority of its institutions have not been structured properly and this rendered access to secondary data a little bit problematic. For instance, at the Ashaiman Fire Station there was the difficulty in getting the relevant data on fire outbreak occurrences over the years. The Fire Station cannot boast of any reliable secondary data on the historical occurrences of fire kept within its domain except for the several months prior to the study when the community recorded 29 commercial/residential fire outbreaks. This development made it cumbersome studying the pattern of fire incidences in the community. In the midst of these difficulties, efforts were still made at the Tema Metropolitan Assembly (TMA) and subsequently the Tema Development Corporation (TDC) for some historical data on the incidence of fire in Ashaiman. Poor layout and perhaps the highly congested nature of the area also hindered the administration of the questionnaire. In most cases one dwelling was visited several times without one's notice because of the crowded nature of settlements. This development resulted in the slow administration of the questionnaire.

CHAPTER TWO

ASHAIMAN: THE GROWTH OF AN INFORMAL SETTLEMENT

2.1 Introduction

This chapter is intended to introduce readers to the study area by presenting brief background details of the area. First, it captures a discussion on the genesis and growth of Ashaiman since this helped in identifying some of the factors which have contributed to the historical growth of the municipality. Secondly, the chapter further discusses issues on the demographic dynamics of Ashaiman. Again, this was done to appreciate the dynamics in the population increase within Ashaiman over the years. More importantly, the role of Ashaiman within the urban economy was also highlighted within the chapter to also give an overall picture of the important role Ashaiman plays in terms of education, health, housing and employment.

2.2 The Genesis and Growth of Ashaiman

Ashaiman is selected as the area of study for this research. It is a heterogeneous community organized along ethnic, religious, and occupational identities (IBIS, 2003). According to the 2000 Population and Housing Census, Ashaiman is dominated by migrants, with the Ewes (31.0%) forming the majority, followed by Akans (30.2%). The Ga-Adangbe, which is the indigenous ethnic group, makes up 21.1%. The population of migrants from the three northern regions (Grumah, Mole-Dagomba, Grusi and Mande) together forms 13.2% of Ashaiman's population. That is to say that all ethnic groupings in the country are heavily represented in the community. There is also a large population of minority migrants from other West African countries such as Nigeria, Togo, Burkina Faso and Mali resident in the community (IBIS, 2003). Ashaiman is located about four kilometers to the north of Tema and about 30 kilometers from Accra, the capital of Ghana. While Tema is situated on the Greenwich Meridian, Ashaiman falls within

latitude 5° 42' North and longitude 0° 01' West. Ashaiman shares boundaries on the North and East with Katamanso Zonal Council of Tema Metropolitan Assembly, on the South with the Tema Township, and on the West with Adjei Kojo, a community which forms part of Tema Zonal Council (Nunoo, 2008).

Ashaiman was founded by one Nii Amui who migrated to the area from Tema Old town in the 17th Century. He named his new settlement “Epo asee”- meaning the sea has ‘spoilt’. He was a fisherman and a farmer. He was later joined by two of his brothers Nii Ashai and Nii Oko. He migrated to the (now Ashaiman) area during the lean fishing season to do some farming in the area, hence the term the sea has spoilt “Epo asee”. Nii Amui later returned to Tema Old Town after the lean fishing season and left behind his two brothers Nii Ashai and Nii Oko who had earlier joined him at ‘Epo asee’ his new settlement. Ashaiman came to be known as the new name for “Epo asee” (the new settlement of Nii Amui). It came about as a result of the fact that people travelling from Tema Old Town to surrounding areas like Zenu, Kubekuro and others usually used where Nii Ashai had settled with Nii Oko as a resting place. Later, this area became a settlement for Nii Ashai and people usually said *‘let us rest at Nii Ashai’s town and continue our journey later’*. Nii Ashai’s town in Ga also means Ashaiman that is how “Epo asee” later became known as Ashaiman. The area where Nii Amui settled is presently called Mansteman, while Nii Oko’s settlement is present day Moneombaanyi. Later other migrants from Ada area to the east of Tema came to settle in Ashaiman. The area where they settled is present day Lebanon section of Ashaiman.

The reason behind the dramatic increase in population in the Municipality has largely been attributed to migration and high birth rate. According to Awumbilla and Agyei-Mensah (2009), Ashaiman’s rapid population growth over the years has been directly associated with the

construction of the town and port of Tema in the early 1950s when migrants who had to move to Accra and Tema in search of jobs were attracted to Ashaiman because of the availability of cheap accommodation. In order to fulfill the high demand for housing, land owners erected cheap housing units without any corresponding development in their infrastructure, such as schools, roads, toilet, portable drinking water and clinics.

Tema was originally one of the several fishing villages about 27 kilometers east of Accra, the capital city of Ghana. Its rapid growth is attributable to its development as an industrial and port city after Ghana's political independence in 1957. According to Kirchner (1968, p. 207), Tema is an example of a planned township which has witnessed massive urban development in Africa. The development of Tema can be linked to the period when the government of Kwame Nkrumah in 1952, acquired 64 square miles of land from the chiefs and people of Nungua, the traditional land owners. In respect of this acquisition, natives of the area were compensated through resettlement with new houses in 1959 at Manhean which is 3 kilometers away from the acquisition area. Migrants who lived in the area were neither resettled nor offered any compensation for the loss of their houses and other properties because, according to the government, they did not hold any customary title to the land which had been acquired. In addition, they were allocated small plots of land at Ashaiman to build their own houses. They were provided with pieces of timber and corrugated iron sheets by the government from the houses that were demolished (Owusu, 2004).

Ashaiman was formerly considered as a temporary settlement for the non-natives (Owusu, 1991). In terms of infrastructural development, no appropriate establishment was laid for the future development of the community. Ashaiman's growth however can be linked directly to the speedy expansion of Tema and the consequent shortage of affordable housing which occurred here. When the development of Tema was planned, it was expected that its population would grow rapidly

from the influx of migrants, both skilled and unskilled, in search of job opportunities. An increased demand for housing was therefore expected. In light of this prospect, the Tema Development Corporation (TDC) was established in 1958 to provide housing and other related urban services in Tema. The TDC built a number of self-contained low and high income housing facilities to cater for all economic groups (Owusu, 2004).

During the early 1970s, while the number of migrants continued to swell, there was a steady turn down in the number of housing facilities built by the TDC which was however due to some political and economic factors. This period marked the beginning of the housing crisis in Tema. The TDC could not meet its annual construction mark of 2000 housing units. For instance, between 1956 and 1976, it only managed to construct a total 16,779 housing units compared to a mark of 40,000 housing units (Owusu, 2004). Hence, in 1985, only 11 out of 19 planned residential communities had been completed. Low supply and high demand for housing stock helped raise housing prices and rents to levels unaffordable by a great percentage of incoming migrants. Ashaiman therefore became the logical choice as a residential area for a lot of people. Again, behind the attraction of migrants to Ashaiman was the lack of any land control and regulation, the availability of cheap rental accommodation and finally its proximity to Tema. Because of the lack of housing regulations, many migrants built their own dwellings on arrival at Ashaiman. Moreover, due to the demand of housing, and the lack of planning regulations, aspiring landlords also engaged in housing construction for rent. These dynamics account for the rapid increase in the population of the community particularly in the early 1970s (Owusu, 2004).

The economic condition in Ghana and the Accra-Tema area in particular in the 1980s also contributed to the growth of Ashaiman during this period. In 1982, with the World Bank's support, the government of Jerry John Rawlings instituted a Structural Adjustment Program (SAP)

to adjust Ghana's malfunctioning economy and promote greater economic efficiency. Policies pursued under the Structural Adjustment Program have included among others, the restructuring of the public sector and the state-owned enterprises by trimming overstuffed bureaucracies, encouraging privatization, the removal of government subsidies and the abolition of price controls (Weisman, 1990). From 1987 to 1991, about 50,000 workers representing 15% of the total period, public employments in Ghana was retrenched (Rogerson, 1997). The social and economic impacts of these policies have been significant. In urban communities, policies that were geared towards trimming government bureaucracies were not compensated with adequate retraining or job placement programs for the redeployed, leading to massive unemployment especially in Accra-Tema region, Ghana's industrial heartland. Among the urban dwellers, wage restraint policies and salary freezes reduced the average worker's purchasing power by 30% in 1985 (Frimpong-Ansah, 1991). These economic policies in combination, negatively affected the already precarious housing market position of many low-income workers in Tema, and caused many of them to relocate to Ashaiman where the cost of housing was much lower. In addition, Ashaiman offered comparatively more opportunities in the informal economic sector, where many retrenched workers would probably have decided to make a fresh start or seek supplementary incomes (Owusu, 2004).

2.3 The Demographic Dynamics of Ashaiman

Ashaiman, which is currently the capital of the newly created Ashaiman municipality (ASHMA), has experienced its highest demographic and spatial growth since the late 1950s (DPU.UCL, 2005). There has been an exponential increase in the growth of the entire population during the past decades. For instance, the population of Ashaiman grew faster than the national average from 2,624 in 1960 to 22,549 in 1970 to 50,918 in 1984. The growth rate registered between 1960 and

1970 was 23.5%. Between 1970 and 1996, the average annual population growth dropped to 6% but it still remained high compared to other communities (Awumbilla and Agyei-Mensah, 2009).

Ashaiman was listed as one of the fastest growing towns in Ghana between 1960 and 1970. According to the 2000 Population and Housing Census Report, the population of Ashaiman was estimated at about 150,312 growing at a rate of 4.6%, which is higher than the national growth of 2.6%. The report also estimates that, 75,183 of the population are males with 75,129 being females. The majority of the population within Ashaiman falls within the ages of 15 years to 34 years. With a land area of about three square kilometers, the population density is estimated at about 7 people per square meter, which is recorded as one of the highest in the country. According to the 2010 Population and Housing Census, the current population of Ashaiman is about 190,972 (GSS, 2010). From the data available, it can be inferred that the annual inter-censal growth rate for each censal period is 277%. In other words, between 1960 and 2010, Ashaiman grew by 4,762% (see Table 2.1). Such high growth rate without corresponding growth in infrastructure has created lots of vulnerable conditions within the community.

Table 2.1: Showing Population Growth in Ashaiman

Year	Population	Inter-Censal Change (%)	Growth Rate
1960	2,624		
1970	22,549	759	
1984	50,918	126	4,762.2%
2000	150,312	195	
2010	190,972	27	

Source: GSS, 2010

2.4 The Role of Ashaiman within the Urban Economy

Ashaiman has in recent times become a home for many people from different ethnic backgrounds. It has in its capacity as a major community played some significant roles that cannot be overlooked since its establishments in the 17th century. The Ashaiman community like most of the well-known communities in Ghana has been handicapped in terms of the provision of education, health, housing and other municipal services to both members and non members of the community.

According to Ashaiman Municipal Annual Progress Report published in 2008 to 2009, Ashaiman plays a significant role in the area of education. The community has about 17 public schools and 286 private schools (see Table 2.2). These include nursery, primary and junior/senior high schools. There has been significant development with the increase in the senior high schools of the community which has actually reduced to a large extent the level of illiteracy in the area. This has in effect added value and increased the human capital in the city getting most people better educated than they were before. It is worth knowing that the level of school enrollment for girls has also risen in Ashaiman and this perhaps has contributed to the quality of life of the girl child in terms of human resource development. Ashaiman can now boast of more graduates and educated people in the community. Some of the schools or educational centres in Ashaiman include the Ashaiman Senior High School, Tema International School, Don Bosco Vocational Technical Institute and other educational facilities (ASHMA, 2008).

Table 2.2: Number of Public and Private Schools in Ashaiman

Level	Public Schools	Private Schools	Total
Nursery	4	150	154
Primary	6	120	126
Junior High School	6	6	12
Senior High School	1	2	3
Computer School	0	10	10
Total	17	286	303

Source: Field Survey: 2012

The role of the community in the area of housing development has been very noticeable in the past few years. The rapid growth of population in Ashaiman during the 1950's brought so much pressure on accommodation in the area which forced many of the settlers to settle in slum areas. The community has collaborated with the United Nations to upgrade some slums in the municipality. For example Tulaku community has been a good beneficiary of this slum upgrading by UN-Habitat Slum Upgrading Facility. These and many other efforts have helped to accommodate most of the people in the region with less risk. The community's role has been very significant in the area of housing and accommodation of its members since a budget has been created by the assembly to facilitate the project of upgrading slums in the area.

In the area of health, the Ashaiman community has made tremendous efforts that can be recorded as successes. The community which used to operate only one health centre has in recent times added 14 private clinics and elevated the status of the old one to a polyclinic. The polyclinic renders health services to members of the community. Some of the services rendered are medical care, pharmacy, health care, school health, family planning, reproductive and child health and maternity services. Despite the fact that these polyclinics in Ashaiman lack some useful health

facilities for their operations, it has saved the lives of many through health services in the area. It is important to know that the health facilities in Ashaiman serve areas like Oyibi, Michel Camp, Appolomia, parts of Adenta and Tema (ASHMA, 2008). There are a number of informal activities in Ashaiman which provide employment and skills training for people especially the youth (see Appendix 8). These consist of large, medium and small-scale industries. The activities cover textile industries (kente weaving, tie and dye), production of agricultural inputs and block-making as well as small-scale aluminium industries that produce cooking utensils. There are no major production units (factories) in the municipality. However, there are several small scale artisanry workshops which produce buckets, corn-mill funnel, cassava graters, grinders and many others (ASHMA, 2008).

The area provides very useful facilities including water and sanitation for the wellbeing of the people. It has a network of water connections from the Kpong water works which also serves the Tema Metropolitan Assembly and other parts of Accra. The area has succeeded in providing a total of eleven fire hydrants to boost fire fighting operations in the municipality. However, sanitation problems in the area still persist but efforts are being made to curb the situation. Currently, an organized system of refuse collection, established by the Tema Metropolitan Assembly has also been made available to Ashaiman.

The Ashaiman area has developed in terms of agriculture. One can talk about all the benefits of agriculture the community derives from agricultural activities such as cattle ranching, poultry farming, piggery and other forms of animal rearing. This has served as an important employment avenue for most of the unemployed in the area, sustaining life and welfare. The area is well noted for the production of vegetables, grains and tuber crops. Agriculture in the municipality has increased its production by using irrigation more recently (ASHMA, 2008). The Ashaiman

irrigation project which was established in 1968 has a potential area of about 152 hectares of which 130 hectares is irrigable. According to researchers, the project has an area reservoir of 5.2 million cubic meters gross capacity with two main canals. Most of the farmers access this project for the farming activities to produce rice, maize, okro, onion, pepper, lettuce, tomato and cucumber. Finally, the area has youth groups such as the Ashaiman Youth Coalitions, which came to being in 2001 with the objective of finding solutions to problems confronting the youth in the area and to support and engage the youth in sporting activities. These engagements reduce the rate at which the youth indulge in social vices such as armed robbery, internet fraud, and others. Altogether, the role of Ashaiman cannot be underestimated due to its immense contributions to national development (ASHMA, 2008).

2.5 Fire Incidence in Ghana: (A Retrospective View)

This section is intended to give a historical overview of fire incidences in Ghana. Data collected from the Ghana National Fire Service Headquarters (GNFS) from 2000-2011 indicated an overall widespread of fire incidences throughout the country. In this regard, this section captures the total number of fire outbreaks which have occurred during the period under review. It also contains the cost of damage to properties. Significantly, the total number of fire outbreaks recorded within a year is made up of a regional distribution of fires which includes domestic, industrial, institutional, vehicular, electrical, commercial and bush fires which have been recorded throughout the country. Subsequently, this section also examines the incidence and prevalence of domestic fire outbreaks which have taken place within Accra and Ghana.

The country happens to be losing a lot of money and resources due to numerous fire outbreaks. These include losses from domestic, industrial, institutional, vehicular, commercial, electrical fires and bushfires. A recount of some series of fire outbreaks in the country such as those at Lands

Commission, Tema Oil Refinery, Kumasi Central Market, Ministry of Foreign Affairs and others have resulted in unquantifiable loss of lives and properties. Table 2.3 summarizes the total number of fire outbreak occurrences which have been recorded from 2000 to 2011 and their respective estimated cost of damage. A glance at Table 2.3 shows that, fire outbreaks generally over the past years have been showing an increasing trend. For instance, in the year 2000 the number of fire cases was 2,214, it then increased to 2,721 in the year 2002. In 2003, the number of fire cases dropped by a slight margin to 2,647 and again increased in 2008 which recorded the highest incidence of fire outbreaks in the year. Beginning from 2008 to 2011 fire occurrences began to drop drastically. Some of the reasons which might have resulted in the drastic reduction in fire outbreaks in the country can be attributed to the following prudent measures which have been instituted by the government as a way of reducing the rampant fire outbreaks in the country.

One of such recent development has been the procurement of fifty- four (54) fire tenders and other equipments for the Ghana National Fire Service (GNFS) to improve its core function of fighting fire outbreaks in the country (GNA, 2012). In addition, several other interventions including the supply of thirty double-cabin pick-ups have also been implemented by the government all aimed at re-equipping the Ghana National Fire Service (GNFS). This according to the Vice President, Mr. John Dramani Mahama was one of the recommendations by the committee set up to investigate the cause of fire outbreak at the Ministry of Foreign Affairs (Daily Graphic, Thursday 24 May, 2012). Another area of attention by government at reducing the rate of fire outbreaks is the issue of public education on fire safety measures and prevention strategies. Due to the incessant fire outbreaks over the years, the government has intensified education in the use of fire extinguishers both at the regional and local level by households.

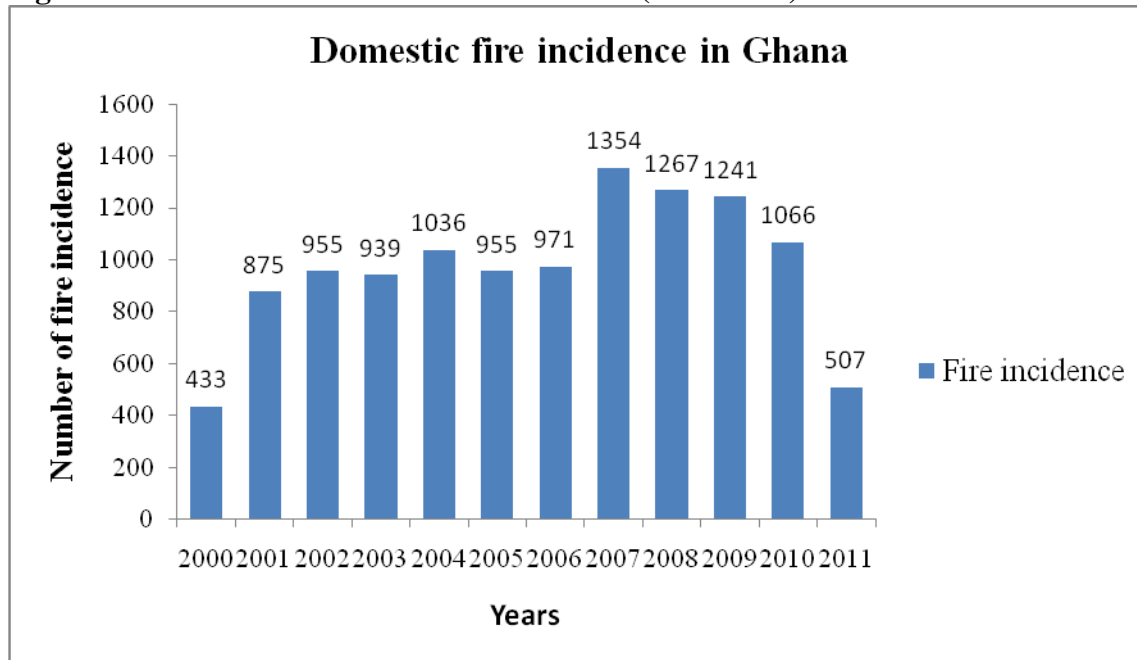
More recent developments aimed at reducing the huge number of fire outbreaks in the country can also be attributed to the training of fire service personnel in fire fighting. Personnel in the service have undergone series of training particularly in the handling of new fire tenders and equipments acquired for the service and also as a way of enhancing their capacity in emergency driving (Ghanaian Times, Tuesday 22 May, 2012). All these development have resulted in the decreasing number of fire outbreaks witnessed in the country. Table 2.3 again reveals the estimated cost of damage of the various fire outbreaks recorded within a particular year. A cursory look at the table reveals that there have been some inconsistencies in the breakdown of the reported cost of damage. For instance, a total of 2,214 fires were recorded in the year 2000 as against Gh¢ 789,720.41 cost of damage. It however appears that when fires dropped from 2,721 in 2000 to 2,647 in 2003, the cost of damage also increased from Gh¢ 1,249,933.9062 to Gh¢ 2,039,229.2 respectively. Again, when fires dropped from 2,647 in 2003 to 2,436 the level of inconsistency was also well noted when the estimated cost of damage also increased from Gh¢ 2,039,229.2 to Gh¢ 5,061,077.9008. This level of inconsistency in data can however be attributed to the following; first is the fire type that is whether institutional, domestic, vehicular, commercial and industrial. For example the cost of damage of domestic fires cannot be equal to that of commercial or industrial fires.

Table 2.3 Total Number of Fire Outbreaks in Ghana and their Estimated Cost (2000-2011)

Year	Total No. of Fire Outbreaks	Estimated Cost of Damage (Gh¢)
2000	2,214	789,720.41
2001	2,432	1,459,203.302
2002	2,721	1,249,933.9062
2003	2,647	2,039,229.2
2004	2,418	1,430,306.0267
2005	2,436	5,061,077.9008
2006	2,606	2,896,460.345475
2007	3,199	751.927976
2008	3,249	795.857075
2009	2,858	698.829252
2010	2,587	35,998.209557
2011	1,335	199.380808

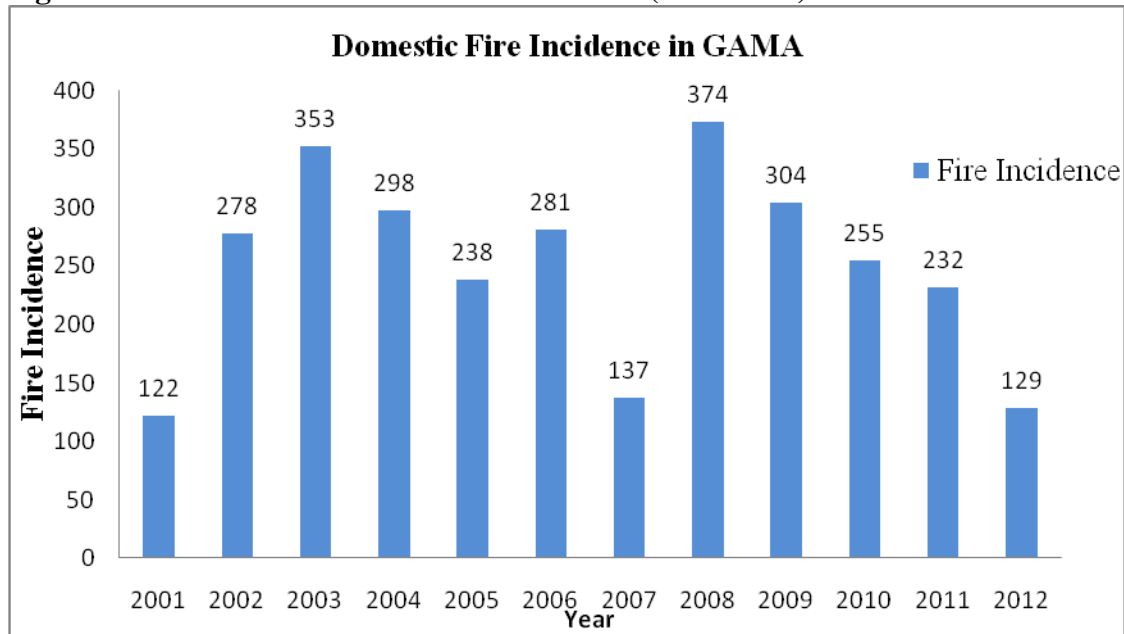
Source: Ghana National Fire Service Headquarters Database, Accra

Figure 2.1 presents the number of domestic fire incidences which have been recorded from 2000-2011. At the onset, fires begun to show an increasing trend with a recorded number of cases of 433 fires within the year 2000. There was a sharp increase in the number of fire cases from 971 in 2006 to 1354 in 2007 which was recorded to be the year which experienced the highest number of domestic fire incidents in Ghana. From 2007, when fire incidence was at its peak, fire incidence begun to show a sharp decreasing trend from 1354 cases to as low as 507 cases in the year 2011.

Figure 2.1 Domestic Fire Incidences in Ghana (2000-2011)

Source: Field Survey, 2012

In order to gain insights into historical occurrence of domestic fire incidences within the Metropolis, Figure 2.2 captures the number of domestic fire incidences which have occurred within the the Greater Accra Metropolitan Area. Due mostly to the rapid population growth and the highly congested nature of the city, pressure on infrastructural facilities, Accra has witnessed a number of fire outbreaks within the metropolis. With as low as 122 cases of fire incidence recorded in the year 2000, fires began to rise sharply to 353 cases in the year 2002 then subsided again to 137 cases in the year 2006. Following this drastic decrease, the number of fire cases again sharply rose to 374 in 2007 which recorded the highest number fire incidence within the metropolis. From 2007, there was an observed decreasing trend in the number of fire cases from 374 to 129 in 2011.

Figure 2.2 Domestic Fire Incidences in GAMA (2001-2012)

Source: Field Survey, 2012

2.6 Summary

This chapter has examined the genesis and growth of Ashaiman. It has brought to the fore discussions on the historical development of Ashaiman by looking at some of the factors which have contributed to the dramatic increase in population within the metropolitan area over the years. It has been established that, the economic conditions in Ghana particularly Accra and Tema during the 1980s contributed to the growth of Ashaiman. It has also been established that Ashaiman's growth over the years was associated with the rapid expansion of Tema and the consequent shortage of affordable housing. This chapter has also studied the trend of past fires incidences in the country by looking at the total number of fire outbreaks recorded between 2000-2011. It has also examined the domestic fire incidences in the country as well as domestic fire incidences in GAMA. It has been established that, fires over the years have shown an increasing trend by recording high number of fire outbreaks over the past years. However, some prudent measures like the training of fire service personnel in fire fighting, the distribution of fifty-four

fire tenders to the fire service, as well as the re-equipping of the fire service with double cabin pick-ups to improve their core function in fire fighting have all contributed to a reduction on the impact of fire outbreaks in the country.

Having looked at housing from a broad overview of urban development in Ashaiman and trends in fire outbreaks at the national, metropolitan and local levels in this chapter, the next chapter now focuses on housing and service delivery in Ashaiman.

CHAPTER THREE

HOUSING AND SERVICE DELIVERY IN ASHAIMAN

3.1 Introduction

Housing delivery is an extremely debatable and politicized subject that is of immense concern to administrators, scholars and the general populace in Ghana (Ibem, 2010). The influx of migrants into cities, the natural increase in population as well as the inadequate responses by the government have contributed to the worsening housing situation in the country, to the extent that economic development and the welfare of the citizens are adversely affected (Akinmoladun and Oluwoye, 2007; Ademiluyi and Raji, 2008). These problems have therefore resulted in huge housing deficits, unsanitary conditions, high cost of housing as well as the mushrooming of informal settlements (Iyagba and Asunmo, 1997; Adedeji, 2005; UN-Habitat, 2006b; Daramola, 2006).

Ghana suffers from a severe housing deficit as a result of low housing delivery relative to households' growth (Boamah, 2010). The Home Finance Company Ltd (HFC) estimated an unsatisfied housing need of 1,232,835 units, with an estimated new annual demand of 133,000 units. This means that only 25,000 units are produced annually leaving an unsatisfied annual demand 108,000 unit (GSS, 2002). As a result of the huge deficiency in the housing market in the country, a vast majority of Ghanaians now "sleep rough", largely in the major cities like Accra, Kumasi, Tema, Sekondi-Takoradi and Tamale (Boamah, 2010). According to GSS (2002), 1.9% of the Ghanaian populace rely on shift dwelling units such as kiosks, tents, cargo containers, attachment to shops and offices for shelters. Added to this is an additional 3% who are homeless and therefore resort to the streets, lorry parks and markets for habitation.

This chapter therefore focuses on the housing and service delivery in Ashaiman by examining the various housing developments which have emerged over the years. In the midst of the high deficit in infrastructural services in low-income/ informal settlements, a critical look at the infrastructural provisions generally in the communities will be discussed.

3.2 The Housing Development in Ashaiman

Ashaiman is historically a satellite town of Tema (Owusu 1999:244). In the 1950s, Tema, lying 30 km east of Accra, developed as a main industrial port. The land around Tema was bought by the Government from traditional owners, with the Tema Development Corporation (TDC) taking charge for planning the port and the new city (Mazeau et al, 2012). Initially, Ashaiman was seen as a temporary settlement to accommodate workers employed in the construction of Tema, but as the number of migrants increased, the temporary houses became permanent. The officials of Tema were forced to relax housing regulations (Kirchher, 1968) and to accept “unauthorized” settlements. The western part of what became Ashaiman was included in the initial plan of the TDC, so by the 1960s, Ashaiman was shaped by two different forms of development:

- i. The western part of Ashaiman was provided with roads, lighting and public toilets. Housing plots and streets were laid out following a grid pattern.
- ii. The eastern part saw farmers and traditional owners renting out some of their land to migrant workers. Housing construction did not follow any regulations or city plans (Owusu, 1999:245), resulting in very dense settlements.

The housing and other physical developments of Ashaiman were not only the result of action by the TDC and national Government. Major industrial companies investing in Tema decided to build flats for their workers in Ashaiman (Konnings, 1978), although the extent of construction is

probably marginal compared to the current housing stock. Most houses were built by individuals, initially indigenous farmers and the wealthier employees working in Tema. State-owned enterprises like the TDC provided housing within the formal sector for the upper classes. Housing for the lower classes was provided by the informal sector, mostly through self-build (Arku, 2009). The traditional leaders and indigenous families also played a key role in the development of Ashaiman.

3.3 Infrastructure Services in Ashaiman

As is common in many of the informal settlements worldwide, lack or inadequate basic service provision is not a new phenomenon in Ashaiman Township. According to UN-Habitat (2003), basic infrastructure provision encompasses potable water supply, sanitation, and sewerage systems, roads, drainage, electricity, solid waste collection, public transport and waste water collection. The availability of infrastructure is therefore vital for housing supply.

3.3.1 Water Supply

The provision of water is vital as it serves as one of the coping mechanisms of residents in a community. In view of this background, access to water remains a critical issue in Ashaiman Township. With Kpong and Weija dams serving as the main source of water for residents within the Greater Accra Metropolitan Assembly, Ashaiman Township also gets its source of water from the same avenues. The Ghana Water Company Limited is responsible for the provision of water to residents within the Ashaiman Township as they claim ownership of all the fire hydrants in the community. According to an official at the GWCL, before one gets water, one needs to present a photocopy of the site plan before getting connected. However, recognizing the illegal status of these residents, some are unable to provide the relevant titles to the land to get connected to the water supply. These developments have become an albatross on the neck of most of the residents

within the communities therefore making it difficult getting water within the municipality. According to GWCL, some of the main challenges encountered in the supply of water to residents within the municipality have been the high increase in demand for water which has resulted in water rationing within the municipality. Again, the difficulty in laying of pipes to get people connected has also become a menace because of the clustered nature of houses.

In spite of these hindrances in water supply, the few residents who have managed to get water access resort to several avenues for water supply by their household for drinking, cooking and bathing. The household survey conducted revealed that a large majority of residents resort to private standing pipe as their main source of water (see Table 3.1). However, there has been some intermittent supply of water to residents. Some residents have therefore put in place reservoir or tanks to store water for future use.

Table 3.1 Sources of Water by Residents

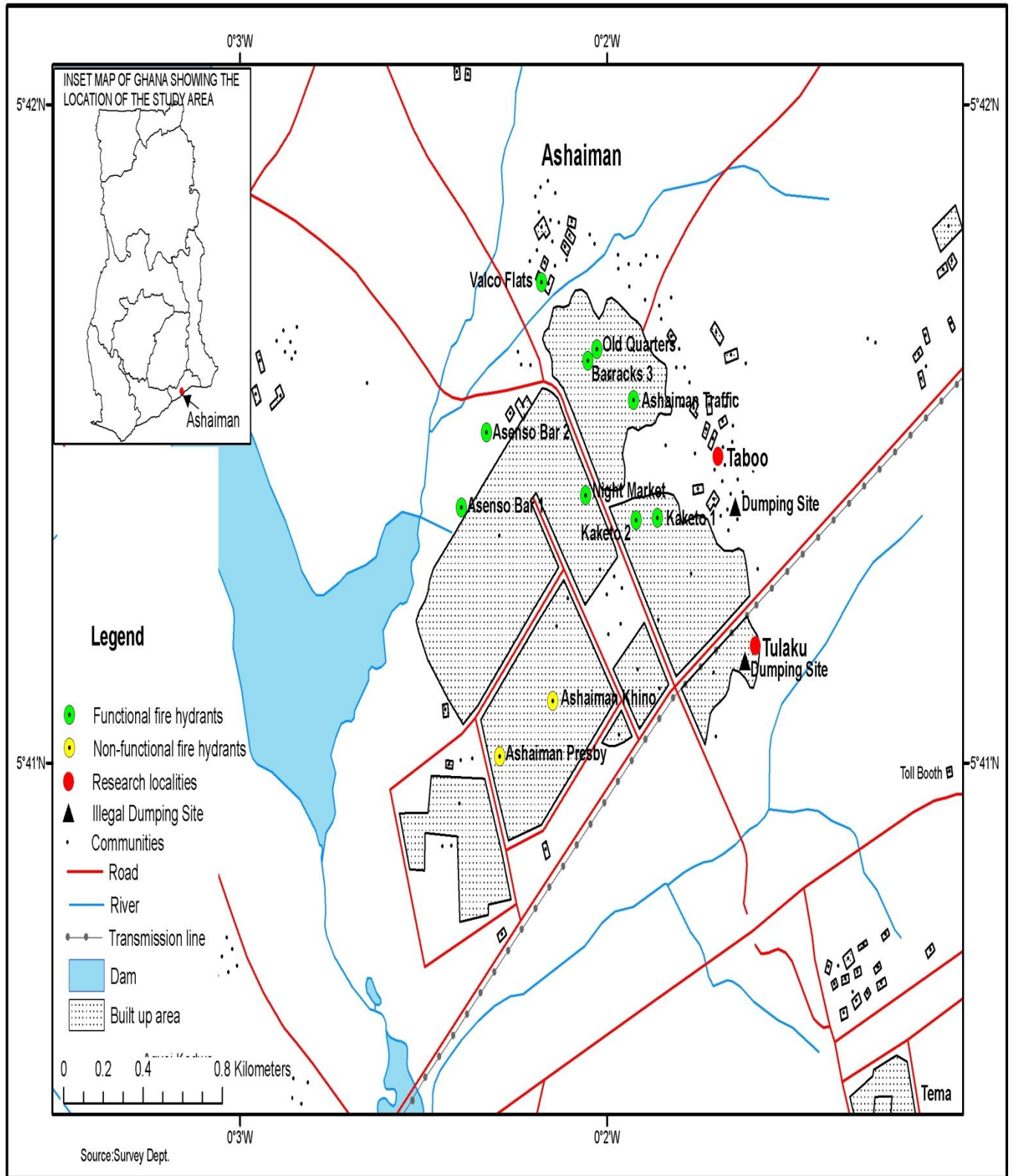
Sources of Water	Frequency	Percentage
Private Standing Pipe	86	50.0
Borehole	2	1.2
Water from Vendors	14	8.1
Public Tap	70	40.7
Total	172	100.0

Source: Field Survey, 2012

The provision of fire hydrants is vital as far as fire fighting in informal settlements is concerned. During the fieldwork and subsequent visits to the Ashaiman Fire Station, it was realized that the municipality is serviced with eleven fire hydrants provided for and serviced by Ghana Water Company Limited. Physical inspection of these hydrants revealed that most of the functional fire hydrants were skewed to and located within the formal settlements within the municipality (see

Figure 3.1). It was also observed that the location of these hydrants coincided with areas within the municipality that have good road networks. Ironically, the only two fire hydrants which were relatively in close proximity to the research localities were said to be non-functional for some time during the fieldwork. It is important to add that areas serviced with fire hydrants contain only 40% of the population while the two research localities which are disproportionately disadvantaged (without a hydrant) have over 50% of residents. “According to WATER UK (2002, pg 4), to be successful in fire fighting, fire fighters must have immediate access to water supplies. Accessibility and the proximity of those water supplies directly affect the resources that fire authorities need in protecting and mitigating their communities from the effects of fire”.

Figure 3.1: Location of Fire Hydrants using GPS



Source: Field Survey, 2012

While the good number of functional fire hydrants within the Ashaiman municipality is commendable, a close examination of their state or condition particularly in terms of accessibility serves as a major challenge for the fire brigade team in times of an emergency. It was observed during the fieldwork that most of the fire hydrants appeared to have been tampered with or not properly covered. Examples of these developments have been presented in plate 3.1.

Plate 3.1a Fire Hydrant used as Garbage Collection Point



Source: Field Survey, 2012

Plate 3.1b Fire Hydrant Used as Point for Store of Waste Water



Source: Field Survey, 2012

It was also observed that some of the hydrants had been used as TV stands by those who sell refurbished television (see Plate 3.2a) whilst others have kiosk harboring provision stores erected over them (see Plate 3.2b).

Plate 3.2a Fire Hydrants Used as ‘Stands’ for the Sale of Electrical Appliances



Source: Field Survey, 2012

Plate 3.2b Fire Hydrants Used as Provision Stands



Source: Field Survey, 2012

3.3.2 Sanitation and Drainage

Sanitation is a major challenge for informal settlement dwellers which has an overwhelmingly negative implication on residents' health (Merkel and Otai, 2007). Sanitation according to Alder (1995) is grossly inadequate in majority of informal settlements. A household survey conducted in Tulaku and Taboo revealed that majority of residents do not have access to domestic toilet facilities in their dwellings. Some interviews conducted revealed that, most land owners did not deem it necessary to add toilet facilities to their dwellings and this has resulted in indiscriminate defecation in open spaces and bushes in the area.

It was however observed from the survey that, disposing of liquid waste is one of the major challenges facing the Municipality. Most of the inhabitants do not have well engineered drainage services and few existing ones were choked with solid waste. In addition, waste water and rain water have therefore formed gullies that currently serve as the only drainage facilities around houses. Plate 3.3 shows sample of such unengineered drainage system serving the community.

Plate 3.3 Poor Drainage System within Dwellings



Source: Field Survey, 2012

3.3.3 Solid Waste Disposal

Solid waste is seen as one of the most problematic environmental problems confronting the residents within Ashaiman. During the field survey, three waste hotspots were identified as where waste accumulates without control. These hotspots are illegal dumping sites due largely to the lack of municipal service provision and lack of communal dumping containers. It was further observed that, most of the waste that remained uncollected accumulates into illegal dumping sites. Most of these illegal dumping sites were located very close to the settlements or shacks as depicted in plate 3.4.

Plate 3.4 An Illegal Dumping Site In-Close Proximity to Wooden Structures



Source: Field Survey, 2012

Probably to reduce the volume of accumulated waste, it was observed during the fieldwork that setting such illegal refuse dumps on fire has become a common practice. Refuse burning has been identified by various scholars as one of the leading problems facing residents in informal settlements (Satterthwaite, 2003; Cairncross and Ouano, 1990). Apart from the health impacts (respiratory problems) on residents through the burning of refuse, this act also contributes to the resident's vulnerability to fire hazards. Considering the fact that, the area is very close to the sea, the tendency of the wind blowing some of the fire particles to nearby "shacks" is very high.

3.3.4 Road Infrastructure

A close inspection of Ashaiman settlement specifically Tulaku Township illustrates that road infrastructure is almost non-existent. The entire community has only one access road albeit without tarmac (see Plate 3.5). Suitable pathways linking settlements to aid movement happen to

be deficient to the extent that one can easily enter someone's dwelling without his or her notice. It is evident that vehicles are unable to access any of the houses within the settlement. A careful observation reveals that, the type of roads available was always inaccessible for motor vehicles and fire engines, and contributed heavily to the loss of lives and property during fire events. In addition, commercial trading has also become a burden for residents because of poor layout of roads to facilitate trading.

Plate 3.5 A Picture of Ashaiman Depicting the Only Accessible Road within the Entire Tulaku Community



Source: Field Survey, 2012

One question was aimed at finding out how far the access point of fire engines to respondent's houses was. Table 3.2 indicates that 61.7% said the fire engines could not access the houses, because of the poor road structure, again because of the crowded/high density nature of the settlements with little space in between. The study concluded that vehicles to access the houses

might be one of the other reasons why in fire incidences many of the affected lost their entire belongings. A few 38.3% of the respondents said the fire engines could access their houses as most of these respondents were on the main road.

Table 3.2 Accessibility of Houses by Fire Tenders

Fire Vehicle Access	Frequency	Percentage
Yes	66	38.3%
No	106	61.7%
Total	172	100.00%

Source: Field Survey, 2012

3.3.5 Electricity Provision

The Electricity Company of Ghana (ECG) is responsible for the provision of electricity formally to informal settlements which exist within the Ashaiman Municipality. According to ECG, before one gets connected to electricity, one has to present the site plan or any legal title to the land before getting connected to the national grid. However, because the ECG does not recognize these settlements as formal, residents have resorted to illegal mode of electricity connections within their neighbourhood by hooking wires to electricity poles to connect electricity to their dwellings. This illegal means of connection has heightened the risk of fire in these communities. According to the ECG, some of the key challenges that they encounter in the distribution of power to such communities has been attributed to the high density nature or crowded nature of the settlements which makes it difficult connecting power to dwellings.

In an effort to reduce the incessant fire outbreaks in the community, the company was trying to upgrade its network distribution and also embark on changing all nine meter poles to ten meter poles. This is because the nine meter poles appears to be short and residents find it unproblematic

climbing to connect electricity to their dwellings. However, according to an interview with the ECG official, they have instituted some mechanisms to check the illegal connections within the community; one of which consist of a law control team which monitor these communities to check illegal connections and secondly other residents also volunteer in providing information about some residents who flout the law by resorting to illegal electricity connection.

3.4 Summary

This chapter has examined the overall infrastructural services provided within the Ashaiman Municipality. Specifically, it has looked at the issue of electricity, water supply, solid waste disposal, sanitation and drainage and the road infrastructure as exist within the two research localities. However, the supply of water has not been regular considering the high demand for it. According to officials, they are now embarking on water rationing within some communities in the Municipality. These developments have therefore resulted in some irregularities in water supply. In spite of these irregularities some residents have managed to get water reservoirs to cope with times of water shortage.

This chapter has also addressed the issue of illegal dumping sites as one of the major environmental problems leading to resident's risk accumulation. It has been established that, the burning of refuse around shack settlements increases the resident's vulnerability to fire. Considering the fact that these settlements are closer to the sea, the tendency of the wind blowing some fire particles to these wooden structures is very high. It has also been established that the issue of illegal electricity connection of what has become a regular norm for residents in the communities contributes to resident's vulnerability. Due to the fact that the Electricity Company of Ghana (ECG) are unable to provide services to residents who fail to provide any site plan or

legal permit to his or her residence. This development has increased the risk of fire as residents haphazardly connect electricity to their dwellings illegally.

Again, this chapter has also brought to the fore the issue of fire hydrants which aid in fire fighting. It has been established that the Ghana Water Company limited (GWCL) is responsible for the provision of fire hydrants in the community. Eleven fire hydrants have therefore been discovered, however it appears these hydrants were all positioned within the formal settlements and none was in existence within the informal settlements like Tulaku and Taboo communities and this development heightens the risk of fire with the study area. Again, it was also discovered that the level of accessibility of these fire hydrants also continues to pose a challenge for the Fire Service in fire fighting operations.

Having looked at the contextual arguments on housing and service delivery and its relation to fire vulnerability among households in Ashaiman, the next chapter of this thesis will explore some vulnerabilities by examining the relationship between socioeconomic factors defined by Jennings and fire incidence as well as some of the factors which have contributed to resident's vulnerability in the study areas.

CHAPTER FOUR

EXPLORING THE VULNERABILITIES OF ASHAIMAN TO FIRE INCIDENCES

4.1 Introduction

This chapter provides an analysis of the empirical data collected from the household survey carried out within the communities between April 2010 to November 2011 in Ashaiman. In order to address each of the specific objectives of the study, the results have been captured under different headings. The first section discusses the demographic characteristics of the sampled households in order to contextualize the study. The second section examines the severity of fire incidence within the community by looking at the vulnerable groups within the community, while the subsequent section highlights some of the factors contributing to making the settlement vulnerable to fire risks.

4.2 The Demographic Characteristics of Respondents

The household survey was conducted to capture the demographic profile of Ashaiman. It also provided a snapshot of the socio-economic characteristics of respondents such as education, income, marital status, age, gender and household size which play a vital role in explaining some of the causes of fire at the household level (see Jennings, 1996). According to the 2000 Population and Housing Census, Ashaiman had a population of 150,312 with a 2010 projection of 190,972 though most key stakeholders contend that, the area has long surpassed the said projection because of the rate at which the area is developing. Indeed, during the fieldwork, an elderly resident of the area (Taboo) jokingly remarked that, “every tribe in Ghana has a representation in our area (Ashaiman)”. During the study a total of 200 households were surveyed but only 172 questions were properly answered and could be used for the analysis.

This gave a response of 86%. The gender distribution of the sample is presented in Table 4.1. The data shows that about 62% of the total respondents were female. Several reasons can explain the high women representation in the sample. In the first place, most of the women are employed in the informal sector which is mainly home-based and therefore they remain perpetually at home while the men “hassle” at the nearby harbour for subsistence (survival). In recent years too, the dominance of female in-migration has also been well captured (Butterworth and Chance, 1981; Bukh, 1979; Lastarria-Cornhiel, 1995). Nyakundi et al. (2010) re-echoed this phenomenon by stressing that men are mostly engaged in outdoor work, unlike women who normally engage in Home-Based Economic (HBE) activities.

Table 4.1 Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	66	38.4
Female	106	61.6
Total	172	100.0

Source: Field Survey, 2012

The survey primarily targeted heads of household. However, in the absence of the household heads, any elderly person available and willing to provide answers to the questionnaire was interviewed. Table 4.2 presents the results of the survey. As can be seen from the table, the survey captures a cross-section of residents within the community and this provides a fair basis to draw conclusions. The results range from 40% being household heads to about 16% representation (relatives) of the household heads.

Table 4.2 Respondent Position in a Household

Position	Frequency	Percentage
Head of Household	69	40.1
Spouse	38	22.1
Relative	28	16.3
Tenant	37	21.5
Total	172	100.0

Source: Field Survey, 2012

The results further shows that, 66.9% of the respondents were married with about 27.3% being single parent households and 5.8% being either divorced, separated and widowed (see Table 4.3).

In assessing a household vulnerability level, marital status is taken into consideration because of the likelihood of creating higher household size. This coupled with the fact that parental control in informal communities is least admirable, gives room for concerns. Indeed Jennings (1996), demonstrates how single parent households increase fire risk within a household, as children for example normally do not attract the maximum care necessary and therefore their activities normally can potentially trigger fire within the home.

Table 4.3 Marital Status of Respondents

Marital Status	Frequency	Percentage
Single	47	27.3
Married	115	66.9
Divorced	5	2.9
Separated	29	16.9
Widowed	3	1.7
Total	172	100.0

Source: Field Survey, 2012

Table 4.4 illustrates the age distribution of the respondents. The results show that (about 37%) majority of the respondents are within the age bracket of 18-30, with only 11% being above 50 years. The findings show the population of the community to be very youthful in nature. This is

not surprising as the settlement is home to mainly unemployed youth who have thronged the capital to seek greener pastures. As already noted, as at 1960, the area had only a few people living in the settlement.

Table 4.4 Age Distribution of Respondents

Age	Frequency	Percentage
18-30	64	37.2
31-40	58	33.7
41-50	31	18.0
51-60	15	8.7
Above 60	4	2.3
Total	172	100.0

Source: Field Survey, 2012

The religious diversity of Ashaiman residents is best represented by the various religious groups in the area. Table 4.5 presents the religious background of respondents with about 74% being Christians with less than 2% having no religious affiliation. The “religiosity” of Ashaiman is quite striking with every available space turned into a place of worship. This could partly be explained due to the fact that most people appear vulnerable and are in dire need to ‘get rich quick’.

Table 4.5 Religious Affiliation of Respondents

Religion	Frequency	Percentage
Christian	128	74.4
Islam	42	24.4
No religion	2	1.2
Total	72	100.0

Source: Field Survey, 2012

Ashaiman’s heterogeneity is further highlighted by Table 4.6. Most of these multi-ethnic groups have moved from their various rural areas to Accra and Tema in search of job opportunities (Awumbilla and Agyei-Mensah, 2009). From the table, the Ewe Community which according to

oral tradition was the first to settle in the area had the highest representation of 43%. This is followed by the Ga's and those of the northern extraction who followed the Ga community with almost equal representation of 24% and 23% respectively. The Akan group, who supposedly joined the fray at a later date, had just about 10% representation.

Table 4.6 Ethnic Background of Respondents

Ethnicity	Frequency	Percentage
Akan	17	9.9
Ewe	74	43.0
GA/Ga-Adangbe	42	24.4
Northern	39	22.7
Total	172	100.0

Source: Field Survey, 2012

Education plays a vital role in smooth and efficient running of every community. Low level of education is associated with low literacy skills which may significantly limit the ability to understand and respond to fire safety messages (Duncanson et al., 2000). Again, low education may also inhibit the ability to read instruction manuals and warning labels for cooking and heating devices, thereby increasing their risk to fire (Fahy and Norton, 1989). As is clearly evident in Table 4.7, 25.6% respondents had no formal education and majority of the respondents (55.8%) had completed primary and JSS/JHS education. It was therefore not surprising that, majority of the respondents are in the informal sector. This result is in agreement with a study by Mills-Tetteh (2008) which shows that informal sector activities such as street trading, hawking and carrying load for cash becomes the available option left for these untrained people.

Table 4.7 Educational Background of Respondents

Educational Background	Frequency	Percentage
No formal education	44	25.6
Primary/JSS/JHS	96	55.8
SSS/SHS/VOC/TECH	32	18.6
Total	172	100.0

Source: Field Survey, 2012

Generally, the composition and size of household play a significant role in analyzing the risk level. Indeed, Jennings (1996) shows the relationship between fire incidences and overcrowding. He argues that overcrowding, which refers to a situation where we have more than one person per room in a dwelling unit, is more of a problem in low-income communities. He shows that, the more people there are in a household, the greater the wear and tear on the dwelling unit's mechanical system and perhaps the more difficult to get everyone out of a burning unit in case of any fire outbreak (Jennings, 1996). As is clearly evident from Table 4.8, Ashaiman is an overpopulated area with 43% respondents having a household size ranging from 1-5, 27% with 6-10 and about 29% has more than 10 persons per household. From these illustrations, considering the various groupings it is clear that the various households surveyed were highly crowded which hence increasing the resident's vulnerability. The overcrowded nature of the area becomes glaring against the fact that most of the "rooms" in the area, housing such big household sizes are less than 10x10 feet. More importantly, most of them are made of wood, often makeshift building materials.

Table 4.8 Household Composition and Size

Household size	Frequency	Percentage
1-5	74	43.0
6-10	48	27.0
11-15	38	22.1
Above 15	12	7.0
Total	172	100.0

Source: Field Survey, 2012

Attempts were also made to ascertain the relationship between respondents' demographic characteristics and their vulnerability to fire incidences. Table 4.9 presents the results of the cross tabulation of variables used in the study and their respective chi-square values. The results show that most of the variables used in the study did not have significant relationship with fire incidence. Only one's marital status was quite significant in determining a respondent's vulnerability level. In other words, the variation among the marital status categories with regards to fire incidence in the community is not due to chance. With a significant level of 0.08, it can be inferred that there is a likelihood of 90% that married couples in the research localities are more likely to experience fire incidence. This is not surprising as such households are likely to have a shack of their own to "rest" in the evening after a day's work. Most unmarried respondents are itinerant workers who are normally "perchers" who virtually have nothing to lose once they leave for work. Indeed, they can be described as "working briefcases" who move out and enter the community with all their belongings.

Table 4.9: Cross Tabulation Matrix of Respondent's Demographic Characteristics and Vulnerability to Fire Incidence

Item	Have you ever experience fire outbreak in your house		Chi-square value	Significance
	Yes	No		
Household size				
1 – 5	16 (22%)	58 (78%)	3.46	0.33
6 – 10	11 (23%)	37 (77%)		
Above 10	7 (18%)	43 (86%)		
Age				
18-30	11 (17%)	53 (83%)	4.88	0.30
31-40	10 (17%)	48 (83%)		
41-50	9 (29%)	22 (71%)		
Above 50	4 (21%)	15 (79%)		
Marital status				
Single	8 (14%)	49 (86%)	8.39	0.08
Married	26 (23%)	89 (77%)		
Education				
No formal education	10 (23%)	34 (77%)	1.38	0.50
Primary/JHS/JSS	16 (17%)	80 (83%)		
SSS/SHS/Voc/Tech	8 (25%)	24 (75%)		
Gender				
Male	10 (15%)	56 (85%)	1.5	0.23
Female	24 (23%)	82 (77%)		

Source: Field Survey, 2012

4.3 Assessing the Severity of Fire Incidences

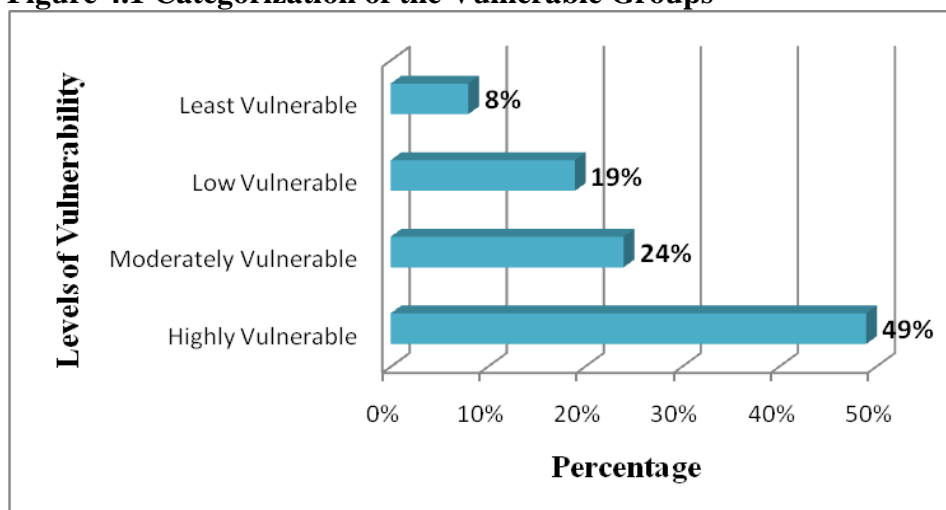
Although Ashaiman Municipality exhibits greater vulnerability to fire incidences, the level of vulnerability varies from place to place. Various reasons account for this, ranging from different economic activities to difference in building materials used in the construction of the community.

The study therefore employed the cluster analysis technique to identify the various levels of vulnerability within the community. To achieve this objective, the study through the use of

selected variables, identified four main clusters; namely highly vulnerable, moderately vulnerable, low vulnerability and finally the least vulnerable. The variables used in clustering range from the building materials used in the construction (wood and corrugated iron sheets), the energy source of lighting (candle, kerosene lamp and electricity connection), energy source of fuel for cooking (firewood, gas, charcoal, paraffin stove), and finally personal behavioral factors (smoking and alcohol) were used in the categorization of the vulnerable groups. Thus, the more a household deviates from the normal accepted standard of building, the more vulnerable the household.

Those households living in houses made of wood were deemed more vulnerable than those in brick houses. In the same way, those using candle and kerosene as a source of energy were deemed vulnerable. It was also the considered view that those respondents who drink and smoke cigarettes were more prone to fire than those who do not indulge in these behavioral traits. Figure 4.1 presents the results of the various clusters. The results shows that 49% of respondents belong to the highly vulnerable group, 24% belong to the moderately vulnerable, with only 8% is in the least vulnerable category. Clearly, the result confirms earlier thinking that the community in general is highly susceptible to fire.

Figure 4.1 Categorization of the Vulnerable Groups

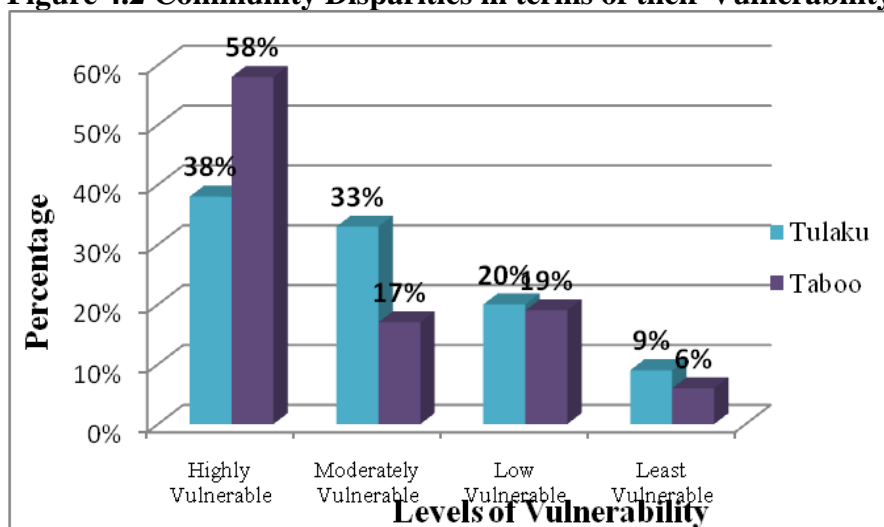


Source: Field Survey, 2012

The study further undertook a comparative analysis of the two research locations. The results are presented in Figure 4.2 below. From Figure 4.2, it can be seen that Taboo Community is more vulnerable than Tulaku. The results shows that as much as 58% of respondents belong to the highly vulnerable group whilst in Tulaku only 38% of the sample population falls within that category. The results are not particularly surprising. As already noted, the name of the community ‘TABOO’ emanates from the material used in the construction of buildings in the area. ‘Taboo’ is an ‘AKAN’ acronym meaning ‘Wooden Planks’, thus almost all buildings in that community are made of that material, making the area very vulnerable to fire.

Tulaku on the other hand is a beneficiary of slum upgrading spearheaded by UN-Habitat Slum Upgrading Fund. Accordingly, part of the area has been face-lifted with three storey apartments with some residents contributing to the project. It was revealed during the fieldwork that even though most residents appreciate the project, the initial deposit of Ghc 75.00 is beyond their reach. Additionally, most also opine that they cannot ply their current trade in the sort of apartment being provided.

Figure 4.2 Community Disparities in terms of their Vulnerability



Source: Field Survey, 2012

Subsequently, a fire risk zonation mapping process took place in Ashaiman specifically Tulaku and Taboo. This activity was done with the support of some NADMO officials and technical assistants from the Fire Service. The Ashaiman Fire Risk Zonation Map was produced based on 1:4000 scale. This was made manifest by integrating five (5) layers of information (hazard attributes) namely the (building material type, building density, accessibility, slum upgrading, fire station) which were collected using the GPS during the field survey. The zonation was prepared through the identification of areas having relatively uniform characteristics from the fire hazard attribute. Attempts were further made to highlight the high risk/ vulnerable areas and low risk areas within two research localities. Taking a cursory look at Figure 4.3, Tulaku community shows portions of the township (Amui Djor Housing Project) as low risk areas, simply because of the slum upgrading it has witnessed by the UN-Habitat. This intervention has reduced immensely the risk faced by informal settlers/residents in and around the facility in terms sanitation, infrastructure and disasters including the incessant fire outbreaks.

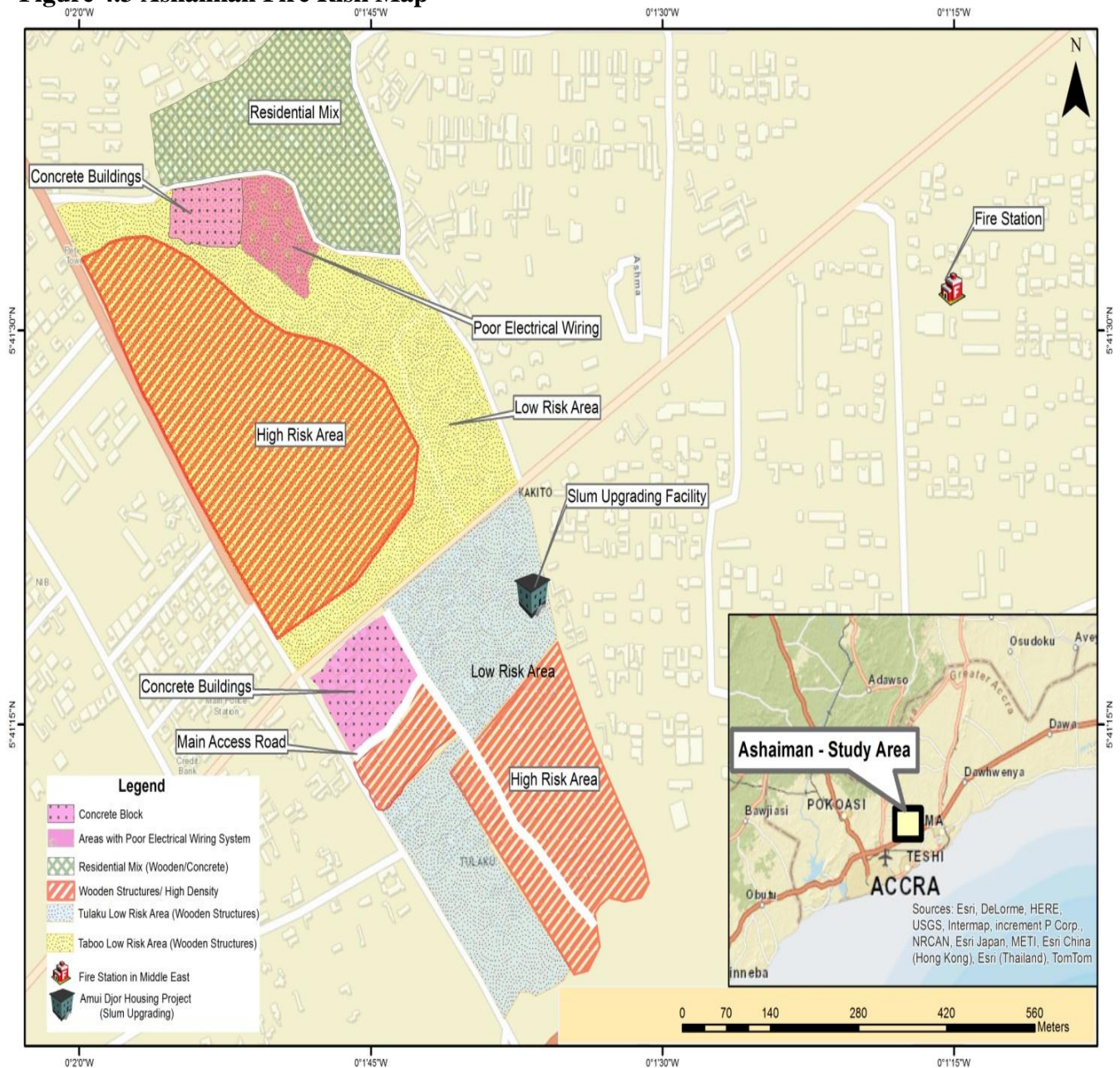
Again, some portions of the community was marked as “high risk” areas, because of the presence of flammable building materials (wooden structures, corrugated iron sheets) which appears the dominant form of habitation for residents in the community. The presence of these flammable materials in addition to the high density nature of the settlements (crowded conditions) has accounted immensely to resident’s vulnerability and thereby making the community prone to fire outbreaks.

Additionally, the road networks within the Tulaku Township were also marked. As depicted from Figure 4.3, there appears to be one main access road within the township (see Plate 3.5). Roads linking settlements appears to be deficient. This phenomenon has contributed to the resident’s vulnerability. For instance in case of any fire outbreak, the possibility of the fire brigade accessing

settlements with their fire tenders will always be a hindrance considering the clustered nature of settlements.

Similarly, some sections of the other research locality (Taboo) were also marked as “high risk” areas on the account of the dominance of wooden structures, crowded settlements in addition to the poor electrical illegal connections, thereby making the community more vulnerable as compared to its counterpart community (Tulaku), which has witnessed some upgrading in some sections of the community.

The location of the Fire Station within Ashaiman was also marked. This was done to bring to light the distance of the station to the informal communities specifically Tulaku and Taboo considering their vulnerable nature.

Figure 4.3 Ashaiman Fire Risk Map

4.4 Building Material for Construction

During the fieldwork, conscious efforts were made to ascertain the nature of building material used in the construction of residential abodes within the neighbourhoods. The study identified 3 main building materials used for construction in the area. These are wooden planks, cement

blocks and corrugated iron sheets. The results show the predominance of the use of wooden planks in construction which from the fieldwork, can be estimated as 80% of respondents residential structures. Plates 4.1 and 4.2 depict samples of typical structures constructed with wooden planks and corrugated iron sheets in the study area. Only 12% of the total respondents use cement blocks in their construction, and perhaps explains why the area is very prone to fire outbreaks.

Plate 4.1 A Typical Informal Dwelling Constructed from Wooden Planks at ‘Taboo’ Area

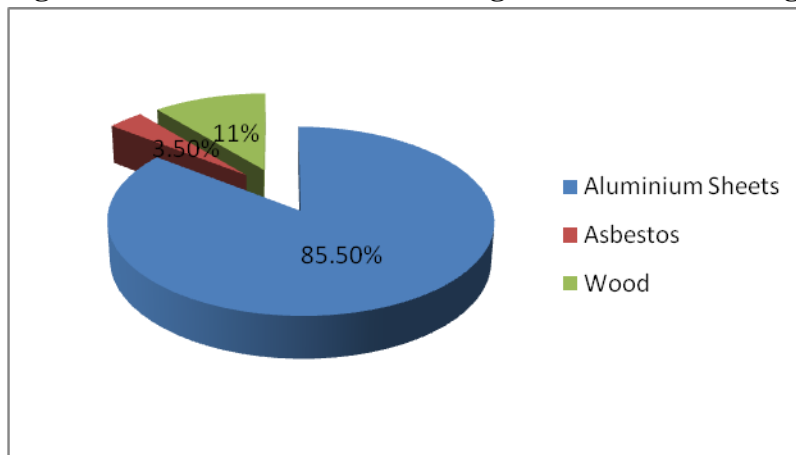


Source: Field Survey, 2012

Plate 4.2 Informal Dwellings Built with Corrugated Iron Sheets

Source: Field Survey, 2012

In terms of materials used for roofing the building in the community, the fieldwork identified three (3) main types. These are aluminum roofing sheets, asbestos and wood. Figure 4.4 shows that 85.5% of the respondents use aluminium roofing sheets which on the surface of it, conform to the normal roofing practices in the country. It was however realized that most of these roofing sheets (corrugated iron sheets) are normally very old ones (see Plate 4.3), which possibly could be rejected by their original owners. The study further revealed that about 13% of the respondents use asbestos in roofing even though its use in developed countries has been banned due to its health implication. Other material used for roofing but on a very limited scale include wood and roofing tiles which jointly recorded less than one percent of the respondents.

Figure 4.4 Materials used in Roofing of Informal Dwellings

Source: Field Survey, 2012

Plate 4.3 The Use of Corrugated Aluminium Sheets in Roofing of Informal Dwellings

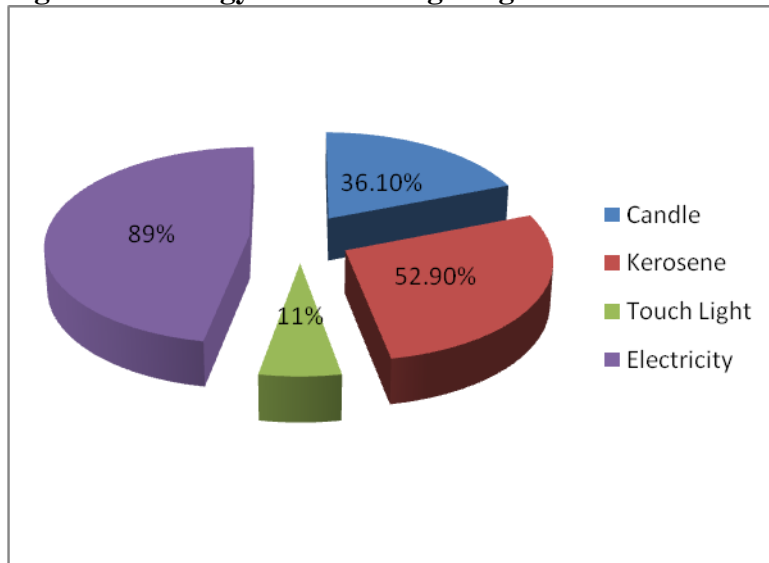
Source: Field Survey, 2012

4.5 Energy Sources

The study identified 4 main sources of lighting within the neighbourhood, the use of electricity, candle, kerosene and battery powered torch light. Figure 4.5 show that 89% of the total respondents use electricity, which ordinarily should have been a welcome development. The study also recorded the use of less desirable (more vulnerable) energy source including kerosene which

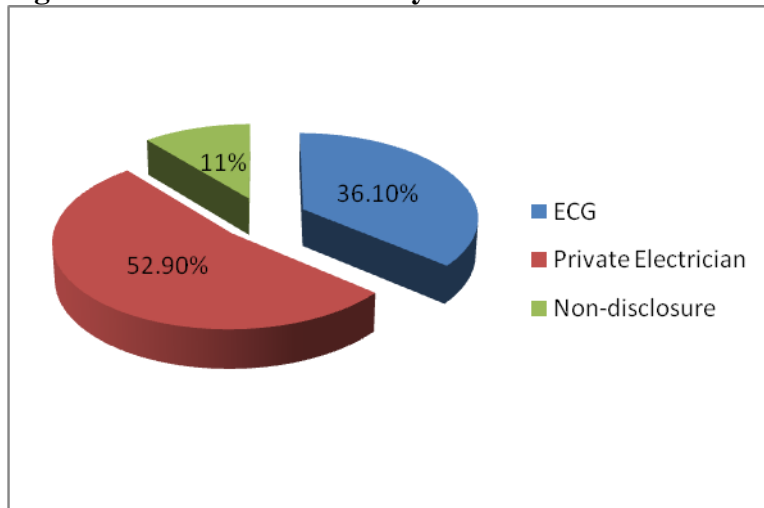
recorded 4% and candle as well as torch light which accounted for 3.5 each. The results tend to create a dilemma, that is, even though most residents use appropriate sources of energy in lighting their residence, the area remains prone to fire. This therefore occasioned an in-depth interrogation of the energy source.

Figure 4.5 Energy Source of Lighting



Source: Field Survey, 2012

During the fieldwork, respondents were asked to indicate how they were connected to the electricity, in case that is their source of energy. The result is presented in Figure 4.6. From the table, only 36% of the respondents had their electricity through the approved channel - the Electricity Company of Ghana (ECG). This is not surprising as already indicated in Chapter 3 that ECG does not normally provide services to those structures which do not possess building permits. This has made the employment of private electricians a normal practice in such settlements. In the study as many as 52.9% of the respondents use such a channel.

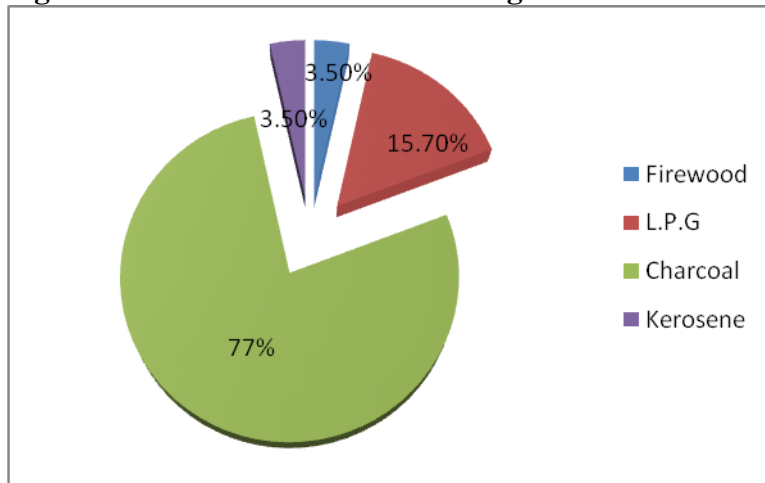
Figure 4.6 Modes of Electricity Connections

Source: Field Survey, 2012

From all indications, the 11% of respondents who failed to disclose the channel may fall within this category. The result is in accordance with the study conducted by MacGregor et al, (2005), who showed that illegal electricity connections has been a major problem for the safety of “Imizamo Yethu” Community in South Africa. The field survey revealed that, people tapping into electricity supply were causing mesh-like networks and many open wire connections (see Plate 4.4) which are possible triggers of fire. Apart from this development, one is also not very sure about the quality of material and the competence of those who undertake these “illegal operations”. Additionally, most of such operations, according to key informants are carried under the cover of darkness.

Plate 4.4 Scenes of Suspected Illegal Electricity Connections**Source: Field Survey, 2012****Source: Field Survey, 2012**

Figure 4.7 captures the source of fuel used for cooking among the households in the surveyed communities. In all, 4 main sources of fuel were identified (the use of gas, firewood, charcoal and kerosene). The data show that 77% of the respondents use charcoal in cooking while about 16% use liquid petroleum gas. Only 3.5% each of the respondents use either firewood or kerosene powered stove. The implications for respiratory health and environmental degradation can be devastating (Alder, 1995 7: 85). This is particularly so in a community where the average household size is about 7 and most of the buildings are made of wood (see Plate 4.5).

Figure 4.7 Source of Fuel for Cooking

Source: Field Survey, 2012

Plate 4.5 Depicts One of the Crowded Home-Based Economic Activities which employ Charcoal as Source of Energy



Source: Field Survey, 2012



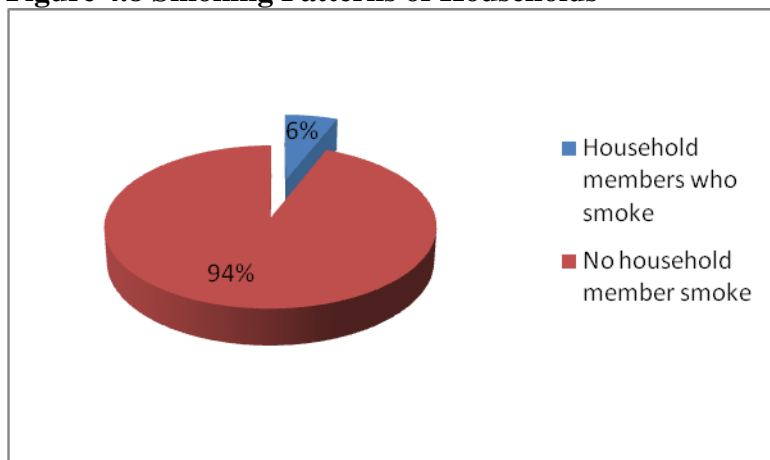
Source: Field Survey, 2012

4.6 Behavior/Attitude of Respondents

Studies elsewhere have revealed that careless smoking is one of the main causes of fire incidences (deaths and injuries). In a survey conducted by the US Fire Administration, even though smoking accounted for 7% of all residential fires in 1990, it was accountable for 26% of all fire deaths and 15% of all fire injuries (United States Fire Administration, 1993). Other studies have also shown

that cigarette smoking is inversely related to income, so low income households are arguably at greater risk from fires caused by careless smoking (Jennings, 1996). Incidentally only 6% of respondents in the current study indicated that they smoke (see Figure 4.8). However, this claim by the respondents was found to be in contradiction during personal observations during the fieldwork. Smoking among the youth was well noted and pieces of cigarette butts were observed throughout the community.

Figure 4.8 Smoking Patterns of Households



Source: Field Survey, 2012

Another important social behaviour interrogated during the fieldwork is respondents' daily attitude since alcohol abuse and drunkenness can also trigger fire incidence. According to key informants, many fires have started when those under the influence of alcohol attempt to prepare food. Most often, they fall asleep leaving the food unattended while in some cases, they light candles leaving them unattended which eventually catches fire (MacGregor, 2005). Only 31% of the respondents claim to enjoy alcohol, even though it is possible many have been economical with the truth.

4.7 Determinant of Household Fire Vulnerability

Table 4.10 presents a cross tabulation matrix (with a chi-square test) using household characteristics to assess the level of a community's vulnerability to fire incidence. As already stated in the methodology section, the chi-squared test enables us to assess the significance of differences between subsets of data or "populations". The chi-squared value is a measure of the degree of deviation between the observed results and the results that would be expected if the populations were statistically equivalent. If populations are statistically the same (the null hypothesis), any deviation between the groups is the result of chance alone. If this is true, then whatever characteristic defines them as separate populations (eg. gender) has no impact on the result being measured. The larger the chi squared value, the larger the deviation between the expected and observed results and the greater the difference between the two populations. By inference, the larger the chi-squared value, the larger the impact of the defining characteristic on the result being measured.

The variables used in Jennings model were adopted for this study and the results show that only three of them were statistically significant in explaining a community's level of vulnerability to fire incidence. From the results, it is evident that, there is a positive relationship between the community in which one resides and one's level of vulnerability to the incidence of fire. A test conducted gives a chi-square value of 8.698 at a 99% level of significance. By inference, there is a high systematic relationship between the community one lives and one's level of vulnerability to the incidence of fire. Many reasons could account for this pattern. First, as already alluded to, Taboo community, demonstrated in the earlier chapters, showed the dominance of the use of wooden planks in the construction of informal dwelling places. Additionally, the other

community, Tulaku, though not immune to fire incidence, have witnessed some slum upgrading and therefore less vulnerable.

The results also show a positive relationship between the type of material used in roofing and incidence of fire. This is confirmed in table 4.10 which reveals a chi-square value of 24.432% at 99% level of significance. During the fieldwork, it was observed that most respondents use very old corrugated aluminium roofing sheets in the construction of their apartments. It has been suggested that these corrugated aluminium sheets are not only harmful to the residence but very susceptible to fire incidences.

The results also show a significant relationship between the use of private (quack) contractor in connecting electricity and the level of vulnerability to fire incidence. A test conducted in table 4.10 gives a chi-square value of 19.820% at 99% level of significance. Thus, most of the respondents who employed the services of private contractors to connect electricity to their homes tend to be highly vulnerable to fire outbreaks. Among the reasons for this development is the likelihood of illegality and the fact that their activities and quality of materials used in such connections can be hardly ascertained.

It is important to reiterate that though Jennings model remains a powerful tool in explaining variations in fire rates, not all the variable in the model were statistically significant in the study area.

Table 4.10: Cross Tabulation Matrix of Household Characteristics and Level of Fire Vulnerability

Variable	Highly Vulnerable	Moderately Vulnerable	Low Vulnerable	Least Vulnerable	Chi-Square Value	Significance
Name of Community						
Tulaku	29	25	15	7	8.694	0.034**
Taboo	56	16	18	6		
Material used in Building						
Wooden Shacks	62	36	27	12	7.625	0.267
Corrugated Aluminum	4	0	0	0		
Cement	19	5	6	1		
Source of Lighting						
Candle	5	0	1	0	5.082	0.827
Kerosene	3	2	1	1		
Electricity	73	38	30	12		
Torch light	4	1	1	0		
Material used in Roofing						
Aluminum Sheets	71	39	26	11	24.432	0.004***
Asbestos	13	2	7	0		
Wood	1	0	0	1		
Roofing Tiles	0	0	0	1		
Source of fuel for Cooking						
Firewood	4	0	1	1	4.928	0.840
Gas	15	7	4	1		
Charcoal	62	33	27	11		
Kerosene/Paraffin stoves	4	1	1	0		
Who connected Electricity to your Home						
ECG	26	9	17	10	19.820	0.003***
Private Individual	47	29	13	2		
None	12	3	3	1		
Do you or any member of your Household Smoke						
Yes	7	2	1	1	1.299	0.729
No	78	39	32	12		
Do you or any member of your Household drink Alcohol						
Yes	26	14	10	3	0.585	0.900
No	59	27	23	10		

NB, ** and *** denotes 5% and 1% significant levels respectively

Source: Field Survey, 2012

4.8 The Impact of Fire Outbreaks in Ashaiman

Even though the study did not assess the impact of fire outbreaks in the research localities, interactions with residents and key stakeholders reveal that the incessant fire outbreaks is causing serious threat to the community's fragile economy (Oladokun and Ishola, 2010). The findings show that series of fire events have resulted in huge loss of lives and properties worth several billions of Ghana cedis (NEMA, 2006). The socio-economic impact of these fires are aggravated by the fact that most of these victims are mostly small scale traders (petty traders, hawkers and artisans) with relatively low income. They therefore find it difficult to cope when such disasters occur (Oladokun and Ishola, 2010). For instance in the December 2011, a fire outbreak in Tulaku led to a complete destruction of 17 wooden structures, rendering over hundreds of residents virtually homeless (see Plate 4.6). People lose their houses, clothing, and money and therefore have to seek refuge with friends and relatives. Others too have resorted to returning to their hometown. During one of the focus group discussion, with some of the fire victims who were traumatized after the fire outbreak: One victim noted:

I was not around when the fire started, when I arrived everything has got burnt. It was left with small fires and they were still applying water on it. In fact everything got burnt and I did not pick any item. I rent mattresses, canopies, plastic chairs; everything got burnt. My children's certificate, jewelry; everything got burnt (Fire Victim 1-Personal Interview, April 16, 2012).

Another victim also noted:

I was bathing at the back of the building when someone alerted me that my house was burning; so when I came out I saw the fire all over and started to run away; all my belongings got burnt (Fire Victim 2-Personal Interview, April 16, 2012).

During the interactions with the residents, most participants unanimously noted that the socio-economic impact of the frequent fire outbreaks within the settlement is threatening. Indeed it was realized that many residents live in constant fear and uncertainty, wondering whether their places of abode would be the next “candidate” for the devastating impact of the incessant fires as exemplified in plate 4.6.

Plate 4.6 Aftermath of Fire Outbreak in Tulaku which Rendered Hundreds of People Homeless



Source: Field Survey, 2012

4.9 Summary

In this chapter, attempts have been made to examine the socio-economic characteristics of respondents because of their possible relationship to fire incidence at the neighbourhood, household as well as the individual level. Among the variables discussed included issues of gender, marital status, age, education and household size as they have some relationship with causes of fire within the community. Using the cluster analysis technique, the community was sub-divided into four main clusters namely the highly vulnerable, moderately vulnerable, low vulnerable and the least vulnerable group.

Generally, the study identifies that only 36% of the respondents get genuine electricity although every household is powered by electricity. Another important observation is the fact that 77% of the respondents, most of who stay in wooden structure, use charcoal in cooking. It was also recorded that the area generally has exceptionally high household size (averagely 7 per household) against the national average of 5.1. These conditions tend to contribute to high incidence of fire with grave consequences for the residents and the society at large. The study explored the level of significance of some of the variables and their relation to fire incidence using the Chi- square. The finding show that not all the explanatory variables used by Jennings have significant values in influencing household's vulnerability to fire incidence and that the most significant variables were the type of material used for roofing, the use of private (quack) contractors in connecting electricity and finally the community in which one resides.

The subsequent chapter will examine some of the institutional arrangements put in place to abate the incidences of fire outbreaks in the study area as well as some of the coping strategies residents have adopted in the absence of state sponsored strategies.

CHAPTER FIVE

COPING WITH FIRE INCIDENCE AT ASHAIMAN

5.1 Introduction

This chapter explores the various roles played by policy makers and the community in addressing issues of fire in Ashaiman. The study interrogates how the community copes with the incessant fire incidences. Additionally, it aims to bring to the fore the various institutional arrangements for handling the incidence of fire in the community.

5.2 The Role and Coping Strategies of the Community

As far as fires in informal settlements are concerned, the community has a major role to play in terms of mobilizing themselves to save life and property, educating one another against perpetrating acts that can trigger fires or providing social support in times of fires. Indeed over the past years the lack of ownership of risk factors has contributed immensely in increasing resident's vulnerability level. Considering the vulnerable nature of these communities it appears no form of mechanism has been instituted by the community to reduce their risk in terms of fire. The heterogeneous nature of the area coupled with economic hardships appears to be killing the community spirit, making the principle of "each one for himself" quite apparent. A study conducted in "Imizamo Yethu" in South Africa revealed that the community has in place an authoritative structure in the form of street committees (MacGregor et al., 2005). These institutions acted as channels or medium through which the community was managing its risk. For instance it was however made known that many fires are started when people go on a drinking spree. What the street committee does is to monitor such behavioural tendencies that can trigger fire. Recalcitrant offenders are thrown out of the community and their dwelling is torn down (MacGregor et al., 2005).

So what is the real situation in Ashaiman? Without any form of mechanism in place to address some of these issues as existed in “Imizamo Yethu”, communities will continue to exist in the midst of incessant fire outbreaks. Moreover, at the household level, residents do not seem to understand and appreciate the entire risk and vulnerabilities which have surrounded their day to day activities. During the focus group discussions, it was admitted by participants that although there is a plethora of ethnic associations, these networks have not been involved in such mitigation activities.

Community members have adapted various strategies to minimize their vulnerability both in the event of fire and fire in the community. According to Kasperson (2001:2) vulnerable people chose a wide variety of options to increase their adaptability and to minimize their risk in times of stress and shock. During the focus group discussion, the participants unanimously identified certain activities they partake in within the community in their bid to forestall or prevent fire incidences. It was for example revealed that, most of the community associations and religious bodies meet every last Sunday of the month during which they embark on public education including how to prevent community fires. They also educate their members on the use of different energy sources. It was also revealed that, some community members can send their children to members of the association for “their care” while they are out of the community.

During the field exercise, residents expressed their dissatisfaction about the role of relevant stakeholders like the Fire Service and National Disaster Management Organization (NADMO) in the management of fire in the community. According to the residents, their response at the community has been very poor. They accused the organizations of waiting for the disaster to strike before embarking on any form of education at the community. In these circumstances,

residents have resorted to several coping mechanisms to facilitate their continuous stay in the community. A community leader remarked;

In this area, quite a significant number of coping mechanisms have been implemented to mitigate fire incidence and these include giving every household a bucket for throwing water or sand onto fires, whistles for alerting settlement members to the fact that there was a fire, and posters to remind people what to do in the event of a fire.

Another strategy being implemented by residents in Tulaku is to knock down shacks adjacent blazing fire in case of an outbreak to create a fire break and prevent the fire from spreading to other settlements. Plate 5.1 depicts one such incident observed during the fieldwork when volunteers busily and swiftly created a fire break to prevent a blazing fire from extending to other parts of the community. This according to residents is one of the useful mechanisms which help residents considering the high flammability of residential dwellings.

Plate 5.1 Residents Knocking down Structures to Create Fire Breaks



Source: Field Survey, 2012

Again, in the event of any fire outbreaks the use of water and sand has also been useful. This is done to reduce the impact of the fire outbreak before the fire brigade comes in. But residents expressed the lack of sustainability of this strategy in the midst of the high distortions in water supply in the community. The issue of managing the impact of disasters after a fire event also tends to be a pressing issue expressed by residents. Residents mostly resort to friends and families to sustain their livelihoods and other relief agencies for survival. For instance in the December 2011 fire outbreak at Tulaku, some victims were moved to families and friends while others decided to rebuild their structures using wooden planks and the burnt iron sheets (see Plates 5.2 and 5.3). The resorting to families and friends as a coping strategy also increases the vulnerability of those households in many ways; such as increasing the population density of the already highly populated settlement, thus increasing the chances of fire outbreaks.

**Plate 5.2 The Aftermath of the Fire Outbreak; in Tulaku-December 2011
Residents Collect Burnt Iron Sheets for Use in Reconstructing their Houses**



Source: Field Survey, 2012



Source: Field Survey, 2012

Plate 5.3 Residents Reconstruct their Burnt Houses



Source: Field Survey, 2012

Again, in the aftermath of any fire outbreak some residents also resort to aid and other relief services from both governmental and non-governmental organization. This is done because residents virtually lose all their properties and need some assistance from these organizations in order to make life worth living considering the low income status of these residents. For instance, during the fire outbreak in Tulaku (see Plate 5.2), residents received relief items from National Disaster Management Organization, including clothing, blankets, mats, soap, mosquito nets, mosquito coils, buckets, maize, beans and among others.

5.3 Evaluating the Current Institutional Arrangements

5.3.1 Official Institutions involved in Fire Risk Reduction

Risks and physical threats in informal settlements such as fire directly involve role-players from outside the immediate community (Du Toit, 2009). During the field survey, the various stakeholders involved in addressing the issue of informal settlement fires were identified to include the National Fire Service, National Disaster Management Organization (NADMO), and

other Non-Governmental Organizations. The Ghana Fire Service according to the L.I. 1724 of the Fire Precaution Regulation 2003 is responsible for the issuing of fire certificates for premises put to any of the following uses;

- i. Public residential accommodation.
- ii. For the purpose of entertainment, recreation or as a club.
- iii. As a place of work.
- iv. As an institution providing health treatment or care for infants, disabled or aged persons.
- v. For the purpose of teaching, training or research.
- vi. For a purpose which involves access to the premises by members of the public, whether on payment or not.

In view of this background, an owner or occupier of a premise within the categories specified in the above regulations shall apply to the Chief Fire Officer for a fire certificate within a twelve months period. Additionally, the regulation also made it clear that no owner or occupier of premises shall use the premises without meeting the requirement of the possession of a fire certificate. Having said this, any application for a fire certificate should contain in it, building plans of the premises and should indicate appropriately the nature of use of the premises.

It must however be added that in-depth interview conducted with some of the key informants within the community and even some public officials revealed that these codes are hardly followed. Among the reasons assigned for the non compliance includes the fact that the legislative instrument was recently passed (2003). Thus the National Fire Service itself is currently building the requisite framework to fully operationalize the law. Also, most residents are genuinely not aware of such regulations and that the Fire Service has generally been seen as an “Odumgya” organization, an ‘Akan’ word meaning fire extinguishing organization and not preventive one. It

was evident that even though the Ghana Fire Service is responsible for the management and prevention of undesired fires, the Service has failed to educate the public on fire prevention and safety measures. The Service is unable to embark on educational programmes for the people within the communities. In an interview with some residents, they alleged that the only sort of education they receive from the Service is at the very time a disaster strikes. That is where they will be propagating the “do’s and don’ts” in fire safety measures, and apart from that, no form of education whatsoever takes place in ordinary times. In an interview with the Acting Municipal fire officer, he refuted the allegations made describing them as an exaggeration. He however admitted some of the challenges that are hindering regular educational campaign, to include the problem of transportation and fire fighting logistics needed in fire prevention and safety campaigns. According to him “*the only vehicle we have is one fire tender which cannot be used in going round educating the public on fire safety measures*”. The comments of the officer was reinforced and buttressed by a news item carried by the Ghana News Agency in August 2009 (see Box 5.1).

Box 5.1 Ashaiman: GNFS Educates Community

The Ghana National Fire Service (GNFS) on Thursday entreated residents of Ashaiman to observe basic fire safety measures to help curb the outbreak of domestic fires in and around the Municipality. Divisional Officer III Jones Sarpong, who made the call during a fire safety education campaign at the Ashaiman Lebanon Taxi Rank, said the Service recorded a total of 83 domestic fires in 2008 and 40 for the first half of 2009. Mr. Sarpong called on the residents to stop deceiving themselves that their homes were immune to fire outbreaks, and be fire-cautious in all their activities. He mentioned some of the hazards as electrical gadgets, matches, gas cylinders, clothing, candles, mosquito coils and kerosene.

The Fire Safety Officer bemoaned the overloading of electrical sockets and extension boards, explaining that the act could lead to overheating, generation of sparks and fire outbreaks. Mr. Sarpong further stated that using an extension board with many holes did not necessarily mean the user should plug gadgets into all the holes at the same time. He, therefore, advised that the energy consuming capacity of gadgets must be checked and matched with the appropriate socket to prevent overheating. On the usage of Liquefied Petroleum Gas (LPG), he implored residents in the Municipality to place their cylinders outside the kitchen, and not near the gas cooker. He explained that since LPG is two and a half times heavier than oxygen, placing the cylinder in an enclosed area especially in the kitchen, could easily lead to fire outbreak if a leakage should occur on the cylinder, the tube or the regulator. “When a litre of LPG leaks, it expands 250 times, meaning being careless with it can lead to a disaster,” he emphasized. Mr. Sarpong cautioned parents against setting bad examples for their children, observing that instead of using an adaptor for an electrical gadget with two pins on the plug, they would use a wood or a metal to force it into a three-hole socket.

He advised that matches should be kept away from children, while lighted mosquito coils and candles must be placed in metal plates with water, instead of rubber plates or on tables. The Fire Safety Officer also urged the public to call the service on 192 when they observed any fire, adding that “no matter how small the fire, the service must be called before it escalates”. The education programme was carried out in Ga, Twi, Ewe and the Hausa languages, while placards were also carried by personnel of the service. Some of the placards read; “The fireman is a friend not an enemy”, “avoid overloading of electrical sockets”, and “avoid illegal electricity connection”.

Source: GNA/AMA, 2009

Another government institution with the mandate to “control” fire is the National Disaster Management Organization (NADMO). In the local realm, one of NADMO’s key roles lies in the regular assessment of vulnerability of communities and households. As an institution, they have the capacity to embark on regular monitoring exercise and take proactive precautionary measures before disaster strike. This is a constitutional mandate enshrined in Act 517 (1996), which established the organization. The results however show that, the education and regular assessment

of communities and households is very limited. Their role in educating the public on some of the triggers of fire is woefully inadequate. The effects of this are that people are doing illegal electricity connections, smoking and leaving cigarette butts around, using of candles and fuel indiscriminately. This has contributed to heightening resident's vulnerability to fire levels.

It appears very little attention has been paid by NADMO to communities in terms of minimizing the risk and impact of disasters like fire. They have rather focused much of their attention to flood related issues to the neglect of fire outbreak, apparently because this perennial incident normally attracts political commentary and actors to the community. It also comes with the distribution of relief items to disaster victims which most officials appear very interested in executing. On few occasions however, there have been quick responses by officials in an event like fire outbreak. For instance during the December 2011 fire outbreak in Tulaku which rendered hundreds of people homeless, the rapid response by NADMO in the distribution of relief items like clothing, food and other essential non-food items to the victims, was very phenomenal.

5.3.2 Official Response to Fire Incidence in Ashaiman

During the interaction with some public officials, it was realized that one of the main challenges confronting the organizations in the control of fire in the study area is the problem of accessibility. According to the Acting Municipal Fire Officer for example, the highly clustered nature of settlements coupled with the absence of good access roads hinder their outfit in fighting fire within the community. He also cited the problem of insufficient fire tenders as one of major problems facing the fire service with regards to fighting the rampant fire outbreaks within the study area.

During the study, attempts were made, with the assistance of fire service and officials to map all the fire hydrants within the study area. Indeed, direct observation with these officials revealed a total of eleven fire hydrants in the community. Despite the apparent huge number of hydrants counted, accessibility to these hydrants by fire personnel always remains a challenge. It was realized that most of these hydrants have been used as garbage collection point (see Plate 5.4). The problem was highlighted when a team from the Fire Service, Electricity Company of Ghana among others inspected the markets at Ashaiman and Tema New Town (see Box 5.2).

Plate 5.4 Fire Hydrants Used as Garbage Collection Points



Source: Field Survey, 2012

Box 5.2 Ashaiman, Tema New Town Markets have no Hydrants

The Ashaiman and Tema New Town markets have no fire hydrants to replenish fire tenders engaged in fire fighting. This was made known by Mr. Gilford Tetteh Adams, Tema Regional Fire Officer on Thursday when he led a team of fire personnel and officers from the Metropolitan Office of the Electricity Company of Ghana, to inspect fire hydrants and illegal electricity connections at the markets. Mr. Adams explained that the lack of fire hydrants in some areas, as well as the blocking and sealing of available ones, were some of the causes of shortage of water during fire fighting. He indicated that to rectify the problem, his outfit would write letters to the head office of the Ghana National Fire Service (GNFS), Ghana Water Company Limited and the District Assemblies, to provide hydrants in market centres. Mr. Adams said all regional fire officers were ordered by the Acting Chief Fire Officer, to embark on an exercise to educate the public, especially market women, on fire issues especially during the harmattan season. Mr. Timothy Osafo-Affum, Tema Public Relations Officer of the GNFS, said all the six hydrants in the Tema Community One Market, had been blocked, since some market women had located their shops on them. He, therefore, called on the two assemblies to make fire hydrants available in the markets while access routes were also cleared. Mr. Osafo-Affum said the nearest fire hydrant to the Ashaiman Market was about one kilometre away.

Mr. Emmanuel Appoe, Protection and Control Engineer of the Tema Electricity Company of Ghana (ECG), sounded a word of caution to people who engaged in illegal connection of electricity in markets. He said such people would be made to pay all the estimated units used, plus penalty when apprehended. Mrs. Leticia Ayaba, Ashaiman Market Queen, who interacted with the team, said efforts by traders to get legal electrical connections from the ECG, were often cumbersome, thus leading to illegal connections of the facility.

Source: GNA, 2010

Another challenge facing the fire service with respect to the management of fires has to do with records keeping. The historical breakdown of fire outbreaks is non-existent; therefore officials are unable to study the trend and dynamics of fire outbreaks in the community. In fact the problem of availability of data appears to be an albatross to the various organizations. Interviews with officials of the National Disaster Management Organization also brought to the fore some of the challenges confronting the organization in managing fire in the community. Lack of finance as well inadequate logistics for embarking on monitoring and community sensitization programmes were also identified as burdens.

5.4 The Role of NGOs

Two main notable non-governmental organizations in Ghana responsible for providing support to low-income communities are the People's Dialogue on Human Settlement (PDG) and the Ghana Federation for the Urban Poor (GHAFUP). The People' Dialogue on Human Settlements is a community-based NGO set up to provide professional technical and strategic support to poor urban communities. This support aims to improve the quality of life of slum dwellers and the urban poor by involving them in development of urban infrastructure. Ghana Federation of the Urban Poor on the other hand, is a network of community savings groups in informal settlements and poor communities in Ghana, including four of Ghana's largest urban areas namely Kumasi, Accra, Ashaiman and Takoradi.

In Ashaiman the role of these notable NGOs appears to be limited, with virtually no sort of assistance from these groups. In case of disaster, residents always find it difficult to cope with the very little assistance from government institutions like NADMO and the Fire Service. For instance, a fire outbreak in Old Fadama, one of Ghana's largest informal settlements, which rendered over 3,500 people homeless, actually witnessed active participation of People's Dialogue on Human Settlements (PDG) and Ghana Federation for the Urban Poor (GHAFUP) providing some sort of livelihood for residents.

During discussions with the executives of some of these NGOs, they maintained that government bureaucratic machinery normally serves as a deterrent for the full participation in risk management. They also alleged that official corruption and political manipulations at times curtail their participation in such humanitarian, supposedly non-partisan activities. It was revealed that most of these NGOs demand strict accountability from state apparatus which appears problematic in most government institutions. Some residents however accused most of the NGOs as having

their personal agenda. In their view, these NGOs only use the community as incubators or laboratory for them to pursue their individual economic interest to the detriment of the whole society. Participants at the fora support their claim by citing the many research projects the community has witnessed though no pragmatic programmes and activities can be pointed to.

5.5 Managing Fire Outbreaks in Ashaiman, On Whose Terms?

This chapter has addressed fire management within the study area both in the event and the aftermath of any fire incidence. It has looked at the various coping mechanism employed by residents during and after any fire incidence. At the community level, it was established that residents adopt a whole range of strategies. The use of water and sand was identified as one of the mechanisms residents resort to in any fire outbreak before the arrival of the Fire Service. Also the breaking down of structures to prevent fires from spreading from one dwelling to another was identified as a useful mechanism employed in any fire incidence. This chapter has also brought to fore the fact that residents do resort to some family and friends for support in case of fire outbreak.

This section also discussed the official responses to fire incidences in the municipality. According to the Fire Service, one of their challenges in fire fighting was the problem of accessibility which makes it difficult to access the settlements in case of any fire outbreak. The availability and problem of accessing fire hydrants were also highlighted. On the part NADMO, they raised the issue of logistics and insufficient finance to embark on monitoring and evaluation activities within the community. Generally, there seems to be a blame game among the stakeholders in managing the incidence of fire outbreaks - the community, state institutions and the Non-governmental Organizations. Though there may be some iota of truth in the accusations and counter-accusations,

they do not auger well for disaster management. The collective and collaborative effort of all holds the key to building a safer city.

Managing fire incidences in Ashaiman has to be the responsibility of all and sundry. Both the community as well as secondary stakeholders has to play their roles effectively and holistically. For instance at the community level, there should be some form of risk ownership. This will help better understand the kind of vulnerabilities surrounding them. According to Macgregor et al. (2005), for sustainable management of risk the community needs to have control. Under no circumstance, should the community feel that it is someone else's responsibility to manage and reduce their risk. This sort of community ownership of risk should also be transferred to the household level.

At the institutional level, both governmental and non-governmental organizations have to discharge their roles effectively and efficiently. For instance, Fire Service has to educate the public on fire prevention and safety measures both at the household as well as the community level. National Disaster Management Organization (NADMO) should also embark on regular assessment of the vulnerability of these communities. Again, non-governmental organizations (NGOs) should come on board to actually support these residents in times of any fire incidence.

5.6 Summary

The study has clearly showed that the Ashaiman Municipality, as a new administrative region, has its own teething administrative problems. In such circumstances, the not too obvious challenges tend to be compromised. In that perspective, planning for a disaster whose time of occurrence is unknown appears to have suffered tremendously. In the absence of adequate state-sponsored mitigation strategies, the residents have carved their own coping strategies; some of which have

been highlighted in this chapter. The final chapter presents the summary of the findings, conclusions arrived at and some recommendations for policy consideration.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The previous chapter presented a discussion on the results of the study. In the main, the chapter explored some of the coping strategies residents of the study area adopt to mitigate fire incidences. This final chapter focuses on the main findings of the study. It also draws some of the important conclusions, based on which some recommendations are made for policy consideration. Attempts are also made to propose possible areas which can be targeted for future research.

6.2 Summary of Findings

The overriding objective of this study was to examine the level of fire risks of residents within the study area. The study made use of multiple research techniques: quantitative, qualitative, including visual and photography, GPS and transect walks, key informant interviews, etc; A summary of the major research findings is presented below.

6.2.1 Identify, Categorize and Map Fire Risk Vulnerability in Ashaiman

The research focused on two research localities within Ashaiman Municipality; Tulaku and Taboo. The purpose was to identify the vulnerable groups/individuals within the two communities and therefore perform a comparative analysis of the two communities. Using cluster analysis technique, a categorization schema was developed using a variety of variables including the materials used in the construction of informal dwellings (wooden planks, corrugated iron sheets, bricks), energy source of fuel for cooking (firewood, charcoal, paraffin stove), energy source of lighting (candle, kerosene lamp, electricity) and other behavioral factors such as smoking and alcohol. Four main clusters were defined; namely the highly vulnerable, moderately vulnerable,

low vulnerable and least vulnerable groups. The results show that within the community, the more a household deviates from the normal acceptable standard of building, the more vulnerable or prone it is to fire incident. Again, houses made up of wooden planks were more susceptible to fire than those made up of bricks. Similarly, households which use candle, kerosene, charcoal were more vulnerable. Again, households, which exhibit some negative behavioural tendencies like smoking and alcoholism, were also deemed vulnerable. Out of the sampled respondents, 45% were highly vulnerable, 24% and 19% represented the moderately and low vulnerable groups respectively. Only 8% of the respondents were within the least vulnerable category. Clearly, the result confirms earlier findings that the community is generally susceptible to fire.

In terms of the two research localities, the study reveals that Taboo community is more vulnerable to fire than Tulaku, apparently because of the high concentration of fire-prone flammable materials within the community. The study shows that 58% of the sampled population in Taboo was within the highly vulnerable group whilst those in Tulaku accounted for 38%. During the fieldwork, it was gathered that the name “TAABOO” is an ‘AKAN’ word which is synonymous with the prevalence and overwhelming use of ‘wooden planks’ as a building material in majority of its dwellings. This therefore partly explains the highly susceptible nature of the area to fire outbreaks. The study also shows that Tulaku’s relative “safety” is because the community has benefited from a slum upgrading facility, championed by SUF in collaboration with People’s Dialogue, two important Non-Governmental Organizations currently operating in the community.

Again, Fire Risk Zonation Mapping was also carried out within the two research localities, possibly to map out the high risk/ vulnerable and low risk areas within the communities (see Figure 4.3). This was done by integrating five (5) layers of information (hazard attributes) which were identified during the survey. The overall ratings shows that Taboo community was more

vulnerable and therefore considered as “high risk” to fire hazards as compared to its counterpart community Tulaku, which has witnessed slum upgrading in some section of the community. The Ashaiman Fire Risk Map served as the basis for the formulation of fire risk reduction strategies both at the individual, household as well as the community level.

6.2.2 Conditions and Processes which enhance Risk Accumulation

Having looked at the contextual arguments by Jennings in explaining some of the causes of fire within the neighborhood, household as well as the individual level, it is apparent that some of the socio-economic variables raised replicate themselves in the study area. Socioeconomic variables such as marital status, large household sizes and poor education were among some of the factors identified as contributing to the high resident’s vulnerability levels. For instance, during the interactions with residents, most participants alluded to the fact that single parent households, which accounted for about 30% of the sample population, were major victims of fire outbreaks in the community. They explained that such parents normally leave their children in their rooms while embarking on their routine survival livelihoods. They contend that in their bid to take up the household chores at times inadvertently results in fire outbreaks in the community. The study further establishes that another socioeconomic variable, which has also contributed to the resident’s vulnerability, is the household size. From the survey, it was revealed that the average household size in the community is about 5, which is higher than the national average of 4. The problem is worsened considering the fact that, most of the respondents occupy ‘single-room housing’ of about 10x10 feet, constructed with wooden planks.

In a close examination of the types of buildings found within the study area, it was made evident that the dominant building materials used in construction are wooden planks. This massive representation of wooden structures happens to be one of the major factors contributing to the

residents' high-risk accumulation within the community. Although, other types of building materials including the use of corrugated iron sheets were also visible and also increase residents' vulnerability, most participants identified the dominance of wooden structures during the in-depth interviews as the major cause of rampant fires within the community. About 80% of respondents use wooden planks for construction of their dwellings.

The study further identifies the issue of illegal provision of electricity within the community as a major risk factor. According to the findings of the study, 89% of respondents use electricity as their main source of energy in the community, which ordinarily could have been a welcome development. However, most of the respondents used illegal and unqualified electricians to connect them to the energy sources. From the results, only 36% of the respondents had their electricity from the appropriate channel that is through ECG, while about 52.9% use illegal means, normally through private contractors. It was also realized that most of the materials used in the wiring were of low quality and this, coupled with the doubtfulness in the competence of the contractors involved makes the area very susceptible to fire outbreaks.

During an interview with ECG officials in Ashaiman, they revealed that before one gets connected to electricity, it is a prerequisite for the individual to present a photocopy of the site/ building plan. This fundamental requirement by extension therefore disqualifies many of the residents within the community from genuinely applying for and being provided with proper energy source from the ECG. They admitted that illegal connection is highly prevalent among residents in the community and attributed this development to this administrative limitation. It was realized during the survey that majority of households who do not have connection to the grid, tap and pay for their electricity from their neighbours who have formally acquired electricity connections. Illegal

electricity connection was therefore seen as a major trigger of fire in the study area, which perhaps has also contributed to residents' vulnerability.

The study also identifies four main sources of fuel for cooking (gas, firewood, charcoal and kerosene). The data shows that 77% of respondents use charcoal as their main source of fuel while about 16% use liquefied petroleum gas. The use of firewood and kerosene, however recorded 3.5% each. It was observed from the survey that, the risk of fire is very high considering the high usage of charcoal, with most households doing their cooking within these enclosed wooden structures and sometimes out of negligence forget to put off fire after usage. In addition, most households have large household sizes of about 7, which also add to their risk accumulation.

The issue of fire hydrants is vital as far as fires in Ashaiman particularly Taboo and Tulaku are concerned. The findings identify that a total of eleven fire hydrants have been provided and serviced by the Ghana Water Company Limited. A thorough inspection of the location of these hydrants revealed that most of the functional ones are skewed to and located within the formal settlements of the municipality, with none located within Tulaku and Taboo settlements. Their location also coincides with areas within the municipality that have good road network. Ironically, the only two hydrants, which were in relatively close proximity to the research localities, were said to have been non-functional for years. "According to an in-depth interview granted by an official of the Fire Service, the non-existence of fire hydrants in the communities contributes immensely to resident's vulnerability".

6.2.3 Coping Strategies by Residents

Managing fire incidences is the constitutional responsibility of relevant state agencies and bodies like the Fire Service and National Disaster Management Organization. The agencies are tasked

with the role of fire prevention and the management of disasters in the community. However, the findings from the study show that these institutions responsible for managing fires are not up to their task as far as fires in informal settlements are concerned or are overwhelmed by the rate of the occurrences. Not only did the respondents admonish the low response rate of Fire Officers to fires incidences, but they equally complained about the poor service delivery of both NADMO and Fire Officials in terms of educating the people on the “dos and don’ts” on fire prevention measures. These, they contended have compelled the community members to adopt several strategies to cope with the situation, before, during and after any fire disaster.

The study identifies many pre-disaster coping strategies including educating residents on how to prevent community fires, how to use different energy sources and making available telephone numbers of the various associations to “those who matter” in the event of any disaster. It was also revealed that some community members also send their children to members of the association for “care”. During the field survey it was also found that the community for example uses sand (in bucket and other containers) as one coping mechanism. It was realized that households have buckets of sand kept within the open spaces for easy accessibility in case of any sudden fire outbreak. These strategies, according to some residents have proven to be effective in any fire outbreak considering the late response by the Fire Service. Another strategy community residents adopt was to break into nearby houses to create firebreak. Considering the high-density nature of these settlements and the dominance of wooden structures, fires easily spread from one dwelling to another. Again, it was evident from the survey that, there also exists informal early warning system in the form of shouting. In the midst of any fire outbreak community members shout for help from residents nearby who come around to support and control fires. The study also finds the

extensive use of social network support - family members, friends, community and tribal associations as well as religious groups and associations in the event of fire disasters.

6.3 Conclusions

The findings of the study have indicated that residents are indeed vulnerable to fire at the community, household as well as the individual level. The lack of ownership of risk coupled with resident's inability to appreciate some of the factors, which makes them prone to fire, has contributed to their vulnerability. Moreover, it appears the various coping strategies outlined by residents in the event and the aftermath of any fire outbreak emerges as unsustainable. In effect, community residents continue to live in fear.

For instance, the fact that the ECG is not providing services to residents in such areas because of their illegal status has also heightened the risk of fire thereby contributing to resident's vulnerability. The appearance and dominance of wooden structures, together with the high usage of charcoal in such dwellings have also made the residents quite vulnerable. Again, institutional bodies like the Fire Service and NADMO also seem overwhelmed by the enormity of the task and therefore are not able to play their roles effectively, culminating in resident's high vulnerability. The limited educational campaign by the Fire Service on fire prevention and safety measures together with NADMO's deficiency on the regular assessment of the vulnerability of these communities have all contributed to the vulnerability to fire faced by residents.

6.4 Recommendations for Policy Consideration

On the basis of the findings, the following recommendations are professed for policy consideration:

6.4.1 On-Site Redevelopment of Informal Areas

This mode of intervention refers to a complete replacement of the physical fabric through gradual demolitions and in-situ construction of alternative housing. This mode targets the informal areas where housing conditions are highly deteriorated, the urban fabric is irregular and tenure status is illegal. Few pilot projects of this type have been done in Egypt (Hadeyek Zeinham project, October 2008) and were implemented by leading NGOs that are capable of mobilizing government support and guard the interest of residents to stay in the same location (Abdelhalim, 2010). In Ghana, a similar project of this kind has been done in Ashaiman Tulaku called the Amui Djour Housing project.

The Tema Ashaiman Metropolitan Slum Upgrading Fund (TAMSUF) was incorporated on 14th December, 2007 with registration number G.22,826 under Ghana's Company Code 1963 (Act 179) under a fourteen member board namely Ghana Real Estate Developers Association (GREDA), Ashaiman Municipal Assembly (ASHMA), Tema Traditional Council (TTC), People's Dialogue on Human Settlements (PDG), Ghana Institute of Architects (GIA), Ghana Federation for the Urban Poor (GHAFUP), Ashaiman Housing Co-operative (AHDCS), Ghana Institute of Engineers (GHIE), Ghana Association of Bankers (GhAB) and the Tema Development Corporation (TDC). The Government of Ghana acting through the Ministry of Local Government as its implementing agency and other ministries agreed to undertake a slum upgrading pilot project under the UN-HABITAT Slum Upgrading Facility. The project which was implemented by Tema Municipal Assembly had residents of Ashaiman Tulaku area as the main beneficiaries.

The initial funding source for TAMSUF which was for capital enhancement came from a UN-HABITAT grant of US\$400,000. Subsequently, an additional grant of US\$100,000 was also made available for administration and development. TAMSUF together with some partners completed

its first housing project which is called the Amui Djor Housing project located in Ashaiman Tulaku. The project consisted of two phases namely demonstration phase and a pilot phase. One of the project partners that is, People's Dialogue on Human Settlements provided a transit quarters for the squatters on the land to create a space for the erection of a permanent settlement. The whole project which is located on a 90ft * 80ft plot size consisted of 31 dwelling units, 15 commercial shops, and commercial toilet facility for the residents in the area. Again, each unit consisted of a hall and a chamber measuring 2.55*6.00 including a 0.90 meters wide separate kitchen facility. The actual construction cost of a chamber and hall unit costed Gh¢ 10,801, while that of a self contained also costed Ghc 21,604.14.

These cost were further reduced by the provision of a cross subsidy with the construction of public toilet, bathing facility as well as stores. In terms of payment for the facility, the actual cost paid by beneficiaries from the community for chamber and hall was Gh¢ 6,576.68 and Gh¢ 13,157.36 for two bedroom unit respectively. Prior to this, the beneficiaries paid a deposit of Gh¢ 1,000 and further took a loan of Gh¢ 1,500.00 from the People's Dialogue. Later on, an amount of Gh¢ 4,078.687 was financed with a bank facility for a period of ten years. With TAMSUF providing the bank with a guarantee for the outstanding loan amount, this model enables the community to make repayments of Gh¢ 75.00 per month over a period of ten years. In the light of the above proposals it is therefore recommended that similar versions of this project should be put up as a way of reducing the resident's level of vulnerability and building resilient cities.

6.4.2 Regularizing Informal Settlements

The issue of tenure insecurity remains as one of the main challenges engulfing residents in Ashaiman and indeed, all informal settlements. This involves providing tenure security for residents. It is however a known fact that, the two research localities namely Tulaku and Taboo

communities are informal settlements because the land which residents have occupied is currently owned by the Tema Stool (stool land), hence residents do not have the legal titles to the land. According to Edesio (2011; p.5), “the continued lack of legal recognition of legal tenure impedes service provision, the availability of other infrastructure and the overall legality of urban residency”. Residents in such communities lack essential municipal services like water and sanitation, safe electricity, access roads among others.

The issue of electricity supply to such informal communities needs to be re-visited. From all indications, the current administrative fiat, which bars the provision of electricity to residents without building permits is a recipe for disaster and must be reviewed. For instance, due largely to the lack of formal electricity being provided to residents in such localities, most residents have resorted to illegal connection which has been identified as one of the major cause of shack fires and thus contributing to residents’ vulnerability. In view of this, it has been suggested that policy makers and key informants should facilitate the granting of legal permit to occupiers of the land.

At first, the authorities and the ECG may want to grant amnesty to all residents who have indulged in illegal connection to voluntarily rectify their connections, while appropriate procedures are devised to formally connect all residents to the national grid. Several policies of regularization of informal settlements have been attempted in Latin American countries which followed two main programmes in Peru and Brazil. For instance, the Peru regularization programme involved the narrow legislation of tenure through titling whilst that of Brazil involved a combination of legal titling with upgrading of public services, job creation and community support structures (Edesio, 2011).

6.4.3 Public Education on Fire Safety

In view of the vulnerable nature of these communities it is suggested that the issue of public education should be intensified both within the community and at the household level. Both the Fire Service and the National Disaster Management Organization should embark on intensive educational campaign among residents on fire prevention and safety measures because it was highlighted that most fires actually occur out of ignorance and negligence on the part of residents. The lack of ownership of risk coupled with resident's inability to appreciate some of the factors which makes them prone to fires has contributed to their vulnerability. It is therefore suggested that some risk reduction strategies, which were implemented in "Ban Hatsady" village of Vientiane, should therefore be replicated in the informal communities in Ashaiman. Some of the strategies as outlined by ADPC (2004) are discussed below;

6.4.3.1 Community Watch: Formation of Community Fire Volunteers

In "Ban Hatsady" village, this was done through the implementation of twenty-four community volunteers composed of youth, women and men who acted as guards for the community against any threat of fire. The Local community in its capacity ought to set up its own fire management systems to reduce the effects and prevent the occurrence of fires, encompassing both prevention and control methods. It is therefore obvious, that well-trained, simply-equipped, community level fire volunteers could act as an effective solution to the high vulnerability of residents to fire hazards in Ashaiman (ADPC, 2004).

6.4.3.2 Community-Based Approach to Disaster Mitigation

During the field research, it was noted that the lack of ownership of risk together with resident's inability to appreciate some of the factors (individual, household as well the community level)

which increases their exposure to fires contributed to their vulnerability. It has being suggested that, “the regular involvement of the community in programs for reducing vulnerability to disasters like fire outbreaks is most effective because as direct beneficiaries, they can assess in detail their own physical, social and economic risks and can deal with it in a more personal, direct and effective way” (ADPC, 2004).

6.4.3.3 Enforcing Fire Safety Regulations

These include the rehabilitation of electrical wiring system, installation of fire hydrants and widening of roads for easy access to fire services. The issue of fire hydrants is deemed very important and should be installed within the informal communities recognizing the fact that during the field survey it was observed that no fire hydrant was located within the two research localities. Households should also be provided with fire extinguishers.

6.5 Future Research Suggestion

This research was conducted among two informal settlements within Ashaiman. This was because of financial and time constraints. This actually affected the possibility of making generalization about fire risk vulnerabilities in informal settlements. The sample size also affected this possibility. Future research therefore should consider and target the whole community including both the planned and an informal settlement to explore their level of vulnerability particularly in terms of fire. The sample size should also be considered to make generalization more appropriate and useful.

REFERENCES

- Abdelhalim, K. (2010). Participatory Upgrading of Informal Areas. A Decision-Makers' Guide for Action. Published by Participatory Development Programme in Urban Areas (PDP) in Egypt.
- Adedeji, Y. M. D. (2005). Sustainable Low-Cost Housing Technology Cities: Accelerated Constructions Initiative Option.
- Ademiluyi, A. I., & Raji, B. A. (2008). "Public and Private Developers as Agents in Urban Housing Delivery in Sub-Saharan Africa: The Situation in Lagos State." Humanity and Sciences Journal, 3(2): 143-150.
- ADPC, (2004). Reducing Fire Threat to Homes: Piloting Community-Based Fire Risk Assessment in Ban Hatsady Village.
- Abrams, C. (1964). Man's Struggle for Shelter in an Urbanizing World. Cambridge MA: MIT. Press.
- Akinmoladun, O. I., & Oluwoye, J. (2007). "An Assessment of Why the Problems of Housing Shortages Persist in Developing Countries: A Case Study of Lagos Metropolis, Nigeria." Pakistan Journal of Social Science, 4(4): 589-598.
- Akrofi, O. E. (2006). Urbanization and the Urban Poor in Africa. Promoting Law Administration and Good Governance. 5th FIG Regional Conference, Accra Ghana March 8-11, 2006.
- Alder, G. (1995). "Tackling Poverty in Nairobi's Informal Settlements: Developing an Institutional Strategy." Environment and Urbanization, Vol.7, No.2, October 1995.
- Angotti, T. (1993). Metropolis 2000: Planning, Poverty and Politics. (London, Routledge).

- Arku, G. (2009). "Housing Policy Changes in Ghana in the 1990s". *Housing Studies*, 24 (2), 261-272.
- Ashaiman Municipal Assembly, (2008). Annual Report [Brochure].
- Atuahene, B. (2004). "Legal Title to Land as an Incentive against Urban Poverty in Developing Nations". *The George Washington International Law Review*, 36 (5), 1109-1179.
- Awudu, M. (2009). Urban Management and Sustainable Development: The Case of the Squatting and Street Trading Population of Kumasi.
- Awumbilla, M., & Agyei-Mensah, S. (2009). Migration and Voting Patterns: Exploring the Linkages in two Migrant Communities in Ghana (Draft). Paper Submitted to the Population Association of American Conference to be held in Detroit, USA, April 30-May 2, 2009.
- Baabereyir, A. (2009). *Urban Environmental problems in Ghana: A Case Study of Social and Environmental Injustice in Solid Waste Management in Accra and Sekondi-Takoradi. Thesis Submitted to the School of Geography, University of Nottingham, for the Degree of Doctor of Philosophy.*
- Barke, M., & O' Hare, G. (1991). The Third World: Diversity, Change and Interdependence: Conceptual frameworks In Geography. 2nd ed. Singapore, Longman Singapore Publishers Pte. Ltd.
- Beattie, N., Campbell, M., & Yildirim, A. B. (2010). Incremental Housing: Solutions to Meet the Global Urban Housing Challenge. Network Session-Global University Consortium-SIGUS-MIT.UN World Urban Forum, Brazil, March 2010.

- Boamah, N. A. (2010). "Housing Affordability in Ghana: A Focus on Kumasi and Tamale." Ethiopian Journal of Environmental Studies and Management Vol. 3 2010.
- Boraine, A., Cranckshaw, O., Engelbrecht, C., Gotz, G., Sithole, M., Narsoo, M. & Parnell, S. (2006). 'The State of South African Cities a Decade after Democracy'? , *Urban Studies*, Vol 43, no 2, pp 259-284.
- Boyce, C. (2006). *Conducting In-Depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input*.
- Brunn, S., & William, J. (1983). *Cities of the World. World Regional Urban Development*, New York.
- Bukh, J. (1979). *The Village Women in Ghana*, Scandinavian Institute of African Studies, Uppsala.
- Butterworth, D., & Chance, J. K. (1981). *Latin American Urbanization*, Cambridge University Press.
- Cairncross, S., & Ouano, E. A. R. (1990). *Surface Water Drainage in Urban Areas*, RUD Programme, World Health Organization. *In The Poor Die Young: Housing and Health in the Third World Cities*, edited by Cairncross, S., Hardoy, J.E., Satterthwaite, D. Chapter 2, London: Earthscan Publications LTD.
- Cheru, F. (2000). *Globalization and Uneven Urbanization in Africa: The Limits to Effective Urban Governance in the Provision of Basic Services*.
- Chung, M., & Hill, D. (2002). *Urban Informal Settlements in Vanuatu: Challenge for Equitable Development*. Report Prepared for Pacific Islands Forum Secretariat and UN Economic and Social Commission for Asia and the Pacific, Pacific Operation Centre.
- Cochran, W. G. (1963). *Sampling Techniques*, 2nd Edition. John Wiley and Sons, Inc. New York.

- COHRE, (2004). *A Precarious Future: The Informal Settlement of Agbogbloshie*, Accra, Ghana.
- Coppola, D. P. (2007). *Introduction to International Disaster Management*. Elsevier: Amsterdam.
- Daily Graphic Thursday, July 18, 2013. Abuja Reduced to Ground Zero.
- Daily Graphic Thursday, May 24, 2012. Fire Service Receives 30 New Vehicles.
- Daramola, S. A. (2006). *Affordable and Functional Housing in a Developing Economy: A Case Study of Nigeria*.
- Darkwa, I. (2006). *Post-Occupancy Evaluation of State-Subsidized Housing Units in Kayamandi, Stellenbosch*. University of Stellenbosch.
- DPU.UCL, (2005). *Housing Infrastructure in Ashaiman: Promotion of Pro-Poor Partnerships*. Ashaiman Group Three, Development Planning Unit and University College of London.
- Dramola, A., & Ibem, O. E. (2010). "Urban Environmental Problems in Nigeria: Implications for Sustainable Development." *Journal of Sustainable Development in Africa* (Vol. 12, No. 1, 2010) ISSN: 1520-5509. Clarion University of Pennsylvania, Clarion, Pennsylvania.
- DREF, (2011). *International Federation of Red Cross and Red Crescent Societies*.
- Duijsens, R. (2010). *Humanitarian Challenges of Urbanization*.
- Duncanson et al. (2000). *Social and Economic Deprivation and Fatal Unintentional domestic fire incidents in New Zealand 1988-1998*. University of Otago Research Team; Research Report Number 5 ISBN Number 0-908-920-47-4 .
- Du Toit, N. (2009). *Informal Settlement Fires: Addressing the Issue in Kayamandi. Thesis Presented in Partial Fulfillment of the Degree of Master of Philosophy (Community and Development)*.
- Dwyer, D. J. (1975). *People and Housing in Third World Cities: Perspectives on the Problems of Spontaneous Settlements*. London: Longman

- Edesio, F. (2011). Regularization of Informal Settlements in Latin America ISBN 978-1-55844-202-3 Policy Focus Report/ Code PF023.
- Everitt, B.S., Landau, S., & Leese, M. (2001). Cluster Analysis, Fourth Edition, Arnold.
- Fahy, R., & Norton, A. (1989). "How Being Poor Affects Fire Risk." Fire Journal. Vol. 83, no.1 (January/February), pp. 29-36.
- Frimpong-Ansah, J. (1991). The Vampire State in Africa: The Political Economy of Decline in Ghana: James Currey.
- Gencer, E. A. (2007). Vulnerability in Hazard-Prone Megacities: An Overview of Global Trends and the Case of the Istanbul Metropolitan Area. Summer Academy for Social Vulnerability (Draft 01)
- Giddings, W. S. (2009). Proposal for a New USAID Approach to Programming for the Urban Poor.
- Gilbert, A., & Gugler, J. (1987). Cities, Poverty and Development; Urbanization in the Third World Oxford University Press, New York.
- Gilbert, A., & Ward, P. M. (1992). Land for the Rich, Land for the Poor. In Josef Gugler (ed). The Urbanization of the Third World. New York, Oxford University Press.
- GNA, (2009). Ashaiman; Ghana National Fire Service Educates Community. Available at <http://ghanadistricts.com/news/?read=27823>.
- GNA, (2010). Ashaiman, Tema New Town Market have no Hydrants. <http://www.ghanaweb.com/GhanaHomePage/regional/artikel.php?ID=199230>.
- GNA, (2011). President Inaugurates Fire Fighting Engines. Available at <http://www.ghanafireandrescue.org/press.htm>.

- Godwin, Y., Hudson, D. A., & Bloch, C. E. (1997). Shack Fires: a Consequence of Urban Migration. *Burns* 23(2): 151-153.
- Grant, R. (2009). *Globalizing City: The Urban and Economic Transformation of Accra, Ghana*, New York: Syracuse University Press.
- Grant, R., & Nijman, J. (2002). Globalization and the Corporate Geography of Cities in the Less-Developed World. *Annals of the Association of American Geographers*, Vol.92, 320-340.
- Grant, R., & Yankson, P. (2003) "Accra: City Profile" *Cities* 20 (1) (2003) 65-74.
- Greene, W. H. (1997). *Econometric Analysis* (3rd Ed). New York: Prentice Hall.
- Grosh, M., & Glewwe, P. (2000). *Designing Household Survey Questionnaires for Developing Countries. Lessons from 15 years of the Living Standards Measurement*.
- Ghana Statistical Service. (2000). *Preliminary Report on Population Census*. Accra.
- Ghana Statistical Service. (2002). *2000 Population and Housing Census. Special Report on Urban Localities*, March 2002.
- Ghana Statistical Service. (2010). *2010 Population and Housing Census*.
- Ghanaian Times, Tuesday May 22, 2012.
- Gunter, P. (1981). "Fire-Cause Patterns for Different Socioeconomic Neighborhoods in Toledo, OH." *Fire Journal*. Vol. 75 (May), pp. 52-58.
- Hedeker, D. (2002). "A Mixed-Effects Multinomial Logistic Regression Model", *Statistics in Medicine*, Vol. 22. No. 9, pp. 1433-1446.
- Holloway, A. (2006). *DIMP (Disaster Mitigation for Sustainable Livelihoods Programme) at University of Cape Town*.

- Hussain, M. K. (1978). Economics of Low-Income Housing. In Proceedings of IAHS International Conference on Housing Problems in Developing Countries. Ed. Fahd H. Dakhil, Oktay Ural and Moneer F. Tewfik. Housing Problems in Developing Countries. Vol 2. International Association for Housing Science. Chichester, New York, Brisbane, Toronto. John Willey & Sons.
- Ibem, E. O. (2010). "An Assessment of the Role of Government Agencies in Public-Private Partnerships in Housing Delivery in Nigeria." Journal of Construction in Developing Countries, Vol. 15 (2), 23-48, 2010.
- IBIS, (2003). Baseline Report on Local Government, Civil Society and Private Sector Organizations and Activities in Ashaiman. Ghana: Institute for Democratic Governance and IBIS.
- ISSER, (2008). Situational Analysis of Selected Slum Communities in Accra and Sekondi-Takoradi. A Report Submitted to CHF-Ghana.
- Iyagba, R., & Asunmo, B. (1997). "Housing Crises in Nigeria's Urban Areas- A Challenge to the Construction Industry and Technology." Lagos Journal of Environmental Studies, (1): 39-47.
- Jennings, C. R. (1996). Urban Residential Fires: An Empirical Analysis of Building Stock and Socio-Economic Characteristics for Memphis, Tennessee. Unpublished Doctoral Dissertation, pp 105-107.
- Jha, S. S. (1986). Situation of Urban Poverty: The Case of Bombay Slums, Popular Publisher, Mumbai.
- Kasperson, R. (2001). 'Vulnerability and Global Environment Change'. Newsletter, International Human Dimensions Programme on Global Environment, Suva, Fiji. 02: 2-3.

- Kessides, C. (1997). *World Bank Experience with the Provision of Infrastructure Services for the Urban Poor*, Washington, DC: World Bank.
- Kirchher, E. (1968). Tema 1951-1962: the Evolution of a Planned City in West Africa. *Urban Studies*, 13, 155-166.
- Konadu-Agyemang, K. (2001). A Survey of Housing Conditions and Characteristics in Accra, an African City, *Habitat International* 25, Vol 15, No 34, p.15-34.
- Konnings, P. (1978). Political Consciousness and Action of Industrial Workers in Ghana: A Case Study of Valco Workers at Tema. *African Perspectives*, 69-82.
- Krazier et al, (1990). "Children in Self-Care: A New Perspective." *Child Welfare* (November/December), pp.571-581.
- Kumar, K. (1987). *Conducting Focus Group in Developing Countries*. AID Program Design and Evaluation Methodology Report No. 8 Washington, D. C, U.S Agency for international Development.
- Lastarria-Cornhiel, S. (1995). *Impact of Privatization on Gender and Property Rights in Africa*, Paper Prepared for Gender and Property Rights in Africa, Paper Prepared for Gender-Prop, An International Email Conference on Gender and Property Rights, May-December 1995.
- Lerise, F., Meshack, J. L. M., & Kiunsi, R. (2004). *Community Initiatives in Managing Urbanization and Risk Accumulation Processes: Lessons from Dar es Salaam, Tanzania*.
- Macedo, J. (2000). *Land Use Policies and Urbanization of Informal Settlements: Planning Initiatives for Environmental Protection Areas in Curitiba, Brazil*. A Dissertation Presented to the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy, University of Florida 2000.

- MacGregor, H., Bucher, N., Durham, C., Falco, M., Morrissey J., Silverman I., Smith, H., ... Taylor, A. (2005). Hazard Profile and Vulnerability Assessment for Informal settlements. An Imizamo Yethu Case Study with Special Reference to the Experience of Children. Cape Town: DiMP, University of Cape Town, March, 2005.
- Mason, O. S., & Fraser, C. (1998). Image Sources for Informal Settlements Management. In Photogrammetric Record, Vol. 92 (1998) No.16, pp. 313-330.
- Mazeau et al, (2012). Sanitation - A Neglected Essential Service in the Unregulated Urban Expansion of Ashaiman, Ghana. Sustainable Futures: Architecture and Urbanism in the Global South Kampala, Uganda, 27-30 June 2012
- McKean, E. (2005). The New Oxford American Dictionary. 2nd Ed New York: Oxford University Press.
- Merkel, S., & Otai, J. (2007). Meeting the Health Needs of the Urban Poor in African Informal Settlements: Best Practices and Lessons Learned.
- Mills-Tetteh, R. (2008). Urban Housing and sanitation: Our Habitat, Our Health. Inaugural Lecture series of the Ghana Academy of Arts and Sciences, Accra.
- Mohanty, M. (2003). Squatters, Vulnerability and Adaptability of Urban Poor in a Small Island Developing State: The Context of Fiji Islands.
- Munson, M. J., & Oates, W. E. (1983). "Community Characteristics and the Incidence of Fire: An Empirical Analysis." *In the Social and Economic Consequences of Residential Fires*. Chester Rapkin, Ed. Lexington, MA: D. C Health and Co., 1983,p.62 and p.73.
- Nabutola, W. (2004). Upgrading Informal Settlements-Kenya; Rural & Urban.
- Napier, M., & Margot, R. (2002). Managing Environmental and Disaster Risk Affecting Informal Settlements; Lessons in Innovative Practice from South Africa local Authorities.

- NEMA, (2006). “National Platform for Disaster Risk Reduction, Nigeria”. A Report Prepared under the Directorship of National Emergency Management Agency, NEMA: Lagos, Nigeria.
- Nguluma, H., & Lupala, J. (2000). “Role of Design and Planning Professionals for Solving the Global Housing Problems”, in Vestbro, D. (ed), *The Report from a Workshop at the Conference- Challenges for Science and Engineering in the 21st Century*, INES, Stockholm, Sweden.
- Nguluma, M. H. (2003). Housing Themselves: Transformations, Modernization and Spatial Qualities in Informal Settlements in Dar es Salaam, Tanzania. Built Environment Analysis, Stockholm, March 2003.
- Niikondo, A. (2010). Migrants to Cities and Towns in Namibia: what their interest are?
- Nugent, P. (2004). Africa since Independence, New York: Palgaare Macmillan.
- Nunoo, L. (2008). ‘Spotlight-on-Ashaiman’: Ghana News Agency. [http:// www. the ghanaijournal.com/2008/11/05/spotlight-on-Ashaiman/Accessed September, 20, 2012.](http://www.theghanaijournal.com/2008/11/05/spotlight-on-Ashaiman/Accessed%20September,%202012)
- Nyakundi et al, (2010). “Community Perceptions and Response to Flood Risks in Nyando District, Western Kenya.” *JAMBA: Journal of Disaster Risk Studies*, Vol 3, No.1, June 2010.
- Oduunuga, O. V. (2009). Exploring Spatial Growth Pattern of Informal Settlements through Agent-Based Simulation.
- O’ Heara, M. (1999). Reinventing Cities for People and the Planet. In Jane A. Peterson (ed). World Watch Paper. No. 147. World Watch Institute.

- Oladokun, V. O., & Ishola, F. A. (2010). "A Risk Analysis Model for Fire Disaster in Commercial Complexes in Nigeria." The Pacific Journal of Science and Technology, Vol. 11. Number 2, November 2010 (Fall).
- Oteng-Ababio, M., & Osman, A. (2012). Hurling Hazards: Exploring Fire Risk Vulnerabilities in Ghanaian Markets. For African Urban Risk Analysis Network (AURAN). (Forthcoming).
- Oteng-Ababio, M., & Sarpong, A. O. (2012). Fire Risk Reduction through Community-Based Risk Assessment Initiative -Reflections from the Makola Market, Accra, Ghana. (Forthcoming).
- Owusu, G., Agyei-Mensah, S., & Lund, R. (2008). "Slums of Hope and Slums of Despair: Mobility and Livelihoods in Nima, Accra". Norsk Geografisk Tidsskrift-Norwegian Journal of Geography 62, pp. 180-190.
- Owusu, G. (2008). 'Indigenes and Migrants' to Access to Land in Peri-Urban Areas of Ghana's Largest City of Accra', *International Development Planning Review (IDPR)* 30(2), pp. 177-198.
- Owusu, G. (2010). "Social Effects of Poor Sanitation and Waste Management on Poor Urban Communities. A Neighbourhood-Specific Study of Sabon Zongo, Accra." Journal of Urbanism: International Research on Placemaking and Urban Sustainability 3(2), pp 145-160.
- Owusu, G. (2011). Urban Growth, Globalization and Access to Housing in Ghana's Largest Metropolitan Area, Accra. A Paper Presented at the 4th *European Conference on African Studies (ECAS4)*, Uppsala, Sweden, June 15 – 18, 2011.
- Owusu, T. (1999). The Growth of Ashaiman as a Squatter Settlement in the Tema District of Ghana 1950-1960. The Arab World Geographer, 2(3), 234-249.

- Owusu, T. (2004). "Urbanization Migration and the Growth of Squatter Settlements in African Cities: Some Theoretical and Empirical Observations." National Social Science Journal Vol, 2004 - Citeseers.
- Owusu, T. Y. (1991). Rural-Urban Migration and Squatter Settlement Formation in African Cities: A Case Study of a Ghanaian Squatter Settlement. *Thesis and Dissertations (Comprehensive). Paper 360.*
- Patton, M. (1987). How to Use Qualitative Methods in Evaluations, SAGE Publications, U.K.
- Payne, G. (1997). Urban Land Tenure and Property Rights in Developing Countries: A Review. London: Intermediate Technology Publications.
- Perlman, J. E., & Sheehan, M. O. (2007). "Fighting Poverty and Environmental Justice in Cities," Chapter 9 in 2007 State of the World: Our Urban Future. Washington, DC: Worldwatch Institute.
- Petrusevich, R. M. (2005). Social Capital Generators? A Case Study of Industrial Association with the Vancouver New Media Cluster.
- Pharoah, R. (2009). Fire Risk in Informal Settlements in Cape Town, South Africa. In Disaster Risk Reduction: Cases from Urban Africa. Earthscan ISBN: 978-1-84407-556-0. Edited by Mark Pelling and Ben Wisner.
- PMO, (2004). Disaster Vulnerability Assessment Phase II DMD and UCLAS, Dar es Salaam; Unpublished Report.
- Rajack, R. (2005). Catching up with Reality – The Informal Settlement Challenge in the Caribbean. *Presentation at the International Conference on the Built Environment-Kingston, Jamaica August 3rd 2005.*

- Rogerson, C. M. (1997). Globalization and Informalization? African Urban Economies in the 1990s in the Urban Challenge in Africa. Ed, C. Rakodi Tokyo: United Nations University Press.
- Saff, G. (1996). "Claiming a Space in a Changing South Africa: The "Squatters" of Marconi Beam Cape Town." Annals of the Association of American Geographers, 86(2): 235-255.
- Satterthwaite, D. (2003). "The Links between Poverty and the Environment in Urban Areas of Africa, Asia, and Latin America." Annals of the American Academy of Political and Social Sciences, Vol.590.73-92. Sage Publications.
- Songsore, J. (2003). "The Urban Housing Crisis in Ghana: Capital, the State versus the People." Ghana Social Science Journal (New Series) 2, pp. 1-31.
- Songsore, J. (2004). Urbanization and Health in Africa: Exploring the Interconnections between Poverty, Inequality and the Burden of Disease.
- Srinivas, H. (2005). Urban Squatters and Slums.
- Swanepoel, H. and De Beer, F. (2006). Community Development: Breaking the Cycle of Poverty. Juta and Co. Ltd: Lansdowne.
- Tipple, A. G., & Korboe, D. (1998). "Housing Policy in Ghana: Towards a Supply-Oriented Future" HABITAT INT., Vol.22, No.3, pp.245D257, 1998. (1998 Elsevier Science Ltd).
- Tsenkora, S., Badyina, S., & Potsiou, C. (2008). In Search for Sustainable Solutions for Informal Settlements in the ECE region: Challenges and Policy Response. A Paper Presented at the Sixty-Six Session of the Economic Commission for Europe, Committee on Housing and Land Management Geneva, 22-23 September, 2008.

- Tshikotshi, V. (2009). *The Challenge of Eradicating Informal Settlements in South Africa by 2014. The Case of Seraleng Sustainable Human Settlement, Rustenburg Local Municipality, North West Province.*
- Turner, J. F. C. (1977). *Housing by People: Towards Autonomy in Building Equipments.* First American Edition (ed). New York: Pantheon Books.
- Twumasi-Ankrah, K. (1995). *Rural-Urban Migration and Socio-Economic Development in Ghana.*
- United Nations, (1990). *Human Development Report.* Oxford University Press.
- United Nations, (1991). *Human Development Report.* New York.
- United States Fire Administration, (1993). *Fire in the United States, 1983-1990.* Washington, D.C.: Federal Emergency Management Agency, United States Fire Administration pp. 70-71.
- UNFPA, (1993). *The State of the World, United Nations Population Fund.*
- UNFPA, (2007). *State of the World's Population 2007: Unleashing the Potential of Urban Growth, United Nations Population Fund: New York.*
- UN-HABITAT, (2003). *The Challenge of Slums; Global Report on Human Settlements 2003.*
- UN-HABITAT, (2006b). *Public-Private Partnership in Enabling Shelter Strategies.* Nairobi: United Nations Habitat Information Services.
- UN-HABITAT, (2007). *Tomorrow's Crisis Today: The Humanitarian Impact of Urbanization,* United Nations, Nairobi.
- UN-HABITAT, (2008a). *State of the World's Cities 2008/2009: Harmonious Cities,* (Earthscan: London).

- UN/ISDR, (2004). *Living with Risk: A Global Review of Disaster Reduction Initiatives*. 2 vols. Geneva: United Nations.
- UN/ISDR, (2009). *Global Assessment Report on Disaster Risk Reduction*.
- UNSTAT, (2005) .[http://unstats.un.org/unsd/environmental/gesform.asp? Getitem=665](http://unstats.un.org/unsd/environmental/gesform.asp?Getitem=665)
- Van-Horen, B. (2004). *Community Upgrading and Institutional Capacity Building to benefit the Urban Poor in Asia: Presented at a Forum on Urban Infrastructure and Public Service Delivery for the Urban Poor Regional Focus: Asia*. New Delhi India: India Habitat Centre 24-25, June 2004.
- Warren, S. (2006). *Understanding the Complexities of Informal Settlements: Insights from Cape Town*.
- WaterAid, (2008). *Turning Slums Around: The Case for Water and Sanitation*.
- Water UK, (2002). *National Guidance Document on the Provision of Water for Fire Fighting, May 2002, 2nd Edition*.
- Weissman, S. R. (1990). "Structural Adjustment in Africa: Insights from the Experience of Ghana and Senegal", *World Development*, Vol. 18. No. 12, pp.1621-1634.
- WHO, (1987). *Improving Environmental Health Conditions in Low-Income Settlements. A Community-Based Approach to Identifying Needs and Priorities. WHO Offset Publication No. 100 ISBN 9241701005*.
- World Bank, (2008). *Approaches to Urban Slums. A Multimedia Source Book on Adaptive and Proactive Strategies*. Washington D.C.
- Wossen, A. (2002). *Problems of Gaining Access to Housing Land by Government Employees and Factory Workers in Gondar Town*.
- Yap, K. S. (1995). *The Global Content of Human Poverty*.

- Yeboah, I. (2003). Demographic and Housing Aspects of Structural Adjustment and Emerging Urban Form in Accra, Ghana, *Africa Today* 10, pp. 106-109.
- Yu, S. O. (2002). Infrastructure Development and the Informal Sector in the Philippines. Employment-Intensive Investment Branch International Labour Office-Geneva.

APPENDIX 1**QUESTIONNAIRE FOR A STUDY ON FIRE RISK VULNERABILITY IN INFORMAL SETTLEMENTS: THE CASE OF ASHAIMAN.**

This research is being carried out as part of M.Phil degree in the Department of Geography and Resource Development, University of Ghana. The information is collected purely for academic research purpose as stated herein and confidentiality will be strictly observed.

Please tick or write where applicable. Thank you for your anticipated participation.

NAME OF COMMUNITY.....

Date.....

House No......

Questionnaire No......

SECTION A: BACKGROUND INFORMATION**1) The respondent for this survey is:**

a) Head of household b) Spouse c) relative d) partner e) Tenant

f) Other, please specify.....

2) Please state your gender

a) Male b) Female

3) When were you born (Age in years)?

.....

4) Marital status

a) Single b) Married c) Divorced d) Separated e) Widowed

f) Other, please specify.....

5) Religious conviction

a) Christian b) Islam c) Traditionalist d) No religion e) Other, please specify.....

6) Ethnic Groupings

a) Akan b) Ewe c) Ga-Adangme d) Northerner e) Other, please

specify.....

7) Educational Level

- a) No Formal Education b) Primary/Junior High c) Senior High/Vocational/Tech
 d) Tertiary e) Other, please specify.....

8) How many households are in this house?

.....

9) What is your household size (no. of persons)?**10) What are the various age categories of households? Please indicate as appropriate.**

0-15 years		16-30 years		31-45 years		46-60 years		Older than 60	
Male	Female	Male	Female	Male	Female	Male	Female	Male	Female

11) Were you born in Ashaiman? If yes, jump to question 14

- a) Yes b) No

12) If No, where were you born?

Hometown..... Region.....

13) If No, why have you migrated to Ashaiman?

- a) In search of a job b) On a job transfer c) Marital Purpose d) Health Reasons
 e) Conflict/ Violence f) Nowhere else to go/needed shelter g) High rent
 h) Other, please specify.....

14) Do you own the land?

- a) Yes b) No

15) If yes, how did you get the land?

- a) Government b) Family c) Community d) Bought

16) How old is your dwelling (structure)?

.....

17) What is the main occupation of the household head?

.....

18) What is the average monthly income of your household (Ghana cedis)?

- a) 0-100 b) 201-300 c) 301-400 d) 401-500 e) Above 501

19) What is your secondary/party time occupation?

.....

20) Where is your work located?

.....

SECTION B: HOUSING CHARACTERISTICS

21) What material was used in building your house? *Please observe the type of dwelling and tick as appropriate.*

- a) Wooden shacks b) Corrugated metal sheet c) Cement blocks d) Burnt bricks
e) Mud f) Sandcrete g) Bamboo h) Other, please specify.....

22) What material was used in roofing your house?

- a) Thatch b) Aluminum Sheets c) Asbestos d) Wood e) Roofing Tiles
f) Other, please specify.....

23) What is the main energy source of lighting for your dwelling?

- a) Candle b) Kerosene Lamp c) Gas Lamp d) Solar e) Generator
f) Electricity g) Other, please specify.....

24) If electricity, who connected it to your home?

- a) ECG b) Private individual c) Self d) Other, please specify.....

25) What is the main source of fuel by your household for cooking?

- a) Firewood b) Gas c) Charcoal d) Kerosene/Paraffin stoves
e) Electric stove f) Other, please specify.....

26) What are the major sources of water for domestic use?

- a) Standing pipe b) Borehole c) Water from vendors d) Public tap

e) Other, please specify.....

27) Do you have a toilet in your dwelling? If No, skip to question 29

a) Yes b) No

28) If yes, what kind of toilet?

a) Water closet b) KVIP c) Pan/ bucket latrine

d) Other, please specify.....

29) If you don't have toilet, what do you use.

a) Public toilet b) Neighbour's toilet c) Pit latrine d) KVIP

e) Flush toilet f) other, please specify.....

30) Do you have a kitchen? If No, answer question 31

a) Yes b) No

31) If your dwelling does not have a kitchen where do you use as kitchen?

a) Sleeping room b) Hall c) Veranda d) Open space within the house

e) Other, please specify.....

32) Who normally prepares food for the household?

a) Self b) Wife c) Husband d) Children e) Maids

f) Parents (Mother) g) Other, please specify.....

33) How do you dispose off your waste?

a) Public skip b) Waste Bin (Contractor) c) Kaya Bola d) Burying

e) Burning f) Other, please specify.....

SECTION C: FIRE RISK PERCEPTION

34) Have you ever experienced a fire outbreak in your home?

a) Yes b) No

35) If YES, what was the main cause of the fire?

- a) Electrical equipment/wiring b) Gas explosion c) Forgetfulness (Negligence)
d) Candles e) Smoking f) Arson (Intentional fires) g) Accident while cooking
h) Children playing with fire i) Don't know j) Other, please specify.....

36) What did you do during the fire outbreak? *Multiple responses are allowed*

- a) Called the Fire Service Department on a phone b) Started packing my property
c) Shouted for help d) Started quenching the fire e) Was motionless
f) Other, please specify.....

37) Which category of people is mostly affected?**38) Please describe the extent of property damage or loss?**
.....**39) Do you have fire fighting equipments?**

- a) Yes b) No

40) If yes, what fire fighting equipments do you have?
.....**41) Can a fire fighting vehicle access your house?**

- a) Yes b) No

42) If yes, how far is the nearest Fire Service Department from your home? (*Distance in walk minutes*)

- a) 0-5 b) 6-10 c) more than 10

43) How long did it take the Fire Service to arrive at the fire scene?

- a) 5- 30 minutes b) 30-1hr c) 1 hr and above

SECTION D: BEHAVIOURAL ATTITUDES TO FIRE INCIDENCE

44) Do you or any member of your household smoke? If No, jump to question 46

- a) Yes b) No

45) If yes, please indicate the number of people who smoke

<i>Category</i>	<i>Respondent</i>	<i>Other household members</i>
<i>No. of people</i>		

46) If yes, how often does anyone smoke inside your home? Would you say daily, weekly, monthly, less than monthly, or never?

- a) Daily.....
- b) Weekly.....
- c) Monthly.....
- d) Less than a month.....
- e) Don't know.....

47) Do you or any member of your household drink alcohol?

- a) Yes b) No

48) If yes, please indicate the number of people who drink alcohol

<i>Category</i>	<i>Respondent</i>	<i>Other household members</i>
<i>No. of people</i>		

49) If yes, how often does anyone drink alcohol inside your home? Would you say daily, weekly, monthly, less than monthly, or never?

- a) Daily.....
- b) Weekly.....
- c) Monthly.....

- d) Less than a month.....
- e) Don't know.....

SECTION E: COPING STRATEGIES OF FIRE RISK VULNERABILITY

50) What measures have you put in place to avoid fire outbreaks?

- a)
.....
- b)
.....
- c)
.....

51) What measures have you put in place to manage fire outbreaks when they occur?

- a)
.....
- b)
.....
- c)
.....

52) What do you think the Government can do to help reduce fire outbreaks in the community?

- a)
.....
- b)
.....
- c)
.....

53) Please tick the appropriate response as applicable to you.

<i>Stakeholders involvement in domestic fire outbreak occurrences</i>	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
The local assembly have been educating us on how to avoid and control domestic fire outbreaks					
National Disaster Management Organization have been educating us on how to avoid and control domestic fire outbreaks					
Environmental Protection Agency have been educating us on how to avoid and control domestic fire outbreaks					
Fire Service Personnel have been educating us on how to avoid and control domestic fire outbreaks					
A Private Agency have been educating us on how to avoid and control domestic fire outbreaks					
Our Chiefs and other Opinion leaders have been educating us on how to avoid and control domestic fire outbreaks					

THANK YOU

APPENDIX 2

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

INTERVIEWS

INSTITUTIONAL INTERVIEW GHANA FIRE SERVICE

DATE.....

BASIC INFORMATION:

1. Name of Respondent.....
2. Sex.....
3. Rank of Respondent.....
4. District.....

How long have you been working in your current job?

1. What is your main responsibility as an organization?
.....
.....
2. How would you assess the discharge of your responsibility? 1. Very good [] 2. Good [] 3. Weak [] 4. Very weak []
Explain.....
.....
3. What are the salient attributed causes of fire outbreaks in informal settlements?
.....
.....
4. What measures have your institution put in place to manage fire outbreaks in informal settlements?
.....
.....
5. What are the main challenges faced with reference to fire management in informal settlements?
.....
.....
6. What are the institutional flaws in fire management in informal settlements?
.....
.....

7. Do you think your personnel have requisite skills to execute their functions?

.....
.....

8. What are the key areas of vulnerability/ risk in the settlement with regards to informal settlement fires?

.....
.....

9. What level of urgency does your organization attach to solving these vulnerability/ risk problems?

.....
.....

10. Is there any specific strategy your organization has developed and want to implement to reduce the present fire risk.

.....
.....

11. How often are there fires in these settlements?

.....
.....

12. How severe are fires in these settlements?

.....
.....

13. Which are the areas in the settlement that are affected?

.....
.....

14. How many fires have occurred as far as you can remember?

.....
.....

THANK YOU

APPENDIX 3

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

INTERVIEWS

INSTITUTIONAL INTERVIEW

DATE.....

ENVIRONMENTAL PROTECTION AGENCY (EPA)

BASIC INFORMATION:

1. Name of Respondent.....
2. Sex.....
3. Rank of Respondent.....
4. District.....

How long have you been working in your current job?

1. What is your main responsibility as an organization?
.....
.....
2. How would you assess the discharge of your responsibility? 1. Very good [] 2. Good [] 3. Weak [] 4. Very weak []
Explain.....
.....
3. What is EPA’s role in fire management in informal settlements?
.....
.....
4. What are the environmental consequences of fire to the inhabitants in these communities?

THANK YOU

APPENDIX 4

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

INTERVIEWS

INSTITUTIONAL INTERVIEW

DATE.....

NATIONAL DISASTER MANAGEMENT ORGANIZATION (NADMO)

BASIC INFORMATION:

1. Name of Respondent.....
2. Sex.....
3. Rank of Respondent.....
4. District.....

How long have you been working in your current job?

1. What is your main responsibility as an organization?
.....
.....
2. How would you assess the discharge of your responsibility? 1. Very good [] 2. Good []
3. Weak [] 4. Very weak []
Explain.....
.....
3. What is NADMO’s role in the management of fires within informal settlements?
.....
.....
4. What are the main challenges faced with reference to fire management in informal settlements?
.....
.....
5. What is the policy framework as far as informal settlements fires is concerned?
.....
.....
6. What are some of the causes of fires in informal settlements?
.....
.....
7. What has been the frequency of fires in informal settlements?

.....
.....
8. What measures are put in place to reduce fire outbreaks in informal settlements?
.....
.....

9. How often do NADMO educate the public on fire prevention measures in informal settlements?
.....
.....

THANK YOU

APPENDIX 5

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

INTERVIEWS

INSTITUTIONAL INTERVIEW ELECTRICITY COMPANY OF GHANA

DATE.....

BASIC INFORMATION:

1. Name of Respondent.....
2. Sex.....
3. Rank of Respondent.....
4. District.....

How long have you been working in your current job?

1. What is your main responsibility as an organization?
.....
.....
2. How would you assess the discharge of your responsibility? 1. Very good [] 2. Good [] 3. Weak [] 4. Very weak []
Explain.....
.....
3. What is the type of electricity service provided in informal settlements?
.....
.....
4. What are the key challenges encountered in the provision of electricity to informal settlement in the Metropolis?
.....
.....
5. Have you implemented any slum upgrading programme? Describe it, please
.....
.....
6. Do you have any special plan for informal settlements in the metropolis?
a) Yes b) No

7. If yes, what are your interventions for informal settlements?

.....
.....

8. Is there any mechanism in place to check the haphazard (illegal) electricity connections in informal settlements?

a) Yes b) No

9. If yes, what are the mechanisms to check the haphazard electricity connections?

.....
.....

THANK YOU

APPENDIX 6

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

INTERVIEWS

INSTITUTIONAL INTERVIEW

DATE.....

ASHAIMAN MUNICIPAL ASSEMBLY (ASHMA)

BASIC INFORMATION:

1. Name of Respondent.....
2. Sex.....
3. Rank of Respondent.....
4. District.....

How long have you been working in your current job?

1. Can you give a rapid overview of the scale and nature of informal settlement in your Municipality?
.....
.....
2. What are the policies surrounding the management of informal settlements?
.....
.....
3. What are the underlying factors that influence the growth of these settlements?
.....
.....
4. What is the legal framework regulating land and property in informal settlements (Ashaiman)?
.....
.....
5. Can we know the Municipality’s Housing sector plan in respect of informal settlements.
.....
6. As an institution have you implemented any slum upgrading programme? Describe it, please.
.....
7. Do you have any special plan for these informal settlements?
a) Yes b) No
8. If yes, what are your interventions for informal settlements?

APPENDIX 7

FOCUS GROUP DISCUSSION GUIDE

This interview is part of the research dubbed “Fire Risk Vulnerability in Informal Settlements: The Case of Ashaiman” for the award of a Master’s Degree in Geography and Resource Development. The objective of the study is to examine the level of fire risk vulnerabilities within Ashaiman.

1. Background information of respondents
2. Historical background of fire
3. Experience of fire
4. Causes of fire
5. Response from officials
6. Coping Strategies by residents
7. How it can be resolved

APPENDIX 8**COMMUNITY PROFILE OF ASHAIMAN**

Data Collection Category	Sub-Division	No.
Businesses	Forex Bureaus	1
	Provision Stores	77
	Tailors	41
	Restaurants or Drinking Spots	41
	Chop Bars	35
	Hair Saloons	33
	Shoe Repairs	7
	Welding	0
	Mechanics	33
	Electrical and Electronics Shops	23
	Grinding Mills	6
	Hardware	8
	Petty trading in Mobile Kiosk	32
	Factories	6
	Spare Parts Shop	11
	Vulcanizers	2
	Charcoal Dealers	5
	Animal Farms	21
	Veterinary Shops	3
Artists	1	

	Herbal Shops	6
	Clothes Shops	3
	Filling Stations	3
	Gas Station	1
	Wood Selling	1
	Scrap Dealers (Metals)	1
Telecommunications	Phone Card Shops	3
	Mobile Phone Call Service Operators (mobile to mobile)	33
	Network Operators	3
	Landline	27
Financial Institutions	Banks	6
	Savings and Loans	5
	Rural Banks	2
Institutions	Churches	4
	Schools	9
	Mosque	3
Amenities	Hospitals	0
	Community Centers	0
	Video Shows	0
Sanitation	Water Points	33
	Toilets	6
	Bathrooms	0
TOTAL		535