AN ASSESSMENT OF THE PHENOMENON OF RESIDENTIAL DEVELOPMENT CLOSE TO SOLID WASTE DUMPSITES: THE CASE STUDY OF THE PANTANG DUMPSITE

BY

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DECLARATION

I certify that with the exception of quoted statements and acknowledged ideas, this dissertation is my original work carried out under the supervision of Dr. Aba Obrumah Crentsil, of the Institute of Statistical Social and Economic Research (ISSER), University of Ghana, Legon. I further affirm that this work has never been previously published at any educational institution nor has it been presented elsewhere for the award of a degree or any other certificate.

…… …….

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…… …….

Dr. Aba Obrumah Crentsil Date

(Supervisor)

DEDICATION

This work is dedicated to my dear mother Margaret Ami Ahlijah (Nee Parbey) for believing in me throughout my academic endeavors and has been a pillar of support in my career pursuits. You have been and still continue to be an inspiration to me I reward you with this. I love you mum.

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LIST OF ABBREVIATIONS

AMA	-	Accra Municipal Assembly
DWMP	-	District Waste Management Plan
ECDC	-	Early Childhood Development Center
EPA	-	Environmental Protection Agency
GEMA	-	Ga-East Municipal Assembly
GSS	-	Ghana Statistical Service
IARC	-	International Agency for Research on Cancer
ICT	-	Information and Communications Technology
ISSER	-	Institute of Statistical and Economic Research
JHS	-	Junior High School
KMA	-	Kumasi Metropolitan Assembly
KVIP	-	Kumasi Ventilated Improved Pit
MMDA	-	Metropolitan, Municipal and District Assembly
NLO	-	National Labour Organization
OPD	-	Out Patient Department
SPSS	-	Statistical Package for Social Sciences
WC	-	Water Closet
WHO	-	World Health Organization

ABSTRACT

Rapid population growth, urbanization and its associated real estate growth lead landfills to compete with residential land use, especially in peri-urban. Though the effects of landfills on residential communities are well-known in literature, there are inconclusive findings in developing countries on the effects on living close by them. This study addresses this knowledge gap by exploring the effects of the Pantang landfills on residents around it. The objectives were to examine the reasons why people chose to live or continue to live close to the dumpsite; the benefits (if any) of the landfill to residents; the risks people are exposed to. and measures to mitigate the challenges residents near the dumpsite are facing. The study used a mixed methodology, to administer structured questionnaire to 200 residents living within 200m radius from the dumpsite and engaged some squatters, landlords and the environmental officer of the Ga East Municipality in an in-depth interview.

The descriptive statistical analysis and content analysis of the results showed that a large proportion of people live less than 100m from the dumpsite. Some were living in the vicinity before the place was turned into a landfill site. They continued to live there because they have built their houses already, rent is affordable and the proximity to place of work. Sixty-nine percent of the residents earned their livelihood from the dumpsite through farming and 20% are also engaged in scavenging. Despite these benefits, almost all of the respondents noted that the air pollution from smoke, fire and odor; insect/flies, leachate, litters, among others affect their health and comfort. Currently, Zoomlion waste management company has been contracted to periodically spray the dumpsite and the number of vehicles bringing waste to the site have been reduced to 60. The study recommended for a well-engineered landfill site away from residential

areas to be built whiles making efforts to close down the Pantang dumpsite to avoid threatening the lives of the people.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Municipal and Metropolitan Solid Waste Management is one of the most sensitive development issues plaguing developing nations around the world. It can be emphasized that solid-waste generation rates are a function of both population and prosperity (Mane and Hingane, 2012). Majority of developing countries including Ghana are experiencing exponential growth in population, coupled with other issues associated with urbanization. This increased urbanization associated with growing economies has posed a significant stress on the environment. With the increasing industrialization globally, people are introducing new and complex chemicals into the environment without any rigorous bio-assessment of their toxicity (Mane and Hingane, 2012).

Solid waste management has therefore become one of the most crucial issues facing authorities in the fast-growing cities in developing countries (Monney et al., 2013). In Africa for instance, the World Health Organization (WHO) has noted solid waste as the second most important environmental health concern apart from water quality (Zerbock, 2003; Monney et al., 2013). The problems caused by solid waste in urban Africa is largely due to the explosive growth rates, particularly in sub-Saharan Africa, which eventually translates into generation of copious amounts of solid waste (UN-HABITAT, 2010; Taiwo, 2011).

Another cause of the problem is rapid urbanization. Urbanization in Ghana for instance, has picked up a considerable momentum over the last two decades. Rapid urbanization over the past decades has resulted in high population concentration in major Ghanaian cities, thereby increasing pressure on land and other urban infrastructure and services (Owusu-Sekyere et al., 2013). Results from the 2010 Population and Housing show that for the first time since 1960, more than half of Ghana's population lived in urban areas The proportion of urban population increased from 23.1 in 1960 to 50.9 in 2010 (Ghana Statistical Service, 2013). In the Greater Accra region for instance, the proportion of urban population has increased from 72.6% in 1960 to an incredible 90.5% in 2010 (GSS, 2013). The resultant effect of this increase has led to the scramble for land for residential building and also for waste disposal. As far as the rate of urbanization continues to rise and strategies to remedy the challenges do not keep pace with the rise, the problem of indiscriminate waste disposal will continue to be a topical issue (Owusu-Sekyere et al., 2013)

In Accra for instance, refuse generation is estimated to have increased three-fold over the last two decades, due to factors already stated above (WaterAid & European Union, 2008) which is putting tremendous pressure on existing solid waste disposal facilities. However, city authorities lack the financial and technical resources to keep pace with the challenges associated with huge amounts of solid waste (Ogwueleka, 2009).

In Ghana, evidence shows that some proportion of solid waste generated are not collected and thus end up in open spaces and drains (Monney et al., 2013). The effects of this phenomenon are threatening both human life and the environment. These repercussions range from flooding, water pollution, the spread of diseases and ugly sights of stinking and pest-infested piles of solid waste in some parts of urban areas (Boadi & Kuitunen, 2004; Puopiel, 2010). Studies have shown that, in Accra and Kumasi, the two largest cities in Ghana, over 3,000 tons of solid waste is generated daily out of which approximately 70% is collected (Anomanyo, 2004; Ketibuah et al., 2004). In Accra alone, as of 2009, statistics by the Accra Metropolitan Assembly showed that of the approximately 2,000 metric tonnes of waste generated daily, only 1,200-1,300 tonnes were properly collected (AMA, 2009). In other urban areas like Tamale, Puopiel (2010) concluded that only 27% of the 810 tons of waste generated daily is collected. This tends to portray that challenges still exist in solid waste collection in the country in spite of the fact that various private waste collection companies have been contracted to augment government's efforts in this regard (Puopiel, 2010).

There are various strategies of managing waste. It can be dumped into landfill sites or destined for composting, incineration or recycling (Gouveia and do Prado, 2010). In Ghana, majority of the waste is dumped into landfill sites. In a general manner, landfill sites can be classified as sanitary, controlled and open. Sanitary landfills use technologies that minimize the environmental impact and possible risks to human health. For example, the ground may be

impermeabilized to avoid infiltration by percolating liquids. In controlled landfills, the garbage is merely covered with earth, without any measures for collecting and treating leachate and biogas. In open dumps, the deposition of waste does not follow any operational standards and is done in the open air (Gouveia and do Prado, 2010). Ghana practice open landfill strategy and many studies have shown that there are major considerable adverse risks to people who live close to landfills.

In Ga-East Municipal Assembly, like many other assemblies in urban Ghana, due to the increasing population pressure on land, many people have in recent times have acquired lands close to landfill sites and putting up residential buildings without taking into consideration its adverse effects.

1.2 Problem Statement

The increasing urban population coupled with poor management of urban solid wastes has made many residents to live close to dumpsites. Unfortunately, landfill sites have been considered to be a potential source of human exposure to toxic substances. The main routes for human exposure to the contaminants present in landfill sites are through dispersion in the ground and in contaminated air (Ward, Williams & Hills, 1996) and through percolation and seepage of leachates (El-Fadel et al., 1997).

Studies using geographic or spatial approaches have suggested that there is an association between living close to solid waste dumps and health-related effects (Pukkala and Pönkä, 2001; Gouveia and do Prado, 2010). Higher risk of liver, stomach, lung, prostate, kidney and pancreatic cancer and of non-Hodgkin lymphoma has been reported among individuals living close to such dumps (Goldberg et al., 1999; Pukkala and Pönkä, 2001; Gouveia and do Prado, 2010). Other studies also found associations with adverse outcomes from pregnancy, such as occurrences of congenital abnormalities, low birth weight, abortion and neonatal death (Elliott et al., 2001; Palmer et al., 2005; Elliott et al., 2009). Aside the health aspects, other studies have also examine the effects of landfill sites on the landed properties close to it. The results of the findings showed that environmental nuisances such noise, smoke, fire, odor from landfill sites reduced the economic value of housing properties (Nelson et al., 1992; Lim and Missios, 2007), especially in areas such as Ghana, where landfills are poorly managed (Boadi & Kuitunen, 2004; Puopiel, 2010; Owusu et al., 2014). Empirical study conducted in Ghana has shown than landfills do depress the value of nearby residential properties (Owusu et al., 2014).

-Having acknowledged the hazard involved in living close to landfill site, the Ghana government passed the National Sanitation Policy to help manage waste disposal in the country. Under Government's Sanitation Policy (2002) regarding waste disposal/landfilling, authorities concerned are to 'acquire sufficient land and secure title with payment of due compensation for the land for immediate and future use and protect such acquisition by proper demarcation,

fencing etc. The goal of the policy is to acquire land for waste disposal whose location should not create safety hazards or aesthetic problems for the surrounding communities.

The Ga East Municipality had stone quarry sites located in the municipality, which was a major source of resource for the development of Accra Metropolis and was also utilized for the construction of the Accra-Cape Coast highway. The activities of the quarry sites created gaping holes that were abandoned and was later filled with rainwater that become breeding grounds for mosquitoes, a major catalyst in the cause of malaria. These craters also became death trap for children and people who are not familiar with these places. In a bid to overcome these problems and to reclaim the land back from the hazards of the quarrying that had taken place, in the 1990s, the authorities and stakeholders agreed to use solid waste generated from the metropolis to fill these holes. This initiative was meant to help manage the challenge with waste disposal into the metropolis.

However, there is evidence of many residential facilities around the landfill sites. The rapid population growth, urbanization and its associated real estate growth has led to a competition of the land around the landfills, located within a peri-urban area. The 2010 National Population and Housing Census put the Municipal Assembly's population at 198,220 with an inter-censual growth rate of about 4.2% and a density of 1,214 persons per sq km. This is much higher than the national density of 79.3 and the regional density of 895.5 persons per sq. km. This indicates a

great pressure of population on land, thereby making people to settle even close to dumpsite although they knew the health implication (GSS, 2013).

Many of the studies (Goldberg et al., 1999; Elliott et al., 2001; Pukkala and Pönkä, 2001; Palmer et al., 2005; Elliott et al., 2009; Gouveia and do Prado, 2010) that have tried to examine the effects of landfill site on residents living around it were conducted in the developed countries. There are however few studies that have been conducted in developing countries (Boadi & Kuitunen, 2004; Puopiel, 2010; Owusu et al., 2014) and though these studies have revealed some effects of landfills on residential communities, the findings are inconclusive. This study addresses this knowledge gap by exploring the effects of landfills on residents living around it in, using the landfill site at Pantang in Accra as a case study.

1.3 Objective of the Study

The main goal of this study is to assess the reason behind the development of residential housing close to the Abokobi dump-site and its effects on the people living close to the dumpsite. The specific objectives are:

1. To examine the reasons why people chose to live or continue to live close to the dumpsite,
2. To examine the benefits (if any) of the landfill to residents,
3. To assess the risks people living close to the landfill sites are exposed to,
4. To examine the measures put in place by the Assembly to mitigate the numerous challenges which residents near the dumpsite are facing.

1.4 Research Questions

The research questions are

1. Why do people choose to live or continue live close to the dumpsite?
2. How does landfill sites benefits communities around it?
3. What are the associated risks people living close to dumpsites are exposed to?
4. What are the measures put in place for the reduction of environmental hazards associated with the management and operation of the dump site in compliance with the National Sanitation Policy?

1.5 Rational of study

Governments and policy experts enact and pass into law certain policies with the aim of improving prevailing livelihoods. In the same vein, the Ghana government policy on sanitation was primary meant to improve sanitation management in the country. This was meant to ensure that any management practice that will be adopted by any Assembly will ensure that people's wellbeing are not affected.

The EPA has designed solid waste management guidelines for municipalities (Ghana Environmental Assessment Regulations, 1999 - LI 1652), and has equally established standards for design, construction and management of waste disposal system to protect health and the environment. The purpose of the guidelines is to assist the district assemblies and other relevant

stakeholders in the planning and management of waste. The EPA makes sure the District Waste Management Plan (DWMP) addresses all aspects of solid waste management in the district. The main rationale behind this study is to assess the extent to which Ga-East Municipal Assembly are complying with the EPA standards in the management of the Pantang Landfill.

The findings from this study will inform think tanks and the Ga-East Municipal Assembly and the government as to whether the agitation from the public towards the closure of the dumpsites are legitimate or not. This will invariably influence the next step of action the Assembly will take towards the management of the dumpsites.

Even though a few people are generically aware of some associated health effects of living close to dumpsites, majority have not been properly enlightened. It is partly for this reason that it is common to find many people (including children) living close to open landfill areas in Ga-East, just like other urban districts in Ghana. This study is therefore meant to create the awareness of the adverse effects of living close to landfill sites so as to reduce the incidence of many short and long term health effects and infections that emanate from living close to dumpsites.

Finally, it is hoped that the study will add to the search for a solution to the proper operation and management of dumpsites and landfills in Ghana, which is of great interest to policymakers, administrators and the general public.

1.6 Scope of the Study

The scope of a research study shows the range and area within which the research covered. Even though the study was conducted in Ga-East Municipal Assembly, it was restricted to Pantang, which is the community, where the landfill is located. The study area covered people who live within 200m from the dumpsites .

1.7 Limitations of the Study

No study can be free from research limitations. There are some common limitations that confront academic research of this nature. The commonest of it all is time and resource constraints. Academic researches for the award of any degree are conducted within a stipulated period of time and students are expected to put in all efforts to work within the time schedule. Due to the time constraints within which this study is to be completed, it affected the scope of the study. The study was therefore limited to those who were staying very close to the dumpsite (200m radius) and not all those staying in the community.

Aside time and financial constraints, the willingness of the people to respond to the questions was also a challenge. For instance, during the preliminary visits to the communities, in an interview with some of the affected people, they noted that people have periodically come to interview them on many occasions but nothing has been done about it. This therefore affects their willingness to corporate with the researcher as the situation is getting worse and it is anticipated to get much worse in the rainy season. Even though the aims and objectives of this study were clearly explained to them (as for purely academic purpose), many of them living

within the 200m radius still did not to give their consent to be interviewed. This reduced the sample size to 200 (those who agreed to be interviewed). This therefore was one of the major setbacks of the study. A focus group discussion was organized to offset the numbers that were to be missed as a result of those their refusal to interviewed.

Though these were the major challenges in addition to other challenges like language barrier, which impeded smooth communication, the research and personal skills the researcher adopted made him to overcome some of the challenges and minimize others. It must be stated that these challenges did not in any way affect the findings of the study.

1.8 Organization of Study

The research work is presented in five (5) chapters. Chapter one provides a background introduction to the research, the specific problem, which is the main concern of the study and the objectives and research questions the study seeks to address. The significance of the study as well as the limitation confronting the study is also presented in the first chapter as well as the structure of the work.

The second chapter reviews some relevant literatures on the subject. Much attention is given to the associated effects of living close to dumpsites. Chapter three presents the methodology for the study. This section is divided into two; the methods of data collection and analysis and the profile of the study area. The fourth chapter presents the findings and discussion of results and

the final chapter summarizes the main findings, draws conclusion and make recommendations for policy purposes.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter reviews relevant scholarly works that has been conducted around the world on the effects associated with residing close to dumpsites. Much of the sections in this chapter looks at the health and environmental effects of dumpsite to residences near it. Some attention is also drawn to the activities of scavengers, whose livelihood depend on dumpsites. Finally, the conceptual framework, showing the linkages and associations between the variables reviewed from literature is also presented in this chapter.

2.2 Location of Dumpsites

Waste or garbage is any material generated by human activity that is considered to be useless, superfluous, valueless or unwanted and is disposed of in the environment. After collection, this waste may be dumped into landfill sites or destined for composting, incineration or recycling. After solid waste has been dumped in landfill sites, it may compromise the soil, water or air quality because it is a source of volatile organic compounds, pesticides, solvents and heavy metals, among other substances (Gouveia and do Prado, 2010).

Dumping sites are the most common way of disposal of municipal solid wastes in the cities. Generally, they are found at the outskirts of the urban areas, turning into sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents (Mustafa, 1993). At dumpsites, the decomposition of organic compounds by micro-organisms is a common phenomenon. Most organic materials, such as food, wood products, or other remnants of plants, decay, and finally return to the environment in the form of simple compounds, such as carbon

dioxide, water, or ammonia (Mustafa, 1993). Interestingly, it was found that most synthetic organic polymers, including the majority of plastics, are extremely resistant to biodegradation. This phenomenon starts to create significant economic and environmental problems when landfills sites overflow with plastics. Due to this, Marc (2006) has recommended that the location of the dumpsites should be properly planned and managed to avoid risks to human health and the environment, at large. Corrective and management measures are likely to be expensive, complex, and pose serious threats to the environment and its habitants.

2.3 Solid Waste Management in Ghana

The responsibility for waste management is placed on Metropolitan, Municipal and District Assembly (MMDA‟s). By the Local Government Act (1993), Act 462 section 10 subsection 3 (d and e), MMDAs are mandated to initiate programs for the development of basic infrastructure and provide municipal works and services and also be responsible for the development, improvement and management of human settlements and the environment in the district. This means that all waste deposited in the public domain is the property of the District Assembly. The selection of a site for developing a dump site is therefore one of the most important decisions MMDAs make in executing their waste management responsibilities. They are further required to ensure that they make available adequate sites for the present and future storage, treatment and disposal of wastes by identifying, acquiring, demarcating and protecting suitable areas for such purpose (Environmental Sanitation Policy, 1999).

In Ghana, garbages are dumped into open drains, thereby creating not only a serious pollution problem, but also providing breeding places for disease carrying insects. Due to increasing awareness creation on environmental issues, communities are no longer willing to tolerate methods that in the past were quite readily accepted for final waste disposal. District Assemblies

are responsible for managing and protecting the environment so as to prevent hazards to human health, conserve natural resources and maintain pleasant surroundings (Adu-Boahen, 2012).

Oduro (2004) noted that solid waste management practices in Ghana have been beset with problems of health concerns for the citizens. The main solid waste management practices have been the use of uncontrolled to semi-controlled open dumps. These dumps have been of environmental concern with respect to the nuisance they created and continue to create. He went further to state that the dumps are the sources of pollution to the very ground water systems which are used by most of the citizens and the repercussion of such management practices has been poor health. Malaria, diarrhea, and intestinal worms and upper respiratory tract infections are among the most frequent health problems reported at outpatient facilities in the country; with seasonal epidemic outbreaks of cholera. Diarrhea, dysentery, intestinal parasites (worms), typhoid and cholera are all caused by poor disposal of solid waste.

2.4 Residential Development around Landfill sites

In many developing countries like Ghana, it is very difficult to find engineered landfill sites, especially in areas where rapid urbanization and urban growth have outpaced the capacity of municipal authorities' waste and sanitation management (Mensah & Larbi, 2005; Fobil, Armah, Hogarh, & Carboo, 2008; Owusu, Oteng- Ababio, & Afutu-Kotey, 2012). Ghana is undergoing rapid urbanization with serious consequences for the provision of basic services, including sanitation and proper waste management, particularly in large cities and towns (EPA, 2002; ISSER, 2007). The poor infrastructure and weak capacities of MMDA authorities has accounted for this societal menace, especially in the largest city and national capital, Accra (Ayee & Crook,

2003; Crook & Ayee, 2006; Mensah & Larbi, 2005; NLO, 2009). Although efforts are therefore been made to construct engineered sanitary landfill in cities such as Kumasi, Sekondi-Takoradi and Accra, their capacities are very small relative to the quantity of wastes generated daily in these cities (Owusu et al., 2014).

The siting of landfills in Ghana have often times been met with conflicts and protests from both residents and civil society organizations (Owusu et al., 2012). The conflicts according to Owusu et al usually emanate from the fact that in peri-urban areas, where there is already intense competition over land, the citing of landfills close to residential facilities will cause negative health and environmental impacts on adjacent neighborhoods. There is therefore the fear that the lives of residents will be endangered with the presence of the landfill site.

Evidence in literature shows that, all things being equal, certain environmental characteristics can decrease the physical features of housing properties (Nelson, Genereux, & Genereux, 1992; Owusu et al., 2014). Empirical studies have shown that landfills do depress the value of nearby residential properties (Owusu et al., 2014). Some of the environmental features include noise level (especially from vehicular, rail, and air traffic), ambient air quality, and perceived general landscape conditions. According to Nelson et al. (1992) and Lim and Missios (2007), prospective residential property owners or renters tend to equate landfill proximity and size with diminished environmental and life quality in nearby neighborhoods.

There is an on-going debate concerning the effect of landfill sites in landed properties. There are some findings which suggest negative effects, while others indicate no significant effects or even positive effects on property values (Bleich, Findlay, & Michael Phillips, 1991; Mundy, 1992; Nelson et al., 1992; Parker, 2003; Owusu et al., 2014). In the work of Bleich et al. (1991) they

found that landfills, if well designed and managed, can be a good neighbour and have no statistically measurable negative impact on surrounding property values. In Ghana and many other parts of developing, such well-designed and engineered are rare and therefore studies such as Owusu et al. (2014) have found a negative effect on surrounding residential properties.

Within the debate on landfills and property values, researchers have been drawn to three key interrelated issues: landfill and distance, landfill size, and nearby communities' level of exposure to or enclosure by landfills (Owusu et al., 2014). Regarding distance, some scholars have posited that houses or properties located closer to a landfill will sell at a lower price than similar houses located farther away (Ready, 2005). However, other studies have found no statistical relationship between landfill proximity and house price (Bouvier, Halstead, Conway, & Manalo, 2000; Parker, 2003).

Secondly, the size of a landfill has been found to have significant on nearby property values (Owusu et al., 2014). The hypothesis is that larger landfills tend to be associated with greater external effects, resulting from a higher volume of waste trucks, larger parcel of land used, and a longer period of post-closure stabilization, which all have greater negative impacts on the natural environment and human health (Lim & Missios, 2007). Third, it has been noted that property values tend not to be affected when a natural or an artificial barrier separates a community from the landfill (Owusu et al., 2014). Thus, landfills that are location-restricted, operate out of view of nearby communities, and are well managed (such as having lower levels of odor, blowing debris and seagulls) are unlikely to impact property values negatively (Owusu et al., 2014)

2.5 Benefits of Landfill Sites to Residents

Despite the enormous health and environmental effects of landfill site to inhabitants around, it offers some form of benefits. In Ghana, the construction of the Dompoase landfill in the Kumasi Metropolitan Area of Ghana, has been described as a 'blessing' because it is considered the most feasible option from the point of view of costs and level of environmental impacts (Owusu-Sekyere et al., 2013a). The project is seen as a panacea to the waste management problems in the Kumasi Metropolis. It has been a source of livelihood to peri-urban agriculturalists that use the fertile lands on the fringes of the landfill despite the much anticipated negative environmental and health effects. The agronomic benefit of the Dompoase Landfill was evidenced by the steady increase in the land area under cultivation and total output since the landfill became operational. The fringes of the landfill are flourishing with agricultural activity. There is further evidence that also suggest that agriculture already occupy up to 85 percent of the fringe area of the site, employ over 500 people (mainly farmers, labourers and traders), and has become an important centre for the supply of urban fresh vegetable needs in the Kumasi Metropolis (Owusu-Sekyere et al., 2013a). Added benefits, including the provision of employment, reduction in the cost of food brought about by removal of the cost transportation element in the price build up and diversification in local food sources resulting in more secured supply (Osumanu, 2009).

According to the director of the Waste Management, the Dompoase project can produce 30 megawatts of energy if properly managed (Owusu-Sekyere et al., 2013a). It has been found that the methane generated from the waste can be used to produce gas for 20 or more years, depending on the landfill characteristics (Goldstein, 2006). Currently, the landfill has gas collection systems. The idea is that the authorities can drill small wells and install compressors and pipes to remove the gas. The gas will be collected in the pipes and then channeled to a

central collection point, where it may be treated to remove contaminants and moisture (Owusu-Sekyere et al., 2013a). The energy opportunities are yet to be fully realized from the landfill site.

One group of people who also derive their livelihood from dumpsites are scavengers. Scavenging is the uncontrolled picking through waste to recover useful items. In most cases, scavenging is done by either people who live close to the dump site or people who have moved to settle in makeshift tents near the dump and earn their livelihood through the sale of recyclable materials. Scavengers therefore play an important role since they collect reusable and recyclable materials, increasing the longevity of the dumpsite and thereby reducing the pressure on urban land use (Adu-Boahen, 2012).

Scavenging has been and still is a common activity that takes place in the informal sector in many developing countries although in some developed countries, it is strictly prohibited (Oduro, 2004). Scavenging for plastic wastes and scrap metals have become a lucrative business for many residents at Dompoase and the surrounding communities as a result of the monetary incentives that come along with it (Owusu-Sekyere et al., 2013b). The survey showed that scavengers are paid GH¢8,000.00 for 10 tons of scrap metals and 25Gp for 1kg of plastic waste collected. On the average, some individual collectors are able to make over GHS40.00 a day, which is higher than the nominal minimum daily wage of GHS4.48 in Ghana (Owusu-Sekyere et al., 2013a). Several companies have been established in Kumasi, Accra and Tema to recycle plastic wastes and scrap metals and they depend largely on scavengers for raw materials. Some of these companies are Clamonia Limited located at Amanfrom, a suburb of the KMA, which employs over 80 workers, and has the ability to recycle 18,000 tons of plastic waste a day; Tema Steel Company, the largest producers of iron rods and fabricated metals in Ghana, employs

thousands of Ghanaian workers; and Blowplast Limited among others (Owusu-Sekyere et al., 2013a).

The Ghana Landfill Guidelines (2002), argued out strongly that scavenging is unavoidable at dump sites/ landfill sites in developing countries and therefore should be rather organized as an auxiliary activity. For aesthetic reasons, scavenging can be confined to a specific area of the waste dump facility so that they do not interfere with normal operations.

2.6 Negative Effects of Landfill

Notwithstanding the enormous socio-economic potentials landfills offer to the communities in particular and the nation as a whole, they have often been described as a 'curse' by the communities due to its impact on health and the environment (Owusu-Sekyere et al., 2013a). This description has largely been the case because of poor maintenance of the site by city authorities. This section broadly divides the effects into two: health and environmental effects. These two both affect residents' livelihoods.

2.6.1 Health Effects

Earlier studies that have been carried out in advanced countries such as Great Britain have raised concerns about possible excess risks of bladder, brain and hepatobiliary cancers and leukaemias among residents living near landfill sites. Griffith et al. (1989) found that the harzardous components of landfill waste are more likely to cause cancers in bladder, stomach, large intestine and rectum. Mallin (1990) found possible cancer in the Bladder; Goldberg et al. (1995, 1999) found possible cancers in the stomach, hepatoibiliary, lung and cervix cancers; Williams and Jalaludin (1998) found possible cancers in the brains; and Lewis-Michl et al. (1998) also found high excess risk of cancer in the bladder and leukaemia especially among women who live close to landfill sites. Laboratory experiments also have shown that environmental toxicants emanating

from landfill sites may accumulate in the liver and biliary tract leading to some excess risks of liver cancer (Elliott et al, 1996, 2000; Vrijheid, 2000).

A wide range of waste degradation products may be released into the environment from landfill sites. Gaseous releases include primarily methane and carbon dioxide as well as smaller quantities of hydrogen sulphide, VOCs and metal vapours (Zmirou et al, 1994; Hamar et al, 1996; Ward et al, 1996; Jarup et al., 2002). Several of these compounds, such as benzene and cadmium are classified as carcinogenic to humans by the International Agency for Research on Cancer (IARC) (Jarup et al., 2002). Human exposure to these releases potentially occurs via inhalation of polluted air, ingestion of contaminated water, or skin contact with contaminated water or soil. A recent WHO report suggested that any potential exposure is likely to be limited to 1 km from landfill sites by the air pathway, and 2 km by the water pathway (WHO, 2000).

In Ghana, Coffie (2010) examined the effect of the Oblogo waste landfill site on the people living around those communities and found that due to the location of the landfill sites and how it is been manage in the communities, there is high prevalence of infectious diseases like malaria, cholera, diarrhoea, typhoid fever among others. At the Dompoase Landfill in the KMA of Ghana, it was found that there are increased prevalence of self-reported health symptoms such as fatigue, sleepiness, and headaches among residents near the landfill site were consistently reported (Owusu-Sekyere et al., 2013a).

2.6.2 Environmental Effects

Many environmental effects have been found in literature to be associated with landfill. One of the major environmental nuisances is windblown papers and litters. In an era where most of the waste produced especially in developing countries have a high constituent of paper and plastics, poor litter control is particularly offensive to neighbours (Rushbrook and Pugh, 1999). Landfill sites in Ghana like many other parts of the developing countries have been found to contain a high amount of plastic bags and other papers, which are blown about by the wind. At the Oblogo landfill site, the windblown litter makes the area unsafe and creates unsightly conditions in the environment. The litter and plastics make parts of the towns very untidy and unhygienic (Coffie, 2010).

Another environmental nuisance is odor. Odor in dump sites come from a number of different sources and some of these are gases, fresh refuse, malodorous chemicals, agricultural and sewage sludge (Adu-Boahen, 2012). Odorous emissions are usually accompanied by reports of ill-health from communities. At Dompoase Landfill, individuals reported a wide range of non-specific health symptoms, attributing these to odour exposure, including nausea, headaches, drowsiness, fatigue and respiratory problems (Owusu-Sekyere et al., 2013a). Coffie (2010) found that unhealthy odor emanates from the Oblogo landfill sites and spread into the residence of the people living in the communities around Weija. Some odor also comes out from the leachate from the waste. Some scholars believe that individual responses to odors are highly variable and are influenced by many factors including sensitivity, age and prior exposure to the odour (Macklin, Kibble & Pollitt, 2011).

Odors cannot be eliminated in an open dump especially where there are no designated areas for dumping and cover for food waste. Odors are carried to areas several kilometers away from the

dumpsite especially during the cool hours of the night. Normally, complaints from the public due to odorous emissions from municipal waste, especially people who live close to dumpsites or who use nearby land or roads, are increasing significantly in many developing countries. At Kojokrom, odor is one of the main complaints made by residents in the communities that are close to the dumpsite. The odor is as a result of the high composition of organic waste in the total waste collected and the absence of waste segregation (Adu-Boahen, 2012).

Dumpsites also harbor flies and vermin, creating a high level of environmental nuisance. Vermin and other pests are a potential public health risk and should not be allowed to breed in dumpsites (Adu-Boahen, 2012). According to Rushbrook and Pugh (1999), the abundance of these birds, vermin, rodents and flies around dumpsites, is a clear indication that the waste is not being managed properly. Flies and mosquitoes are two types of insects that can be found in landfill sites in Ghana and these two insects are a great source of many diseases (Adu-Boahen, 2012). Flies spread many food borne diseases, by carrying bacteria from the waste to food. Mosquitoes, on the other hand, breed in water that collects in depressions on the landfill surface and in unconpacted and uncovered wastes such as piles of tires and other bulky items. Mosquitoes are known to carry diseases such as encephalitis, dengue fever and malaria. Rats and other rodents spread diseases such as rabies, rat-bite fever, leptospirosis, typhus, and bubonic plague (Adu-Boahen, 2012). Observations made around and within the living environments of Dompoase revealed huge presence of flies in the kitchen and toilet areas. This presented a risk of exposure to food and drinking water. The presence of insects in the community was a source of worry, as they were perceived to be the carriers of the disease causing organisms (Owusu-Sekyere et al., 2013a).

Other environmental nuisances are poisonous gases, fire, dust, leachate and noise. Studies have shown that when high dust events occur, people with preexisting respiratory conditions (e.g., asthma, bronchitis, chronic obstructive pulmonary disease (COPD), etc) could suffer adverse reactions (U.S Department of Health and Human Services, 2003). Waste dump gas and leachate also contribute to long-term effects by polluting air, water and land. Most fires, though may be caused by landfill gas igniting itself, may also be caused by fire in waste transported from collection points in towns and cities due to hot ash deposited in central communal containers. Fire at dump sites is a major complaint by people living in nearby communities because of its attendant smoke nuisance including ash and particulate matter (Adu-Boahen, 2012). Coffie (2010) observed that at the Oblogo landfill site, smoke from the burning of refuses at the landfill sites spread to the residence and noise from vehicles bringing solid waste to the landfill sites for disposal was very high and unbearable for residents.

2.7 Conceptualization of Residential development around dumpsite

The focal problem this study sought to address was to research the reasons why people choose to live very close to dumpsites regardless of the numerous health implications documented. The study also sought to find out if there were some benefits derived from living close to dumpsites. Looking at the location of the dumpsite (peri-urban area) and the period the place was turned into a dumpsite (1990s), there will be people already residing in that vicinity and others also moved in to live there after the place has been converted into a dumpsite. In examining the underlying drivers as to why people continue to stay or relocate to live near a dumpsite, there are immediate and root causes that compel them to live there. Some of the main immediate causes are the lack of institutional control over housing developments, cheap or affordable accommodation around the area, proximity to the place of work, promise of the Assembly to the people that they will

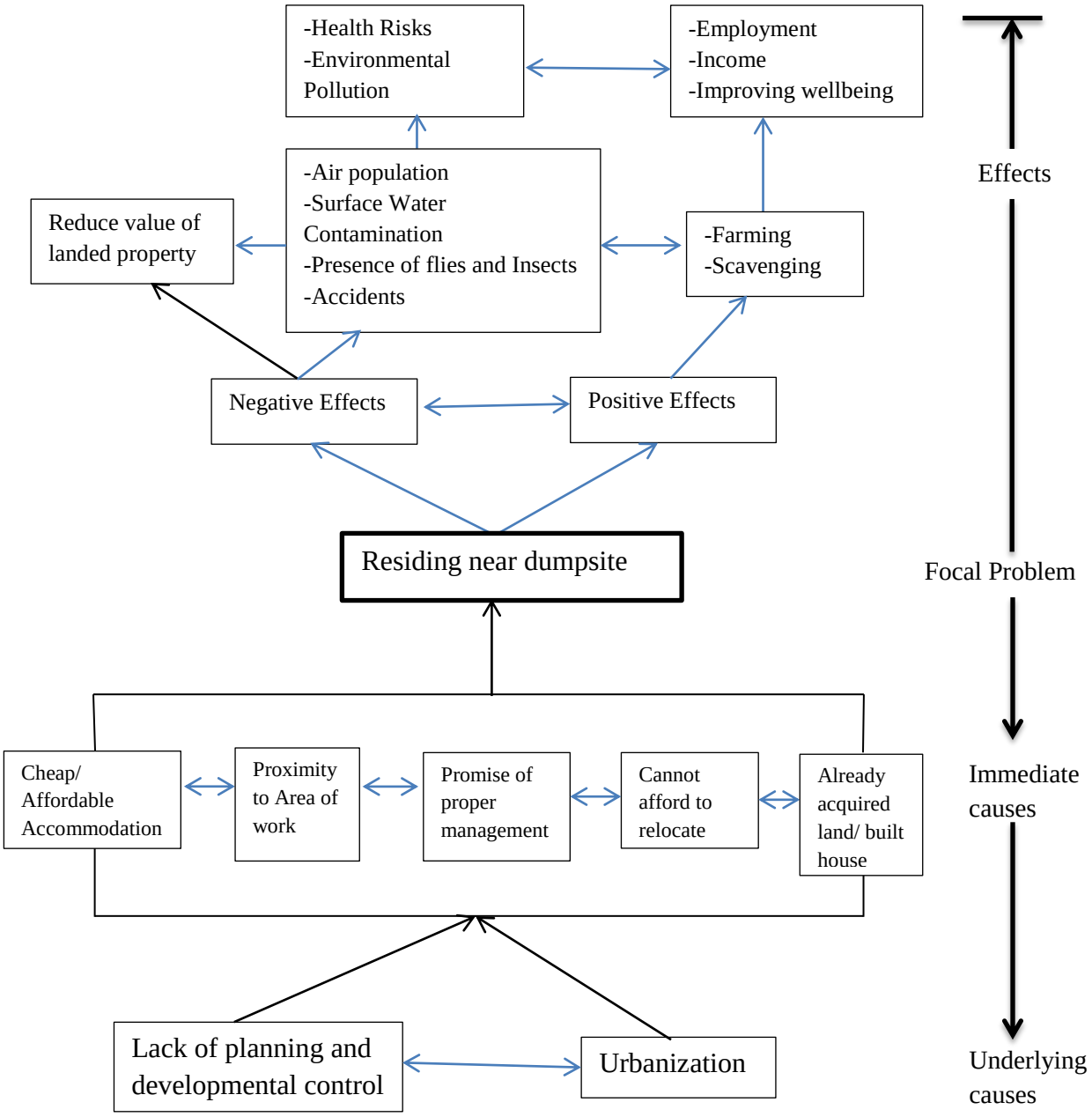
properly manage the site that it will not pose any challenge to them. Another important immediate cause is that some people might have acquired their land or built their house already. There are some who also just cannot afford to relocate due to economic reasons or perhaps they have lived there all their lives.

However, there are two underlying causes, which are the near absence of planning and developmental control and increasing urbanization. These two factors drive urban residents to reside in areas which may even pose challenges to their lives.

The dumpsite offers both positive and negative effects to people living close to it. On the positive side, the dumpsite offers two opportunities two people living around it; agriculture and scavenging. Thus, when the organic wastes get rotten over time, they make the land very fertile, thereby encouraging agricultural activities around the fringes of the dumpsite. Like many dumpsites in Ghana, people are expected to earn livelihood by scavenging metal and plastic from the dumpsites. On the other hand (negative effects), the nuisances of odor, smoke, leachate, flies/pest/insects are expected to threaten the health of the people as well as pollute the environment (air and water pollution). Both risks are expected to affect the livelihood of the people.

Evidence from literature (e.g. Nelson et al., 1992; Lim and Missios, 2007; Owusu et al., 2014) has also shown that the location and environmental setup of a building affect its value. Hence, a landed property like a house is more likely to reduce its value when located close to a dumpsite as compared to those located far away. Therefore, prices of accommodation around the dumpsite are expected to be far cheaper as compared to those located at a place, which is not a dumpsite.

Figure 2.1: Conceptual Framework



Source: Author's own construct, 2015

Urbanization in Ghana, has picked up a considerable momentum over the last two decades. Rapid urbanization over the past decades has resulted in high population concentration in major Ghanaian cities, thereby increasing pressure on land and other urban infrastructure and services (Owusu-Sekyere et al., 2013). However, city authorities lack the financial and technical resources to keep pace with the challenges associated with huge amounts of solid waste (Ogwueleka, 2009), coupled with poor infrastructure and weak capacities of MMDA authorities has accounted for this societal menace, especially in the largest city and national capital, Accra (Ayee & Crook, 2003; Crook & Ayee, 2006; Mensah & Larbi, 2005; NLO, 2009).

There is evidence of many residential facilities around landfill sites. The 2010 National Population and Housing Census put the Ga East Municipal Assembly's population at 198,220 with an inter-censual growth rate of about 4.2% and a density of 1,214 persons per sq km.. This indicates a great pressure of population on land, thereby making people to settle even close to dumpsite although they knew the health implication (GSS, 2013).

Living close to dumpsites have both Positive and negative effects. Studies using geographic or spatial approaches have suggested that there is an association between living close to solid waste dumps and health-related effects (Pukkala and Pönkä, 2001; Gouveia and do Prado, 2010). Higher risk of liver, stomach, lung, prostate, kidney and pancreatic cancer and of non-Hodgkin lymphoma has been reported among individuals living close to such dumps (Goldberg et al.,

1999; Pukkala and Pönkä, 2001; Gouveia and do Prado, 2010). Aside the health aspects, empirical study conducted in Ghana has shown than landfills do depress the value of nearby residential properties (Owusu et al., 2014).

It can be a source of livelihood to peri-urban agriculturalists that use the fertile lands on the fringes of the landfill despite the much anticipated negative environmental and health effects.

Scavenging for plastic wastes and scrap metals on dumpsites have become a lucrative business for people.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The methodology section of this work is structured into two. The first section presents the procedures used for data collection and analysis for the study. The second section presents the profile of the study area; Ga-East Municipal Assembly. The chapter specifically looks at the justification for the use of both qualitative and quantitative designs for the research, study population as well as the sample size and sampling method. It further elaborates on the methods used for the data collection and analysis. The chapter concludes by considering the ethical issues that the researcher undertook in order not to violate the rights of the participants.

3.1 Research Design

The design of the research is basically the roadmap showing how the study will be collected and analyzed. This study used a mixed research design in collecting and analysis data. It combines both qualitative and quantitative research methods in gathering and analyzing the data. According to Wisdom and Creswell (2013), mixed method "refers to an emergent methodology of research that advances the systematic integration, or "mixing," of quantitative and qualitative data within a single investigation or sustained program of inquiry".

Quantitative research approach

The quantitative approach, with proper sampling, allows for the measurement of many subjects' reactions to a set of questions. Because each question has a limited set of answers, the results can be compared and analyzed statistically (SEEP-AIMS, 2000). Thus, quantitative methods are

standardized, systematically obtaining succinct responses from as many clients as possible. Under the quantitative research design, a survey was conducted to administer structured questionnaires to the people living close to the Pantang landfill site. Another structured questionnaire was administered to the Assemblyman of Pantang.

Qualitative research approach

Qualitative methods provide the context against which to more fully understand those results. They capture what people have to say in their own words and describe their experiences in depth. Qualitative data provides the texture of real life in its many variations; it gives insight into the reasoning and feelings that motivate people to take action (SEEP-AIMS, 2000). Thus, a qualitative approach provides greater richness and more detailed information about a smaller number of people

Under the qualitative research design, two focus groups were conducted with landlords and squatter (who are also scavengers), who live close to the dumpsite. The Ga-East Municipal Assembly Environmental Officer was also engaged in an in-depth interview. This was to enable an in-depth understanding of the efforts the Assembly is making to resolve the challenges facing the residents around the dumpsite.

3.2 Study Population

The people living close to the dumpsite served as the population from which the effect of the dumpsite on livelihood was assessed. However, the study was limited to only residents living within a range of 200m from the dumpsite. Some of the studies that have examined the effect of dumpsites on residents have used even a larger radius such as 1km to 2km radius from the

landfill (Coffie, 2010; Owusu et al., 2014). This study however limited the distance because many people were found living very close (within 200m from the dumpsite), majority of who are scavengers living in squatter buildings (such as kiosk and other improvised structures).

The Officials (Assemblymen and the Environmental Officer) on the other hand served as the key resource persons responsible for managing the site not to pose threat to lives. The analyses of the view from both parties enabled a holistic understanding of the subject under study.

3.3 **Sampling and Sampling size**

There are two types of sampling methods used in research. These are the probability and non-probability sampling. Whereas in the probability sampling methods, the size of the population constituting the sampling frame is known, the size or frame of the population is unknown in the non-probability sampling method. Both methods were used in sampling respondents. Stratified sampling method was used under the probability sampling technique whiles convenience and purposive sampling methods were used under the non-probability sampling technique. The details these techniques as used in the study are described below.

In this study, the survey target considered are those living close to the dumpsite (Pantang). According to the district profile, the total population of the residents of Pantang Village is 1,018. However, not all these people live close to the landfill site. Whiles some live very close (less than 200m) to the dumpsite, others live far away (over 5000m) from the dumpsite. Therefore, to use the population of Pantang as the frame for sampling will be wrong.

The researcher therefore adopted a stratified sampling method to sample the respondents. Under this method, the community (Pantang) was divided into strata using distance from the dumpsite. The community was divided into 3 strata namely: those living within 200m from the dumpsite;

those living from 200m to 1000m from the dumpsite and those living more than 1000m from the dumpsites. Those within 200 radius from the landfill sites were described as highly affected zone, between 200m and 1000m radius from landfill sites were described as moderately affected zone and more than 1000m was described as not affected zone.

This method is similar to what some other scholars used to examine the same subjects in other areas. For instance, Jarup et al. (2002) in their study of "Cancer risks in populations living near landfill sites in Great Britain" use distance to landfill sites to stratify the population. Abdul (2010) in his study on "Environmental and Health Impact of Solid Waste Disposal at Mangwaneni Dumpsite in Manzini: Swaziland" also divided households into strata based on their distance to the landfill site.

Since the population in each strata is not known, the method for calculating sample size from an unknown population was used to scientifically get the sample size. The formula is given as:

Sample Size = $(\text{Z-score})^2 * \text{StdDev}*(1-\text{StdDev}) / (\text{margin of error})^2$

The z-score which is the confidence level of 95% will give a Z-Score = 1.96StdDev, which is the standard deviation, varies but since the survey has not been conducted, the safe decision is to use 0.5. According to Smith (2014), 0.5 is the most forgiving number that ensures that the sample will be large enough.

The margin of error (confidence interval) is +/- 5%

Putting all together, $= [(1.96)^2 \times .5(.5)] / (.05)^2 = 384.16$

Convenience sampling method was used to sample the respondents. That's, those who were available at the time of the research were interviewed. No one was forced to answer the

questions unless those who were available and willing to participate in the research were interviewed.

However, during the data collection, the researcher was much interested in those who were severely affected by the dumpsite. There was a great difficulty in getting the entire 384 respondents. The number that refused to be interviewed were mainly the ones that lived within 200 meters to 1000 meters from the dumpsite. The people living within this radius had been taken to court by the Ghana Post Company who is contesting ownership of that portion of land saw the exercise as a ploy by the Ghana post to get vital information that could be used against them in court. Another section were not willing indicating that many individuals and institutions, including the Assembly and other educational bodies and students periodically come to interview them but nothing has been done about the dumpsite. Those who were available and willing to be interviewed were 200.

3.4 Focus group discussion and In-depth Interview

Two focus group discussions were conducted; one with landlords and one with squatters. The reason for interviewing landlords was first of all to offset the numbers that refused to part take the questionnaire survey, and also ascertain an in-depth information on why they decided to build close to the dumpsite, knowing that it has health implication. It was also to ascertain the efforts they have made to report the challenges they were facing to the Assembly. Many squatters, who are mainly scavengers were found living very close (less than 50m) from the dumpsite. The focus group discussion was to also ascertain why they have chosen to live such close to the dumpsite, the challenges they face, and the benefits (if any) of the dumpsite to them.

For the focus group discussion, the respondents were conveniently selected. Thus, they were asked to join the discussion and those who were available and willing joined but many angry ones did not. A total of seven landlords participated and thirteen (13) squatters participated in the focus group discussions. The Environmental Officer of Ga-East Municipal Assembly (GEMA) was purposively selected and engaged in an in-depth interview to ascertain the efforts the Assembly is doing to remedy the effects of the dumpsite on the people living around it.

3.5 Data Collection

For the survey, a structured questionnaire was designed to elicit information from the respondents. With semi-structured questions, it has both close and open-ended questions. The open-ended questions enable the respondents to explain some of the questions where necessary as a way of clarity. After the respondent has been selected, the researcher explains the purpose of the study to him/her and asks for his/her consent to administer the questionnaire. In some cases, where the respondent did not understand English, the questions were translated to Twi and Ewe. Where the Twi and Ewe language too was a challenge to be understood, an interpreter was sort to translate to either Ga or any other language(which the respondent understands).

For the focus group discussions, an interviewer guide was developed to guide the interview and discussions. A set of questions were listed which enabled the researcher to also ask follow up questions. With the permission of the participants, tape recorders were used to record the conversation. For confidentiality reasons, the respondent's names were not included in the study.

An interview schedule was booked with Environmental Officer at his own convenience. During the interview, tape recorder was used to record the conversation after his permission has been sought. This was to ensure that no vital information is lost.

During the study, observations were also included as a qualitative approach to gather data. The research observed the smoke and sting from the landfill site affected those living close to it and their reactions to it.

The study also made use of secondary data which were mainly the reviewed work of other scholars who have conducted extensive study on the subject. The secondary data were sourced from books, articles, and other internet sources. The references are duly cited.

3.6 Data Analysis

After the data was gathered from the survey, the responses were inputted into Statistical Package for Social Sciences (SPSS) software for analysis. The main analysis technique used was descriptive statistics. Using this method, the result, tools such as tables, frequencies, percentages were used to present some descriptive analysis of the responses. Crosstab analysis was also used to examine the nature of the associations between the variables, especially distance and effect on livelihood. Where appropriate a chi-square analysis of interdependence was conducted to examine the strength of the associations.

For the qualitative data, the recorded information were transcribed. After transcription, a content analysis method was used in the presentation of the findings. This method, also known as thematic analysis, enabled the researcher to directly quote the statements of respondents under various and relevant themes under discussion.

3.7 Ethical Considerations

To begin with, introductory letter from Institute of Statistical Social and Economic Research (ISSER) was given to the Municipal Chief Executive Officer of GEMA to seek for permission to conduct the study in the Municipality. After permission was granted, copies of the letter were

given to the Assemblyman, Municipal Environmental Officer and the Municipal Waste Management Officer.

Another ethical issue that was adhered to was informed consent. All the participants were informed about the purpose of the research. It was made known to them that the research is solely for academic purpose and there are no known risks involved in one's participation.

Voluntary Participation is another ethical issue that was adhered to by the researcher. Participants were not forced to participate in the research. In fact, they were selected based their willingness to participate in the study. They were also informed about their freedom to withdraw from the study at any point in time where they fill the questions are not convenient for them.

Another important ethical issue that was strictly considered was confidentiality. Participants were assured that their information will not be disclosed to anyone and for that matter their names and identity will not feature in the research. Disposal of information was also considered. The researcher assured the participant that all information relating to them will be destroyed after the work has been accepted by the Graduate School.

Finally, all references and information sources have dully been acknowledged in the work.

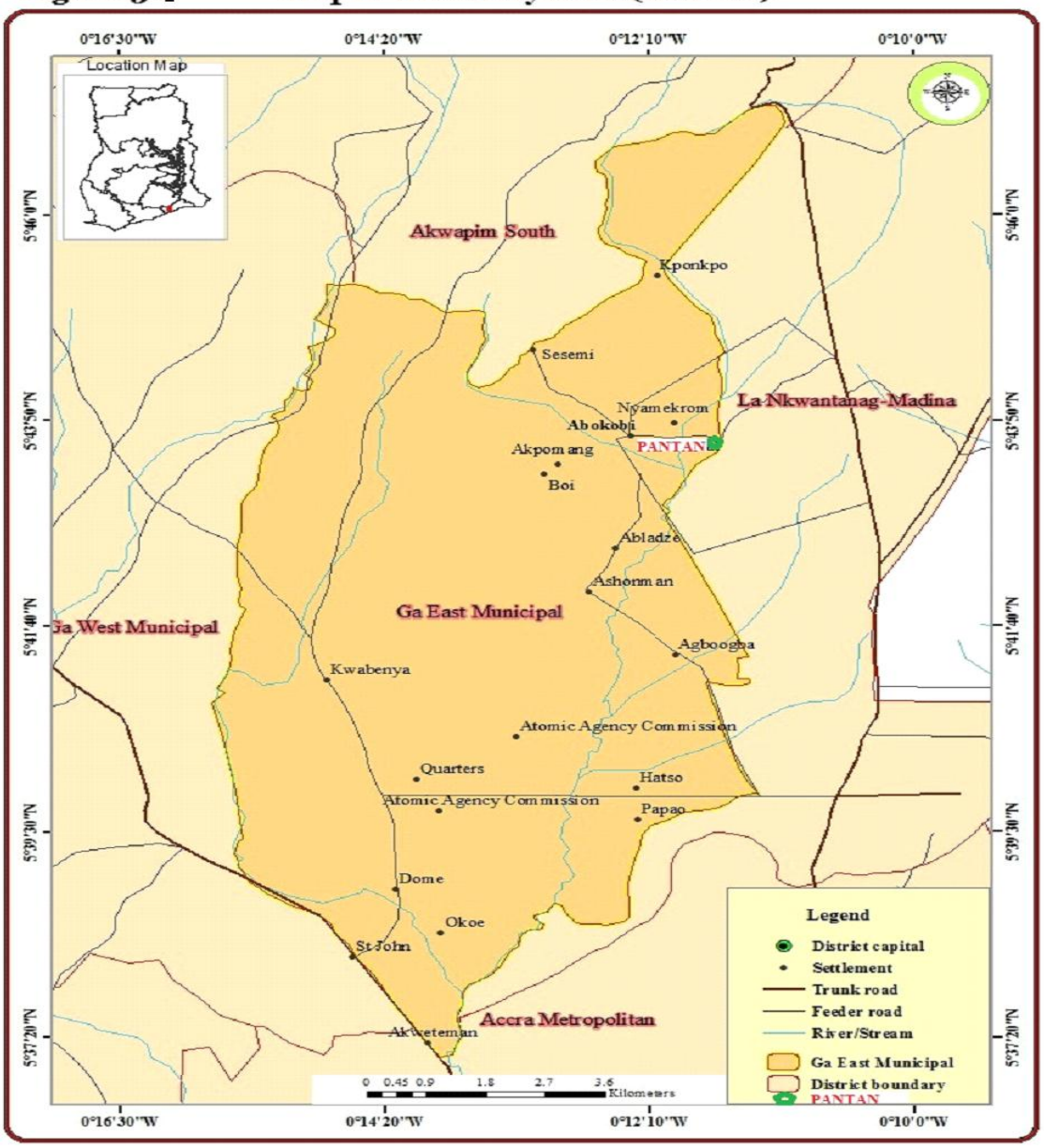
3.8 Profile of the study area

3.8.1 Location and Size

The Ga East Municipal Assembly is located at the northern part of Greater Accra Region. It was created in 2004 and re-demarcated in 2014. It covers a Land Area of 166 sq km. It is boarded on the west by the Ga West Municipal Assembly (GWMA), on the east by the Adentan Municipal

Assembly (AdMA), the south by Accra Metropolitan Assembly (AMA) and the north by the Akwapim South District Assembly.

Figure 3.1 Map of the Study Area (Ga East)



Source: Ga - East Municipal Assembly, 2013

3.8.2 Population Growth

The 2010 National Population and Housing Census put the Municipality's population at 259,668 with an inter-censual growth rate of about 4.2%, comprising of 127,258 males and 132,410 females. It has a household population of 252,914 with 66,286 households and a household size 3.8. The growth of the population is mainly due to the influence of migration inflows. The population is concentrated mainly along the urban and peri-urban areas of the municipality particularly along the border with AMA to the south. These include Dome, Taifa and Haatso just to mention a few.

The urban/peri-urban population constitutes 87.5% (227,172) of the municipality's total population with the remaining 12.5% (32,496) residing in the rural portion towards the Akwapim Hills. The municipality can therefore be described as urban. Indeed the level of urbanization is above the national average of 43.4%. It is however important to note that the urban population resides in about 65% of the total land area of the municipality. This indicates a densely populated urban area with its associated pressure on social infrastructure and land. Land litigation, encroachment on the few open spaces; overcrowding and construction of illegal structures are some of the development challenges the Assembly has to manage. Of most important is the pockets of slums that are fast developing in Taifa, Madina, Adenta West, Dome and Haatso.

The hitherto sparsely populated rural area is also gradually opening up with the location of the municipality's capital at Abokobi and the reconstruction of the Pantang to Ayimensah portion of the Accra-Aburi trunk road. Effective development control, upgrading and provision of the requisite social amenities are therefore some of the development issues to be addressed.

3.8.3 Climate and Vegetation

The Municipality falls in the savannah agro-ecological zone. Rainfall pattern is bi-modal with the average annual temperature ranging between 25.1^{o}c in August and 28.4^{o}c in February and March. February and March are normally the hottest months. The Municipality has two main vegetation namely shrub lands and grassland. The shrub lands occur mostly in the western outskirts and in the north towards the Aburi hills and consist of dense cluster of small trees and shrubs that grow to an average height of about five meters. The grassland which occurred to the southern parts of the district has now been encroached upon by human activities including settlements.

3.8.4 Education

Distribution of schools in the municipality is quite even. The Municipal Assembly can boast of two (2) well known senior secondary schools, namely, Presbyterian Boys' Secondary School, Legon and West Africa Secondary School, Adenta West. There are about 13 privately owned secondary schools, seventy-one (71) public Junior Secondary Schools and a number of private Junior Secondary schools which are sited mainly in the peri-urban areas of the municipality. Also, there are 68 public primary schools with about 40 Early Childhood Development Centers (ECDC) and enroll only 9.8% of children at that level. There are however a number of privately owned ECDCs. There are therefore 181 public schools in the municipality. Most of the schools lack libraries; ICT resource centers and recreational grounds.

It is also import to state that most of the school lands are also being encroached upon. Reclamation of these lands will have to be undertaken to ensure that land is available for future expansion projects.

3.8.5 Top ten diseases

Malaria continues to be a major public health issue. It accounted for 24% of Out Patient Department (OPD) attendance in 2013. Lifestyle diseases (hypertension and diabetes mellitus) are posing a challenge to the health service delivery. For three years in succession, hypertension has occupied the 3rd position. Weekly specialized clinics are organized at Madina Polyclinic for these lifestyle disease clients. Regular health walks and screening of the community members have been adopted to 'Catch them early' and managed appropriately

The position of diarrhoeal diseases has not changed. An outbreak of cholera in the region trickled down to the municipality. Three of the cases that reported at Achimota Hospital in a neighbouring district hailed from this municipality (Kwabenya, Haatso). However, none of the cholera cases reported in the facilities during the period of review.

3.8.6 Sanitation

On the issue of sanitation in the Municipality, it appears that a number of people have access to some type of sanitation facilities either public or private. Others also resort to indiscriminate defecation in gutters, school compound and public refuse dumps. Total sanitation coverage is estimated at 31% for household facilities and 29% for institutions. The types of facilities in use include WC toilets, KVIPs, Household VIPs and public KVIPs. Pit latrine even though not approved by the Assembly is being used by some households even in the urban communities.

The urban communities, viz Taifa, Dome and Adenta West and Abgogba are in crisis and need urgent attention to clear the backlog and also provide for the ever increasing population

3.8.7 Waste Management

The rate of waste generation and management in the municipality is a matter of concern to the Assembly. With the increasing influx of people and the rapid urbanization, huge amounts of human and industrial waste are generated at an alarming rate. It is estimated that about 750 tonnes of solid waste is generated monthly out of which 490 tonnes are collected which represents 63%. This leaves a substantial amount of backlog that creates various kinds of inconveniences including health hazard to people in the municipality. Out of the 490 tonnes collected the private sector collects about 81% through door-to-door collection.

Apart from the door-to-door collection, waste is collected in containers placed at vantage points by the Assembly. The situation is compounded by the inadequate machinery and equipment by the Assembly and the private collectors. Also the absence of proper engineered final disposal site is a major constraint. In addition, solid waste is brought from neighbouring Assemblies that is the Adenta Municipal, Accra Metropolitan and Ga West Municipal Assemblies to the crude dumping site at Abloradjei. The constant burning of the waste at the dumping site is creating serious air pollution and threatening the life of people in the surrounding communities. The soil in the area is also being polluted.

In general, the following are the major waste management problems in the municipality.

- Soil pollution – contaminated sites and illegal dumping
- Hazardous waste disposal and handling
- Low levels of waste minimization, recycling and recovery
- Poor treatment of sewage and liquid waste

- Poor land fill design, operation and maintenance
- Poor public attitude towards waste management
- Inadequate numbers of refuse containers for communal center
- Irregular and untimely refuse collection both at the communal dump site in some residential areas
- Lack of engineered final disposal site
- Inadequate machinery and equipment
- A number of unauthorized dump sites
- Poorly equipped Waste management Department
- Inability to balance environmental standards and the need to attract industries

3.8.8 Housing and Development Control

Access to adequate housing is an important ingredient in the Municipal Assembly's efforts to improve the livelihood and environmental sanitation of the people living in the Municipality. The lack of sufficient housing units, especially in the urban areas of the Municipality has among other things contributed to overcrowding, development of illegal structures, conversion of commercial facilities to residential use, streetism and pressure on social facilities and amenities. This has resulted in the development of slums in areas like Dome, Taifa, Kwabenya and Haatso.

The result of these is the creation of an insanitary environment with no drains and properly demarcated sanitary sites. Waste is therefore disposed-off indiscriminately and liquid waste flows freely on the already poorly demarcated streets. (GSS, 2013).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the findings of the survey conducted at Pantang to assess the challenges confronting residents around dumpsites. A structured questionnaire was administered to 200 residents living around the dumpsites. The study also engaged two assemblymen, whose assembly areas are affected by the dumpsite in an in-depth interview. A questionnaire was also administered to the Environmental Department of the Ga East Municipal Assembly. Descriptive statistical tools such as graphs, frequencies, cross-tabs and chi-square analysis were used in the presentation and analysis of the findings.

4.1 Socio-Demographic Characteristics of Respondents

4.1.1 Sex and Age of Respondents

Out of the 200 residents who were interviewed, the analysis shows that more than half of them were males. Thus, as high as 125 of the respondents representing 62.5% were males and 75 of them representing 37.5% were females. The age analysis shows that on the average, the respondents were approximately 37 years old. There was no significant difference between the males and females even though the females were slightly older than the males (37 years for the males and 38 years for the females). The variance test of the age difference between male as ($F=0.220$) had a p-value greater than 0.05 ($p\text{-value} = 0.796 > 0.05$) as presented in Table 4.1.

Table 4.1 Sex by Average Age

Sex	Age	Number	Percentage
Male	37.27	125	62.5
Female	37.60	75	37.5
Total	**37.44**	**200**	**100**
F = 0.220	**Pr = 0.796**		

Source: Field data, 2015

4.1.2 Religion and Marital Status

The results presented in Table 4.2 indicate that out of the 200 respondents, 155 respondents representing 77.5% were Christians and 45 representing 22.5% were Moslems. Thus, the proportions of Christians living in the community around the dumpsite are higher than that of Moslems. The analysis of the marital status of the two religions indicate that of the 155 Christians, majority of them (93) were married, 35 were single, 6 have divorced, 11 are widows and 10 are co-habiting, on the other hand, of the 45 Moslem respondents, 20 were married, 10 were singles, 2 were divorced, 1 was a widow and 3 were co-habiting.

Table 4.2 Marriage status by Religion

Marital Status	Religion		
	Christian	**Moslem**	**Total**
Married	93	20	113
Single	35	19	54
Divorced	6	2	8
Widowed	11	1	12
Co-habiting / Separated	10	3	13
Total	**155**	**45**	**200**

Source: Field data, 2015

4.1.3 Education and Employment Status

The educational and employment status of the respondents shows that, out of the total 200 respondents, 21 of them have no education and of which 13 were employed and 8 were unemployed. 39 of them also had basic or primary education out of which 31 of them were employed and 8 were unemployed. 44 of them also had middle or Junior High School (JHS) education out of which12 were unemployed and 31 were employed. Majority of the respondents (73) had secondary education of which 65 of them were employed, 4 were unemployed, 3 were retired and 1 was a student. Lastly, 23 had tertiary education, out of which 18 were employed, 2 were retired and 3 were students.

The results clearly indicate that unemployment rates are relatively low among those with higher levels of education, particularly, those with secondary and tertiary education. Even those with tertiary education recorded zero unemployment rates. In totality, there were a total of 158 respondents, representing 79% who were employed and only 32 representing 16% were unemployed. Five each were either retired or students as shown in Table 4.3 below.

Table 4.3 Educational Background by Employment Status

Educational Background	Employment Status				
	Employed	**Unemployed**	**Retired**	**Student**	**Total**
No school	13	8	0	0	21
Basic/Primary	31	8	0	0	39
Middle school/JHS	31	12	0	1	44
SSS/SHS	65	4	3	1	73
Tertiary	18	0	2	3	23
Total	**158**	**32**	**5**	**5**	**200**

Source: Field data, 2015

4.1.4 Occupation and Level of Educational Attainment

As noted in Table 4.3, 158 of the respondents indicated that they were employment. Table 4.4 presents the various occupations that the respondents are engaged in with regards to the various level of educational attainment. Of the 158 respondents who were employed, 30 of them worked as salaried workers and out of which more than half (16) had tertiary education and 7 had secondary education. Only 1 with no education indicated that he/she was a salaried worker. 48 of the 158 workers were also traders and of this number 20 have secondary education, 13 have middle or Junior High School (JHS) education, 8 have basic education and 7 have no education. None of those with tertiary education was a trader. Majority of the respondents (52) were artisans out of which 22 had secondary education, 17 basic education and 11 had middle/JHS . Majority of the 12 drivers and 11 beauticians had secondary and middle/JHS education as presented in the

table below. Finally, 5 of them were farmers and out of the 5, 2 had basic education, 1 had no education, 1 had middle or JHS education and 1had secondary education.

The chi-square test of the relationship between education and occupation shows that education is a significant variable that influences people's occupation. The value of the chi-square test (χ = 86.8301) was statistically significant as the significance level of the test was 0.000. The result shows that education plays a major role in the occupation one finds him/herself.

Table 4.4 Occupation and Education

Occupation	**Educational Background**					
	No school	**Basic / Primary**	**Middle / JHS**	**Secondary**	**Tertiary**	**Total**
Salaried work	1	3	3	7	16	30
Trader	7	8	13	20	0	48
Farmer	1	2	1	1	0	5
Seamstress /hairdresser	0	0	2	8	1	11
Artisan	1	17	11	22	1	52
Driver	1	1	3	7	0	12
Total	**13**	**31**	**31**	**65**	**18**	**158**
Chi^2	**χ = 86.8301**		**Pr = 0.000**			

Source: Field data, 2015

4.2 Distance to Dumpsite and Length of Living in the Vicinity

The results presented in Table 4.5 shows that a large proportion of the respondents live very close to the dumpsite. Thus, more than half of the respondents (55%) live less than 100m radius from the dumpsite. Further disaggregation shows that as high as 32% of the 200 respondents were found to be living less than 50m from the dumpsite. It must be stated that during the field

study it was observed that some were living as close as 5m from the dumpsite, and therefore can be described as living on the dumpsite.

A large proportion of those living less than 50m from the dumpsite, have been living there between 1 – 5 years (64%) and 6-10 years (19%). A few others living very close to the dumpsite have been living there above 10 years (10%). About 24% were also found living between 50-99m from the dumpsite and majority of them noted that they have stayed there over a period of 1-5year (66%), even though 17% have stayed between 6-10 years and 13% have stayed over 10 years.

Another 21% were also found living between 100-149m from the dumpsite; a large proportion (42.9%) of which have stayed there between 1 and 5 years. There were a few of them (19%) who have stayed there above 10 years. Finally, there were 24% of the respondents who lived between 150-200m from the dumpsite and 58% of them have lived there between 1-5years.

So for the radius of 200m, which have been found as the distance that residents are highly affected by dumpsites (Coffie, 2010; Owusu et al., 2014), more than half of the respondent in this study have lived within this radius for 1-5 years (60%), 19% have stayed between 6-10years and 13% have stayed for more than 10 years. It was only 9% who have lived closed to the dumpsite in less than a year.

Table 4.5 Distance from landfill site by Duration of stay around the dumpsite

Distance	Duration (%)				
	less than 1year	1-5years	6-10 years	Above 10 years	Total
Less than 50m	3	68	19	10	32
50-99m	4	66	17	13	23
100-149m	12	43	26	19	21
150-200m	19	58	13	10	24
Total	**9**	**60**	**19**	**12**	**100**

Source: Field data, 2015

4.3 Reasons for Staying Close To Landfill Site

4.3.1 Place of residence before the area was used for landfill

The respondents were asked if they were living there before the place was turned into a landfill site. Out of the 200 respondents, 72% indicated that they were not living there before the place was tuned into a landfill site. Only 28% indicated that they were living there before the place was turned into a landfill site. This assertion reveals the lack of developmental control and planning, a point largely made in this dissertation. Majority of those who were living there before the place was turned into a landfill site where primarily those living between 100-200m (48%) radius and those living less than 50m from the dumpsite (29%) as shown in Table 4.6 below.

Table 4.6. Were you residing before this place was used for landfill

Distance from landfill site	Resident before place was used for dumpsite (%)		
	Yes	No	Total
Less than 50m	29	71	63
50-99	21	79	47
100-149	48	52	42
150-200	17	83	48
Total	**28**	**72**	**200**

Source: Field data, 2015

4.3.2 Reasons for relocating close to a landfill site

As shown in the Table 4.6, 144 of the respondents indicated they were not living there before the place was turned into a landfill site. This shows that they relocated to the place knowing well that they were going to stay close to a landfill site. They were therefore asked to give the reasons why they chose to live so close to a landfill site. As much as 44% of the respondents noted that accommodation is affordable in the area and 38% also cited that the place is close to their place of work. A further 37% also added that they are living in the area as a temporary measure and they have plans to leave in the near future. A few others also cited that they had lands or building there before the place was turned into a landfill site. We also had 8% also noting that they were born there.

When the Environmental Officer was asked why people continue to live close to the dumpsite, he remarked that the place might be near to their places of work, the landfill offers some livelihood opportunities (esp. scavengers), some do not just want to leave the place and some feel comfortable living in those places like any other place. In the view of one of the Assemblymen in the area, the reasons why people continue to live close to the dumpsite are affordable accommodation; they bought their lands before the place was turned into a landfill site; and the landfill offers some livelihood opportunities (esp. scavengers and farmers). Other reasons were that some do not just want to leave the place and some feel comfortable living in those places like any other place.

Table 4.7: Reasons for settling near a Dumpsite

Reasons	Total	Percentage within case
Accommodation is affordable	63	44
I had my house/land here before the place was turned into a landfill site	13	9
This is where i was born	11	8
this area is close to my place of work	55	38
I am living here temporary	53	37
Other	6	4

Source: Field data, 2015

During the focus group discussion, the responses that the participants stated support what have been presented in the table above. On the issue of affordability of rent, some of the squatters noted that they pay little for living close to the dumpsite. One said that "*I pay GH¢10 a month for the single room I rent because it is close to the dumpsite and many people don't want to live at where I stay*". Also one of the squatters indicated that he pays nothing for the place he lives since it is part of the dumpsite.

One of the respondents also indicated that he moved to live in the vicinity about 3 years ago and therefore bought the land after the dumpsite had been sited there. When asked the reasons why he chose to live there even with the presence of the dumpsite, he responded that, "*it is not because the land value around here is cheap, but the unavailability of land within the Accra vicinity and the problems associated with acquiring problem-free land led me to buy land at this place*". He explained further that the value of a plot of land there is comparable to those in areas such as Adentan and La-Nkwantanan metropolis.

4.3.3 Reasons for continuing to live close to landfill site

As noted earlier, Twenty Eight percent of the respondents noted that they were living there before the place was turned into a landfill site. When they were asked to give reasons why they continued to live there after the place was turned into a landfill site. Majority of them (60.7%) noted that the Assembly and private waste operators promised that the dumpsite will not pose any challenge to them. The respondents (those who were living there before the place was converted into a dumpsite) noted that when the Assembly first came to the community to survey the area and informed them that they were going to use that portion of land as a dumpsite, they unanimously revolted against that decision, with series of demonstration and confrontations. There were many occasions when the leaders of the community petitioned the Assembly to revert their decision, because there were many people living there and creating a dumpsite close to their place of residence was not healthy for their wellbeing. The Assembly however came with Zoomlion executives and promised them that they were going to properly manage the dumpsite in such a way that it will not pose any threat to their lives. The people therefore decided to count on the promise that the dumpsite will be properly managed by Zoomlion and the Assembly. 32 of the respondents also indicated that they continued to live there because they have already built their house there and 24 of the respondents indicated that cannot afford to relocate elsewhere due to financial constraints.

The gender analysis of the factors show that the proportion of males (53.13%) who continued to leave close to the dumpsite as a result of having built their houses there already, were more than the females (46.88) but the difference was not statistically significant (p-value = 0.232 >0.05). Similarly, the proportion of males (62.50%) who continue to live close to the dumpsite because

they cannot afford to relocate elsewhere was higher than the females (37.5%) but again the difference was not statistically significant (p-value = 1.00 > 0.05). There was however a significant gender difference with regards to those who continue to live there because of the promise the Assembly and Zoomlion made to them that the dumpsite will be well managed and will not pose a threat to their lives. The proportion of females (52.94%) was significantly higher than the males (47.06%) (p-value = 0.041 < 0.05) as shown in the table below. The proportion of males (66.67%) leaving there for other reasons such as depending on the landfill for a living, having the family there and cares for other people property (caretaker) was higher than the females (33.33) but the difference was not statistically significant (p-value = 0.792 > 0.05).

The analysis of the factors influencing people to continue to live close to dumpsite by level of educational shows that there is no statistically significant difference across the various the various educational level (p-values > 0.05). For instance, for those who continue to live close to the dumpsite because they have already built their houses there, the proportion of those with SHS education (31.25%) was higher than all the other educational levels but the difference across the educational level was not statistically significant (p-value = 0.451 > 0.05). For all the remaining factors (as cited previously) influencing people to continuously live close to the dumpsite, the proportion of females was higher than all the other educational levels. However, the difference across the various groups is not statistically significant (p-values > 0.05).

Occupational-wise the analysis shows that there is a significant difference among people who continue to live close to the dumpsite because they have already built their house there. The proportion of traders living close to the dumpsite because they have already built their house

there before the dumpsite was sited was higher than the rest of the occupations and this difference was statistically significant (p-value = 0.004 < 0.05). There were no significant occupational differences among those who continue to live there because they cannot afford to relocate or they were promised the dumpsite will not pose any threat to their lives.

Table 4.8: Reason for living close to dumpsite by Sex and Educational Status

Reasons	Sex (%)		p-value
	Male	Female	
I have already built my house here	53.13	46.88	0.232
I can't afford to relocate elsewhere (financial)	62.50	37.50	1.00
We were promised the landfill will not pose any risk to us	47.06	52.94	0.041
Other	66.67	33.33	0.792

	Educational Status (%)					
	No School	Basic	JHS	SHS	Tertiary	p-value
I have already built my house here	9.38	12.50	28.13	31.25	18.75	0.451
I can't afford to relocate elsewhere	16.67	0.00	20.83	50.00	12.50	0.103
We were promised the landfill will not pose any risk to us	14.71	11.76	26.47	38.24	8.82	0.625
Other	11.11	0.00	33.33	55.56	0.00	0.353

Reasons	Occupational status (%)						p-value
	Salary worker	Trader	Farmer	Seamstress/ Hairdresser	Artisan	Driver	
I have already built my house here	34.48	48.28	3.45	0.00	13.79	0.00	0.004
I can't afford to relocate elsewhere	19.05	28.57	0.00	14.29	33.33	4.76	0.713

We were promised the landfill will not pose any risk to us	16.13	48.39	3.23	9.68	22.58	0.00	0.114
Other	16.67	50.00	0.00	0.00	33.33	0.00	0.861

Source: Field data, 2015

Few of the participants from the focus group discussion noted that they were staying there before the place was converted into a landfill site. Some of them noted that he continues to stay there because it is the place they were born and have some social ties with them. One of them said that "*I was born and bred here and nothing can move me out of this place, not even the dumpsite even though I don't feel comfortable living at all*".

4.3.4 Level of satisfaction living close to the dumpsite

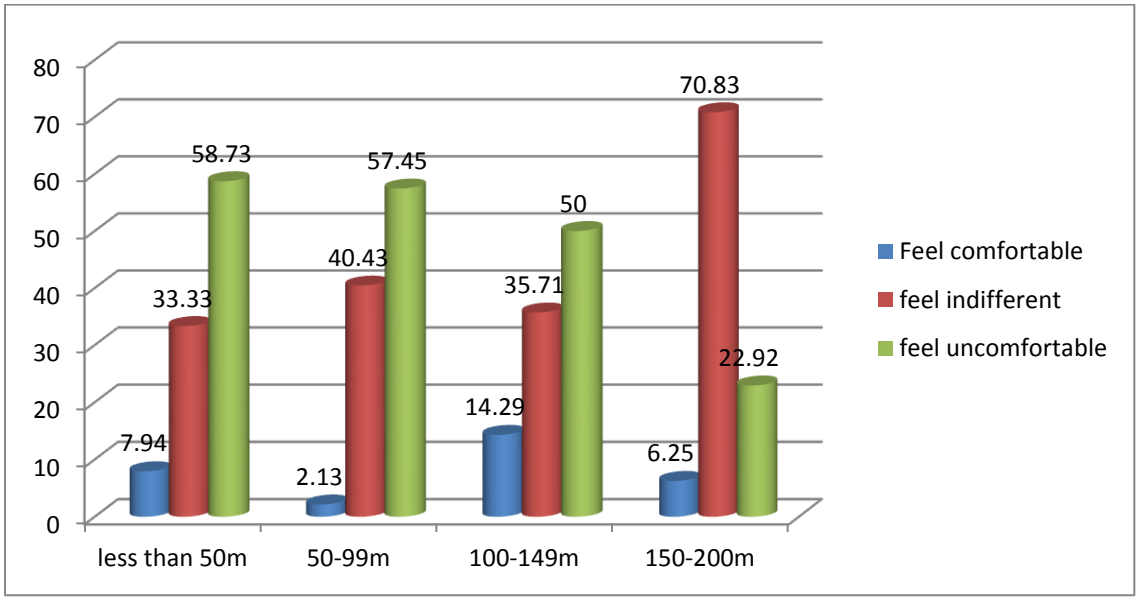
The respondents were asked to share how they feel living close to the dumpsite. The analysis of the feeling of living close to a dumpsite by distance shows that majority of those who live less than 50m from the dumpsite feel uncomfortable (58.73%). Only 7.94% indicated that they feel comfortable living such close to the dumpsite with the explanation that they earn their livelihood from the dumpsite. Some of those living very close to the dumpsite explained that living close to the dumpsite enable them to get quick access to plastics and metals whenever the trucks bring in refuse, and before the other scavengers come, they have already taken the most valuable items.

For those living within 50-99m radius from the dumpsite, more than half (57.45%) also indicated that they do not feel comfortable at all because of the dumpsite. As high as 40.43% however indicated that they do feel indifferent living within such distance from the dumpsite. Exactly half

of those who live between 100-149m radius from the dumpsite also indicated that they feel very uncomfortable living within such meters from the dumpsite. 35.71% of them however indicated that they feel indifferent living within such meters from the dumpsite. Expectedly, majority of those living within 150-200m (70.83%) radius from the dumpsite indicated that they feel indifferent living within such distance from the dumpsite since they effect of the dumpsite is not greatly felt as compared to living less than 50m from the dumpsite. Only 22.92% indicated that they feel uncomfortable as shown in the figure 4.1.

The chi-square test results (χ^2 = 23.3640) examining the level of satisfaction people expressed with regards to the difference distance of residence from the dumpsite produced a p-value = 0.001. This results show that the comfort or otherwise people face living in the area is significantly influenced by the distance of the residence from the dumpsite. Thus, as the dumpsite expanded closer to ones area of residence, the level of comfort in living in the area reduces. When these people were asked why they live close to the dumpsite and yet indicated that they feel indifferent, some of them explained that they have been living with it over the years and nothing has been done about it. They only hear of empty promises so they have also considered it as a permanent situation they have to face every day.

Figure 4.1 Feelings of living close to the landfill site



Source; Field data, 2015

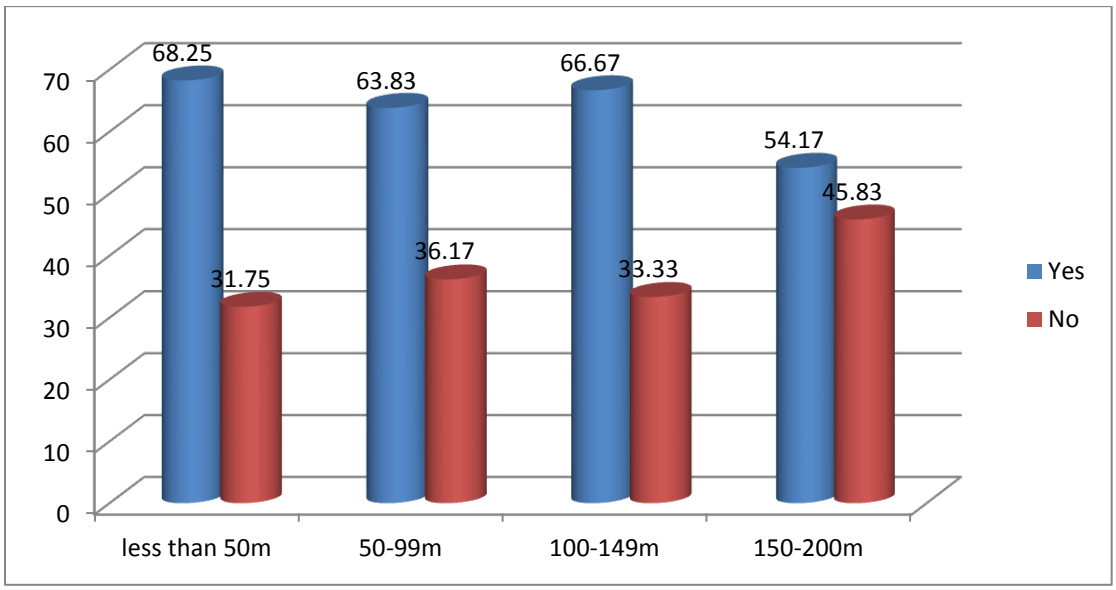
When the squatters who live very close to the dumpsite were asked how they feel living close to the dumpsite, they all indicated that they feel very uncomfortable. One of them said that "*it is not easy at all living close to the dumpsite. However, because of the benefits we get from the dumpsite, we cannot complain much*" (male squatter). At the landlords focus group discussion, many of them complain bitterly about the landfill indicating that they do not feel comfortable at all. One of them explained that "*I sometimes feel bad for building my house here due to the smoke and the smell". Another explained that "no one in his right senses living close to this 'thing' will say he feel comfortable. Even I hope you are uncomfortable due to the smell*".

4.3.5 Future Plans to relocate

When asked if they have any future plans of relocating from the community due to the uneasiness in living close to the dumpsite, more than half of the respondents answered in the affirmative. The results show that out of the 200 respondents, as high as 63.5% had plans of relocating from the community in the future and only 36.5% indicated that they have no plans in relocating from the community. For respondents living less than 50m from the dumpsite, as high as 68.2% indicated that they have future plans to relocate from the community and only 31.7% indicated otherwise. Similarly, for those living between 50-99m from the dumpsite, as high as 63.8% have plans of future relocation and only 36.2% have not. For those living between 100-149m from the dumpsite, 66.7% have plans to relocate in the future and 33.3% have not. For those living between 150-200m from the dumpsite, a little more than half (54.2%) had plans to relocate in future but 45.8% indicated otherwise. The large proportion of respondents living in less than 150m from the dumpsite future desires to move from the community indicates that living close to the dumpsite makes them feel uncomfortable. They feel their lives are at stake if nothing is done about it and therefore the desire to move out from the community if they get the opportunity.

Interestingly, the landlords and squatters who participated in the focus group discussions indicated that they have no plans of relocating even though the dumpsite pose a of threat to their lives. One of the squatters explained that "*just as you sit in your office and get paid, we get our money from the landfill. Living here is not an option for us for now, unless we find another better source of living*". One of the landlords also stated that "*I struggled to put up this building and now I am on retirement. I cannot relocate from my house*".

Figure 4.2: Future plans of relocation (%)



Source: Field data, 2015

4.4 BENEFITS/OPPORTUNITIES FOR PEOPLE LIVING CLOSE TO DUMPSITES

4.4.1 Obtain any benefit from the Dumpsite

Despite all the uneasiness and lack of comfort the respondents expressed about living close to the dumpsite, it was however realized that some people obtain certain benefits from the dumpsite. When asked if the dumpsite was in any way beneficial to the people living in the community, less than half of the respondents answered in the affirmative. The results presented in Table 4.11 show that of the 200 respondents, only 45.5% of them indicated the community obtains certain benefits from the dumpsite but as high as 54.5% thinks the dumpsite is not beneficial to the community members. The crosstab employment analysis shows a significant relationship of the dumpsite across the employment groups. Majority of those who are unemployed (71.9%) see the dumpsite as beneficial but a large proportion of those who are employed (57%) does not consider the dumpsite as beneficial. This difference was statistically significant (p-value = 0.001 < 0.05).

This indicates that the dumpsite is beneficial to those who are formally unemployed but a threat to those who are employed. It must be noted here that those who were scavengers noted they were unemployed because this is not their desired unemployment. All those who were retired and students do not also consider the dumpsite as beneficial.

4.9 Is the dumpsite beneficial to the people living in this area

Is the dumpsite beneficial	**Employment Status (%)**				
	Employed	**Unemployed**	**Retired**	**Student**	**Total**
Yes	43.04	71.88	0.00	0.00	45.50
No	56.96	28.13	100.00	100.00	54.50
Chi2 $\chi = 17.7118$		**Pr = 0.001**			

Source: Field data, 2015

Other studies that have tried to examine the economic impacts of landfill site have found that despite the enormous hazards associated with living close to dumpsite, others still gain their livelihood from it. For instance, Owusu-Sekyere et al. (2013a) found that the Dompoase landfill in the Kumasi Metropolitan Area was beneficial to some of the residents. The findings from this study also showed that the dumpsite provided the community with two major benefits: scavenging and farming.

4.4.2 Scavenging from the Dumpsite

Interestingly, even though only 54.5% of the respondents noted that the dumpsite was beneficial to the community, as high as 91% noted that they have seen or known that people pick items from the dumpsite when asked if people scavenge items from the dumpsite. Only 9% indicated that they have not seen anyone picking items from the dumpsite. A large proportion of even

those who are employed (89.24%), who earlier indicated that the dumpsite offers no benefits to the communities, noted that they have seen scavengers on the dumpsite. Almost all the unemployed (96.88%) also indicated that they have seen scavengers on the dumpsite. All the retirees and students also indicated that there is scavenging activities goes on in the dumpsite.

Studies (e.g. Owusu-Sekyere et al., 2013a; Owusu-Sekyere et al., 2013b; Oduro, 2004; Adu-Boahen, 2012) have shown that one group of people who also derive their livelihood from dumpsites are scavengers. Though the activities of scavengers expose them to many health risks, the study by Adu-Boahen (2012) revealed that the reusable and recyclable materials scavengers collect increase the longevity of dumpsites and thereby reducing the pressure on urban land use. This means that scavengers at Abokobi dumpsite are not just making a livelihood for themselves but they are indirectly increasing the longevity of the dumpsite, which is beneficial to the Assembly since it is very difficult to acquire land to be used as a dumpsite, given the financial constraints facing the Assembly.

Table 4.10 Do people pick items from this Dumpsite

	Employment status				
Do people pick items from these site	**Employed**	**Unemployed**	**Retired**	**Student**	**Total**
Yes	89.24	96.88	100.00	100.00	91.00
No	10.76	3.13	0.00	0.00	9.00

Source: Field data, 2015

4.4.3 Items mostly picked from the Dumpsite

The respondents were asked items that are usually scavenged from the dumpsite and the number of people who usually scavenge those items. Whiles 4.5% indicated that few people (20%) usually pick only plastics, 3% said few people (10%) pick only metals. As high as 90% of the respondents indicated that many people (93.98%) usually pick both plastics and metals from the dumpsite. This means that the dumpsite provides a source of livelihood to many people, especially those living around it.

Scavenging has been and still is a common activity that takes place in the informal sector in many developing countries (Oduro, 2004). Other studies that have assessed the economic benefits of dumpsite to people have all found that plastics and metals continue to be the items of priority to scavengers, especially in our part of the world. Research in Ghana has shown that scavenging for plastic wastes and scrap metals have become a lucrative business for many residents at Dompoase and the surrounding communities as a result of the monetary incentives that come along with it (Owusu-Sekyere et al., 2013b). The great number of people who scavenge items from the dumpsite clearly shows the lucrative nature of scavenging to people.

Table 4.11 Items are normally picked from the dumpsites

Items	**Number of People**			
	Many	**Few**	**don't know**	**Total**
Plastics only	3.61	20.00	4.17	4.50
Metals only	1.81	10.00	8.33	3.00
Plastics and Metal	93.98	70.00	70.83	90.00
Other	0.60	0.00	16.67	2.50
Total	83.00	5.00	12.00	100.00

Source: Field data, 2015

4.4.4 Do respondents pick items from the Dumpsite

The respondents were asked if they personally pick items from the dump site and out of the 200 respondents, only 20% indicated that they were scavengers on the dumpsite. Of the 20%, majority of them (90%) were males and only 10% were females. Thus, the proportion of males scavengers was higher than females (p-value = 0.000).

When asked how much they are able to earn from the scavenging activities in a month, the results presented in Table 4.14 indicate that on the average, scavengers make GH¢ 316.61 in a month, with the men earning GH¢295.71 and the women earning GH¢337.50. Even though the gender difference was not statistically significant (p-value = 0.341 > 0.05), the results shows that the people who scavenge items from the dumpsite earn enough from their activities.

Of the 40 scavengers, as high as 90% of them indicated that the dumpsite is beneficial to them and only 10% indicated that it is not beneficial. The gender analysis shows that of the 36 male respondents, as high as 92% of them consider the dumpsite beneficial and 8% does not see the dumpsite as beneficial. Similarly, of the 4 females, 75% of them consider the dumpsite as beneficial but 25% do not. This finding therefore shows that the dumpsite is beneficial to scavengers, despite the risks it poses on the people. This is principally because scavengers earn their livelihood from the dumpsite.

The activities of scavengers have been found to be very lucrative. The study on the Dompoase Landfill in the Kumasi Metropolitan Area of Ghana by Owusu-Sekyere et al. (2013b) showed that scavengers are paid GH¢8,000.00 for 10 tons of scrap metals and 25Gp for 1kg of plastic waste collected. On the average, some individual collectors are able to make over GHS40.00 a day, which is higher than the nominal minimum daily wage of GHS4.48 in Ghana (Owusu-

Sekyere et al., 2013a). Several companies have been established in Kumasi, Accra and Tema to recycle plastic wastes and scrap metals and they depend largely on scavengers for raw materials. Some of these companies are Clamonia Limited located at Amanfrom, a suburb of the KMA, which employs over 80 workers, and has the ability to recycle 18,000 tons of plastic waste a day; Tema Steel Company, the largest producers of iron rods and fabricated metals in Ghana, employs thousands of Ghanaian workers; and Blowplast Limited among others (Owusu-Sekyere et al., 2013a). The activities of scavengers are therefore cardinal to the effective functioning of these industries.

Table 4.12: Do respondents personally pick items from the site

Sex	Do you personally pick items from the site?		Total	Monthly earning (GH¢)
	Yes	No		
Male	90.00	55.63	125	295.71
Female	10.00	44.38	75	337.50
Total	**20.00**	**80.00**		
p-value	**0.000**			**0.341**

	Is Dumpsite beneficial to Scavengers (%)		
Sex	**Yes**	**No**	**Total**
Male	92	8	36
Female	75	25	4
Total	**90**	**10**	**40**

Source: Field data, 2015

4.4.5 Farming Activities around the Dumpsite

The respondents were asked if any farming activities goes on around the dumpsite and out of the 200 respondents, 77 indicated in the affirmative. They were asked to give the reasons for the

farming activities around the landfill site and 96% of the respondents indicated that the lands around the dumpsite are fertile and therefore it supports agricultural activities. 27% also noted that people farm around the dumpsite as a way of protecting their lands from encroachment or being taken away. 26% also added that they believe it is the only land the farmers have and therefore have to farm on it and lastly, a few others believed that the farmlands around the dumpsite is cheaper to rent or buy. The assessment of the people who are engaged in the farming activities shows that both community members and outsiders (69%) all make use of the ands around the dumpsite for farming.

It is not only the Abokobi dumpsite that provides rich fertile soil for agricultural purposes. Owusu-Sekyere et al. (2013a) found that landfill is a source of livelihood to peri-urban agriculturalists that use the fertile lands on the fringes of the landfill despite the much anticipated negative environmental and health effects. For instance, the agronomic benefit of the Dompoase Landfill was evidenced by the steady increase in the land area under cultivation and total output since the landfill became operational. The fringes of the landfill are flourishing with agricultural activity. The farming activities provide employment, reduce the cost of food due to reduced cost of food transportation and diversify local food sources resulting in more secured supply (Osumanu, 2009).

Table 4.13: Reason for Farming Activities around the Dumpsite

Reasons for farming around the dumpsite	People Farming (%)		
	Community Members	Both community members and Outsiders	Total
The land is fertile	31	69	96.0
The land is their only land	40	60	26.0
A way to protect their land from intrusion	24	76	27.0
Farmlands around the dumpsite is relatively cheaper	33	67	12.0
Other	100	0	3.0
Total	31	69	100

Source: Field data, 2015

4.5 RISKS ASSOCIATED WITH LIVING CLOSE TO LANDFILL SITES

4.5.1 Does Dumpsite pose any risk to community members

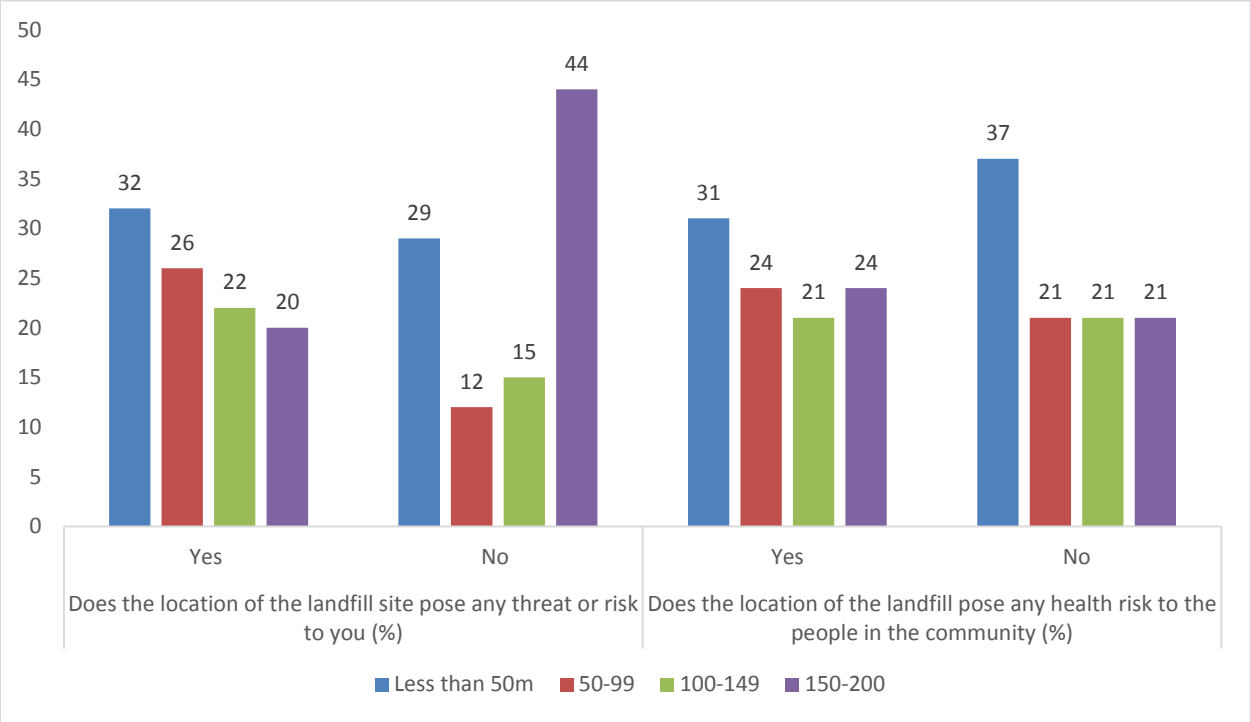
Despite the benefits that have been outlined above, there are evidence in literature (e.g. Pukkala and Pönkä, 2001; Gouveia and do Prado, 2010) to suggest that the location of landfill site can sometimes pose significant challenge to the people who live close to it. The respondents were therefore asked whether the location of the dumpsite pose any challenge to them and even the entire community members.

When asked whether the location of dumpsite pose any challenge to the community members, as high as 91% out of the 200 people answered in the affirmative and only 9% believes that the location of the dumpsite do not pose any challenge to the community members. A large proportion of all the respondents living at different distances from the dumpsite indicated that the

dumpsite pose a challenge to the community members. The respondents were also asked if the dumpsite pose any challenge to them. As high as 83% of them indicated it poses a lot of health risk on them. The proportion of the people who live less than 50m from the dumpsite (32%) indicated that the dumpsite pose much challenge to them than all the others living at farther distance from the dumpsite.

The Environmental officer of the Assembly also considered the dumpsite as very hazardous to the residents around it. This view was also shared by the two Assemblymen whose communities both suffer from the dumpsite. The respondents from the focus group discussion all showed that the landfill is very risky to the people living around it. Some of the landlords noted that the landfill is very risky to them and their households. According to one of them "*my daughter gave birth some few weeks ago and I have to send my child away because of the smoke, which I think can be deadly to the newly born child*". Another landlord added that "*with all the smoke and smell, our lives and that of our families are at great risk. The thing is that we cannot do anything about it*".

Figure 4.3: Any possible risk living close to landfill



Source: Field data, 2015

4.5.2 Perceived Health Challenges to the Community

Given the fact the respondents noted that the presence of the dumpsite pose a lot of health risk on them, they were asked to identify the factors posing the risks and its associated sicknesses in the community. 90% of the respondents noted that the smoke, fire and odor from the site is a major factor accounting for typhoid fever and malaria (68%), which is very rampant in the community, cholera (22%), respiratory diseases (8%), diarrhea (2%) and other cardiovascular diseases (1%). The presence of mosquitoes and other insects where also cited as accounting for the high fever and malaria cases (69%), cholera (20%) and other sicknesses such as respiratory diseases (7%), diarrhea (2%) and cardiovascular diseases (1%). Surface water contamination due to leachate was noted for accounting for the fever (58%), cholera (24%) and respiratory diseases (14%). The dumpsite also has increased reptiles in the area such as snakes, which are very harmful to human

existence. One of the respondents also added that the smell air from the dumpsite as well as the water sometimes pollute the food items, which can lead to cholera outbreak.

All these challenges (air pollution due to smoke, fire, and odor from the landfill site; surface water pollution due to leachate from the site; presence of mosquitoes and other infectious insects; and presence of reptiles such as snakes) were all cited by the Environmental Officer and the Assemblymen as some of the challenges confronting the community. The Environmental Officer added physical accidents from equipment and other mechanical sources as other risk facing the community.

The participants of the focus group discussion, both the landlords and squatters, all indicated that the landfill is the main source of all the numerous sicknesses. According to one of the landlords, malaria is the major sickness in the community and it is attributable to the mosquitoes from the landfill site. One of the landlords confessed that "*for those of us living very close to the landfill site, we are left at the mercies of mosquitoes and there is no week that passes without someone getting malaria*". Another landlord added that "*the sting and smoke from the landfill site are a great source of many liver and heart sicknesses*". A squatter explained that "*it is very risky living this close to the dumpsite. Cholera and diarrhea are very common. We usually get malaria*". Another squatter added that "*snakes usually come into our homes. For those we eat, we kill and eat but there are others which are also very dangerous*".

Studies that have been conducted across different parts of the world, within both developed and developing countries have found that there are many serious health risks that are associated with living close to dumpsite. Some of them have found diverse kinds of cancers to be associated with living close to dumpsite (Lewis-Michl et al.,1998; Jalaludin, 1998; Elliott et al, 1996, 2000; Vrijheid, 2000). Human exposure to these releases potentially occurs via inhalation of polluted

air, ingestion of contaminated water, or skin contact with contaminated water or soil have all been found to pose significant health risks to people (WHO, 2000).

In Ghana, Coffie (2010) examined the effect of the Oblogo waste landfill site on the people living around those communities and found that due to the location of the landfill sites and how it is been manage in the communities, there is high prevalence of infectious diseases like malaria, cholera, diarrhoea, typhoid fever among others. At the Dompoase Landfill in the Kumasi Metropolitan Assembly (KMA) of Ghana, it was found that there are increased prevalence of self-reported health symptoms such as fatigue, sleepiness, and headaches among residents near the landfill site were consistently reported (Owusu-Sekyere et al., 2013a).

Table 4.14: Perceived Health problems and common sicknesses in this vicinity

	Common sicknesses in this vicinity, which can be attributed to the landfill site (%)					
Health Problems	**Cholera**	**Diarrhea**	**Typhoid Fever/ Malaria**	**Respiratory Disease**	**Cardiovascular Diseases**	**Total**
Air pollution due to smoke, fire, and odor from the landfill site	21	2	68	8	1	90.0
Surface water pollution due to leachate from the site	24	1	58	15	2	42.0
Presence of mosquitoes and other infectious insects	21	2	69	7	1	82.0
Presence of reptiles such as snakes	31	2	38	27	2	23.0
Others (polluted food items)	100	0	0	0	0	0.5
Total	**22**	**2**	**68**	**7**	**1**	**100**

Source: Field data, 2015

4.5.3 Has any respondent or household member ever suffered from any common disease

The results presented in Table 4.18 shows that 80% of the respondents or their household members has ever suffered these form of sicknesses before but 20% of them noted otherwise. For the commonest sickness in the area, fever or malaria (67%) was cited as the sickness they have ever contracted. This was followed by cholera (20%) and respiratory disease (8%). Health records from the Ga-East Municipal Assembly (2012) show that malaria continues to be a major public health issue in the Municipality. It accounted for 40.8% of Out Patient Department (OPD) attendance in 2012 and it is still the leading sickness in OPD cases. Frequent outbreaks of cholera in the municipality are also of great concern. Sporadic cases have also been recorded in other parts of the Municipality, of which Pantang is part of them, mainly due to poor environmental sanitation (GEMA district profile, 2013). Lifestyle diseases (hypertension and diabetes mellitus) are also posing a challenge to the health service delivery. For three years in succession, hypertension has occupied the 3rd position. In 2013, the top ten diseases in the Municipality were malaria (25%), acute respiratory illness (ARI) (11%), hypertension (5%), diarrhea (3%), skin diseases (3%), typhoid fever (2%), pregnancy related conditions (2%), rheumatism (2%), and urinary tract infections (UTI) (2%). The ten top sicknesses accounted for 55% of all OPD cases whiles all other sicknesses accounted for 45% of all OPD cases.

The second common sickness was cholera and of the 43 people who attributed it to the dumpsite, as high as 32 have suffered of it before. Respondents or their household members have suffered diarrhea, respiratory diseases and cardiovascular diseases among others.

Table 4.15: Have you or any member of your family ever suffered any sicknesses

Common sickness	Have you or any member of your family ever suffered any sicknesses (%)		
	Yes	No	Total
Cholera	20	28	22
Diarrhea	3	0	2
Fever/Malaria	67	70	68
Respiratory Disease	8	0	6
Cardiovascular Diseases	1	0	1
Other	1	2	1
Total	80	20	100

Source: Field data, 2015

4.5.4 Frequency of Ailment and Health Status

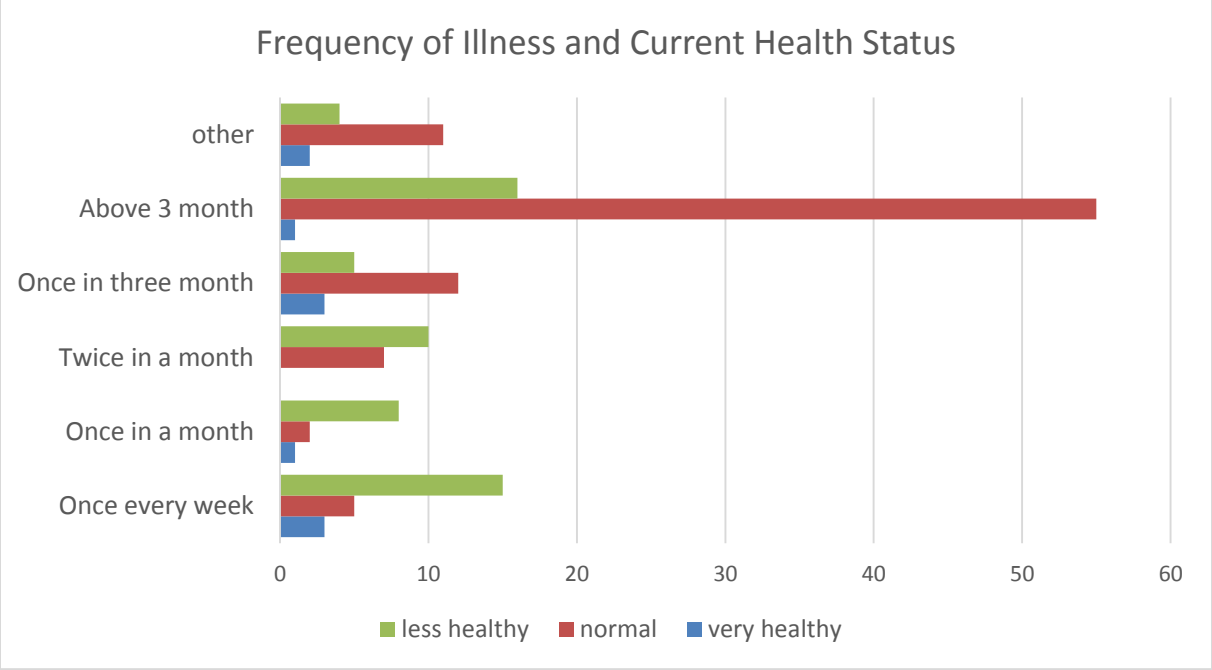
The assessment of the frequency of sickness among the respondents show that even though 45% indicated that they fall sick once in more than three months, there was also a total of 44.4% who also indicated that they usually fall sick at least once every month. Majority of the 36% respondents who indicated that they often become sick after 3 months evaluated their current health status as normal as compared to the period when the dumpsite was not there (55%).

However, 12% of them also noted that they fall sick every week and considered their current health status as less healthy (65%) as compared to when the dumpsite was not there. Another 10% of the respondents also noted that they fall sick once every three months and they considered their current health status as normal (60%) as compared to periods when the dumpsite was not there. 9% fall sick twice in a month and considered their current health status as less healthy (59%). 6% fall sick twice in a month and considered their current health status as less

healthy (73%) as compared to the period when the dumpsite is not there. There were 9% other respondents who also indicated that they usually fall sick for a long time (unable to give it a time frame) and majority of them (58%) considered their current health status as healthy, even though 24% noted that they are less healthy.

In sum, of the 160 respondents, those who fall sick after every three months (45%) considered their current health status as normal. On the other hand, those who fall sick (44.4%) at least once every three months considered their health status as less health. This shows that the longer a person lives without falling sick, the more healthy that person is.

Figure 4.4: Frequency of Illness and Evaluation of current Heath Status



Source: Field data, 2015

4.5.5 Extent to which People livelihoods are affected by the dumpsite

Various nuisances from dumpsites were given to respondents to evaluate the extent to which they are affected. On the issue of noise from the landfill site, 53% noted that they are moderately affected but 20% indicated that they are severely affected. For litter or rubbish from the dumpsite, 38% were severely affected, 37 were moderately affected and 25% were less affected. For odor from the dumpsite, 80% were severely affected and 18% were moderately affected. Similarly, for pest (flies, vermin etc), as high as 80% indicated that they were severely affected and 18% noted that they were moderately affected. On fire and smoke, 64% were severely affected and 33% were moderately affected. For poisonous gases, 46% were severely affected and 42% were moderately affected. On the issue of dust from the dumpsite, 59% were moderately affected and 32% were severely affected. Finally, on surface water contamination, 47% were moderately affected and only 24% were severely affected.

For all the environmental nuisances that affect people livelihoods that can be attributed to the dumpsite, the ones that severely affect the livelihood of people were odor from the site, pest (flies, vermin etc.), fire and smoke, poisonous gases, and litter or rubbish from the landfill. These findings support earlier studies that Landfill sites in Ghana like many other parts of the developing countries have been found to contain a high amount of plastic bags and other papers, which are blown about by the wind. At the Oblogo landfill site, the windblown litter makes the area unsafe and creates unsightly conditions in the environment. The litter and plastics make parts of the towns very untidy and unhygienic (Coffie, 2010).

The odor is as a result of the high composition of organic waste in the total waste collected and the absence of waste segregation (Adu-Boahen, 2012). Odour in dump sites come from a number of different sources and some of these are gases, fresh refuse, malodorous chemicals, agricultural

and sewage sludge (Adu-Boahen, 2012). Odorous emissions are usually accompanied by reports of ill-health from communities. At Dompoase Landfill, individuals reported a wide range of non-specific health symptoms, attributing these to odor exposure, including nausea, headaches, drowsiness, fatigue and respiratory problems (Owusu-Sekyere et al., 2013a). Coffie (2010) found that unhealthy odor emanates from the Oblogo landfill sites and spread into the residence of the people living in the communities around Weija. Some odor also comes out from the leachate from the waste.

Dumpsites also harbor flies and vermin, creating a high level of environmental nuisance. Vermin and other pests are a potential public health risk and should not be allowed to breed in dumpsites (Adu-Boahen, 2012). According to Rushbrook and Pugh (1999), the abundance of these birds, vermin, rodents and flies around dumpsites, is a clear indication that the waste is not being managed properly. Flies and mosquitoes are two types of insects that can be found in landfill sites in Ghana and these two insects are a great source of many diseases. Flies spread many food borne diseases, by carrying bacteria from the waste to food. Mosquitoes, on the other hand, breed in water that collects in depressions on the landfill surface and in uncompact and uncovered wastes such as piles of tires and other bulky items. Mosquitoes are known to carry diseases such as encephalitis, dengue fever and malaria. Rats and other rodents spread diseases such as rabies, rat-bite fever, leptospirosis, typhus, and bubonic plague (Adu-Boahen, 2012).

Table 4.16: Extent to which people livelihoods are affected

Effects	Proportion of Effect %		
	Severe	**Moderate**	**Less**
Noise from the landfill	20	53	27
Litter or rubbish from the landfill	38	37	25
Odor from the site	80	18	2
Pest (flies, vermin etc.)	72	26	2
Fire and Smoke	64	33	3
Poisonous gases	46	42	12
Dust	32	59	9
Surface water contamination	24	47	29

Source: Field data, 2015

In an interview with the Municipal Environmental Officer, he noted that the dump site is not an engineered dump site hence methane gases that seeps from the dump site sparks, leading to burning and emission of smoke. He noted that though the gases and smoke are very harmful, they cannot do anything about it. He added that "*due to this among many others, the community demonstrated continuously for 3days for the closure of the dumpsite and they are not wrong in that regard because living close to the site is really harmful*".

4.6 Response to the Challenges posed by the dumpsite

4.6.1 Authorities responsible for managing the Dumpsite

When asked whose responsibility is it to manage the dumpsite, majority of the respondents (122) indicated that it is the Municipal Assembly and even though only 42% of the respondents have ever reported the problem of the dumpsite to the Assembly, the response was not satisfactory (100%). 50 of them also cited both private operators and the Assembly as those responsible for managing the problems of the dumpsite. Of the 55% who have ever reported the issue to the authorities, only 9% received a satisfactory response but the remaining 91% did not. 26 also noted that it is private waste operators that are responsible for managing the waste and even though 2% have reported the problems they are facing to them, they did not receive any satisfactory response. 2 however believe it is the community that needs to manage it and although 1% reported it to the community leaders, there was no satisfactory response.

The Environmental Officer's response supported the claim made by the people that they have continuously been reporting the challenges they are facing to the Assembly. He noted that he receives the complaints very frequently. And the complaints they mostly lodge, requires the Assembly to totally close down the dumpsite or properly manage the site to minimize the risks they are facing.

Table 4.17: Authorities responsible for solving problems emanating from the landfill site

Whose Responsibility	Frequency	Ever reported any issue to the authorities (%)		Was response satisfactory (%)	
		Yes	No	Yes	No
Municipal Assembly	122	42	75	0	100
Private Waste Operators	26	2	21	0	100
Community Members	2	1	1	0	100
Both Private and the Assembly	50	55	3	9	91
Total	**200**	**86**	**114**	**4**	**82**

Source: Field data, 2015

4.6.2 How the Assembly is responding to the challenges

According to the environmental officer, the Assembly totally agrees with the community that the dumb site needs to be closed "*but we are currently adopting a gradual approach as the Dome market alone has 6 containers measuring 60 cubic which has to be emptied on the daily basis*". This therefore put a lot of pressure on the Assembly to get a more effective and efficient approach to solve the high daily waste generation.

The Assembly has currently reduced the number of vehicles, which deposit waste in the dumpsite. He said "*currently there are only 60 vehicles that are allowed to discharge waste at the site*". In addition to this there are other small independent waste collectors, who are also allowed to use the dumpsite "*as in the absence of that they would be expected to go all the way to Kpone and there is the believe that they may end up dumping some else instead of going to Kpone*".

In an effort to solve the challenges confronting the communities, the Environmental officer noted that the assembly formed a working committee after the demonstration, comprising of 2

members each from the Pantang Hospital, Nurses training college, and the members of the community and 3 officials from the Municipal Assembly to review management of the dumpsite. "*However, after the committee was set up and a meeting was called, they never showed up*" (Environmental Officer).

Some of the other initiatives the Assembly is using are that Zoomlion has been contracted to manage the dumpsite. They are mandated to compact waste brought to the site and also to spray the dumpsite and beyond 500metres radius every 2weeks. The Assembly has also recognized the effort made by scavengers to minimize rubber and metal waste and hence the Assembly has registered 96 scavengers. They are regularly educated on the health hazards of their work and safety measures they need to take to avoid contracting any sickness.

The Environmental officer noted that these measures are moderately effective and the community is aware of these measures. However, the assembly is proactively looking for sustainable measures to manage the waste because "*the daily waste generation from the municipality is overwhelmingly high*".

In many developing countries like Ghana, it is very difficult to find engineered landfill sites, especially in areas where rapid urbanization and urban growth have outpaced the capacity of municipal authorities' waste and sanitation management (Mensah & Larbi, 2005; Fobil, Armah, Hogarh, & Carboo, 2008; Owusu, Oteng- Ababio, & Afutu-Kotey, 2012). The poor infrastructure and weak capacities of governing authorities has accounted for the challenges confronting residents, especially in the largest city and national capital, Accra (Ayee & Crook, 2003; Crook & Ayee, 2006; Mensah & Larbi, 2005; NLO, 2009).

The agitation made by the people through series of demonstration clearly confirms the position of Owusu et al. (2012). According to them the main reasons accounting for the resistance is the anticipated nuisance and hazards that the landfill will create for the residents. Engineered landfill site is the best option like those being constructed in cities such as Kumasi, Sekondi-Takoradi and Accra. However, given that their capacities are very small relative to the quantity of wastes generated daily in these cities (Owusu et al., 2014), there is the need for much bigger engineered landfill sites since the volume of waste generated daily are increasing.

4.6.3 Recommendation for Management of the Dumpsite

The residents who were interviewed made some recommendations to the Assembly to consider as a way of solving the challenges they are facing with regards to managing the dumpsite. Majority of them (53) asked for the relocation of the dumpsite due to the residential developments around the area. Also, 36 suggested periodic spraying of the dumpsite as a way of managing the pest and odor from the site. 28 however asked the government to stop Zoomlion from using the dumpsite. 4 each also suggested the construction of a fence wall around the dumpsite and to recycle the materials from the site. 3 however noted that their livelihood depend on the dumpsite and therefore cannot asked for the closure of the dumpsite.

Table 4.18: Recommendation for the authorities towards the management of this landfill site

Recommendation	Frequency
A fence wall by the assembly should be made around the site	4
Can't say anything because i work here and depend on it	3
Government needs to stop the activities of the Zoomlion company.	28
Proper management of the site and it should be sprayed	36
Recycling of materials at the site	4
Relocation of site	53

Source: Field data, 2015

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This study sought to assess the phenomenon of residential development close to the Abokobi dumpsite in the Ga-East Municipality. The study used a mixed approach (quantitative and qualitative methodologies) to gather primary data. Under the quantitative approach, the survey was conducted to administer structured questionnaire to 200 residents of the areas as well as 2 Assemblymen whose communities are affected by the dumpsite. Under the qualitative approach, the Environmental Officer of the Ga East Municipa Assembly was engaged in an in-depth interview. Landlords and squatters were engaged in focus group discussions. Whiles descriptive statistical tools such as tables, cross tabs, frequencies and graphs were used in the presentation of the quantitative data, content analysis was used in the presentation of the interview and focus group discussion data. This section presents the summary of the key findings, draws conclusion and make recommendations for policy consideration.

5.1 Summary of Findings

The study sought to achieve four main objectives to: examine the reasons why people chose to live or continue to live close to the dumpsite; examine the benefits (if any) of the landfill to residents; assess the risks people living close to the landfill sites are exposed to; and to examine the measures put in place by the Assembly to mitigate the challenges residents near the dumpsite are facing in compliance with the Ghana Landfill Guidelines produced by the Enviromental Protection Agency(2002).

The socio-demographic analysis of the respondents show that majority of the respondents are employed. Education was found to be a significant factor influencing the occupation of the resident. Those with lower education were mostly engaged in the informal sector (engaged in activities like trading, farming, driving, hairdressing, seamstress among others), whereas those with higher education were mostly engaged in salaried work. Majority of the respondents were also living less than 50m from the dumpsite and they have lived there between 1 – 5 years.

5.1.1 Reasons for living close to the dumpsite

The results show that some of the respondents were living there before the place was turned into a dumpsite whiles others came to stay after the area has been turned into a dumpsite. Interestingly, on 28% of the respondents were staying in the vicinity before the place was converted into a dumpsite. The remaining 72% came to live in the area knowing very well that it was a dumpsite area.

The main reasons that were given by those who relocated to settle close after the place has been a dumpsite were that accommodation is affordable in the area, the place is close to their place of work, and they are living there temporary. Other reasons were that they had their house/land there before the place was turned into a dumpsite and they were born there.

For those who were living there before the place was turned into a dumpsite noted that the Assembly promised them that the landfill would not pose any risk to them. They also added that they had their houses already built there before the place was turned into a dumpsite and for that reason they cannot afford to relocate elsewhere. The gender dimension shows that men continue to live there because they have already built their house there whiles women live there because of the promise the Assembly made to them. In the educational sense, those with tertiary education continue to live there because they have built their houses there whiles those whose

educational attainment are less than tertiary are counting on the promises of the Assembly. Whereas salaried workers continue to live there because of the house they have built there, traders, farmers, seamstresses and other are counting on the Assembly promises or they cannot just afford to relocate.

Majority of the respondents, especially those living less than 50m from dumpsite, feel very uncomfortable living close to the dumpsite due to the effects of the dumpsite on their lives. Those who fee indifferent are those who live between 150 – 200m from the dumpsite. A few also indicated that they feel comfortable and these are those who live 150 – 200m away from the dumpsite. This is probably because the place is close to their place of work and they are not much affected by the dumpsite. Due to the effects of the dumpsite on the livelihood of the residents, majority of the residents (especially those living close to the dumpsite) have intentions to leave in the future is nothing is done about it.

5.1.2 Benefits of the Dumpsite

Despite the complaints about the effect of the dumpsite on the livelihood of residents around, the findings show that residents around the dumpsite obtain certain benefits from the dumpsite. Two major benefits were found from the analysis of the study: scavenging and farming. Majority of the respondents indicated that they have seen many people pick items (plastics and metals) from the dumpsite. 40 of the respondents were scavengers, who earn an average monthly income of GH¢316.61 from the rubber and metals they pick from the dumpsite. Majority of the scavengers were males and as high as 90% of the scavengers considered the dumpsite as beneficial to their livelihood.

Some of the community people and even other outsiders also farm around the dumpsite. The main reason given for farming activities around the dumpsite were that the land is fertile due to

the decomposing of the refuse. Other reasons were that it is a way of protecting landed property from intrusion, it is the only land, and renting a farmland around the dumpsite is relatively cheaper.

5.1.3 Risks associated with living close to the Dumpsite

Though the dumpsite is profitable to the livelihood of some of the residents and even non-community residents (scavengers and farmers), as high as 91% indicated that the dumpsite is a threat to the community members. In addition, 83% noted that the feel threaten living close to the dumpsite. The issues that were cited as putting their health at risk were pollution of the air due to smoke, fire, and odor from the landfill site and the presence of mosquitoes and other infectious insects. Other health hazards were the pollution of water bodies due to leachate from the site, the presence of reptiles such as snakes and the pollution of food items.

Due to these hazards that emanate from the dumpsite, there were some common sicknesses that were attributed to the presence of the dumpsite. The commonest among them is malaria or typhoid and cholera, which are very prevalent in the community. Respiratory diseases, diarrhea and cardiovascular diseases were other disease attributed to living close the dumpsite. 80% of the respondents indicated that a member of their household or themselves have been a victim of these sickness (especially the malaria and cholera).

In an evaluation of their current health status, almost equal proportion indicated that they fall sick either once in every quarterly or above three months. Those who fall sick at least every quarterly indicated that they are currently less healthy but those who fall sick more than three months indicated that their current health status is normal. Only a few noted that they were very healthy.

An assessment of the extent to which residents were affected by the dumpsite indicate that certain environmental nuisances such as odor from the site, pest (flies, vermin etc.), fire and smoke, poisonous gases, and litter or rubbish from the landfill severely affect the livelihoods of the residents.

5.1.4 Measures to mitigate the challenges residents face living near the dumpsite

The Environmental officer confirmed that the residents have been facing many challenges, especially those who live close to the dumpsite. This was because the site is not an engineered site and therefore makes it difficult to effectively manage it. He further explained that the community organized a demonstration to express their dissatisfaction with the challenges they are facing living close to the dumpsite.

In the past, the Assembly set up a working committee comprising members of the community and that of the Assembly to meet and come out with working plans and strategies to help minimize the challenges they are facing. Unfortunately, the working committee did not work because the members of the committee failed to turn up whenever a meeting was called. The Assembly has minimized the number of vehicles that bring waste to the dump to 60 per day. Zoomlion has also been mandated to spray the site and 500metres radius every 2weeks. The scavengers whose livelihood also depends on the dumpsite are periodically educated on certain safety measures to prevent any form of accidents. The Environmental officer noted that these efforts have not fully achieved the desired output and the Assembly is brainstorming on an effective sustainable solution.

Given the sprawling of residents around the site, the residents recommended for relocation of the site to somewhere outskirt of the town. Other asked for the proper management of the site through periodic spraying to minimize the threat. Some also asked that the government stop the

activities of Zoomlion, which uses the site as the final disposal site. A few recommended for the recycling of some of the waste to help reduce the quantity of waste on the dumpsite. Finally there were other who couldn't suggest anything because their livelihood depends on it.

5.2 Conclusion

The findings of this study have shown that there are multi-faceted reasons why people are found living close to dumpsite. From this study, people were settling in the community before the place was turned into a dumpsite. Others had already purchased their lands therefore before the place was turned into a dumpsite and other settle there because it is close to their places of work. Despite all these reason, the study has also revealed that the dumpsite at Pantang is posing significant threat to the health of the residents. This is mainly due to its improper management.

Given the fact that some people were living there before the place was turned into a dumpsite, which is also a non-sanitary engineered clearly shows that the Assembly and officials who released the land for use as a dumpsite did not take the wellbeing of the people into consideration. The number of people recently living close to the dumpsite are increasing and this calls for proactive strategic measures to be taken else in the next few years, the story will turn from one of complain and demonstration to outbreak of endemic diseases and casualties.

The present state in which landfills are sited and operated in Accra and elsewhere in Ghana leaves much to be desired. This study sides with the view of Owusu et al. (2014) that "if residential properties are viewed as a strategic area for stimulating economic growth, while at the same time improving the living conditions of Ghanaians, then the siting and management of landfills warrants a more serious level of political attention" (p.1152).

5.3 Recommendation

For the reduction to the risks residents living close to the dumpsite are exposed to, the following recommendations are made:

- The Ghana Environmental Protection Agency (EPA) should exercise its monitoring and sanctioning roles adequately. It should put in place a systematic process of checking, observing, inspecting, regulating or otherwise controlling key parameters and characteristic activities at the dumpsite to ensure compliance with specific standards or other performance requirements to measure progress toward reduction of health and environmental risks.
- The Ga-East Municipal Assembly (GEMA) should consider as a matter of priority the use of other methods of waste disposal such as waste reduction strategies. Reduction strategies use food waste and other organic components of waste to generate compost for use in agriculture and incineration.
- The GEMA should embark on a vigorous campaign for waste segregation since reusable or recyclable articles are not waste and can be used repeatedly before discarding. This can commence with institutions such as educational institutions, government agencies and ministries, and in offices.
- The GEMA should widen the polluter pays principle in waste management where waste generators are made to pay for the disposal cost of the waste they generate by volume in the municipality. This will be a very useful waste management tool which when properly applied can generate sustainable funds while creating economic incentives for waste minimization at source.

- The GEMA should make full use of the media (print and electronic) present in the municipality to intensify the education on environmental cleanliness. Fora and public lectures should be organized for identifiable groups to increase awareness on the health hazards associated with inadequate solid waste disposal.
- As a matter of urgency the GEMA should take the necessary steps to ensure that she constructs a sump for leachate collection.
- The GEMA should try to look for funds to construct an engineered sanitary landfill somewhere at the outskirt of the residential facility and abandon the Pantang one.

Reference

Abdul, S. (2010). Environmental and Health Impact of Solid Waste Disposal at Mangwaneni Dumpsite in Manzini: Swaziland. *Journal of Sustainable Development in Africa*, Vol. 12, No.7, pp. 64 – 78.

Accra Metropolitan Assembly (2009). Integrated Solid Waste Management Strategy. Accra, Ghana, Hifab-SIPU-Colan Consultants. Urban Environmental Sanitation Project.

Adu-Boahen,A. (2012). Assessing the operations and Management of the Kojorom Final Waste Disposal Site by the Sekondi Takoradi Metroplitan Assembly (Master's Thesis, Kwame Nkrumah University of Science and Technology,Kumasi,Ghana).Retreived from http://ir.knust.edu.gh/bitstream/123456789/4771/1/ALEX

Anomanyo, D.E. (2004). Integration of Municipal Solid Waste Management in Accra (Ghana): Bioreactor Treatment Technology as an Integral Part of the Management Process. Sweden, MSc. thesis. Lund University.

Ayee, J., & Crook, R. (2003). 'Toilet wars': Urban sanitation services and the politics of public-private partnerships in Ghana (Institute of Development Studies (IDS) Working Paper No. 213). Sussex: IDS.

Bleich, D. H., Findlay, C., & Phillips, M. G. (1991). An evaluation of the impact of a well-designed landfill on surrounding property values. *Appraisal Journal*, 59(2), 247–252.

Boadi, K. O. & Kuitunen, M. (2004). Municipal Solid Waste Management in the Accra Metropolitan Area, Ghana. The Netherlands, Kluwer Academic Publishers. *The Environmentalist,* Vol. 23.

Bouvier, R. A., Halstead, J. M., Conway, K. S., & Manalo, A. B. (2000). The effects of landfills on rural residential property values: Some empirical evidence. *Journal of Regional Analysis and Policy*, 30(2), 23–38.

Coffie, F.M (2010). Landfill sites management challenges: The perceived effect and willingness on the part of the people in the Ga East and South Municipalities to pay for improvement (master's thesis, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana).Retrieved from http://www.udsspace.uds.edu.gh/bitstream/123456789/455/1/WILLINGNESS

Creswell, J. W. (2009). R*esearch design: Qualitative, quantitative, and mixed methods approaches*. USA: SAGE Publications, Incorporated.

Crook, R., & Ayee, J. (2006). Urban service partnerships, 'street-level bureaucrats' and environmental sanitation in Kumasi and Accra, Ghana: Coping with organisational change in the public bureaucracy. *Development Policy* Review, 24(1), 51–73.

El-Fadel, M, Findikakis, A. N., & Leckie, J. O. (1997). Modeling Leachate Generation and Transport in Solid Waste Landfills. *Environ Technol*. Vol. 18, No.7, pp. 669-86.

Elliot, P., Richardson, S., Abellan, J. J., Thomsom, A., Hoogh, C., Jarup, L., Briggs, D. J. (2009). Geographic Density of landfill sites and risk of congenital anomalies in England. *Occup Environ Med.* Vol. 66, No. 2, pp. 81-9.

Elliott, P., Briggs, D., Morris, S., de Hoogh, C., Hurt, C., Jensen, T. K., Maitland, I., Richardson, S., Wakefield, J., Jarup, L. (2001). Risk of adverse birth outcomes in populations living near landfill sites. *BMJ*. Vol. 323, No. 7309, pp. 363-68.

EPA (Environmental Protection Agency) Ghana (2002). *Ghana landfill guidelines* (Best Practice Environmental Guidelines Series No. 1). Accra: EPA.

Fobil, J. N., Armah, N. A., Hogarh, J. N., & Carboo, D. (2008). The influence of institutions and organizations on urban waste collection systems: An analysis of waste collection system in Accra, Ghana (1985–2000). *Journal of Environmental Management*, 86(1), 262–271.

Ghana Statistical Service (2013). 2010 Population & Housing Census: National Analytical Report. Accra, GSS.

Goldberg, M. S., Siemiatyck, J., DeWar, R., Désy, M., & Riberdy, H. (1999). Risks of developing cancer relative to living near a municipal solid waste landfill site in Montreal, Quebec, Canada. *Arch of Environ Health*, Vol. 54, No. 4, pp. 291- 296.

Goldstein, R. (2006). "Trash to Treasure: Landfills as an Energy Resource," District Energy Magazine (Third Quarter): 6-10, http://www.epa.gov/landfill/docs/3q06landfill.pdf

Gouveia, N., and do Prado, R. R. (2010). Health risks in areas close to urban solid waste landfill sites. *Rev Saúde Pública*, Vol. 44, No. 5, pp. 1 – 8.

Hammer GB, McGeehin MA, Phifer BL and Ashley DL. (1996): Volatile organic compound testing of a population living near a hazardous waste site. J Expo Anal Environ Epidemiol. 1996 Apr-Jun; 6(2):247-55.

Institute of Sanitary Engineering, Water Quality and Solid Waste Management, Universitat Stuttgart Germany.

ISSER (Institute of Statistical, Social and Economic Research) (2007). *The state of the Ghanaian economy in 2006*. Accra: ISSER, University of Ghana.

Jarup, L., Briggs, D., de Hoogh, C., Morris, S., Hurt, C., Lewin, A., Maitland, I., Richardson, S., Wakefield, J., and Elliott, P. (2002). Cancer risks in populations living near landfill sites in Great Britain. *British Journal of Cancer*, Vol. 86, pp. 1732 – 1736.

Ketibuah, E., Asase M., Yusif, S., Mensah, M.Y. & Fischer, K. (2004). Comparative Analysis of Household Waste in the Cities of Stuttgart and Kumasi-Option for Waste Recycling and Treatment in Kumasi. *Proceedings of the 19th international CODATA Conference*, pp. 1-8.

Lim, J. S., & Missios, P. (2007). Does size really matter? Landfill scale impacts on property values. *Applied Economics Letters*, 14(10), 719–723.

Mane, T. T,. and Hingane, H. N. (2012). Existing Situation of Solid Waste Management in Pune City, India. *Research Journal of Recent Sciences*, Vol. 1, pp. 348-351.

Marc, J. (2006). Urban infilling impacts on solid waste facilities. Retrieved from: http://www.forester.net/mw-0506urban.html.

Mensah, A., & Larbi, E. (2005). Solid waste disposal (SWD) in Ghana. WELL Fact Sheet. Retrieved from http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/RSA%20Solid%20waste.htm

Monney, I., Tiimub, B. M., and Henry Chendire Bagah, H. C. (2013). Characteristics and management of household solid waste in urban areas in Ghana: the case of WA. *Civil and Environmental Research*, Vol.3, No.9, pp. 10 – 22.

Mundy, B. (1992). The impact of hazardous materials on property value. *The Appraisal Journal*, 60(2), 155–162.

Mustafa, N. (1993). Plastics waste management, disposal, recycling, and refuse. London: Marcel Dekker, Inc.

Nelson, A. C., Genereux, J., & Genereux, M. (1992). Price effects of landfills on residential land values. *Journal of Urban Planning and Development*, 118(4), 128–137.

NLO (The New Legon Observer) (2009). Why is urban sanitation such a big challenge to Ghana? *NLO*, 3, 1–5.

Oduro, A. K.,(2004). Management of Landfills in Ghana. Project Work presented to the

Ogwueleka, T. C. (2009). Municipal Solid Waste Characteristics and Management in Nigeria. *Iran. J. Environ. Health. Sci. Eng.* Vol. 6**,** No. 3, pp. 173-180.

Osumanu, I.K. (2009). "Urbanization challenges in Africa: creating productive cities under globalization". In, Graber, D.S. and Birmingham, K.A. (eds.), Urban Planning in the 21st Century. New York: Nova Science Publishers, Inc: 129-140.

Owusu, G., Nketiah-Amponsah, E., Codjoe, S.N.A., & Afutu-Kotey, R.L. (2014). How do Ghana's landfills affect residential property values? A case study of two sites in Accra. *Urban Geography*, 35:8, 1140-1155.

Owusu, G., Oteng-Ababio, M., & Afutu-Kotey, R. L. (2012). Conflicts and governance of landfills in a developing country city, Accra. *Landscape and Urban Planning*, 104(1), 105–113.

Owusu-Sekyere E, Osumanu, IK and Abdul- Kadri Y (2013a). An Analysis of the Plastic Waste Collection and Wealth Linkages in Ghana. International Journal of Current Research 5(1), 205-209

Owusu-Sekyere, E., Osumanu, I. K., and Yaro, J. A. (2013b). Dompoase Landfill in the Kumasi Metropolitan Area of Ghana: A 'Blessing' or a 'Curse'? *Int. J. Cur. Tr. Res*, Vol. 2, No. 1, pp.87-96.

Palmer, S. R., Dunstan, F. D. J., Fielder, H., Fone, D. L., Higgs, G., & Senior, M. L. (2005). Risk of congenital anomalies after the opening of landfi ll sites. *Environ Health Pesp*, Vol. 113, No. 10, pp. 1362-1365.

Parker, B. J. (2003). Solid waste landfills and residential property values (White Paper). Washington, DC: National Solid Wastes Management Association.

Pukkala, E, and Pönkä, A. (2001). Increased incidence of cancer and asthma in houses built on a former dump area. *Environ Health Perspect*, Vol. 109, pp. 1121–1125.

Puopiel, F. (2010). Solid Waste Management in Ghana: The Case of Tamale Metropolitan Area. Kumasi, Ghana, MSc Thesis, Kwame Nkrumah University of Science and Technology.

Ready, R. C. (2005). Do landfills always depress nearby property values? *Journal of Real Estate Research*, 32(3), 321–340.

Rushbrook, P. and Pugh, M. (1999), A Technical Guide to Planning, Design and Operation, Smith, S. M. (2014). Determining Sample Size: How to Ensure You Get the Correct Samples Size. https://www.qualtrics.com/blog/determining-sample-size/ [Accessed: 29/4/2015]

Taiwo, A. M. (2011). Composting as a Sustainable Waste Management Technique in Developing Countries. *Journal of Environmental Science and Technology*, Vol. 4, No. 2, pp. 93 -102.

U.S. Department of Health and Human Services (2003). Agency for Toxic Substances and Disease Registry Division of Health Assessment and Consultation, Atlanta, Georgia

UN-HABITAT (2010). Housing as a Strategy for Poverty Reduction in Ghana. United Nations Human Settlements Programme. Nairobi. Kenya, UNON, Publishing Services Section.

Vrijheid, M. (2000). Health effects of residence near hazardous waste landfill sites: a review of epidemiologic literature. *Environmental health perspectives*,*108*(Suppl 1), 101.

Ward, R. S., Williams, G. M. & Hills, C. C. (1996). Changes in major and trace components of landfill gas during subsurface migration. *Waste Manage Res.* Vol. 14, No. 3, pp. 243–61.

WaterAid and European Union (2008). Urban Sector Assessment Report. Accra, Ghana.

WHO (WHO , 2000). Report from a WHO Meeting Lodz, Poland, 10–12 April, 2000. Bilthoven, The Netherlands: WHO Regional Office For Europe, European Centre for Environment and Health

Wisdom, J., and Creswell, J. W. (2013). Mixed Methods: Integrating Quantitative and Qualitative Data Collection and Analysis While Studying Patient-Centered Medical Home Models. Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. 13-0028-EF.

World Bank Technical Paper No. 426 Solid Waste Landfills in Middle and Lower Income Countries–The World Bank Washington D.C

Zerbock, O. (2003). Urban Solid Waste Management: Waste Reduction in Developing Nations. Houghton, MI: Michigan Technological University.

Zmirou, D., Deloraine, A., Saviuc, P., Tillier, C., Boucharlat, A., & Maury, N. (1994). Short-term health effects of an industrial toxic waste landfill: a retrospective follow-up study in Montchanin, France. *Archives of Environmental Health: An International Journal*, *49*(4), 228-238.

APPENDIX I

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

AN ASSESSMENT OF THE PHENOMENON OF RESIDENTIAL DEVELOPMENT CLOSE TO SOLID WASTE DUMPSITES: THE CASE STUDY OF THE ABOKOBI DUMPSITE

Questionnaire for Assembly

1. What is the distance between the Abokobi dumpsite and the nearest residential facility?
   (a) Less than 50m (b) 50m -100m (c) 101m - 500m
   (d) 501-1km (e) 1km - 2km (f) Above 2km

2. Do you consider the location of the landfill site hazardous to the inhabitants living close to the dumpsite? (a) Yes (b) No

3. What forms of risks do you think the people living close to the dumpsite are exposed to? (tick as many as applicable)
   (a) Air pollution due to smoke, fire and odour from the landfill site
   (b) Surface water pollution due to leachate from the site
   (c) Presence of mosquitoes and other infectious insects
   (d) Presence of reptiles such as snakes
   (e) Other (specify) ……..

4. Why do you think people build /stay near the dumpsites?
   (a) Accommodation is affordable there
   (b) They bought their lands before the place was turned into a landfill site
   (c) The place is close to their area of work
   (d) The landfill offers some livelihood opportunities
   (e) Some do not just want to leave the place
   (f) They feel comfortable living there like any other place
   (g) Other (specify) ……..

5. Have you been receiving complaints from the community members concerning the landfill site? (a) Yes (b) No

6. If yes, what has been the nature of complaints from the communities?
   (a) Asking for the closure of the dumpsite

(b) Asking for a proper management of the dumpsite
(c) Asking for compensation
(d) Other (specify) ……

7. How frequent do you receive these complaints?
   (a) Very frequent (b) Moderate (c) Less frequent

8. Do you have any program or strategy in place for managing the nuisance from the landfill site? (a) Yes [*Skip to Q9*] (b) No

9. If No, why does the municipality have no policies or strategies in place for managing the nuisance from the dumpsite?
   ……
   ……
   ……

PROGRAMME FOR NUISANCE CONTROL

10. What procedures are in place for managing the following nuisances at the landfill?
(a) Odour ……...
(b) Smoke……...
(c) Pest (fly, Vermin)……
(d) Windblown litter……..
(e) Leachate (Water from Landfill)……...
(f) Landfill Gas (Methane)……

11. How effective are these programmes in managing the nuisance?
   (a) Very effective (b)Moderately effective (c) Less effective

12. Are the community aware of these programmmes? (a) Yes (b) No

APPENDIX II

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

AN ASSESSMENT OF THE PHENOMENON OF RESIDENTIAL DEVELOPMENT CLOSE TO SOLID WASTE DUMPSITES: THE CASE STUDY OF THE ABOKOBI DUMPSITE

Vicinity name: _____ Interview Date: ____/____/_____ (dd-mm-yyyy)

Distance from landfill site: (a) Less than 50m (b) 50 – 99m (c) 100 – 149m
(d) 150 – 200m

BACKGROUND DATA

1. Sex: (a) Male (b) Female

2. Age ……

3. Employment Status (a) Employed (b) Unemployed (c) Retired
(d) Student

4. If employed, what work? (a) Salaried worker (b) Trader (c) Farmer
(d) Seamstress/Hairdresser (e) Artisan (e.g. carpenter, mason etc.)
(f) Driver (g) Other (specify) ……

5. Religion: (a) Christian (b) Moslem (c) Traditionalist

6. Marital Status (a) Married (b) Single (c) Divorced (d) Widow
(e) co-habiting / Separated

7. Educational Background (a) No School (b) Basic/Primary
(c.) Middle School/JHS (d) Secondary School/SHS (e) Tertiary
(f) Other (specify)…….

8. How long have you lived in this vicinity? (a) Less than 1 year (b) 1 -5 years

(c) 6-10 years (d) Above 10 years

Reasons for staying close to landfill site

9. Were you residing here before this place was used for landfill purposes?

(a) Yes (b) No

10. If no, why did you chose to stay here knowing that the place is a landfill site (***Multiple Response***)

(a) Accommodation is affordable here

(b) I had my house/land here before the place was turned into a landfill site

(c) This is where I was born

(d) This area is close to my place of work

(e) I am living here temporary

(e) Other (specify) …

11. If yes, why did you continue to live here when the place was turned into a landfill site?

(a) I have already built my house here

(b) I can't afford to relocate elsewhere

(c) We were promised the landfill will not pose any risk to us

(d) Other (specify) …….

12. How do you feel living close to the landfill site?

(a) Feel comfortable (b) Feel indifferent (c) Feel uncomfortable

13. Do you have any future plans to relocate from here?

(a) Yes (b) No

Benefits/Opportunities for people living close to dumpsites

14. Is the dumpsite beneficial to the people living in this area in any way?

(a) Yes (b) No

15. Do people pick items from the landfill site?

(a) Yes (b) No

16. How many people in this vicinity pick items from the dumpsite?

(a) Many (b) Few

17. Do you personally pick items from the site? (a) Yes (b) No [If No, skip to 19}

18. If yes, what items do you pick?

……..

19. How much do you usually make in a month from the items you pick from the landfill site?

GH¢ ……

20. Do some people farm around the landsite?

(a) Yes (b) No

21. Are they community members?

(a) All of them are from the community (b) They are all outsiders (c) Some are community members whiles others are from others

22. Why do you think the people farm around the dumpsites?

(a) The land is fertile
(b) That's their only land
(c) As a way to protect their land from intrusion
(d) Farmlands around the dumpsite is relatively cheaper
(e) Other (specify) ……..

Risks Associated with living close to landfill sites

23. Does the location of the landfill site pose any threat or risk to you?

(a) Yes (b) No

24. Does the location of the landfill pose any health problem on the people living in community?

(a) Yes (b) No

25. If yes, what health problems does the landfill pose?

(a) Air pollution due to smoke, fire and odour from the landfill site

(b) Surface water pollution due to leachate from the site

(c) Presence of mosquitoes and other infectious insects

(d) Presence of reptiles such as snakes

(e) Other (specify) ……..

26. What sicknesses are common in this vicinity, which can be attributed to the landfill site?

(a) Cholera (b) Diarrhea (c) Malaria (d) Typhoid fever

(e) Respiratory disease (f) Tuberculosis (TB)

(g) Other (specify) …….

27. Have you or any member of your family ever suffered any the sicknesses before?

(a) Yes (b) No

28. How frequent do you or family members fall sick?

(a) Once every week (b) Once in a month (c) Twice in a month
(d) Once in three months (e) Above 3 months

29. Do you know of anyone in this vicinity who has also suffered a health crisis due to the land fill?

(a) Yes (b) No

30. How will you evaluate your health status now as compared to when the landfill was not here?

(a) Very healthy (b) Normal (c) Less healthy

31. To what extent are you affected by the following? Indicate your level using the following scales: 1 – Severely affected 2 – Moderately affected 3- Less affected

(*Please indicate your assessment by ticking in the appropriate box*)

No		Severe [1]	Moderate [2]	Less [3]
a.	Noise from the landfill			
b.	Litter or rubbish from the refuse			
c.	Odour from the site			
d.	Pest (flies, vermin etc.)			
e.	Fire and Smoke			
f.	Poisonous gases			
g.	Dust			
h.	Surface water contamination			

Solution

32. Who is responsible for solving the problems emanating from the landfill site?

(a) Municipal Assembly (b) Private waste operators

(c) Community Members (d) Others (specify)……..

33. Have you or any member of this vicinity reported any issue to the authorities responsible?

(a) Yes (b) No

34. Were you satisfied with the response? (a) Yes (b) No

35. What is your recommendation for the authorities towards the management of this landfill site?

……
……
……