PRESBYTERIAN UNIVERSITY COLLEGE, GHANA

FACULTY OF DEVELOPMENT STUDIES

DEPARTMENT OF RURAL COMMUNITY DEVELOPMENT

SOLID WASTE MANAGEMENT AT NKAWKAW IN THE KWAHU WEST MUNICIPALITY

BY

FORTUNATUS ANKAH

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Dissertation submitted to the Department of Rural and Community Studies of the Faculty of Development Studies, Presbyterian University College, Ghana in partial fulfilment of the requirement for the award of MA degree in International Development

BY

FORTUNATUS ANKAH

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DECLARATION

Candidate's Declaration

I hereby declare that, except for reference to other people's work which Has duly been acknowledged, this dissertation consists of my own work produced from research undertaken under the supervision and that no part has been presented for any degree elsewhere.

Signature……..… Date……

Name: Fortunatus Ankah

Supervisor's Declaration

I hereby declare that, the preparation and presentation of this dissertation were supervised in Accordance with the guidance on supervision of dissertation lay down by the Presbyterian University College, Ghana

Signature…… Date…….

Name: Dr. Richard Amfo-Otu

ABSTRACT

This research examine the value for money on solid waste management in Nkawkaw in the Kwahu West Municipality and examine the effectiveness of waste collection services and also assess the household willingness to pay for services. One Hundred and three (103) respondents and three other Environmental Officers were selected randomly within three areas at Nkawkaw in the Kwahu West Municipality. A structured questionnaire was administered. The results indicated that; out of 103 respondents, 63 percent of them said they dump at the communal container site, 23 percent of them have their waste collected by the private companies. Also, with reference to the data collected, 15 percent out of the total respondent said Yes and that they were willing to pay more for improve waste and 11 percent of them said No to improve waste services. Finally, 18 percent of the respondents said No they were not satisfied with their services whiles 4 percent stated that, they were satisfied with their service provision. It was therefore concluded that majority of the respondents were not happy with services provided and they are willing to pay more for improve waste. It was recommended that there is the need for more collaboration with the private companies by all the Assemblies to have a set amount to be paid by households for a best service delivery.

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DEDICATION

I dedicate this work to my wife (Linda KOD-Mensah) and my children.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Solid waste management has been an integral part of every human society (Shekdar, 2009). However, the current trends of generation, collection and final disposal of all waste forms present a great challenge to city authorities with mandate to manage waste. This problem has increased with change in consumption pattern; increase in consumerism and unavailability of waste management facilities, especially in developing countries. One obvious consequence of rapid urbanization is the growing generation of solid waste and many city authorities face unprecedented challenges in managing these, including problems of coping with their collection and disposal (Erni *et al.*, 2006). Solid waste management in Ghana is highly challenged in most of the Metropolitan, Municipal and District Assemblies (MMDA's), from financial, human resources and data management.

According to Tchobanoglous *et al*., (1993), solid waste management is a discipline associated with the control of generation, collection, transfer and transport, processing and disposal of solid waste in a manner that is in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes. "Recent event in major urban centers in Africa have shown that the problem of waste management has become a monster that has aborted most effort by city authorities, state and the federal government and professionals alike" (Onibokum, 1999). Waste is more recognized than define; something can become waste when it is no longer useful to the owner or it is used and fail to fulfill its purpose (Gouley, 1992).

Globally, waste generation rates are rising. In 2016, the worlds' cities generated 2.01 billion tonnes of solid waste, amounting to a footprint of 0.74 kilograms per person per day. With rapid population growth and urbanization, annual waste generation is expected to increase by 70% from 2016 levels to 3.40 billion tonnes in 2050. Compared to those in developed nations, residents in developing countries, especially the urban poor, are more severely impacted by unsustainably managed waste. In low-income countries, over 90% of waste is often disposed in unregulated dumps or openly burned. These practices create serious health, safety, and environmental consequences. Poorly managed waste serves as a breeding ground for disease vectors, contributes to global climate change through methane generation, and can even promote urban violence. Managing waste properly is essential for building sustainable and livable cities, but it remains a challenge for many developing countries and cities (Navarro and Ferronato, 2019).

Most countries in the world experience challenges in managing waste. The challenges range from reducing generation of waste, separation, change of habits, collection, transport, treatment, reuse and disposal of the waste (Kumar & Nandini, 2013). UNEP (2005) sees the challenges as different for different levels of industrial development. In an attempt to accelerate the pace of its industrial development, an economically developing nation may pay inadequate attention to solid waste management.

Many developing countries are still struggling with solid waste collection and management (Wilson, 2007), and Ghana is no exception. Given the level of investment, the running cost of solid waste management, and the competing priorities (water, health, education, roads, and energy) of national governments, the public sector alone could not deliver the solid waste services (Wilson, 2007). The private sector is partnering with the public sector to provide the needed resources for the solid

waste service delivery. But for this arrangement to have impact on total service coverage and environmental cleanliness, it will depend on the formal rules and enabling environment (policies, legal and regulation) created and maintained by the local and central governments to provide the needed incentives for more investment, improved service quality, and regular price adjustment (OECD, 2000).

The private sector participation in solid waste collection activities is actively being pursued by local government authorities in Urban areas whiles Rural areas are offering the traditional free social services through the private sector (McDougall *et al.,* 2001). Providing free waste collection services may not be sustainable, considering the challenges posed by waste to city authorities and in introducing fee-based-waste collection systems. The private sector participation in the solid waste collection is affirmed in the Integrated Solid Waste Management (ISWM) which involves the active participation of all stakeholders for implementing sustainable waste management system from point of generation, storage, collection, transfer and transportation, treatment and disposal in accordance with sound environmental practices (McDougall *et al.,* 2001). Environmental services delivery's strategies which solely depend on government funding are not sustainable and therefore waste generators contribution in funding waste collection activities is critical in keeping cities and towns clean and healthy (McDougall *et al.,* 2001).

In Ghana, the government started privatizing Solid Waste Collection (SWC) in order to meet the collection demand of the enormous waste being generated. The privatization is believed to have taken place in the mid 90s (Baud & Post, 2002). According to Wiafe (2015), after privatization, what the government does is to make sure that the companies that have been contracted to collect the solid waste live up to expectation. This is done through monitoring and evaluation. Based on this

monitoring and evaluation, any company that does not perform up to expectation, has its contract terminated and those that live up to expectation have their contracts renewed. An inspectorate team has been set up, and the team undertakes the monitoring and evaluation task. The team goes round each zone to assess the sanitation conditions there and award marks based on their indicators and then rank the companies from first to the last company.

Ghana's first sanitary landfill facilities were commissioned in the four largest towns in the country namely Accra, Kumasi, and Sekondi Takoradi between 2003 and 2004 (Songsore, 1994). Solid waste are waste consisting of domestic waste, industrial waste, public cleansing or street waste containing less than 70% of water (World bank,2004). Solid waste is widespread environmental problem and has been categorized into two broad terms namely hazardous and non-hazardous. Hazardous wastes are those unwanted materials capable of posing a substantial threat to health or the environment. Non-hazardous wastes are those wastes that pose no direct threat to human, animal or plant life. However, they are risk to the society and the ecology if too much is generated and not properly managed (Nisar et al.2008).

Nkawkaw is engulfed in filth because it has a serious waste management problem from generation through storage to disposal. The wrong perception and unconcern attitude of residents towards waste management might also be the cause to this problem.

1.2 Problem Statement

Solid waste management anywhere in the world is a problem that continually accelerates as a product of industrialization and population growth. As cities grow economically, greater business activity and diverse consumption patterns serve to drive up the solid waste quantities (Baako, 2010). Ghana has been principal victim of

this disaster. Enough attention has been given to this challenge, but it seems to be mere lip service that is played. A holistic and technical approach is needed since solid waste management is a complex challenge for the environment (Akafia, 2014). Wastes that are not properly managed are a serious health hazard leading to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that in turn spread diseases. WHO (2004) estimates that about 1.8 million people die annually from diarrheal diseases where 90% are children under five, mostly in developing countries. With the increasing influx of the people and the rapid urbanization, huge amount of human and small scale business waste of about 950 tones generate out of which 480 tones are collected representing 51%. This leaves a substantial amount of back log that creates various kinds of inconveniences including health hazards to the people of Nkawkaw, Indiscriminate dumping of waste, irregular collection of waste generated and inadequate resources are the problems facing solid waste management in the municipal.

To improve the system, private sector involvement has been adopted to help address the financial, human resources and logistical constraints through contractual arrangement. The private sector (Zoomlion Ghana Limited) has operated in many Metropolitan, Municipal and District Assemblies over the past decade, yet not major improvement has been achieved. The costs of service delivery by the company in Nkawkaw Municipality (Kwahu South) are not well documented to ensure value for money. The quantities of solid waste hauled to disposal sites are not well captured in academic literature. Again, it is not clear if some members of the Municipality have subscribed to kerbside and door to door waste collection services and whether they are currently satisfied with service delivery. All these have created some knowledge gap in academic literature. This study therefore, is to help bridge these gaps.

1.3 Objectives of the study

The main objective is to examine the value for money on solid waste management in Nkawkaw in the Kwahu West Municipality.

1.4 Specific objective

1. To assess the cost of solid waste services provided to the Kwahu West Municipal Assembly.

2. To examine the effectiveness of waste collection services within the Kwahu West Municipality.

3. To assess the household willingness to pay for improved solid waste collection services.

1.5 Research Questions

These issues identified above raise critical questions such as:

1. How much does it cost the Kwahu West Municipality to manage solid waste?
2. To what extent is the waste collection services provided by the private waste collection company effective?
3. To what extent are households willing to pay for improved solid waste collection services?

1.6 Significance of the study.

The study is significant because it help the researcher to discover the problems of solid waste management. It will help create awareness about the dangers associated with improper waste management. It will be relevant to the Kwahu west municipal Assembly and the Municipal Environmental Health Department as to how to properly manage solid waste. The study will also assist policy makers to draw concrete plans that will tackle the problems of solid waste management in the study area. Finally, it

will contribute to the existing body of knowledge on solid waste management and also stimulate further research.

1.7 Scope of the study

Although there are quite a number of suburbs in Nkawkaw, the researcher decided to include

Railway quarters, Zongo and Akuajoo communities for the household level. The reason is that, it

1.8 Limitation(s) of the study

The following constraints were encountered during the study. Time frame was limited. Considering the time frame couple with academic work is very limited. No funds for mobilization and transportation. Due to lack of funds, purchasing of stationary and the cost of printing the entire work was a problem and transportation to the communities. Language barrier. The questionnaires had to be translated into the local language (Akan) for those who cannot read and write. Some respondents put up criticism and argument which resulted in their inaccurate response to the questionnaire. Some respondents wanted to be compensated for the time spent to the questionnaire. This made the administration of the questionnaire quite difficult.

1.9 Organization of the study

Chapter One presents the background to the study, statement of the problem, research questions, objective of the study, specific objective and significance of the study. Chapter Two will deal with the literature review to the research on willingness to pay waste management. Chapter Three will involve the methodology used for the study whiles Chapter Four will involve analysis of results and discussions of findings.

Chapter Five presents the summary, conclusion and recommendations that will be based on the findings of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews issues pertaining to the objectives of the study and it is divided into various subheadings. The literature was obtained from books, articles, report as well as information from the internet. Literature review helps to give direction to the work and to avoid reinvention of what has already been done.

2.2 Solid Waste Management Service in Ghana

In most developing countries, adopting the appropriate Solid Waste Management System is becoming more complex and a difficult issue to handle due to the changing nature of waste and its management. Apart from the increasing involvement of the private sector, co-operation among city authorities, perhaps due to chronic financial constraints, is on the ascendancy (Ljunggren, 2000). It is also becoming obvious that waste has both economic and environmental value with new or modified treatment technologies emerging (Furedy, 1997). The authorities are therefore challenged to achieve acceptable quality services in the face of budgetary constraints and lack of co-operation among waste generators. As a way out of this dilemma, Zia and Devadas (2008) suggest the adoption of integrated solid waste management.

One key feature of the ISWM system is the waste hierarchy approach which involves waste collection, storage, transportation, processing, treatment, recycling and final disposal (Cheeseman *et al*. 2000). It is a simple, affordable and sustainable system (socioeconomically and environmentally) and guarantee equitable provision of services to both the poor and the rich. However, in a developing country like Ghana where waste generators and pickers are involved in primary collection by carrying

waste to container sites (or transfer stations), this process demands systematic planning according to Post (1999).

This is particularly so when recyclable material may be extracted from the waste stream from the points of generation, "transfer stations" or disposal sites (Oteng-Ababio 2007), and where both the public and private sectors are active participants in SWM due to inadequate infrastructure and finance (Oteng-Ababio 2010a). The public sector in this context refers to the statutory agencies established in the assemblies and mandated to provide SWM services to the communities. In most cases, the sector suffers from low staff productivity, inadequate supervision and unsatisfactory equipment, and political manipulation, especially from politicians who find the service an important instrument to retain political patronage and popularity. These and other problems have made general service delivery unsatisfactory and expensive (Oteng-Ababio 2007).

In Ghana, where about 50 percent of the urban population live below the poverty line of one US dollar a day and statistics in rural areas reveal more serious poverty conditions (GSS 2008; UN-Habitat, 2010), waste picking provides an opportunity for waste collectors to "make a living" by creating their own jobs as opposed to "earning a living" in regular formal employment. However, they do not operate in a separate economic realm as informal local waste circuits depend on an extra local formal economy and there can be various loops from informal activities back to formal industry in terms of supplying recycled inputs.

The challenge facing those "making a living" arises, not from their belonging to a separate or isolated local urban economy, but from the fact that they are in a subordinate position within global and local economies and lack access to financial resources and technology and to complete market information.

2.3 Solid Waste Management

The term solid waste management has been viewed differently by various authors. Kumah (2007: 2) defines solid waste management as "the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste". However, Tchobanoglous et al (1993: 7), provide a more

Comprehensive definition of solid waste management. According to them, solid waste management is:

".....that discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes".

Therefore, if solid waste management is to be accomplished in an efficient and orderly manner, the fundamental aspects and relationships involved must be identified and understood clearly (Tchobanoglous et al, 1993). On the basis of this solid waste management incorporates the following: source separation, storage, collection, transportation and disposal of solid waste in an environmentally sustainable manner.

2.4 Solid Waste Management Processes

The key elements in solid waste management include: waste generation, storage, collection, transfer and transport, processing and recovery and final disposal. This means that when waste is generated it is first stored in either dustbins or skips. It is then collected and finally disposed of in landfill. Also, when waste is collected it can be transfered from small collection equipment like the tricycle to a bigger truck for final disposal

2.5 Waste Generation

Waste generation encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal (Momoh and Oladebeye, 2010). According to UNEP (2009), in 2006 the total amount of municipal solid waste (MSW) generated globally reached 2.02 billion tones, representing a 7 per centannual increase since 2003. It is further estimated that between 2007 and 2011, global generation of municipal waste will rise by 37.3 per cent, equivalent to roughly 8 per cent increase per year (UNEP, 2009). The programme also says that, as per WHO estimations, the total health-care waste per person per year in most low income countries, is anywhere from 0.5 kg to 3 kg. That notwithstanding, the causes of this increased should have enumerated by the organisation and therefore, has not exhausted the issue on discussion.

It is accepted that solid

Waste Generation

Storage

Collection

Processing and Recovery

Transfer and Transport

Final Disposal waste generation is increasing at a faster rate globally as indicated by UNEP and this is confirmed by Mensah and Larbi (2005) concerning solid waste generation in Ghana.

2.5.1 Storage

Tchobanoglous et al (1977) explain storage to mean where solid waste is stored before it is collected. It could be stored in a skip or dustbins and not thrown away

indiscriminately. According to them, storage is of primary importance because of the aesthetic consideration.

2.5.2 Collection

The element of collection includes not only the gathering of solid waste, but also the hauling of waste after collection to the location where the collection vehicle is emptied (Kreith, 1994).

According to Kreith (1994), the most common type of residential collection services in the United States include "curb", "setout-setback" and "backyard carry". According to the USPS (2000), in the city of Thimphu in Bhutan the collection of solid waste from households, commercial set-ups was done in concrete receptacles placed at strategic points and conveyed by trucks/tractors. Accordingly, there were concrete bins and containers provided at various locations from where the waste was lifted for disposal. Individual bins/containers were also placed alongside the shops in certain areas, which were emptied directly into the trucks/tippers. This prevents people from dumping waste indiscriminately.

On the other hand, the building of these concrete bins and containers may be expensive to do in Ghana and for that matter TAMA.

2.5.3 Transfer and Transport

According to Kreith (1994), transfer and transport involves two steps: (1) the transfer of wastes from the smaller collection vehicle to the larger transport equipment and (2) the subsequent transport of the wastes, usually over long distances to the final disposal site.

2.5.4 Processing and Recovery

The element of processing and recovery includes all the technology, equipment, and facilities used both to improve the efficiency of other functional elements and to recover usable materials, conversion products or energy from solid wastes (Tchobanoglous et al,1977). In the recovery, separation operations have been devised to recover valuable resources from the mixed solid wastes delivered to transfer stations or solid waste processing plants (Tchobanoglous et al, 1977).

2.5.5 Disposal

It is the ultimate fate of all solid wastes whether they are residential wastes collected and transported directly to landfill site. Having explained the various elements in the diagram by some authorities, the next section analyses in further details the final disposal methods of solid waste. Several methods of solid waste management have evolved over the years.

These methods according to the Centre for Environment and Development (2003) vary greatly with types of wastes and local conditions. For the purpose of this analysis, this section is divided into early practices of managing solid Waste and contemporary methods of waste management systems.

2.6 Early Practices of Solid Waste Management

According to Tchobanoglous et al (1993:17-18), the most commonly recognized methods for the final disposal of solid wastes were:

•dumping on land, canyons and mining pits

•dumping in water

•ploughing into the soil

•feeding to hogs

•reduction and incineration

Some of these unwholesome practices of solid waste identified during the early disposal practices still exist in cities, towns and villages today.

Indiscriminate dumping on opened land and dumping in gutters particularly are clearly evident in towns and cities, while dumping in water especially people living in coastal towns is common place.

Burning of dumps is also common in peri-urban and rural communities in Ghana and in many other less developed countries. A study carried out in Ado-Akiti in Nigeria by Momoh and Oladebeye (2010) showed that, the methods of solid waste disposal include dumping of waste in gutters, drains, by roadside, unauthorized dumping sites and stream channels during raining season and burning of wastes on unapproved dumping sites during the dry season. This has gone to confirm that the practices of solid waste disposal in the 1950s still exist today and study area is not an exception. On the other hand, Momoh and Oladebey's (2010), assessment of waste situation in Ado-Akiti in Nigeria is questionable as they did not further explain what brought about the indiscriminate dumping. It could be that people dumped the waste any how because they were no skips or dustbins for the people to store their waste for collection.

Having assessed how solid waste was disposed in the early days, the next section discusses the contemporary methods of managing solid waste.

2.7 Contemporary Methods of Managing Solid Waste

In the contemporary era, the methods of managing solid waste include source reduction, sanitary landfills, composting, recycling, and incineration

(Denison and Ruston, 1990). These methods are examined below.

2.8 Source Reduction

Denison and Ruston (1990) viewed source reduction as any action that reduces the volume or toxicity of solid waste prior to its processing and disposal in incinerators or landfills. This view is similar to the one given by Kreith (1994). According to him, source reduction focuses on reducing the volume and /or toxicity of waste generated. Source reduction includes the switch to reusable products and packaging, the most familiar example being returnable bottles. According to USPS (2000) in the city of Thimphu in Bhutan to reduce waste problems in future, reduction in waste generation would be the most important factor. Examples of possible reduction at the consumption level include reuse of containers (including bags), better buying habits, and cutting down on the use of disposable products and packaging (USPS, 2000).

It is agreed that, source separation and resource recovery is an important method in waste management. This is because there is nothing like waste on this earth. Wastes that are discharged may be of significant value in another setting, but they are of little or no value to the possessor who wants to dispose of it. According to Tsiboe and Marbel (2004),Austria, the Netherlands, and Denmark developed a waste management processes to efficiently resolve the waste disposal problem by essentially coaxing their citizens to separate their domestic solid waste into glass, paper, plastic categories; thereby enabling easy collection and consequently reuse.

As suggested by the three authors, one way of effectively managing solid waste is to minimise solid waste generation through source reduction.

2.9 Sanitary Landfill

Sanitary land filling includes confining the waste, compacting it and covering with soil. It not only prevents burning of garbage but also helps inreclamation of land for valuable use (Centre for Environment and Development, 2003).

The placement of solid waste in landfills is the oldest and definitely the most prevalent form of ultimate waste disposal (Zerbock, 2003:16). He further argued that "landfills" are nothing more than open, sometimes controlled dumps.

According to him the difference between landfills and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leachate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of "tipping fronts" or compaction of waste (Zerbock, 2003). Furthermore, landfills are one form of waste management that nobody wants but everybody needs (Kreith, 1994: 2.8)

According to him, there are simply no combinations of waste management techniques that do not require landfilling to make them work. Of the basic management options of solid waste, landfills are the only management technique that is both necessary and sufficient. According to Kreith (1994) some wastes are simply not recyclable, many recyclable wastes eventually reach a point where their intrinsic value is completely dissipated and they no longer can be recovered, and recycling itself produces residuals. He further highlighted that the technology and operation of modern land fill can assure the protection of human health and the environment.

In contrast to what the various authors have said about sanitary landfill as an option for waste management, they have failed to recognize that land fill in itself has some disadvantages as it is costly to construct and maintain, can pollute ground water

through leaching, location is a problem in terms of availability of land particularly in the cities.

Other critical factors such as gas recovery, composting, waste to energy recovery, storm water control, distance to any settlement and water body were not clearly spelt out by the authors. Therefore, there could be an alternative which is recycling. This method is discussed in the next sub-section.

2.10 Recycling

According to Momoh and Oladebeye (2010: 1) recycling has been viewed as a veritable tool in minimizing the amount of household solid wastes that enter the dump sites. It also provides the needed raw materials for industries. According to them, it has been established that, it is the best, efficient and effective method of solid waste management system. However, this may not be cost effective in developing countries like Ghana. The United States Environmental Protection Agency (USEPA) (1999) has recommended recovery for recycling as one of the most effective waste management techniques. According to USEPA, recycling turns materials that would otherwise become waste into valuable resources and, it yields environmental, financial, and social returns in natural resource conservation, energy conservation, pollution prevention, and economic expansion and competitiveness. More importantly, a sizeable portion of what is thrown away contains valuable resources -metals, glass, paper, wood, and plastic—that can be reprocessed and used again as raw materials (USEPA, 1999). Kreith (1994) has also added that, recycling is the most positively perceived and doable of all the waste management options. According to him recycling will return raw materials to market by separating reusable products from the rest of the municipal waste stream. The benefits of recycling are many, he added. It

saves precious finite resources, lessens the need for mining of virgin materials which lowers the environmental impact for mining and processing.

For example, according to the Institute of Waste Management cited by Tsiboe and Marbel (2004), UK recycles only 11per cent of it's household waste, Italy and Spain only 3 per cent, Netherlands 43 per cent, Denmark 29 per cent, and Austria 50 per cent respectively. Having proposed recycling by different authors as the best option to manage solid waste in modern times; they have forgotten about the cost component which is key to successful implementation of any recycling project. Even developed countries are not able to successfully do it. But alternatively, it may be the best option for effectively managing solid waste in Ghana.

2.11 Composting

Composting process uses microorganisms to degrade the organic content of the waste. Aerobic composting proceeds at a higher rate and converts the heterogeneous organic waste materials into homogeneous and stable humus (Centre for Environment and Development, 2003:9).

UNEP (2009) has also defined composting as a biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture. According to the UNEP (2009), composting is the option that, with few exceptions, best fits within the limited resources available in developing countries. A characteristic that renders composting especially suitable is its adaptability to a broad range of situations.

According to Zerbock (2003), a low-technology approach to waste reduction is composting. He further says that in developing countries, the average city's municipal waste stream is over 50 per cent organic material.

2.12 Incineration

According to the Centre for Environment and Development (2003: 9), incineration is a controlled combustion process for burning combustible waste to gases and reducing it to a residue of non-combustible ingredients. According to the Centre, during incineration, moisture in the solid waste gets vapourised and the combustible portion gets oxidised and vapourised. C02, water vapour, ash and non-combustible residue are the end products of incineration. Incinerators have the capacity to reduce the volume of waste drastically, up to nine fold than any other method (Kreith, 1994). According to him incineration can also recover useful energy either in the form of steam or electricity. He however, recognized that the main constraints of incineration are high cost of operation, relatively high degree of sophistication needed to operate them safely and economically as well as the tendency to pollute the environment through emissions of carbon dioxide. Having assessed the major methods that have been proposed by the various authors, literature has further revealed that there is an alternative method of managing solid waste effectively which is synonymous to waste reduction and recycling as mentioned earlier on. This forms the next section of the review.

2.13 Integrated Solid Waste Management

Although considerable efforts are being made by many Governments and other entities in tackling waste-related problems, there are still major gaps to be filled in this area (UNEP, 2009). According to UNEP (2009), the World Bank estimates that in developing countries, it is common for municipalities in developing countries to spend 20 to 50 percent of their available budget on solid waste management, even though 30 to 60 percent of all the urban solid wastes remain uncollected and less than 50 percent of the population is served. The programme (UNEP) suggested that if most

of the waste could be diverted for material and resource recovery, then a substantial reduction in final volumes of waste could be achieved and the recovered material and resources could be utilized to generate revenue to fund waste management. This forms the premise for the Integrated Solid Waste Management (ISWM) system based on 3Rs (reduce, reuse and recycle) principle. ISWM system has been pilot tested in a few locations (Wuxi, PR China; Pune, India; Maseru, Lesotho) and has been well received by local authorities. It has been shown that with appropriate segregation and recycling system significant quantity of waste can be diverted from landfills and converted into resource (UNEP, 2009). Similarly, the United States Environmental Protection Agency (1999) has said that if a state or local government wants to plan for and implement ISWM, they have to consider a hierarchy of methods which are reduce, recycle, and incinerate/landfill. Having discussed extensively by different authors on the methods that can be used to manage solid, the next section assesses the problems facing effective solid waste management in developing countries.

2.14 Solid Waste Management Practices within Municipalities

According to Nyachhyon (2006), public private partnership has been identified as efficient instrument to promote solid waste management at the municipal level. Usually in the area of urban public services such as waste management, are promoted as a means to deliver service through a contractual relationship with a private sector firm.

Globally, millions of tons of municipal solid waste are generated every day. Urban waste management is drawing increasing attention, as it can easily be observed that too much garbage is lying uncollected in the streets, causing inconvenience, environmental pollution, and posing a public health risk (Devadas, 2007). The problem of solid, liquid, and toxic-waste management in Africa has come with

urbanization in the developing world. An important feature of the urbanization of the developing world is the rapid growth of cities and metropolitan areas. The high rate of urbanization in African countries implies a rapid accumulation of refuse. Social and economic changes that most African countries have witnessed since the 1960s have also contributed to an increase in the waste generated per capita (Owusu et al., 2012).

Gouley (1992), argued that by focusing on the production process itself, examining where waste are generated and exploring how they can be reduced, even simple measure such as separating was so that they can be reused more easily, using different raw material or replacing non- biodegradable products with biodegradable ones can help achieve large waste reduction results. He also claimed that the greater part of present waste arises not because the producer does not want it in such quantities that waste is invisible. This argument paces emphasis on recycling and conversion of waste as important solid waste management practices.

It is also important to know that the sustainability of funds to manage solid waste is contingent on the willingness of people to pay for improved solid waste disposal services. In Ghana, the Local Government Act (Act 462) has made the various district assemblies responsible for managing waste and sanitation (MLGRD, 1999). Unfortunately, most assemblies have under–performed in this direction. Currently, about 50% of most assemblies' recurrent budget (plus government subvention) is spent on waste collection and transportation, with little focus on its treatment and proper disposal (Oteng–Ababio, 2010). In spite of devoting such a large portion of their income to waste collection, most MMDAs still remain heavily indebted to their private contractors.

No solid waste management technology can function successfully unless the municipal corporation authorities strictly adopt the practice of segregating the garbage

at domestic level, Said Amrit Mann, Mayor of Borough of Hounslow, London, here today. He said segregation of garbage at household-level was initiated by the local government in London long ago, for which the key aspect was to make residents aware about the utility and necessity of this system. In fact, the cost of the three-coloured bins which are positioned in front of every house in London, is borne by the residents. The corporation's responsibility is only to lift the garbage regularly and dispose it off, he said. When the governments of African countries were asked by the World (World Bank,2004).

Health Organization to prioritize their environmental health concerns, the result revealed that while solid waste was identified as the second most important (after water quality), less than 30% of urban populations have access to "proper and regular garbage removal" (Senkoro, 2003). Meeting the financial demands of solid waste management at the municipal level will continue to be a problem in the cities of developing countries. In areas where residents are assessed fees for waste removal, the rate of collection can be quite poor. Further, fewer people will not be willing to pay in the face of poor or declining service. Many municipalities may not even be aware of the degree to which revenues are collected, or the true cost of their entire solid waste operations. In this wise many municipalities have turned to privatization as a potential solution; certainly the financial picture is cleared somewhat when the entire system is turned over to outside contractors. However local governments will still be held accountable if service declines (Schubeller, 1996).

2.15 The Attitude and Perception of People towards Solid Waste Management

Navez –Bounchaire (1993) stated that the management of household refuse is ties to perception and socio-cultural practices which result in modes of appreciation of space which are greatly different according to whether the space is private or public. This is

relevant as the population is heterogeneous. Abrokwah (1998) observed that ignorance, negligence and lack of law to punish sanitary offenders and low level of technology in waste management are there three major causes of waste management problems in Kumasi' he suggested that awareness should be created among the residents to manage household refuse and educate them on hazards that ill-disposed waste could pose to the environment and to them. Kendie (1999) argues that, the upsurge in waste disposal problems stems from the fact that, "attitudes and perceptions towards waste and rating of waste disposal issues in people' minds and in the scheme of official development plans have not been adequately considered".

There has been a tendency to concentrate on the design of waste management technologies and how to apply them in context rather than looking at the problem from a governance perspective. In an article, "Do Attitudes Matter"; Waste Disposal and Wetland Population in Cape Coast Municipality of Ghana," Kendie (1999) set out to develop an in-depth understanding of sanitation practices and underlying factors responsible for the state of environment sanitation in Cape Coast by exploring the relationship between perceptions, attitudes and beliefs on the one hand and sanitation practices on the other. In this article, Kendie was quick to dismiss the argument on rapid urbanization and inadequate funds.

According to Kendie, there is a positive relationship between the growth rate of cities and environmental health. This view suggests that the faster the growth rate of urban centres, is more likely that environmental services would be provided. Besides Ghana's urban population growth rate (4.0-4.5 per annum) is lower than countries such as Botswana (12%), Zimbabwe (6%) which have relative improved sanitation services. Again Kendie thought that "while inadequate funding may have contributed to poor sanitation in the 1970's and early 1980's, this argument no longer holds in

recent years. This study clearly shows that most people do not believe nor are not sure whether the authorities in charge of waste can solve the problems.

According to Agbola (1993), the root cause of many nations' environmental problems can be traced to the way and manner in which "the imbibed behavioural patterns and acquired values are superimposed on the environment". Attitudes are derived from experiences or leadership. He further said that beliefs, perceptions and attitudes are learned response sets and can therefore be changed through education.

2.16 Private sector-led Solid Waste Services Delivery

The World Bank in its quest to achieve eradication of severe poverty and maximizing shared property has spent around 1.2 million dollars in investments and over 55 advisory and analytical works on solid waste programmes and portfolios on about 114 sustainable and active projects within 58 countries (world bank). Notwithstanding these interventions, developing countries have seen widening gaps SWM. Ghana currently produces about 13,000 tons of waste daily with over 4,000 tonnes produced in Accra and Kumasi (Anarfi and Monney, 2014). City authorities and waste management departments are still grappling with how best to deal with this challenge.

In the wake of the SWM challenges, the Government of Ghana revised the Sanitation Policy in 2010 to address the limitations of the old policy published in 1999 and a result of nation-wide consultation among sector stakeholders .The new policy lays the basis for developing a systematic approach and framework for identifying and harnessing resources for value-for-money services to all. The broad principles underlying the revised policy are the principle of environmental sanitation services as a public good; environmental sanitation services as an economic good; the polluter-pays-principle; cost recovery to ensure value-for-money ensuring economy, effectiveness, and efficiency; subsidiarity in order to ensure participatory decision-

making at the lowest appropriate level in society; improving equity and gender sensitivity; recognizing indigenous knowledge, diversity of religious and cultural practices; precautionary principle that seeks to minimize activities that have the potential to negatively affect the integrity of all environmental resources; community participation and social intermediation. The focus areas of the policy are capacity development, information, education and communication, legislation and regulation, levels of service, sustainable financing and cost recovery, research and development, and monitoring and evaluation.

Privatization of waste collection is suggested as a way to effectively deal with this menace and significantly contribute to improving the environmental sanitation situation in our cities (Anarfi, 2012) . The involvement of the private sector in SWM has brought some relief to governments; yet, there is still much to be done. In most industrialized cities, SWM service have been provided by private enterprise for decades, and failure of municipal and metropolitan authorities in low- and middle-income countries (LMIC) to keep up with rapid growing cities have necessitated the involvement of the private sector (Coad, 2005).In Ghana, although private waste management companies have been involved in SWM for some time, the problem of SWM is far from being resolved. Waste management services are still inadequate especially in low-income areas (Martin, 2011) due to inadequate financing, lax attitude of officials and residents, lack of clearly defined roles for stakeholders, poor cost recovery, and institutional weaknesses (Baabereyir,2009)

Solid waste management is one of the key factors that contributes to the general well-being and financial advancement of urban areas. In most parts of the world, the responsibility of solid paradigm shift from public sector delivery of public services (solid waste service delivery) in developing countries to private sector provision

began in the past two decades. Governments vigorously began to promote the private sector as a provider of services to improve service efficiency and effectiveness (Roth, 1987; Cointreau-Levine & Coad, 2000; Batley & Larbi, 2004), but the needed private finance and expertise to bring about the improvement are still issues, especially in developing countries.

The rationale for the Private Sector Involvement in solid waste collection is to improve efficiency (reduce cost) and effectiveness of service delivery (service quality) through competition for the market where private sector providers compete for a zonal monopoly to render service over a period of time and to ensure that the environmental aspect of sustainable development is integrated into solid waste management. However, recent case studies of Private Sector Involvement in solid waste management in some developing countries for example, in Kenya (Karanja, 2002; Mwangi, 2003), in Ghana (Obiri-Opareh, 2002; Awortwi, 2003), in Tanzania (Mbuligwe, 2004; Kassim, 2006) and in India (Post *et al.*, 2003) showed that there has been an increased coverage in some of the countries, but the service quality, efficiency and sustainability of private sector service delivery are still issues that require further studies to identify drivers for performance.

2.17 Cost analysis of Service Delivery by the Private Sector

Private sector involvement in infrastructure development has gained significance over the years in developed and developing countries alike (Akintoye, 2009). The local government typically represents the public partner at the national, state, or local agency level while the private partner can be a privately-owned enterprise or consortium of businesses with a particular specialization whose main aim is profit realization. Massoud (2002) defines public-private partnerships (PPPs)as a contract between a public authority and one or more private operators to transfer the control of

a good or a service currently provided by the public sector, either in whole or in part, to the private operators.

Private Sector Initiative (PSI) started in Accra and Tema in the early 1990s and later extended to Kumasi in the mid-1990. Afterwards, this initiative was extended to Takoradi and Tamale in 2000 and 2002 respectively. There year 2004–2007 saw the inclusion of more private companies in to waste business all over Ghana. The companies in Accra and Tema increased to 18 and 6 respectively by 2006. As a result, contracts were open up for competition. The first competitive bidding for solid wastes took place in Kumasi in 2007 and later in Accra in year 2008 (Oduro, 2010). The rapid population growth in Ghana has resulted in increased waste generation in the country. The amount of solid waste generated per day in Accra was 750–800 tonnes in 1994 (Asomani, 2007) 1800 tonnes per day in 2004; 2000 tonnes per day in 2007 this figure increased to 2200 in 2010 (Oteng, 2010).

It is a fact that the provision of waste management services in any large city is an expensive undertaking that makes huge demands on the finances of local governments (Pacione, 2005). Apart from making investments in capital equipment, money is also required for the day to day operational cost of the service in the procurement of fuel, spare parts and working gear (Barbereyie, 2009). It is clear that to make waste management efficient, local governments and other service providers should have a reliable and sustainable means of obtaining funds to cover the costs of the service. In line with this, it is very important and timely to look at the possibility of cost sharing by households, and to do this the question of demand needs to be analysed for improved solid waste management (Aggrey and Omortor, 2010).

2.18 Fee-based solid waste collection and willingness to pay for waste collection

Willingness to pay for waste management services or facilities is very important to the success of the private sectors' participation (PSP) in (SWM) program. Rahman *et al*., (2005) reveals the willingness to or not to pay by households could have direct impact (positive or negative) on the reliability and success of any solid waste management strategy.

Inadequate funding for capital investment and poor cost recovery capabilities have always been a frequent challenge to waste management authorities in Ghana (Asase *et al.*, 2009).

"Rapid urbanisation, low levels of revenue collection and competing needs have combined over recent decades to place an inordinate strain on the capacity of many local authorities to deliver efficient waste management services, steadily reducing their areas of service coverage and diminishing the quality of services offered" (UN-HABITAT, 2010).

The situation leaves the MMDAs indebted to private solid waste collection contractors resulting in low collection coverage and overflow of communal containers at sanitary sites with its attendant public health and environmental effects. The need for a more sustainable means of financing environmental sanitation has become imperative as current sources of funding are unsustainable (MLGRD, 2010a).

A more sustainable approach in recent times is the increasing recognition of the possibility of greater household and community resources through full or partial cost sharing for collection services (Mehta & Knapp, 2004). (McDougall *et al.*, 2001) recommend that, all beneficiaries thus the public, the recycling industry and local authority should pay for solid waste services. It is preferable to implement user

charges to raise public awareness about the cost associated with providing the service and to make the service agency accountable.

In order to reduce and or remove the financial burden of solid waste management from the local government and to ensure the financial sustainability of the system in developing countries, it would be essential among other things to determine the willingness and ability of beneficiaries of waste collection services to pay user charges. UNEP (2005) suggest that prior to the introduction of user charges, well designed surveys aimed at determining the willingness and capacity of beneficiaries to pay must be conducted.

A survey conducted in the Kumasi Metropolis by Awunyo-Vito *et al*, (2013) revealed respondents were willing to pay more for improved waste management services. The determinants of willingness to pay for improved waste management services were identified using logit regression model which were level of education, length of stay in the area, housing arrangement, and distance to solid waste dumping sites as well as gender were noted to significantly influence the respondents' likelihood of willingness to pay for improved waste management services. Specifically, the study revealed that good proportion of 342 (57%) households are willing to pay for improved services while 258 (43%) are unwilling to pay for improved services. Some of the reasons given for the unwillingness to pay included the following.

(i)There is no waste management service provided in the area.

(ii) Some do dispose their waste in secondary receptacle of which they were not charged for.

(iii) They dispose their waste generated in holes dug around their homes.

(iv) It is the responsibility of the government to pay for them.

(v) It is not necessary to pay for waste when there are other equally important issues.

Considering the above reasons, education is important to encourage individual households to pay for improved waste management services. However, what is of much significance is the determination of the necessary contributing capital and operational cost factors and the setting of economically viable user charges that can be met by households and at the same time ensure full or partial cost recovery of any fee-based solid waste management system.

2.19 Performance of Private Sectors in Waste Collection

There are many cases of dramatic reductions in costs as a result of the involvement of the private sector (Cointreau-Levine & Coad, 2000). Private sector companies cannot always be more efficient without effort to apply private sector management techniques. It is useful to understand the reasons why private sector can be more efficient than the public sector or why some private sector companies can be more efficient than other private sector companies, since some companies have competitive advantage over others. When the reasons for higher private sector efficiency are understood, it is possible to prepare arrangements for involving private companies such that higher potential for efficiency is achieved in practice (Cointreau-Levine & Coad, 2000).

Private sector involvement in urban solid waste collection services seeks to improve service efficiency and increased investment. However, if the inter-organisational arrangements and conditions are not well structured, private sector involvement may not achieve either of these objectives, regardless of the market forces (Cointreau-Levine & Coad, 2000).

Before the objective of improving service efficiency can be achieved, private sector companies have to improve equipment holdings, upgrade their knowledge and skills

to rationalize operations and maintenance, and to be accountable, whereas the public sector has to ensure proper performance monitoring.

The econometric studies in solid waste collection in the developed countries identified some explanatory factors for private sector cost efficiency. In the USA, Callan and Thomas (2001) found that the organizational form (private, public) does not influence costs in solid waste collection. Bel and Costas (2006) study of Spanish cities and towns found that organizational form does not influence costs overall, but market concentration (the number of companies in the waste sector) creates problems for competition.

Dijkgraaf and Gradus (2003) show no difference between public and private solid waste collection costs under competitive contracting among cities in The Netherland. Dijkgraaf and Gradus (2007) identified that cost savings from PSI erode over time. Only cities that recently started PSI show cost savings, but cost savings from PSI appear to erode over time, since there were no cost differences between cities that had started PSI earlier and that of public provision.

Ohlsson‘s (2003) study of Swedish cities found private provision more costly than public provision because of higher input and capital costs for private firms. A study by Szymanski (1996) on 365 English municipalities found that although savings eroded over time, private provision costs were lower than public production.

The private sector efficiency and reductions in private sector prices are a result of certain internal and external factors. According to Batley and Larbi (2004), explanatory factors of private sector efficiency identified include competition (including managed competition), management flexibility, operational capability (rationalized operations), accountability for results, clear performance measures and no political interference.

2.20 Challenges of Solid Waste Services Delivery

Developing Countries are faced with a number of challenges in solid waste management. First, the capacity of the local governments (LGs), to manage contracts and enable the efforts of non-state actors to deliver efficient and effective service, is not up to the level required for the facilitating, regulating and monitoring roles of the local governments (Awortwi, 2003). The enablement requires local governments to reduce direct service delivery but manage better and differently (Helmsing, 2002: 323).

The enabling role involves facilitating efforts of others to perform responsibilities that have been transferred from state departments, setting policies and regulating private providers, and monitoring the performance of private providers and assessing their performance. The LGs face challenges of contract management, public opposition, and monopolistic behaviour and inefficiencies of agents (Awortwi, 2003).

The second challenge is how to enforce legislations enacted to improve and sustain solid waste collection and management service – increase cost recovery, stop indiscriminate solid waste dumping on unauthorised places, and avoid waste littering – through polluter-pay-principle or user charges and establishment of efficient and effective institutional structure to deal with the weak enforcement.

Finally, the capacity challenge has to do with how the local governments could remove the inefficiencies from their direct service delivery. There is the need for capacity to optimise collection operations to take advantage of costs reduction and maximum output of waste collected.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses the methodology which was used in this study. It covers the research design, population, sample and sample procedure, instruments, data collection procedure and data analysis procedure, a profile of Kwahu West District of Ghana

3.2 Description of the Study Area

Kwahu West District was curbed out of Kwahu South District in 2004 as part of Government local reform policy. The District was upgraded to a Municipal status in January 2008 by the legislative instrument 1870. The municipal lies between latitudes 6°30' North, and 7° North and longitudes 0°30' West and 1° West of the equator, covering an area of about 414 square kilometers. The Municipal capital, Nkawkaw is located about 241 kilometers North-West of Accra with a projected population of 144,409.

The Municipal is bounded to the north by Kwahu South District, to the West by Asante Akim South District. To the east, it is bounded by the Fanteakwa District and to the south by Birim North and Atiwa District. A very high proportion (66 per cent) of the municipal population is Kwahu's. The other significant tribes are ewes (15 per cent) and Asantes (17 per cent). These figures portray the municipal as heterogeneous in terms of ethnicity. Again the municipal is predominately Christians as they constitute 89 percent. Islamic and the traditional religions also constitute 11 percent.

The commercial activities of the people are trading farming and surface mining. It has social amenities such as schools telecommunication, electricity and water. Nkawkaw play host to both civil and public servants as well.

Kwahu West Municipality lies within the semi-deciduous zone with very little of virgin forest existing due the negative effect timber extraction and farming practices. There are three forest reserves in the municipal namely southern scrap being the largest, Kade Bepo and Nkanwanda Forest Reserves. Pra, Trado, Asuboni and Adansua are some rivers in the municipal. The existing transportation networks are roads and railways. However, with the dis-functioning of the railways system, road network is the only available transport system. There are a number of health facilities in the Municipality to attend to the health needs of the people. It has been documented that the leading health problem in the municipality is malaria with 24.356 cases being reported in the year 2018 (Kwahu West Municipal Health Directorate, 2018)

There are piped borne water system, hand dug wells or boreholes in the municipal. Some of the communities also depend on rivers and streams as their source of water supply. There are few public sanitation facilities available for use by community members. Over the years concerns have been expressed about indiscriminate disposal of solid waste into places such as rivers, and open drains. Among the methods of liquid waste disposal in the country are throwing either onto a compound, onto the street or any available space outside the house. The most common method of solid waste disposal is by dumping in a publicly designated facility i.e. containers (38.1%) followed by Public dump in open space (31.6%). Indiscriminate dumping of solid waste is practiced by five percent of households while 7.4 percent bury their waste. Collection from the dwelling place of household by specialized refuse collection agencies is minimal (4.1%). Disposing of solid waste at a Public dump (container) is common in urban localities (67.6%) than rural areas (4%) while dumping solid waste in open space at a public dump is more common in rural (60.3%) than in urban localities (6.9%).

MAP OF THE STUDY AREA

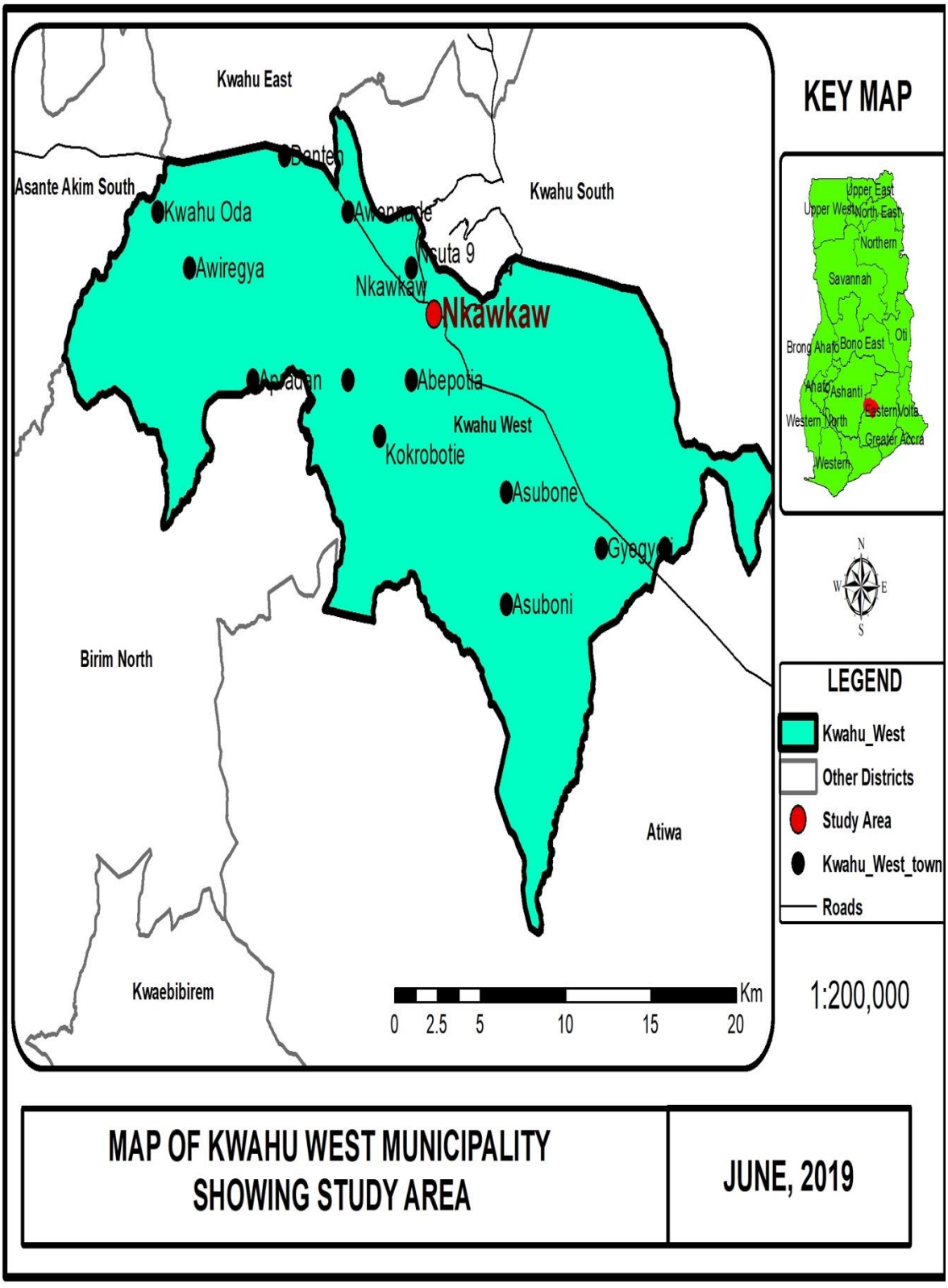

Figure 1Map of Ghana Showing Kwahu West

Source: Kwahu West Municipal Assembly, 2019

3.3 Study Design

This study was a non-interventional study which adopted a descriptive study type. This design was selected to help undertake an in-depth description of solid waste management in the study area by covering private sector participation and cost of waste management to the Municipal authority.

3.4 Study Population

The target group for this study was some selected households at Nkawkaw who are at the age of 20 and above comprising of both male and female. Key staff at the Kwahu West Municipal Assembly like Municipal Environmental Health Workers and the Supervisor for the private company providing waste collection services were important for this study.

3.5 Sample Size

The sample for the study was made up of 35 households in each of the three communities chosen namely Zongo, Akuajoo and Railways Quarters, the Municipal Environmental Health Officer and the private sector service delivery representative. The reason is that, it is normally in these three communities that communal refuse containers get full and scattered around the containers. Through this process, a sample size of 105 respondents from the households was engaged for the study and 2 officials from the public and private sector.

3.6 Sampling Method

The questionnaires were given to the respondents for completion either immediately or at their convenience during the day, where households were selected randomly and officers purposively.

3.7 Data Collection Tools

Questionnaire and interview guide was the main instrument developed and used to gather data for the study. The questions on the instrument were mainly open ended and closed ended. The items on the questionnaire were organized into two sections. Section A deals with the bio data of the respondents while section B deals with the main data comprising specific objectives of the study.

3. 8 Data collection methods

The questionnaire was administered to some selected households as respondents. The researcher assisted those who could not read and interpret the items on the questionnaire through interview schedule. The items were translated into their local languages and their answers were selected based on their choices.

The Municipal Environmental Health and Zoom lion Ghana Limited District Supervisor was interviewed using the interview guide. The interviews were conducted in English language and responses were recorded and transcribed after the sections or hand written.

3.9 Data Analysis

The data collected from the respondents were edited, coded and fed into the computer. Special package for Social Sciences (SPSS) version was used to run the data. The results were presented in the form of frequency distribution tables and was analysed with the percentage rate of the responds from the respondents.

3.10 Ethical Considerations

Permission letters were sent to Kwahu West Municipal Assembly and the Environmental Health and Sanitation Units to seek permission to conduct the study in the municipality. The respondents were assured of confidentiality and anonymity.

Their right of privacy was paramount to the researcher and that made them to feel free to provide the right information needed for the study.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the main findings of the research. The results are presented using tables which summarize the responses from the respondents to whom the questionnaires were administered to in the Kwahu-West Municipality. The analysis of the issues of concern precedes the tables. The issues are grouped under specific topics based on the specific objectives of the study and the demographic characteristics of the respondents. Findings from the study have been discussed in line with other research findings conducted by other researchers.

4.2 Demographic characteristics of the study

Various studies have shown that people are willing to pay for a better waste disposal services. However, their willingness to pay for such services depends on many socio-demographic factors. Addai and Danso-Abeam (2014), in their analysis of the household's willingness to pay for improved solid waste management in Dunkwa-on-Offin, Ghana, maintained that age, household size and income maintain an increasing function with consumers' willingness to pay for an improved solid waste management system. Besides, they found females to have a positive influence on consumers' Willingness to Pay and males to have a negative influence on consumers' Willingness to Pay. Again, Ojok *et al.* (2012) assert that sex significantly influences households' willingness to pay for solid waste disposal services. Afroz *et al.* (2009) also stated that variables like household expenditure, quantity of waste generated and level of education also have a significant influence on consumers' Willingness to Pay. Addai and Danso-Abeam (2014), Amfo-Otu *et al.* (2012) and Aggrey and Douglason (2010) all hypothesised that the higher people's level of education, the more they would

appreciate the consequences of mishandling solid waste, and the more they would be willing to pay in order to avoid the risk of being victims of an unclean environment. Afroz *et al.* (2009) also emphasised that education relates to a better understanding of the problem of solid waste and hence Willingness to Pay for waste disposal services. All these findings empirically show that there is a positive correlation between educational levels and consumers' Willingness to Pay for improved solid waste disposal services.

4.3 Sex of reproductive

From Table 1, out of 103 respondents, 53% of them were males and 46% were females. This means that majority of the family heads were men who participated in the study. Since both sexes were fairly represented, it can be said that the views and opinions expressed are valid and reflect the real state of services delivered by the private sector company and also show the households position to pay more for improved service.

Table 1: Sex of respondent

Gender	Frequency	Percentage
Male	55	53.398
Female	48	46.601
TOTAL	**103**	**100**

Source: Field Survey, June, 2019

4.4 Respondents age of respondents

From Table 1, about one-third (32%) of the respondents were between the ages of 31-40 years, 28% were 21-30 years, 18% each were between 41-50 years, 51 years and above, respectively with few of them (3%) who were between 10-20 years.

Considering their ages, it is obvious that most of the respondents are likely to be responsible people and may be paying for or supervising waste management activities in their homes.

Table 2: Age of respondents

Age Range	Frequency	Percentage
10-20	3	2.912
21-30	29	28.155
31-40	33	32.038
41-50	19	18.446
51 and above	19	18.446
Total	**103**	**100**

Source: Field Survey, June, 2019

4.5 Marital status of respondents

From Table 1, it is clear that majority (63%) of the respondents were married, 23 percent are single, 7 percent are divorced whiles 6% were separated. This shows that most of them will be concern with waste management in their homes since it can easily led to the spread of diseases.

Table 3: Marital status of respondents

Marital status	Frequency	Percentage
Single	24	23.3
Married	65	63.106
Divorced	8	7.766
Separated	6	5.825
Total	**103**	**100**

Source: Field Survey, June, 2019

4.6 Educational status of respondent

From Table 4 below, out of the 103 respondents, 35% had tertiary education, 25% had secondary education, 16% had JHS education 15% had Primary education, whiles 5% were Illiterate. The results indicates that most of the respondents have fare idea about waste management and the problems that can be associated with it if not handle with care.

Table 4: Educational level of respondents

Educational Status	Frequency	Percentage
No response	1	0.97
Illiterate	6	5.825
Primary	16	15.533
JHS	17	16.504
SHS	26	25.242
Tertiary or O'level/vocation	37	35.924
Total	**103**	**100**

Source: Field Survey, June, 2019.

4.7 Positions of respondents

From Table 5 which shows the demography of officers, in a total of 3 respondents, 1 was a Municipal Manager, another one, Municipal Environmental Health Officer and the last person an Officer for the Environmental Department.

4.8 Work Experience of respondents

From the Table 5, the Municipal Manager had 8 years whiles the Municipal Env. Health Officer had 13 years and the Officer also had 7 years of working experience.

The working experience of the officers shows how well they have the knowledge concerning their field of work.

4.9 Working Companies of respondents

From the Table 5, with the three respondents, two of them were workers in Zoomlion, and one was with the Municipal Assembly.

4.10 Contracts that are executed by the Assembly

From the Table 5, two out of three respondents were involved in Sanitation, Improved Package, Landfill management, whiles one is involve in Solid waste management, Public education.

Table 5: Demography of Officers

	FREQUENCY	PERCENTAGE
Position/Rank		
Municipal Manage	1	33.33
Municipal Env. Health Officer	1	33.33
Officer	1	33.33
Total	**3**	**100**
Work Experience		
Municipal Manager 8	1	33.33
Municipal Env. Health Officer 13	1	33.33
Officer 7	1	33.33
Total	**3**	**100**
Companies		
Municipal Assembly	1	33.33
Zoomlion	2	66.67
Total	**3**	**100**
Contracts		
Sanitation, Improved Package, Landfill management	2	66.67
Solid waste mgt, Public education	1	33.33
Total	**3**	**100**

Source: Field Survey, June, 2019

4.11 Cost of solid waste management services to households.

4.11.1 Disposal sites

From Table 6, 61% said they dump at the communal containers site, 23% said their waste is been collected by the private companies, 12% said they dump at the communal dumpsite whiles 3% said they burn their waste. Also from the responds

from the Municipal Officer, he stated that, they collect 175 trips of waste from the SIP container sites every month. The officers also stated that, they do collect domestic, municipal in to the communal containers in exception of the industrial and hospital waste of which is mostly noted for poisonous substances which can harm the waste handlers.

Table 6: Final waste disposal sites

Disposal sites	Frequency	Percentage
Dump at communal container site	63	61.165
collect by private company	24	23.3
Dump at communal dumping site	13	12.621
Burn the waste	3	2.912
Total	**103**	**100**

Source: Field Survey, June, 2019.

4.12 Payment for dumping in communal containers

From Table 7 below, 72% out of the total respondents said they do not pay any amount when they go to dump in the communal containers. From the responds from the Municipal officer and the Zoomlion Officer, those monies are used in the repairing and maintaining equipment and tools for waste management, labour cost, fuel and other management cost. The officer stated that, they incur an approximate amount of Gh₵ 13,500 per month for service provision.

Table 7: Communal container site

Responses	Frequency	Percentage
No	75	72.815
No response	8	7.766
Not applicable	20	19.417
Total	28	27.184
Actual Total	103	100

Source: Field Survey, June, 2019

4.13 Amount paid by respondent

From the survey, there were only few people who answered and with an amount of GH₵ 1.00, 20p, 40p and 50p of which all had the same 0.116% and 96% of them did not respond to the question.

Table 8: Amount paid for dumping

Amount	Frequency	Percent
No responds	99	96.116
1.00	1	0.116
20 p	1	0.116
40 p	1	0.116
50 p	1	0.116
Total	**103**	100

Source: Field Survey, June, 2019

4.14 Period of time waste is collected

From the Table 9 below, out of the 103 respondents, 10% of the respondent stated twice, 6% said once per week and 3% said private waste companies come for their

waste once per two weeks. Also, officers stated that, they normally do the once per week waste collection from the various households.

Table 9: Frequency of waste collection at the households

Responses	Frequency	Percent
once per week	7	6.8
Twice	11	10.7
once per two weeks	4	3.9
Total	22	21.4
No response	1	0.97
Not applicable	80	77.7
Total	81	78.6
Actual Total	**103**	**100**

Source: Field Survey, June, 2019

4.15 Amount paid per month by Respondent

From the Table 10, one-sixth (15%) of the respondents said they pay GH₵25. 00, 3% of them said GH₵ 40.00 for collection, 2% of them also said GH₵ 20.00, also, 1% said GH₵ 150, another 1% said GH₵ 30.00 and finally, 1% said they pay GH₵ 8.00 for the collection. There was a confirmation by the officers stating that, they charge above Gh₵ 25.00 per household every month.

Table 10: Amount paid per month

Amount (GH₵)	Frequency	Percent
No responds	79	76.7
150	1	1.0
20.00	2	1.9
25.00	16	15.5
30	1	1.0
40	3	2.9
8.00	1	1.0
Total	**103**	**100**

Source: Field Survey, June, 2019

4.16 Willingness to pay for Improve services

From the survey, 15% out of the total respondent said 'Yes', and that they are willing to pay more for improve waste collection services, and 11% of them said No to paying more for improve waste collection services as shown in Table 7.

Table 11: Pay more for improve services

Responses	Frequency	Percent
Yes	15	14.5
No	11	10.6
Total	26	25.2
No response	77	74.7
Actual Total	**103**	**100**

Source: Field Survey, June, 2019

4.17 Amount they want to pay

From the Table 12, only few people were able to respond to the question, 7% of them said GH₵ 30.00, 3% of them said GH₵50.00, 2% of them also said GH₵ 35.00, another 1% also said GH₵25.00, 1% said GH₵2.00 and GH₵1.00 respectively.

Table 12: Amount they want to pay

Amount	Frequency	Percent
No response	88	85.4
1.00	1	1.0
2.00	1	1.0
25.00	1	1.0
30.00	7	6.8
35.00	2	1.9
50.00	3	2.9
Total	**103**	**100**

Source: Field Survey, June, 2019

4.18 Services by private waste companies

From the Table 13, 18% of the respondents said No they were not satisfied with their services whiles 4% stated that, they were satisfied with their service provision. From the responds from the officers, they were two of them said, they do not provide the services they are supposed to render to the households and One stated they do their best to satisfy their clients.

Table 13: Satisfied with services by waste collectors

Responses	Frequency	Percent
Yes	4	3.9
No	18	17.5
Total	22	21.4
Not applicable	81	78.6
Total	**103**	**100**

Source: Field Survey, June, 2019

4.19 Composition of waste generated by households

From the Table 14, for the plastic composition, 2% of the respondents stated 1-10% and 11-20% respectively was the amount of plastic waste generated, also, 1% of them said 21-30% and 41-50% respectively was what the generate. It was noted from the Officers that, since Municipality and the other waste companies have not made containers available for households to dump in various waste materials; they do not really know the exact percentage of waste compositions that are generated by the households.

The results in Table 14 indicate that out of 103 respondents, 3 percent stated they generate 51-60% and 21-30% each of organic waste, and 2% of them stated 31-40% for organic waste that they generated by their households. These group of people are of the the view that the predominant fraction of their waste is the organic waste. Though, the numbers are few their view seems to conform to the reality of organic waste fraction of the waste generated in the country as reported by Mensah and Larbi (2005). Again, out of 103 respondents, 5% stated 1-10% of the waste they generate are metals whiles 1% stated 11-20% of metal is generated from their households of which is mostly collected by the scraped guys.

Table 14: Waste composition

	Frequency	Percent
Plastics		
1-10%	2	1.9
11-20%	2	1.9
21-30%	1	0.9
31-40%	1	0.9
Total	**6**	**5.8**
No response	97	94.2
Actual Total	**103**	**100**
ORGANIC/FOOD		
21-30%	3	2.0
31-40%	2	1.9
51-60%	3	2.9
Total	**8**	**7.8**
No response	95	92.2
Actual Total	**103**	**100**
Metals		
1-10%	5	4.9
11-20%	1	1.0
Total	6	5.8
No response	97	94.2
Actual Total	**103**	**100**

Table 14 cont'd

Papers		
1-10%	5	4.6
51-60%	1	1.0
Total	6	5.8
No response	97	94.2
Actual Total	**103**	**100**
E-Waste		
1-10%	4	3.9
21-30%	1	1.0
Total	5	4.9
No response	98	95.1
Actual Total	**103**	**100**
Inert/Silts		
1-10%	2	1.9
11-20%	3	2.9
Total	5	4.9
No response	98	95.1
Actual Total	**103**	**100**

Source: Field Survey, June, 2019.

About 5% of the respondents out of 103 respondents indicated that they generate 1-10% of papers in their households and only 1% also generate 51-60% of papers. From the survey, out of 103 respondents 4% of them said 1-10% of e-waste was generated by the household, 1% of them said they generate 21-30% of the e-waste in their

household. From the Table 10, 3% out of 103 respondents stated that they generate 11-20% of silts/inert, and 2% of generate 1-20% of silts/inert.

4.20 Waste collected per month from the Assembly

From the survey made, out of the 103 respondents, only 1% who said the communal dump containers get full, of which will show the approximate volume of which is filled with different types of waste. From the officers responds, they are able to collect 1050 tonnes of waste per month.

Table 15: volume of waste collected

Responses	Frequency	Percent
No responses	102	99.0
A communal dump container full	1	1.0
Total	**103**	**100**

Source: Field Survey, June, 2019

CHAPTER FIVE

SUMMARY AND CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This research examined the value for money on sloid waste management at Nkawkaw in the Kwahu West Municipality was the main objective of the research, and the others include; Assessing the cost of solid waste services provided to the assembly, examining the effectiveness of waste collection services, assessing the household willingness to pay for services. One Hundred (106) respondents were used and it was between three areas within the Municipality, as they were selected randomly and purposively respectively. A structured questionnaire was administered to them and SPSS was used to analyze the data.

The results indicated that the out of 103 respondents 63% of them said they dump at the communal container site, 23% of them have their waste collected by the private companies. Also out of 103 respondents, 72% said they do not pay for dumping at the communal container. Furthermore, only 10% of the respondents out of the 103 respondents stated their waste was collected twice per week by the private companies. With reference to the data collected, 15% out of the total respondent said Yes and that they were willing to pay more for improve waste and 11% of them said No to improve waste services. Finally, 18% of the respondents said No they were not satisfied with their services whiles 4% stated that, they were satisfied with their service provision.

Also with regards to the composition and generation of solid waste, for the plastic composition, 2% of the respondents stated 1-10% and 11-20% respectively was the amount of plastic waste generated, also, 1% of them said 21-30% and 41-50% respectively was what they generate. Also, out of 103 respondents, 3% stated they

generate 51-60% and 21-30% each, and 2% of them stated 31-40% for organic waste that they generated by their households.

5.2 Conclusions

From the results of the studies, it was concluded as It was noticed that majority of the respondents were dumping at the communal dumpsite and only few of them had their waste collected by private companies. Also, most of them were not satisfied with the services provided by the private waste companies and only few were willing to pay for an improve waste. In accordance with composition and generation of solid waste, most of the households do not have any idea about the amount of waste composition percentage rates that they generate. More so, they had no idea about the volume of waste collected per month by the Assembly.

5.3 Recommendations

The following are some recommendations:

- Since the households do not pay for dumping at the communal container site, nothing much can be done by the assembly in terms of getting more containers for separation. So then, the Assembly is to request from the households to pay some amount for more containers to be mounted to help improve the waste management services in the Municipality.
- Furthermore, charges from households whose waste were been collected by private companies should be increased since most of them were willing to pay for improved services.
- Also, there is the need for more collaboration with the private companies by all the Assemblies to have a set amount to be paid by households for a best service delivery.

REFERENCES

Abrokwa, K., (1998). *Refuse Management Problems in Central Kumasi*"; status report on A population, Human Resource Development Planning Policy in Ghana 1960.

Addai, N. K. & Danso-Abbeam, G. (2014). *Determinants of willingness to pay for improved solid waste management in Dunkwa-on-Offin*, Ghana.

Afroz, R., Hanaki, K. & Hasegawa-Kurisu, K. (2009). Willingness to pay for waste management improvement in Daka city, Bangladesh. *Journal of Environment Management* 90 (2009) 492-502

Agbola, T., (1993). "*Environmental Education in Nigerian Schools*" In filho W.L (Ed) Environmental Education in the Commonwealth of Learning Vancouver.

Aggrey, N. & Douglason, G.O. (2010). Determinants of willingness to pay for solid waste management in Kampala City. *Current Research Journal of Economic Theory*, 2(3), 119-122.

Akintoye, A. (2009). *An Overview of Public Private Partnership.* Environmental Problems and Urban Household in Ghana Accra Metropolitan Accra.

Amfo-Otu, R., Debrah W.E., Adjei K. P. & Akpah-Yeboah, S. (2012).*Willingness to pay for solid waste collection in semi-rural Ghana*: Logit estimation. International Journal of Multidisciplinary Research Vol. 2 Issue 7, July 2012, ISSN 2231-5780

Asase, M., Yanful, K. E., Mensah, M., Stanford, J. & Amponsah, S. (2009), "Comparison of municipal solid waste management systems in Canada and Ghana: A case study of the cities of London, Ontario, and Kumasi, Ghana. *Waste Management*, Elsevier, 29.

Asomani-Boateng .R. (2007). "*Community-Based Organic Solid Waste Recycling, Urban Gardening, and Land Use Planning in Ghana, West Africa.*

Anarfi W. S., "Solid waste management in Ghana," Waste Management, vol. 1–8, 2012.

Awortwi N. (2003). Getting the fundamentals wrong: *"Governance of multiple modalities of basic services delivery in three Ghanaian Cities."* PhD Thesis. ISS.

Batley R. & Larbi, G. (2004). '*The changing role of government*." The reform of public services in developing countries. Palgrave Macmillan, New York.

Baabereyir .A. (2009),*Urban Environmental Problems in Ghana*: a Case Study of Social and Environmental Injustice in Solid Waste Management in Accra and Sekondi-Takoradi, University of Nottingham, Nottingham, England,

Caincross, C., and Freachen R., (1993). "Environmental Health Engineering in the Tropics." (2 nd Edition). Chiechester; john Willey and son Ltd.

Centre for Environment and Development (2003).Study of the Attitude and Perception of Community towards Solid Waste Management. A case study of Thiruvananthapuram city-Phase II. Submitted to Kerala Research Programme on Local Level Development.

Cheeseman, K., Phillips, P. S., & McClatchey, J. (2000). The Northamptonshire resource efficiency project: A critical analysis of the opinions of project champions. Environmental and Waste Management, 3(4), 175-187.

Coad A. (2005), *Private Sector Involvement in Solid Waste Management*: avoiding problems and building on successes, Eschborn,.

Cointreau-Levine, S., Coad, A., & Gopalan, P. (2000).*Guidance pack: Private sector participation in municipal solid waste management*. St Gallen: Swiss Centre for Development Cooperation in Technology and Management.

decentralization and privatization on urban environmental management. Amsterdam: Municipal University, PhD.

Denison, R.A. and Ruston, J.(1990). Recycling and Incineration. Island Press, Washington D.C

Erni .M., Mukhtar, Ian .D., Williams, Peter .J. Shaw and Francis .O. Ongondo, (2006), A tale of two cities. "*The emergence of Urban Waste System in Developed and Developing City".*

Experiences in Urban Solid Waste Collection in Accra (Ghana) and Hyderabad" (India). *Urban studies*, 40 (4): 837-854

Ghana." M.A.C. Stockhelm, Ghana.

Furedy, C. (1997). *Waste reduction in cities of developing countries*: Developing frameworks to guide policies and interventions. Toronto, Canada: York University.

Government of Ghana (2010), *Environmental Sanitation Policy*, Government of Ghana, Accra, Ghana,

Goulay, K.A., (1992). "*World of waste, Dilemmas of industrial Department"*, Zed books Ltd London.

GSS (Ghana Statistical Service). (2010). Ghana Population and Housing Census. Ghana Statistical Service, Accra.

Karanja, A., (2002). Solid waste management in Nairobi: actors, "*institutional arrangements and contribution to sustainable development*." PhD Dissertation, ISS.

Kassim S .M. (2006). "*Sustainability of Private Sector in Solid Waste Collection*". Dares Salaam Tanzania PhD Thesis, Loughborough University UK, 2006.

Kendie, S., (1999). "*Do Attitudes Matter? Waste Disposal and Wetland Degradation in the Cape Coast Municipality of Ghana*." Development and Planning Center, University of Bradford Discussion Paper no. 21 Bradford.

Kwahu West Municipality Health Directorate (2018).

Kreith, F. (1994). Handbook of Solid Waste Management. McGraw Hill, USA.

Kumah, A.M. (2007).The Situation of Solid Waste in Ghana.Accra, Ghana.

Ljunggren, M. (2000). *Modeling national solid waste management.* Waste Management & Research , 18(6), 525-537.

Massoud, M. El-Fadel, M. (**2002)** Public-private partnerships for solid waste management services. *Environ. Manag., 30,* 621–630. doi:10.1007/s00267-002-2715-6.

Martin O.-A.,(2011) "*Governance crisis or attitudinal challenges?* Generation, collection, storage and transportation of solid waste in Ghana," in Integrated Waste Management-Volume I, InTech Open, London, UK, 2011,

Mbuligwe S. E., (2004). Assessment of performance of solid waste management contractors: a simple techno-social model and its application. "*Waste management"* 24 pp 739–749.

McDougall, F., White, P., Franke, M. & Hindle, P. (2001). "*Integrated Solid Waste Management: A Life Cycle Inventory"*, Blackwell Science, Oxford, UK.

Mehta, M. & Knapp, A. (2004), "The challenge of financing sanitation for meeting the millennium development goals", *in 12th session of the*

United Nations commission on sustainable development (CSD-12), New York, 2004, pp. 1-28. Ministry of State Environment (2002).

Mensah, A. and Larbi, E. (2005). Solid waste disposal in Ghana.

MLGRD (Ministry of Local Government and Rural Develop- ment). (2010a). Kwabenya landfill development. Technical advisory committee. Final report, pp. 1-22

Momoh, J.J. and Oladebeye, D.H. (2010). Assessment of Awareness of Attitude and Willingness of People to Participate in Household Solid Waste Recycling Programme in Ado-Eketi, Nigeria,in the Journal of Applied Sciences in Environmental Sanitation. Jakarta, Indonesia.

Monney .I. (2014). *Ghana's Solid Waste Management Problems*: the Contributing Factors and the Way Forward, Modern Ghana, Ghana, 2014,

Mwangi, S.W. (2003). *Challenge of urban environmental governance, Participation and partnerships in Nakuru municipality*, Kenya. Amsterdam: Municipal University, PhD.

Navez-Bouchaive, F., (1993). "*Cleanliness and the Appropriation of Space, Refuse and Living Habitation Large Morocco Town People's Mediterranean."* Morocco.

Nisar H., Ejaz N., Naushad Z., Ali Z. (2008). *"Impacts of solid waste management in Pakistan: a case study of Rawalpindi city*" Waste Management and the Environment IV, Wessex Institute of Technology Press.

Nyachhyon, B., (2006). *"Prospects and Contraints of Public Private Partnership for Urban Waste Management".* Policy paper 15, Kathmandu, Nepal; SCAEF, Economic Policy Network. Asian Development Bank.

Obirih-Opareh, N. (2002). Solid waste collection in Accra. *Assessing the impact of Managing the monster urban waste and governance in Africa*. Canada's International Development Research Centre.

OECD (2000). *Competition in Local Services*: Solid Waste Management, OECD Directorate for Financial, Fiscal and Enterprise Affairs Committee on Competition Law and Policy

Onibokun & Kumuyi (1999). *Governance and Waste Management in Africa***:** In Adepoju G. and Onibokun (ed).

Ojok, J., Koech. M.K., Tole M., & OkotOkumu, J. (2012). *Households' Willingness to Pay for Improved Municipal Solid Waste Management Services in Kampala*, Uganda. Science Journal of Environmental Engineering Research ISSN: 2276-7495

Oteng-Ababio, M. (2007). Private-public partnership in solid waste management in the Greater Accra Metropolitan Area in Ghana. PhD Dissertation, University of Ghana, Legon.

Oteng-Ababio, M. (2010). "*Private sector involvement in solid waste management in the Greater Accra Metropolitan Area".* Waste Management & Research , 28(4), 1-8.

Oteng-Ababio, M. (2010). *Solid waste management in Ghana: Willingness to pay for improved services*. Ghana Journal of Geography Vol. 2.

Owusu G, Oteng-Ababio M, Afutu-Kotey RL: "Conflicts and governance of landfills in a developing country city", Accra. Landsc Urban Plan. 2012, 104: 105-113. 10.1016/j.landurbplan.2011.10.005.

Pacione, M. (2005). *Urban Geography.* A Global Perspective. 2nd. Edition. London and New York. Routedge, Taylor & Francis Group

Post, J. (1999). The problems and potentials of privatising solid waste management in Kumasi, Ghana. Habitat International, 25(2), 201-215.

Post, J. (2002), New partnerships in the collection of urban solid waste in developing world. In: Baud I.S.A., Post, J. & Furedy, C. (eds) Urban Management, "*Markets and Sustainable Development, Urban Solid Waste Management in Hyderabad and Nairobi*". London: Earthscan Publication, 33–51.

Post, J., Broekema, J. & Obirih-Opareh, N. (2003). "*Trial and Error in Privatisation:*

Rahman, M., Salequzzaman, Md., Bahar, M., Uddin, N., Islam, A., & al Hrun, A.Y., (2005). People's perception of the existing solid waste management of Khulna City Corporation (KCC) Area: A case study of participatory management. Proc. National Workshop for REGA and CDM Awareness & Motivation under the ADB PREGA Project, Bangladesh Centre for Advanced Studies, Khulna.

Roth, G. (1987). "*The private provision of public services in developing countries'*. Oxford University Press, New York.

Schubeller, P (1996). Urban Management and Infrastructure. *"Conceptual Framework for Municipal Solid Waste Management in Low-Income Countries*". Working Paper No. 9.

Senkoro, H., (2003)."*Solid Waste Management in Africa*"; AWHO/AFRO Perspective 1.

Shekdar .A.V.(2009). "*Sustainable Solid Waste Management*".An integrated Approach for Asian Countries.

Songsore, J., Benneh, G., Nabila, S. T., Amuzu, A. J., Tutu K. A., Yaugyuom (1994).

Tchobanoglous, G., Theisen, H. and Eliason, R. (1977). Solid Wastes: Engineering Principles and Management issues. McGraw-Hill Publishing Company, USA.

Tchobanoglous, G., Theisen, H. and Vigil, S. (1993). Integrated Solid Waste: Engineering principles and management issues. McGraw-Hill Publishing company, USA

Tsiboe, I.A. and Marbell, E.(2004).A Look at Urban Waste Disposal Problems in Accra.Roskilde University, Denmark.

UNDP/UNCHS (Habitat/World Bank/SDC Collaborative Programme on Municipal Solid Waste Management in Low-Income Countries.St, Gallen, SKAT.

UN-Habitat (2010). *State of the World's Cities 2010/ 2011: Bridging the Urban Divide*, London: Earthscan.

United Nations Environment Programme (2005)."Waste Quantities and Characteristics," pp. 31–38, http://www.unep.or.jp.

USPS (2000).

Solid Waste Management Plan for Thimphu City, Bhutan, Draft version, April 2000. Bhutan: Urban Sector Programme Support Secretariat.

United States Environmental Protection Agency (USEPA) (1999). State and Local Solut ions to Solid Waste Management Problems.

W.H.O. (2004). "*Estimation on Diarrheal Diseases*", Geneva; W.H.O. Puplication

Wiafe, M. (2015). "*Private Sector Involvement in Solid Waste Management* "in the Kumasi Metropolitan Assembly.

Wilson, D., C., (2007). *Development drivers for waste management.* Waste World Bank .(2004). Vietnam Environment Monitor 2004 — *Solid Waste*. Jointly prepared by World Bank, Vietnam Ministry of Environment and Natural Re-sources, and CIDA.

World Bank, (2013). *Results-Based Financing for Municipal Solid Waste*, World Bank, Washington, DC, USA, Management & Research, 25: 198–207

Zerbock, O. (2003). Urban Solid Waste Management: Waste Reduction in Developing Nations. (www.cee.mtu.edu). Accessed on 18th July, 2009.

Zia, H., & Devadas, V. (2008). *Urban solid waste management in Kanpur*: Opportunities and perspective. Habitat International, 32(2), 58-73.

APPENDIX I

QUESTIONNAIRE FOR HOUSEHOLD

INTRODUCTION

The purpose of this questionnaire is to conduct a study into solid waste management at Nkawkaw in the Kwahu West Municipal. It would be appreciated if you could assist by responding to this questionnaire. You are assured that your responses will be treated confidentially.

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Gender a. Male b. Female [ ].

2. Age a. 10-20 b. 21-30 c. 31-40 d. 41-50 e. 51 and above

3. Marital Status a. Single b. Married c. Divorced d. Separated e. others specify…….

4. Educational level attained a. Illiterate b. Primary c. JHS d. SHS d. SHS e. Tertiary or O' level/ vocation

5. Occupation of respondents……

SECTION B: COST OF SOLID WASTE MANAGEMENT SERVICES TO HOUSEHOLDS.

6. Where do you dispose your waste?

a. dump at communal container site b. collect by private company c. dump at communal dumping site d. burn the waste

7. If dump at communal container site, do you pay as you dump? a. Yes b. No

8. If you pay, how much do you pay per dumping? GH₵……..

9. I collect by private company, how often is waste collected from your households?

a. Once per week b. twice per week c. once per two weeks d. others…….

10. How much do you pay per month? GH₵…….

11. Are you willing to pay more for improved services? a. Yes b. No

12. If yes, how much are you willing to pay? GH₵……

13a. Are you satisfied with the services provided by the private company? a. Yes b No

13b. Give your reasons for answer to Q13……

……

……

SECTION C: COMPOSITION AND GENERATION OF SOLID WASTE

14. What is the composition of the waste generated by the households you have been collecting?

a. plastic……%

b. organic/food……...%

c. metal/can ……%

d. papers…….%

e. e-waste…….%

f. silts/inert ……%

15. What is the volume of waste collected per month from the Assembly?

……

INTERVIEW GUIDE

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Position/Rank of officer …….
2. Years of working with company
3. Name of company providing solid waste management services in the Assembly.
4. Qualification of the officer ……..
5. Number of years the company has been operating in the District ……..
6. Kinds of contracts being executed by company in the District…….

   ……
7. Contact information of company

SECTION B: COST OF SOLID WASTE MANAGEMENT SERVICES TO THE ASSEMBLY

8. What quantity of waste do you collect from the SIP container sites per month?
9. How much are you paid by the Assembly for this service per month? .....

   ……
10. How often do you get this money paid by government?

    ……..
11. How much do you incur in the cause of service provision per month?

    …….

    ……..
12. What items lines constitute the expenses during service provision?

    ……

SECTION C: COMPOSITION AND GENERATION OF SOLID WASTE

13. Do you collect different types of solid waste from households?

    a. Yes b. No

14. What are some of the solid waste do you collect? (Select as many as applicable)

    a. Domestic waste

    b. Municipal waste

    c. Industrial waste

    d. Hospital waste

15. What is the composition of the waste generated by the household you have been collecting?

    a. Plastic…….%

    b. Organic/food ……%

    c. Metal/can ……..%

    d. Papers ……%

    e. E-waste ……%

    f. Silts/inert ……..%

16. What is the volume of waste collected per month from the Assembly?

    ……

    ……..

SECTION D: SOLID WASTE MANAGEMENT SERVICES DELIVERY TO HOUSEHOLDS.

17. How often do you collect waste from households?

    a. Daily b. Weekly c. Fourth nightly d. Monthly

18. What are the charges for your waste collection services paid by the household?

    ……

    ……

19. Do payments made by households meet services provided? a. Yes b. No

20. Do you have official contract with the Assembly to provide household level waste collection services? a. Yes b. No