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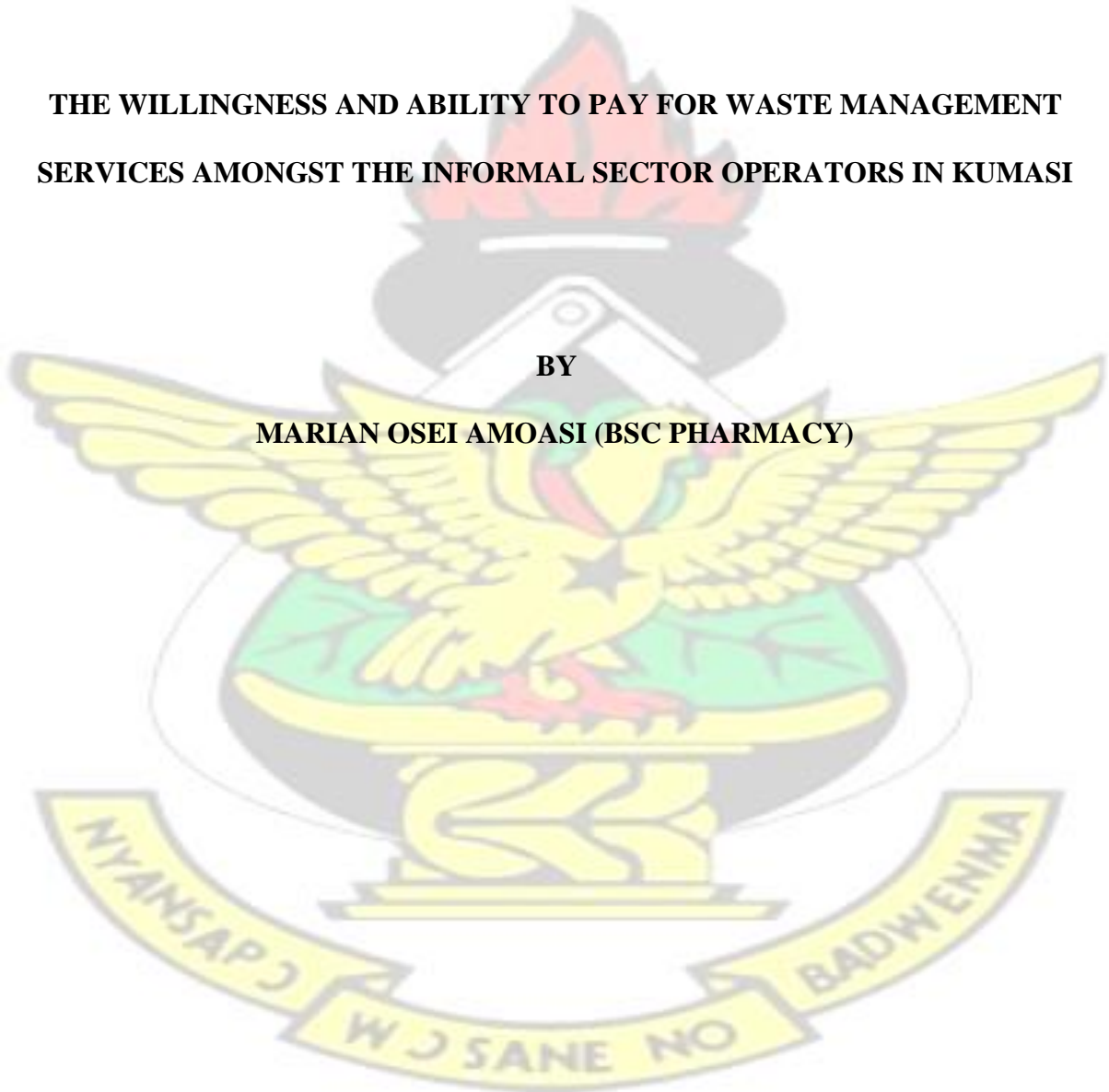**KUMASI, GHANA**

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH POLICY MANAGEMENT AND ECONOMICS

THE WILLINGNESS AND ABILITY TO PAY FOR WASTE MANAGEMENT SERVICES AMONGST THE INFORMAL SECTOR OPERATORS IN KUMASI

BY

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SERVICES AMONGST THE INFORMAL SECTOR OPERATORS IN KUMASI

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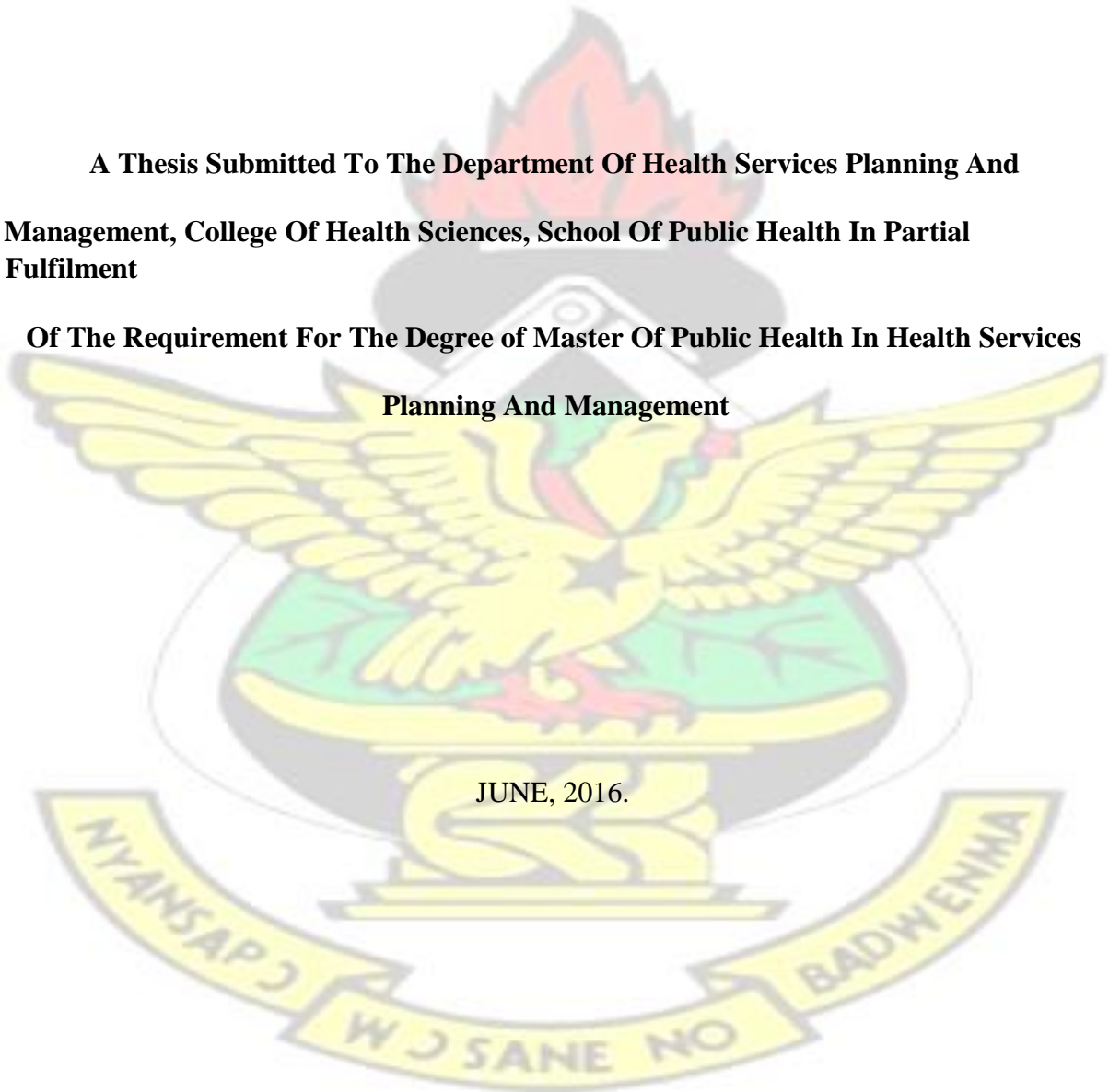
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DECLARATION

I hereby declare that except for references to other people''s work which have been duly acknowledged, this piece is my own composition and neither in whole nor in part has this work been presented for the award of a degree in this University or elsewhere.

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ABSTRACT

The management of waste continues to be a major challenge in urban areas throughout the world particularly in the rapidly growing cities of the developing countries. Hence, key stakeholders including the government, metropolitan assemblies, companies and individuals are expected to be willing to pay for the services rendered by the waste management companies. The main objective of this research was to assess the willingness and ability to pay and the relationship with utilisation of waste management services among the informal sector operators in Kumasi. It also looked at the utilisation of waste management services and the factors that influence it. Using questionnaires, data was collected from 554 respondents from Subin, Suame and Asokwa sub-metros. Descriptive statistics and binary logistic regression model were employed to analyse the data collected from the respondents. The study found that people are willing to pay for the services provided by the waste management companies and preferred private waste collectors to Metropolitan Assembly. The study showed that 54.7% of the respondents were willing to pay for waste management services. It was found that the maximum amount the respondents were willing to pay was GH¢ 23.

However, it was revealed that the respondents" willingness to pay for waste management services depends on the reliability, efficiency, cost and quality service delivery of waste management providers. Again, quality of waste management service cost of waste management service, the proximity of the waste management service providers to the people and peer influence were found to be the factors that influence people"s utilization of waste management services. The study recommended to all stakeholders including the government and its agencies, district assemblies, private waste management companies and community residences to help improve the management of waste in the country. Specifically, the study recommended to the government and its departments responsible for waste management to revise the environment and waste management policy to enrich it with the requisite strategies to ensure efficient waste management. Again, district assemblies must levy residences with moderate fees while providing quality and reliable waste management services. The pay as you dump waste management policy must be reinforced and price adjustment must be done in moderation. The study also recommends to private waste management companies to review their charges and make it affordable to majority of the people who are willing to pay for their services.

AKNOWLEDGEMENT

DEDICATION

This study is first dedicated to the Almighty God, then to my family and all significant others for their support in various forms.

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IWM	Integrated Waste Management
SBS	Step by Step
UNFPA	United Nations Fund for Population Activities
MMDAs	Metropolitan, Municipal and District Assemblies
EPA	Environmental Protection Agency
WMDs	Waste Management Departments
AMA	Accra Metropolitan Assembly
KMA	Kumasi Metropolitan Assembly
ISWM	Integrated Solid Waste Management
CVM	Contingent Valuation Method
WTP	Willingness to Pay
NOAA	National Oceanic and Atmospheric Administration
CHRPE	Committee for Human Research Publications and Ethics
KNUST	Kwame Nkrumah University of Science and Technology
SHS	Senior High School
JHS	Junior High School

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

The creating of waste, the collection, processing, transport and disposal comprises the process of waste management. This is important for both the health of the public and aesthetic and environmental reasons. Waste is anything discarded by an individual, household or organization. As a result waste is a complex mixture of different substances, only some of which are intrinsically hazardous to health. The potential health effects of both waste itself and the consequences of managing it have been the subject of a vast body of research (Anomanyo, 2004).

It usually refers to materials produced by human activity and the process is usually undertaken to reduce their effect on health, the environment or aesthetics. Solid waste generated includes refuse from commercial establishments, households, yard waste, street sweepings, and waste from industrial establishments and the informal sector in business. Broadly, waste generated from the informal sector includes pieces of fabrics cut out when sewing by tailors, metal scraps and other unusable and obsolete materials generated by mechanics, sawdust and wood filings from carpenters and packaging materials etc (Coad, 2005).

In Ghana, towns and cities are faced with rapidly growing urban population and this seeks to bring increasing strain on infrastructure facilities and one obvious area is in waste management where the existing system appears to lack the capacity of coping with the heap of waste generated on daily basis. . Many informal sector individuals who generate a lot of waste have no waste receptacles and even those who have them, they are inadequate and inappropriate. A large proportion of waste is left uncollected and as a result there is choking and subsequent

flooding during rainfall and other health implications like cholera, typhoid fever and respiratory infections from the stench emanating from the garbage.

It costs the metropolis about 400,000 cedis per month to provide waste management services in the metropolis so the assembly is looking forward to enhancing the system so that a lot of revenue could be generated to sustain effective waste management and at the same time resourcing contractors to ensure continued disposal and waste.(Solid waste disposal in Ghana, 2006)

1.2 Current Knowledge

1.2.1 Current State of Knowledge

The key problems with solid waste disposal in Ghana principally relate to problems with haphazard dumping, increasing difficulties with acquiring suitable disposal sites, difficulties with conveyance of solid waste by road due to worsening traffic problems and the lack of alternative transport options and the weak demand for composting as an option for waste treatment and disposal. (Solid waste disposal in Ghana, 2006)

Generally the poor state of waste management is clearly not only an engineering problem but rapid urbanization, poor financing capacity of local authorities, low technical capacity for planning and management of solid waste, weak enforcement of environmental regulations which allow local authorities to flout environmental regulations without any sanctions have all contributed to compound the problem. The Ghanaian experience shows that within the existing socio-economic context, manual systems are appropriate. The work would be beneficial to both waste managers and improve utilisation waste management services by the informal sector. By this rampant dumping of waste would be reduced and in the long term prevent diseases caused by pollution from waste (Alberini, 1995)

1.3 Problem Statement and Rationale

Waste management is now a major problem for every town and city across the world including those of Ghana. Kumasi happens to be the second mostly commercially city in Ghana and is one of the most populated cities as well. It is benefiting from the negative effects of population growth, urbanization and increased informal operators. These have led to generation of a lot of waste, absence of or inadequate and inappropriate waste receptacles, leading to dumping at inappropriate places. Other effects are waste that is left uncollected, choking gutters, Flooding and fires, health implications like cholera, typhoid fever, and respiratory infections from the stench emanating from the garbage. One way of addressing these effects and maintaining quality waste management services is for waste generators to pay realistic prices. But can clients genuinely pay realistic prices? How does the sector receive the concept of having to pay for the service of waste managers?

Do people pay because they have the ability and willing to pay or because they have no option than to pay under duress? Does the informal sector in the metropolis have the willingness and ability to pay for the services and do they receive the expected standard of service?

Hence the study sought to assess the Willingness and ability of the informal sector operators who are assumed to be up to 60% of the total population to pay for such service in order to improve waste management service

1.4 Objectives

1.4.1 General Objectives

To assess the willingness and ability to pay and the relationship with utilisation of waste management service amongst the informal operators in Kumasi

1.4.1.1 Specific Objectives

1. To assesses the utilization of waste management service.

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2. To estimate the willingness and ability to pay for waste management services by informal operators.

3. To ascertain the factors that influence utilization of waste management services.

1.5 Research Questions

1. How well do clients utilise waste management services?

2. How willing and able are clients to pay for waste management services?

3. What factors affects the clients" willingness and ability to pay for waste management services?

1.6 Conceptual framework
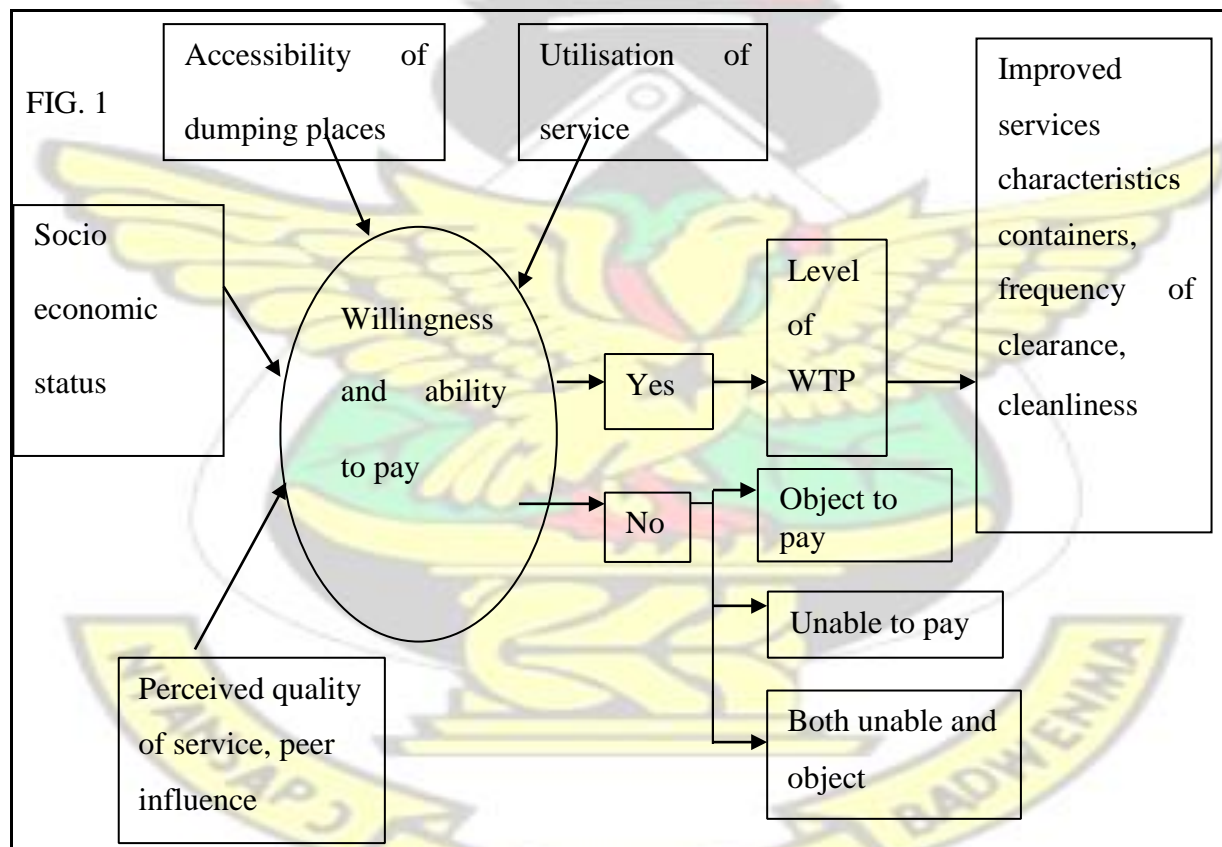
Figure 1.1: Conceptual framework

Socio economic factors such as age and income and level of education and occupation shapes peoples attitude. These reserves provide a measure of a person"s income and his ability and the means to live comfortably enough to be willing and able to pay for waste management services. The willingness and ability to pay also depends on the accessibility of dumping places of waste

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generated, the determinants of willingness to pay including peer influence, perceived quality of service, the cost and how quick the garbage is picked and proximity. With the willingness and ability to pay for a higher fee for service, there will be improved service characteristics.

1.7 Definition of Terms

Willingness and Ability to Pay - The maximum amount a person would be willing to pay, sacrifice or exchange in order to receive a good or to avoid something undesired which is usually dependent on user preferences and is highly conditioned by available income for consumption.

Waste Management Services- The creating of waste, the collection, processing, transport and disposal of waste.

Informal Sector-Sector of employment where there is lack of records in their activity

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This aspect of the study touches on the review of literature on waste management tackling areas including the definition of waste, the global, African and Ghanaian view of waste management as well as waste management practices in the study area. The chapter also looked at the theory of social justice, sustainable waste management and integrated waste management, the concept of waste hierarchy and finally knowledge gaps and innovations in waste management.

2.2 Overview

In spite of the numerous technological achievements in modern times, management of waste remains one of the greatest challenges facing humankind. The control of waste generated in communities worldwide has become a task too heavy for technology alone to be able to handle effectively. It rather appears that new technologies bring new types of waste into the

environment adding to the complex accumulation puzzle" (Kwawe, 1995). Moreover, proper waste management can be costly in terms of time and resources and so it is important to understand what options exist for managing waste in an effective, safe and sustainable manner (El-Haggar, 2007). This therefore calls for the need to take a critical look at ways of managing different forms of wastes at relatively low costs.

An Integrated Waste Management (IWM) has emerged with time as a holistic approach to managing waste through the combination and application of a range of suitable techniques, technologies and management programs to achieve specific objectives and goals (McDougall et al., 2001; Tchobanoglous & Kreith, 2002). Just as there is no individual waste management method, which is suitable for processing all waste in a sustainable manner, there is no perfect IWM system (McDougall et al., 2001). Individual IWM systems vary across regions and organizations (McDougall et al., 2001 cited in Davidson G., 2011). The emergence of IWM, to a great extent helps manage waste in both developed and developing countries as well as reduce the high costs involved.

2.3 Definition of Waste

A waste according to Botkin and Keller (2003) is a discarded material, which has no consumer value to the one who disposed of it. A waste can also be defined as any material, which is of no further use to a consumer and therefore dumped or discarded. The oxford dictionary also defines waste as a material, substance, or by-product eliminated or discarded as no longer useful or required after the completion of a process.

According to the Waste Management Report Step by Step (SBS) Group (2004), the main sources of waste are offices, commercial activities (Cafeterias, Print Shop, Commissary, Garden and landscaping, Clinic), Maintenance of buildings and machinery, Sewage and

Toiletries (sanitary waste). However, there are basically two types of waste namely liquid and solid waste and these are discussed in the paragraphs that follow.

2.3.1 Solid waste and Liquid waste

Solid and liquid wastes comprise the two main types of wastes that are discharged from various firms and households. Solid waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted (Tchobanoglous et al., 1993). The Ghana Innovation Market Place (2009) also defines solid waste as neither wastewater discharges nor atmospheric emissions, arising from domestic, commercial, industrial, and institutional activities in an urban area (Puopiel, 2010). The term solid waste can also be referred to as any material such as household garbage, food wastes, yard wastes, and demolition or construction debris. It also includes discarded items like household appliances, furniture, scrap metal, machinery, car parts and abandoned or junk vehicles.

Solid waste according to Zerbock (2003) includes non-hazardous industrial, commercial and domestic waste including household organic trash, street sweepings, institutional garbage and construction wastes.

Liquid waste on the other hand refers to waste that is generated or converted to liquid form for disposal. Various establishments including hospitals, schools and industries do produce different forms of liquid wastes from their productions and their daily activities. If not properly managed, liquid wastes cause a lot of pollution to the environment including the destruction of water bodies leading to the spread of diseases. There is therefore the need to check the management of both liquid and solid wastes in both developed and developing countries around the world so as to avoid the negative effects that accompanies improper waste control.

2.4 Waste Management (Global view)

Waste management has become a global problem especially in the developing countries of the world. Public parks and private gardens play critical roles in supporting biodiversity and providing important ecosystem services in urban areas. Such spaces also provide primary contact with biodiversity and offer „natural" environment for many people. It may influence the physical and mental well-being of those people, and in the case of public open spaces, it presents broader social benefits as the meeting places that give a shared focus to diverse communities and neihbourhoods. Ironically, these open spaces have been taken over by indiscriminate dumping of waste by residents thereby changing the urban morphology. Poor management practices however tend to worsen the existing situation globally (Babalola, 2010).

The collection and disposal of waste within an urban area has traditionally been seen as the responsibility of the local municipal government. Provision of services to collect and dispose of municipal refuse is expensive, even when the most primitive methods are employed. It is therefore not unusual for the cost to comprise 20 - 40% of a municipal budget. Collection and transportation generally make up 70 - 80% of these amounts, with disposal comprising the remainder. The private sectors in industrialized countries have in recent years become more involved in refuse collection and disposal. For instance, in Europe, the service is still the responsibility of the local government, who contract out its operation to the private sector. The Local Government collects the appropriate fees and supervises the standard of service provision. In the US, the private sector works directly to the householder, collecting a user fee indirectly. In both Europe and the US, industrial waste services are provided direct to industry by the private sector.

There is currently considerable interest in the potential for introducing the private sector to solid waste management services in Africa. While this has some potential for cost saving, it is certainly not a remedy to solve all problems. Two particular pitfalls need to be avoided.

The first of these is that a direct service, where a householder pays the waste collector directly, would tend to serve mainly the middle and upper income levels, as low-income people could not afford the expense. Similarly, if the private collectors are performing the service in order to make a profit from the recyclable, they would again tend to serve only those residents with "rich" waste. In either case, a substantial proportion of the city´s refuse would be left uncollected; it may be inefficient for the City to collect the leftovers of the primary private sector system.A more appropriate model of private sector involvement might well be the "European" or Hong Kong" system, whereby collection and/or disposal is contracted out by the public sector to the private sector, with responsibility for funding and for monitoring the quality of the service remaining with the public sector.

The pitfall to avoid here is that of accepting the lowest bid irrespective of the standard of service to be provided. The majority of the problems could be satisfactorily resolved if a number of deficiencies in the contract or the contracting system were resolved (Ahorlu, nd).

Solid waste management is the one thing just about every city government provides for its residents. While service levels, environmental impacts and costs vary dramatically; solid waste management is arguably the most important municipal service and serves as a prerequisite for other municipal action.

Currently, world cities generate about 1.3 billion tonnes of solid waste per year and this volume is expected to increase to 2.2 billion tonnes by 2025. Waste generation rates will more than double over the next twenty years in lower income countries. Globally, solid waste

management costs will increase from today"s annual $205.4 billion to about $375.5 billion in 2025. Cost increases will be most severe in low income countries (more than 5-fold increases) and lower-middle income countries (more than 4-fold increases). The global impacts of solid waste are growing fast. Locally, uncollected solid waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhoea and dengue fever. In lower income country cities solid waste management is usually a city"s single largest budgetary item (Hoornweg and Bhada-Tata, 2012). Waste management practices are therefore vital to the development of both developed and developing countries.

However, because individual waste management methods cannot deal with all potential waste materials in a sustainable manner, waste management methods cannot be uniform across regions and sectors (Staniškis, 2005). Conditions vary; therefore, procedures must also vary accordingly to ensure that these conditions can be successfully met. Waste management systems must remain flexible in light of changing economic, environmental and social conditions (McDougall et al., 2001; Scharfe, 2010). In most cases, waste management is carried out by a number of processes, many of which are closely interrelated; therefore it is logical to design holistic waste management systems, rather than alternative and competing options (Staniškis, 2005).

European countries like Britain, France, Spain, Ireland and Italy being classified by Chazan (2002) as constituting the nucleus of the "dirtiest" countries in Europe, "drowning in a sea of garbage" and with most of their "municipal rubbish dumped in landfill sites". It is well known that until recently the Rhine in Germany and most of the rivers in Britain had dangerously high levels of nitrate, coal and iron deposits as a result of chemical and/or toxic waste dumped into them from iron and steel industries. In most of these developed countries such as Britain, USA, Ireland and France there has been a tendency to rely on landfills to reduce waste accumulation,

which compared to other means of waste disposal like incineration and composting has the ability to contain and dispose greater proportions of waste produced and seemed to be relatively less costly (Kwawe, 1995: 53; Chazan, 2002).

However the current upscale in issues related to landfills such as pollution of ground water, "Not in my backyard", and competition for housing development complexes cited by Kwawe, Chazan and Botkin et al respectively, raises questions as to the sustainability of landfills as a panacea to waste accumulation problems in developed countries. Kwawe(1995: 54) reports that by 1995 half of the million tonnes of waste generated in central London were being transported more than 64 kilometres to be dumped because all dumping sites in central London were full. Botkin and Keller (2003) also point to the same problem involving the cost of construction, transportation and managing landfill sites in the USA and warned that the USA may be close to running out of landfill space because of the sheer amount of refuse produced on a daily basis.

There is nevertheless a small group of countries namely Austria, the Netherlands, and Denmark, that have evolved necessary 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.

According to the Institute of Waste Management, UK recycles only 11% of its household waste, Italy and Spain only 3%, Netherlands 43%, Denmark 29%, and Austria 50% respectively(IWM cited in Chazan: ibid). All these points highlighted above bring to light the need to enforce effective and efficient waste management systems globally.

2.5 Waste Management practices in Africa

Africa like any other continent on the globe is struggling to keep its waste disposal practices in check. In most developed and developing countries with increasing population, prosperity and

urbanization especially in Africa, it remains a major challenge for municipalities to collect, recycle, treat and dispose of increasing quantities of solid waste and wastewater. A cornerstone of sustainable development is the establishment of affordable, effective and truly sustainable waste management practices in developing countries. It must be further emphasized that multiple public health, safety and environmental benefits accrue from effective waste management practices which concurrently reduce greenhouse gas emissions and improve the quality of life, promote public health, prevent water and soil contamination, conserve natural resources and provide renewable energy benefits (Ahmed et al., 2007).

In Africa, individual countries are at various stages in this gradual evolution towards "modern" standards of waste management. In many of the poorest countries, and in the lowincome areas of major cities, the first priority is still to get the refuse out from under the roof. The standards of waste disposal are still almost universally low, with open dumping as the standard method in most countries. Hazardous wastes are beginning to be recognised as a priority problem, but most countries are at a relatively early stage in developing and implementing action programmes. Many waste management efforts in Africa have emphasised technology at the expense of management support systems. This has unfortunately been due to a lack of understanding of the policy issues related to effective waste management strategies and a lack of experience in implementing programmes. This in turn is due to institutional weakness and unfortunately the involvement of politics. An acceptable level of service for waste management depends critically on well planned management, operating within an adequate institutional arrangement and capable of generating the financial resources required to meet operating maintenance and investment

costs.

Among the common weaknesses in existing institutional systems are untrained staff, poor pay scales, the lack of incentives to do a good job, and corruption. Related to these are two key problem areas, namely inadequate supervision of workers and inadequate maintenance of facilities. In industrialized countries, one would expect one supervisor for every five to seven collection vehicles, whereas one per 10 - 30 vehicles is more common in Africa. In addition, supervisors in Africa often have no means of moving about within their service area, so that effective supervision is very difficult.

The provision of adequate funding for solid waste management on an on-going basis is a major problem in many African cities. As the proportion of total city budget, which is spent on cleansing, may be quite large, this implies an effort to improve the overall municipal administration system. This is because the money for running the service most commonly comes from the general municipal revenue. Direct user charges for refuse services are relatively uncommon, and where they do exist, collection rates are often very low. Three particular problems with direct charges are that those who can afford to pay live in the better income areas, while the problem is often providing an adequate service in the poorer areas; there is usually no viable means of shutting off service to a residents who do not pay their bills; and a direct charge provides an incentive to indiscriminate dumping, which is the opposite effect to that intended (Ahorlu, nd)

The problem of waste in urban cities of Africa can be better understood in the light of recent rapid urbanization worldwide and political pressures from outside Africa to deal with the governance and management problems related to waste (urbanization creates the waste and market forces serves as a panacea to the waste problem). For the first time in the history of mankind, we are witnessing an unprecedented phenomenon in the development of places of habitat: the balance of human settlement patterns have shifted from more people inhibiting

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rural areas to more people living in cities (Rabinovitch, 1998, UNFPA, 2001). This is especially so in developing countries such as Ghana, Lagos, Nairobi and Mauritania.

Urbanization introduces society to a new way of life: cars, pre-packed foods; it allows for economies of scale in the production of goods and services, and in the transportation of the finished products for human consumption (UNFPA, 2001). This new wave of urbanization as Rabinovitch (1998) concludes has led to, "a radical transformation in the structure of cities in many parts of the developing world, accompanied by complex social, economic and environmental changes" (Rabinovitch, 1998).

Whilst urbanization is not a new phenomenon in Africa, the current rate of uncontrolled and unplanned urbanization in Africa has given rise to a huge amount of liquid and solid wastes being produced, so much so that these wastes have long outstripped the capacity of city authorities to collect and dispose of them safely and efficiently (Porter et al, 1997; Chazan2002).

Recent events in major urban centres in Africa have shown that the problem of waste management has become a monster that has aborted most efforts by city authorities, states and federal governments, and professionals alike (Onibokun, 1999). As industrialized countries run short of sites for dumping waste, the need to recycle more rubbish grows increasingly urgent" (Chazan, 2002).

Solid waste management is one of the functions that have been devolved to local government in a number of developing countries (Van, 2006). Its proper handling of this task is often taken as an indicator of the successfulness of urban reform. Public services delivery has been failing in developing countries for a long time (Van, 2006). The expectation was that decentralization and private sector participation in developing countries would improve service delivery, which

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has often not happened. Obviously, decentralization and private sector participation alone are not enough, if proper policies; strategic frameworks for performance measurements and regulations are not strictly followed (DijkiandOduroKwarteng, 2007).

2.6 Waste management in Ghana and Kumasi Metropolitan Assembly

Waste disposal has become a major challenge to Metropolitan assemblies in Ghana over the years. General Waste Management in Ghana is the responsibility of the Ministry of Local Government and Rural Development, which supervises the decentralized Metropolitan, Municipal and District Assemblies (MMDAs). However, regulatory authority is vested in the Environmental Protection Agency (EPA) under the auspices of the Ministry of Environment and Science. The Metropolitan, Municipal and District Assemblies are responsible for the collection and final disposal of solid waste through their Waste Management Departments (WMD) and their Environmental Health and Sanitation Departments. The policy framework guiding the management of hazardous, solid and radioactive waste includes the Local Government Act (1994), Act 462, the Environmental Protection Agency Act (1994), Act 490, the Pesticides Control and Management Act (1996), Act 528, the Environmental Assessment Regulations 1999, (LI 1652) the Environmental Sanitation Policy of Ghana (1999), the Guidelines for the Development and Management of Landfills in Ghana, and the Guidelines for Bio-medical Waste (2000). All these Acts and Regulations emanate from the National Environmental Action Plan (Sanitation Country Profile Ghana, 2004).

However, metropolitan Assemblies find it difficult to deal with the large quantities of solid waste generated due to urbanisation and increasing densities in these areas. People resort to indiscriminate dumping as the only means to managing their domestic solid waste; resulting in littering and heaping of waste.

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Mensah and Larbi (2005) indicated that based on an estimated population of 22 million and an average daily waste generation per capita of 0.45 kg, Ghana generates annually about 3.0 million tonnes of solid waste. Boateng and Nkrumah (2006) also further added that, solid waste generated daily in Accra was between 1500 - 1800 tonnes. Waste from domestic sources include, food waste, garden waste, sweepings, ash, packaging materials, textiles and electric and electronic waste with organic waste being the major component. This constituted about 65 per cent. According to him, the high proportion of food and plant waste was due to the fact that Ghana's economy largely depended on agricultural products for export and domestic consumption. But the waste rate of Ghana's capital city (Accra) was about 2000 tonnes a day with per capita waste generation of 0.45kg (AMA, 2009).

Also, according to Kumasi Metropolitan Assembly (KMA) (2009), the current domestic waste generation in Kumasi rate was approximately between 1000 - 1500 tonnes a day. This was based on the projected population of 1,610,867. According to Ketibuah et al (2010), in Kumasi the bulk of household waste is found to be organic waste which includes food waste and putrescible waste with an average of 55 per cent (Puopiel, 2010).

Events of the 20th century and early into the 21st century indicate that waste, in whatever form or classification: solid, liquid, or toxic, has become a major consequence of modernization and economic development. In our quest for „Western-styled" development, humanity did not budget for the associated problems related to the management of waste (Tsiboe. and Marbell ., 2004).

The environmental sanitation policy in Ghana outlines the roles of the City Authority, Kumasi Metropolitan Assembly (KMA), but the implementation of the policy directives is not fully followed (Awortwi, 2003). The implementation of the national environmental sanitation policy in Ghana is not receiving the necessary attention and therefore influences the quality of solid

waste service. The Kumasi Metropolitan Assembly has powers conferred on it by the Local Government Act 1993 (Act 462) to promulgate and enforce by-laws to regulate solid waste management, sanitation, cleansing and abatement of nuisance in the

Kumasi Metropolis. Companies cannot operate without the approval of or license from the KMA. The three mechanisms of regulation (price regulation, service quality regulation and access to information regulation) are followed to some extent in Kumasi but still require improvement (Dijki and Oduro-Kwarteng ., 2007).

Currently, there are about six private companies involved in solid waste collection and disposal services in Kumasi with communal collection and house-to-house as the main mode of solid waste collection.

Kumasi Metropolitan Assembly (KMA) and the private companies collected on the average about 55% (545 tonnes) of solid waste generated in Kumasi with the remaining 45% partly recycled/reuse and partly uncollected and indiscriminately disposed of within the environment creating aesthetic nuisance and health problems (Oduro-Kwarteng et al., 2006).

Some companies do not comply with the obligations in the contracts awarded by KMA but are not sanctioned as indicated in the contracts. The quality of solid waste service rendered by the companies is therefore inadequate because of weak enforcement of the by-laws (Awortwi, 2003).

About 33 per cent of the population in Kumasi enjoys the service of waste disposal companies but payment for the services tends to be irregular. This and other factors therefore serve as obstacles to the Ghanaian sanitation sector as it reduces their ability to render quality services to the general population.

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According to the 2004 Sanitation Country Profile Ghana, the following are some of the Obstacles and Challenges in the Ghanaian Sanitation Sector

- Inadequate funds to pay solid waste contractors who are currently doing about 80% of the collection not paid for by residents;
- Inadequate waste collection vehicles;
- Revenue generated is not sufficient to meet waste collection;
- Inadequate Government financial support on sanitation. The shift of attention has gone to curative instead of the preventive aspect of sanitation
- Lack of public awareness on the need to pay for sanitation services;
- Indifference of the public towards good sanitary practices;
- Lack of intense and sustained public education on sanitation;
- Problem of land acquisition for public waste disposal
- Not in my backyard syndrome (Nimby syndrome)
- Inadequacy of law enforcement
- Need to put in place recycling plants e.g. plastic waste
- The development and construction of the radio-active waste disposal site being at a standstill for lack of funds.

2.7 The Theory of Social Justice

The term „social justice" seems to have an uncertain origin (Baabereyir, 2009). The term is best understood as forming part of the broader concept of „justice" in general. According to Miller (1999 cited in Baabereyir, 2009), actions are „just" when they are taken in attempt to bring about a "just state of affairs", or when they actually have desirable result. A number of conditions that must be met before we can describe a situation as just or unjust:

- The situation in question must involve sentient beings

- It must be a situation in which a person or group is enjoying a benefit or suffering a burden relative to others

- It must be a situation which has resulted from the actions of sentient beings, or is at least, capable of being changed by such actions

- The people affected by the situation in question must be equally deserving of the benefit or burden in question (Miller 1999 cited in Baabereyir, 2009).

It is desirable, at least from an egalitarian perspective that the collective benefits of society (such as public money and natural resources) as well as its collective burdens (such as public debt and pollution) are equally allocated among its members. In the real world, however, vulnerable members of the population such as the poor and minority groups are discriminated against as they frequently receive less of the benefits and bear more of the burdens (Tilly, 2004). Such discrimination against vulnerable groups in society has been conceptualized as „social injustice" (Syme and Nancarrow, 2001). As defined by Atkinson (1983) the term social justice refers to "perceived unfairness or injustice of a society in its distributions of rewards and burdens". Syme and Nancarrow (2001) have also referred to social injustice as "when not all people within a society have equal access to facilities, services or systems within that society". Advocacy for social justice is therefore an effort to correct injustices in society and to achieve fair and just treatment for all societal groups in the distribution of collective rewards and burdens (Baabereyir, 2009).

Miller (1999) cited in Baabereyir, (2009) argues that "a just policy or state of affairs is one that ensures that no person, or more usually category of persons, enjoys more or less of the advantages due them or bear more or less of the burdens they ought to bear relative to other members of the society". In this sense, a situation of social justice exists when all members of

a given society, irrespective of status or class, receive equitable shares of public assets and bear equitable shares of collective burdens (Baabereyir, 2009).

The review of studies on the waste situation in developing countries has shown that the organization of waste collection services is usually unfair and inequitable. While municipal authorities (and their waste contractors) are usually unable to undertake adequate waste collection in cities, their efforts are usually concentrated in the few high-income residential areas and official premises where they provide regular waste removal and ground cleansing service. On the other hand, low-income and informal residential areas usually receive little or no service for waste collection (Hardoy et al., 2001). Thus, there are usually great spatial disparities in environmental quality between rich (formal) and poor (informal) areas within cities so that while the wealthy populations usually enjoy patches of clean space and fresh air, the poor residents of the cities usually suffer health and life-threatening squalor. This classbased discrimination can be regarded as social injustice as it provides one category of residents (the rich) a disproportionate share of a public service and causes another category of residents (the poor) to bear a disproportionate share of the burdens or nuisances associated with the non-collection of waste (Baabereyir, 2009).

There are a number of grounds for making a claim for social injustice in waste management. One reason is that these areas are often the most difficult to serve because the access routes are often unpaved and narrow. Furthermore the waste in poor areas has the least value for recycling and the poor have less political and social influence (Coad, 2005). Some municipal authorities have argued that the rich residents of the cities pay for the regular services they receive while the poor are unwilling to, or cannot pay for waste disposal (Hardoy et al., 2001).

However, studies have showed that the cleanliness of the streets and the regularity and convenience of the primary collection service influenced the willingness to pay of the residents

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– the secondary transport system and the method used for waste disposal had no impact (Devas and Koboe, 2000, cited in Hardoy et al., 2001). Other issues also affect the willingness to pay. For example, two similar small towns, about 25 km apart, exhibited very different degrees of willingness to pay. In one town the local council had rejected the idea of a waste management fee. In the other there was a high level of payment, based on a general environmental law that was enforced by the police (Coad, 2005).

Accordingly Coad (2005), suggested that the best way of providing a service to low-income communities is often to involve local people, but consideration must be given as to how the collected waste will be transported to the disposal site. Often the poor are able and willing to pay a small fee that is enough to fund the primary collection service, but this income is insufficient to cover the costs of transporting the waste to the disposal site and of the disposal process itself. More so several studies have shown that the levies paid by the wealthy residents for their waste disposal services usually constitute just fractions of the actual costs of the services they receive which means that public funds are used to subsidize the service provided for the rich (Baabereyir, 2009). As such the services must equally be enjoyed by people of both the informal or low income and formal or high income alike.

Coad (2005), argue that communities who have recently suffered from a lack of service may be happy to pay for regular waste collection, seeing the clear link between the fee and the improvement of environmental conditions. Various factors may motivate communities to be willing to pay for waste collection, including the desire for a healthier environment, convenience, competition and status. In many cases it is necessary to implement a programme of public education regarding the health, environmental and economic benefits of a good waste management service, but it must not be assumed that knowledge alone is enough to persuade beneficiaries to pay their fees regularly. If they regard the fees as too high or have no confidence

in the organisation that collects the fees, then no amount of environmental awareness will make them willing to pay. For example, residents in one village agreed that they would not be willing to pay a fee to the local government administration for a waste collection service, but they said that they would be willing to pay a fee to a local NGO, if that organisation would provide the service. There appeared to be a lack of confidence in the local administration.

Willingness to pay is linked to level of service, amount to be charge and confidence in the waste collection institution. Some may be willing to pay for a high level of service, such as a daily collection from the door of each apartment. Others, concerned to minimize costs, may prefer a much less convenient service – for example, communal collection which involves carrying waste to a street container. It is therefore essential to involve beneficiaries in decisions regarding level of service and fees for two reasons:

(i) to get a reliable understanding of the kind of service that they are willing to pay for, and (ii) because when people are involved in making a decision they are more likely to participate in implementing the decision, since they feel ownership or responsibility for the decision. Therefore it is advisable to select two or three feasible and acceptable collection systems, calculate the costs and the fees for each, and offer these alternatives (levels of service and associated fees) to waste generators, asking for their preferences, and checking how much they would be willing to pay for the service they select (Coad, 2005).

This implies a more holistic planning and broad stakeholder participation in waste management. Approaches that provide a mechanism for achieving such a holistic planning and stakeholder participation in waste management is integrated waste management and waste hierarchy, which also offer the advantage for attaining sustainability in, waste management.

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2.8 Sustainable Waste Management

Throughout the years the major concern of waste management has been changing. Health and safety were major concerns; therefore, waste management has been prioritizing and minimizing health risks (UNEP, 2002). Today, sustainability has become the major concern of waste management in addition to health and related issues. Accordingly, sustainable waste management incorporates the three major pillars of sustainable development, which are economic, social and environmental. According to the Brundtland Report titled Our Common Future published in 1987, Sustainable development or sustainability is defined as ´a development that meets the needs of the present without compromising the ability of future generations to meet their own needs´ (WCED, 1987 cited in Gugssa, 2012). "For a waste management system to be sustainable, it needs to be environmentally effective, economically affordable and socially acceptable (Nilsson-Djerf and McDougall 2000). This point is buttressed by Petts (2000) who stressed that the best waste management must be related to local environmental, economic and social priorities and must go further to involve the public before important waste management decisions are made. Social, environmental and economic compatibilities are therefore observed to be the dimensions of sustainable waste management models or strategies (Joos et al 1999; Morrissey and Browne 2004 all cited in Anomanyo, 2004)

In general, sustainable waste management has three objectives these are: reducing the amount of waste generated, managing sustainably (by minimizing the environmental burden, minimizing the economic cost and maximizing the social acceptability), and the last objective is considering waste as a resource (UNEP, 2002:32). Changing attitudes towards waste and considering it as a resource shows shifting of societies towards sustainability (Gutberle, 2008 cited in Gugssa, 2012).

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Presently, a more systematic approach, sustainable and integrated solid waste management, has been developed to incorporate major aspects and stakeholders in the planning of a waste management system. This approach considers major planning aspects such as environmental, legal, socio-cultural, institutional and political, and additionally considers the importance of the role of stakeholders such as the informal recycling sector and small-scale enterprises in addition to the existing stakeholders.

Other elements of the waste management system such as prevention, reuse and recycling, collection, street sweeping and disposal are also considered as the integral parts of the system. The approach strengthens the sustainability of the waste management system by providing economic service delivery and establishing cost recovery mechanisms. The approach gives recognition to the direct linkage of willingness to pay and the quality of service delivered. The approach makes sure that the cost is recovered through direct fees, indirect general taxes and revenues from recycling and resource recovery among others. The approach is also encourages the minimization of resource use and impact on the environment

(Zhu et al. 2007 cited Gugssa, 2012)

2.9 Integrated Waste Management

In recent years, the concept of integrated waste management (IWM) has become popular as a new approach to waste management (Baabereyir, 2009). The concept of integrated waste management developed by McDougall et al. (2001) links waste streams, waste collection, treatment and disposal methods with the life cycle analysis concepts while aiming at achieving environmental benefits, economic optimisation and social acceptability (Anomanyo, 2004). IWM has been defined by Tchobanoglous et al. (1993 cited in Chati, 2012) as the selection and application of appropriate techniques, technologies, and management programs to achieve specific waste management objectives and goals. As defined by the World Resource

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Foundation (WRF, cited in UK Environment Council, 2000), IWM refers to "the use of a range of different waste management options rather than using a single option". It considers how to manage solid waste in a way that prevents harm to humans and the environment (Anomanyo, 2004). In other words, IWM is an approach, which relies not only on technical solutions to the waste problem, but on a wide range of complementary techniques in a holistic approach. The approach involves the selection and application of appropriate technologies, techniques and management practices to design a programme that achieves the objectives of waste management (Tchobanoglous et al., 1993). The concept of IWM seems to have emerged from the realization that technical solutions alone do not adequately address the complex issue of waste management and that there is the need to employ a more holistic approach to waste management (Baabereyir, 2009).

The UNEP International Environmental Technology Centre (1996 cited in Chati, 2012) has identified the importance of integrated solid waste management. These include:

1. Some problems can be solved more easily in combination with other aspects of the waste system than individually;

2. Adjustments to one area of the waste system can disrupt existing practices in another area, unless the changes are made in a coordinated manner;

3. Integration allows for capacity or resources to be completely used; economies of scale for equipment or management infrastructure can often only be achieved when all of the waste in a region is managed as part of a single system;

4. Public, private, and informal sectors can be included in the waste management plan;

5. An ISWM plan helps identify and select low cost alternatives;

6. Some waste activities cannot handle any charges; some will always be net expenses, while others may show a profit. Without an ISWM plan, some revenue-producing activities are "skimmed off" and treated as profitable, while activities related to

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maintenance of public health and safety do not receive adequate funding and are managed insufficiently.

As argued by Rhyner et al. (1995 cited in Baabereyir, 2009), "a single choice of methods for waste management is frequently unsatisfactory, inadequate, and not economical". Use of an integrated approach to managing solid waste has therefore evolved in response to the need for a more holistic approach to the waste problem. In this approach, all stakeholders participating in and affected by the waste management regime are brought on board to participate in waste management.

Furthermore, issues such as social, cultural, economic and environmental factors are considered in the design of an IWM project (Tchobanoglous et al., 1993; Rhyner et al., 1995; Schubeller et al., 1996 all cited in Baabereyir, 2009).   IWM involves the following functional elements: waste reduction, reuse, recycling, recovery through physical, biological, or chemical processes (e.g., composting, incineration) and land filling. These elements of IWM are frequently formulated into a waste hierarchy model (Baabereyir, 2009). The hierarchy of integrated solid waste management thus involves the 3Rs (reduce, reuse and recycle), incineration and land filling (Chati, 2012). The diagram below shows the hierarchy of the integrated solid waste management approach.

Waste prevention and reduction

Recycle and composting

Land filling and Incineration
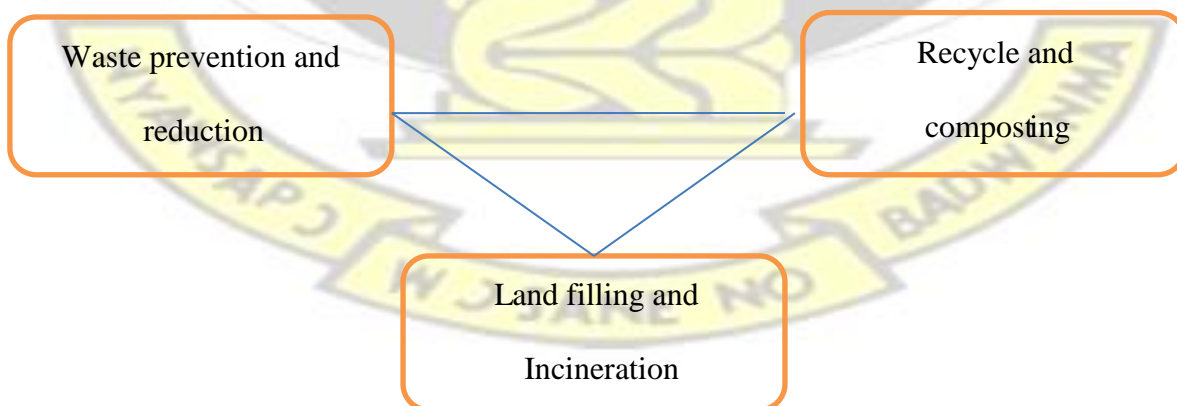
Figure 2.1: Integrated solid waste management model

Source; Chati, 2012

2.10 Contingent Valuation Method

The values of most goods and services are well defined by economic markets through revealed prices and consumer decision making behaviour. In contrast, non – market goods and services do not have observable monetary values, because they are not traded in a market with revealed prices. Most environmental goods and services, such as clean air, fresh water, healthy biodiversity levels and biogeochemical processes, fall into this category. Non-market valuation methods have been developed to assess policy initiatives and assess damages from accidents that affect non-market goods and services.

The contingent valuation method (CVM) is a well-established tool for quantifying the values of non-market goods and services, in use since the 1960s (Carson et al. 2001). This method is based on a survey that directly asks respondents about their willingness to pay (WTP) for a specific environmental good or service (King and Mazzotta 2000). The CVM is referred to as "contingent" because it elicits WTP in a hypothetical market and the resulting value is therefore contingent on that market scenario (Carson et al. 2003, King and Mazzotta 2000). CVM is a type of stated preference method, as distinct from revealed preference methods that instead infer values from actual choices (King and Mazzotta 2000). The fact that contingent valuation is based on what individuals say they would do in particular hypothetical situations, as opposed to what they are actually observed doing, is the source of its greatest strengths and its greatest weaknesses (King and Mazzotta 2000).

Realism is essential, to ensure that the extrapolations made from the individual WTP are valid, accurate and have meaning. To achieve an accurate measure of non-market benefits, the survey must simultaneously meet the methodological imperatives of survey research and the requirements of economic theory (Wattage, 2002). The method of contingent valuation

involves a number of processes. The first step is to define the good that is to be valued by individuals. The second is to select the appropriate population of beneficiaries, a representative sample of which will then be asked to report information about their willingness to pay (WTP) for the good or public program. The mean WTP, multiplied by the size of the population affected, gives the total benefits of the program (Alberini, 1995).

The most significant advantages of contingent valuation are the ability to value non – use goods and services and the opportunity to introduce new or modified goods and services beyond the range of previous consumer experience (Carson and Hanemann 2005, King and Mazzotta 2000, Whitehead and Blomquist 2006, Venkatachalam 2004). This enables researchers to estimate the values that consumers place on goods and services that do not yet exist, which is valuable for product development and marketing schemes. Non –use (or passive use) goods and services are not associated with actual physical use or even the opportunity or option to use a specific good or service (King and Mazzotta 2000).

Although estimation of passive use or non-use values is a significant advantage of CVM, it has also led to criticisms (Whitehead and Blomquist 2006). There is controversy over the validity and reliability of willingness to pay values elicited through contingent valuation methods, especially for non-use or passive-use goods and services (Venkatachalam 2004, Carson et al. 2003). Critics of CVM argue that the values elicited are inconsistent with the tenets of rationale choice and that respondents fail to approach the questions in a serious manner because the results of the survey are non-binding (Arrow et al. 1993). These criticisms are difficult to evaluate because most CVM studies cannot be externally validated, since there are no other methods available to elicit non-use values (Arrow et al. 1993, Venkatachalam 2004).

In addition to these fundamental criticisms of stated preference methods and the concept of non-use values, CVM is also subject to a host of other potential problems that can affect the

reliability of value estimates. The accuracy of value estimates is highly dependent on the survey structure, the delivery method used to collect responses, the type of payment vehicle used to elicit willingness to pay values and other technical issues associated with recording responses and data collection (Whitehead 2006, Venkatachalam 2004). To address these issues, best practice methods have been developed for CV studies. The most widely accepted set of guidelines were produced in 1993 by a Blue Ribbon Panel on Contingent Valuation appointed by the National Oceanic and Atmospheric Administration (NOAA). Since the

NOAA guidelines, many other references have been published on optimizing survey performance and increasing the reliability of CV studies (Arrow et al. 1993, Venkatachalam 2004, Alberini and Kahn 2006).

2.10.1 Application of Contingent Valuation Method

The CV method first came into use in the early 1960"s when Robert K. Davis (1963) used questionnaires to estimate the benefits of outdoor recreation in a Maine backwoods area. Following his work, Ronald (1967) used the CV method in several studies of air pollution benefits. Over the next few years several other economists used the CV approach to value various recreational amenities. The most influential of the early studies was that conducted by Randall et al., (1974). This study was notable for, among other things, its theoretical rigor and its use of photographs to show the visibility levels. In this experimental design certain aspects of the bidding game were varied systematically to see if they affected the WTP amount in some systematic fashion.

Since the early 1970"s the CV technique has been used by economists to measure the benefits of a wide variety of goods, including recreation, hunting, water quality, decreased mortality risk from a nuclear power plant accident and toxic waste dumps. In 1979 the Water

Resources Council published its newly revised "Principles and Standards for Water and Related Land Resources Planning" in the Federal Register. This important document set forth the guidelines for federal participation in project evaluation. The inclusion of CV as one of the three recommended methods was a sign of CV"s growing acceptability. More recently the US Army Corps of Engineers and the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), have begun to use CV for measuring benefits and damages.

Funding from the US Environmental Protection Agency (EPA) has played a key role in CV"s development. Almost all of the CV studies funded under this program were designed to test various aspects of the method and to establish its theoretical foundation. Efforts of EPA and many researchers since then have contributed significantly on the development of an overall framework, based on a theory of individual behaviour in CV market settings (Wattage ., 2002)

Furthermore, Contingent Valuation is used extensively in a variety of applications and contexts, and provides the basis for policy decisions by many governments and international agencies. It can be and has been used to place a value on the reductions in the human health effects of environmental exposures, in transportation safety policies, in determining the value of recreation, hunting and fishing days in national parks and public lands, to place a value on groundwater, biodiversity protection, and natural resource management.

The technique is sometimes criticized because of its reliance of what individuals say that they would do under hypothetical circumstances, but comparison with market−based and other non−market valuation methods suggest that when performed properly contingent valuation gives valid results. For example, infrastructure investment studies in India and other developing countries suggest that 91% of the people who said that they were willing to pay a stated price

for piped water connection did indeed sign up for such connections when they became available (Alberini, 1995).

2.11 Concept of Waste Hierarchy

The waste management hierarchy categorizes waste management strategies depending upon their ability to minimize waste as reduce, reuse and recycling (Gugssa, 2012). Its main tenets are based in the assumption that the diversion of wastes from landfills and incinerators is congruent with the ideals of environmental sustainability. Subsequently, the hierarchy accentuates the concepts of reduce, reuse, recycle as most desirable options while incineration and land-filling are considered less favourable (Squire, 2012). As shown in the model (Figure. 2.2), waste prevention and reduction are placed at the top to show that the best way to deal with waste is to prevent its production and, where this is not possible, to produce less of it. At the other extreme, disposal is placed at the bottom to show that it should be the last resort among the strategies for waste management (Baabereyir, 2009).

Reduction is aimed at reducing the amount of waste produced by adopting or optimizing the production process of manufacturers and industries. As a result, natural resources will be saved. Reuse does not involve reprocessing or transforming from one type of material in to another. Rather reuse occurs when one material served its original purpose and reused for another purpose rather than being thrown away. Recycling is all about transforming or reprocessing of materials that served the original function in to new products. Otherwise, those products that served the original function will be considered as waste. Recycling is common among materials produced of virgin materials such as glass, plastic, metals and electronic waste. Recycling also involves organic materials for the production of compost (Gugssa, 2012)

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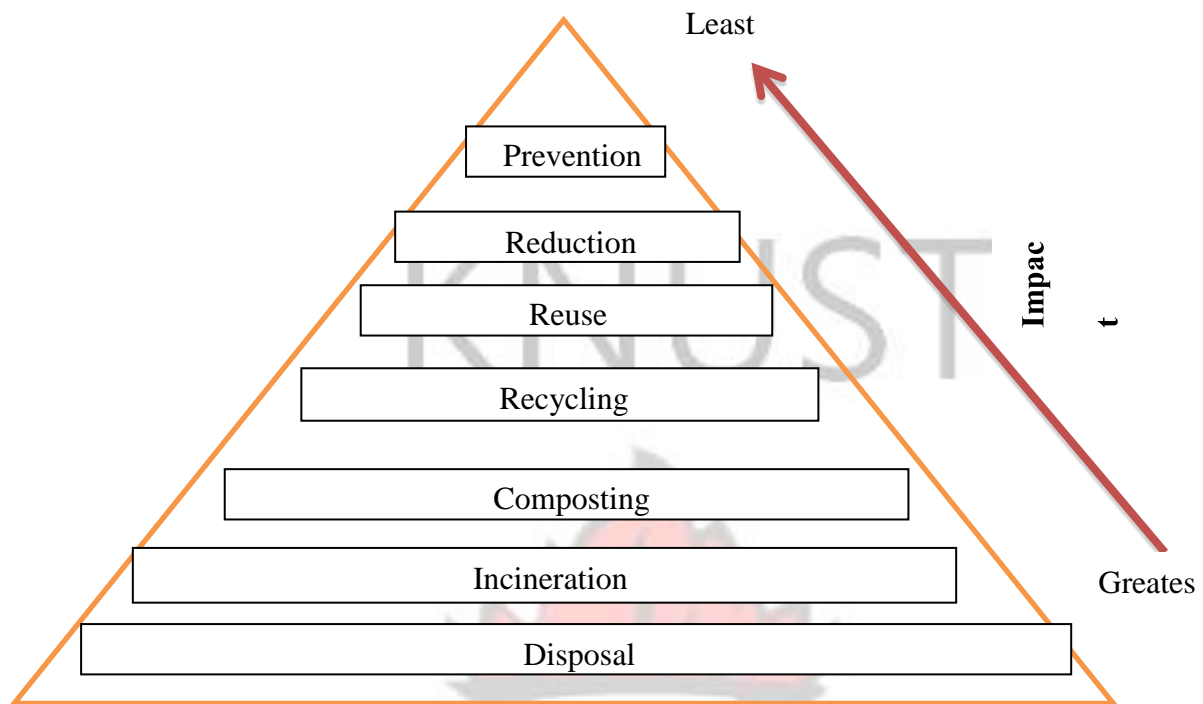
Figure 2.2: Waste Management hierarchy
Source; Baabereyir, (2009)

According to Gugssa (2012) the concept of waste hierarchy promotes the collaboration between waste generators, collectors, processors and manufacturers, and reduces the amount of waste that is disposed. As a result, the amount of environmental deterioration will be reduced, emissions from landfills will be minimized and natural resources and energy will be saved (Zhu et al 2007).

The government and the private sector are responsible for the minimization of waste by reducing the amount of inputs or resources used for production and consumption, and recycling makes these inputs more efficient. Both the reuse and recycling of waste can be carried out at the primary and secondary level. The primary level includes all the activities within the household, firms and institutions, on the other hand, the secondary level includes after the materials have entered the waste stream. At this point the extent of the source separation is an important aspect that determines the level where the recycling and reuse activities are carried out (Baud et al.2004).

Theoretically, the emphasis on minimization, reusing and recycling as desirable options in the waste management hierarchy is congruent with the ideals of sustainable development. Such practices ensure the diversion of wastes from landfills and incinerators. In practical terms however, the hierarchy does not address socio-economic, technical, and political barriers to effective implementation of its preferred options.

The waste management hierarchy also fails to highlight treatment of hazardous wastes as an option. A major weakness of the waste management hierarchy therefore lies in its view of waste as homogenous, rather than consisting of several unique characteristics. Such an oblique view may militate against the attainment of effective waste management outcomes.

For example, the preferred options outlined in the hierarchy may not necessarily work favourably in the context of managing infectious and hazardous biomedical residue. Thus, the waste management hierarchy although a useful concept, is laden with some major weaknesses (Squire, 2012).

However, Longe, (2009) argue that even though the fundamental objectives of any solid waste management programme are to minimize environmental pollution, these goals become unachievable in the absence of sustained funding, affordable local technological option and lack of participatory approach to integrated solid waste management. Intergrated waste management and the waste hierarchy both inspire sustainable waste management and can reduce the environmental hazards associated with waste disposal. It is therefore important for stakeholders in the waste sector to realize that an integrated approach, which constantly strives to move up the waste hierarchy, can be a useful tool for sustainable waste management (Baabereyir, 2009).

2.12 Knowledge Gaps and Innovations in Waste Management

Research on waste management and on the best ways to achieve the transfer of environmentally sound technologies will play a key role in improving waste management practices. Such research will require strong international and national collaboration between academia, governments and the private sector. The foregoing literature review shows that willingness to pay for waste management is related to the level or quality of service, amount to be charged on the collection and confidence in waste collection institution.

Other also suggests that public education can be an important tool to enlighten households" social and environmental cost of waste management. This suggests the need for broad stakeholder particularly household engagement in waste management planning especially. However, little is known about the extent of household engagement and household participation in waste management decision. Moreover, research has suggested the use of the 3Rs as the first option to a sustainable waste management approach. But nothing is known about the extent of this management practice is utilized in term of the evolving waste management approaches being utilized in the country. Research could also be undertaken on how certain economic sectors, such as ship decommissioning, car destruction, chemicals production or agriculture, could apply environmentally sound approaches for dealing with their waste issues in a more advanced way.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was employed in conducting the research. It describes the study type and design, study population, study site, method of sampling and study variables. Additionally, the chapter discusses data collection tools and techniques, data analysis, assumptions and limitations of the study.

3.2 Study type and design

The type of design used in this research is a cross sectional study because of the use of routine data collected at a point in time. This design however only measures prevalence rather than incidence and hence difficult to establish the time sequence of events. It was carried out to investigate the relationship between the economic status of the informal sector and their willingness and ability to pay for waste management service.

3.3 Study Site

The site for the study was the Kumasi metropolis, which is the most populous district in the Ashanti region. King Osei Tutu I found Kumasi, popularly known as the garden city because of its numerous flowers and plants in 1680. It features a tropical wet and dry climate with relatively constant temperature throughout the course of the year.

The metropolis has a population of 2,035064(Ghana Statistical Service, May 2012) or more according to the growth rate of 5.4% per annum and this account for a third of the region"s population. It is located in the forest zone and is about 270km north of Accra and shares boundaries with Kwabere East district to the north, Atwima district to the west, Ejisu Juaben municipal to the east and Bosomtwe to the south.

The economic activity of the city operates on mainly industry, commerce and the service sector, which are either formal or informal. The formal is characterised by businesses with corporate ownership, large scale with the use of sophisticated technology while the informal is made up of a maze of tiny workshops and enterprises producing almost everything including wood processing, weaving, pottery, carving, tailoring etc. The famous Suame Magazine where small engineering based industries are cited also contributes immensely to the economy of the city.

The metropolis has various tourist attractions sites including the famous Manhyia palace with a museum, Komfo Anokye sword and the Kumasi zoo with Akwasidae being its main festival. The supply of water to the metropolis is from two surface water treatment plants, namely Owabi and Barekese located 10km and 16km from Kumasi. The current waste generation is based on the projected population is 1000 tonnes.

3.4 Study Population

The study population will consist of carpenters, tailors and dressmakers, mechanics, traditional caterers and waste management operators aged 18 years or more and resident in Kumasi for the past 6 months.

- **Inclusion Criteria**

The study will include all tailors and dressmakers, carpenters, mechanics and food vendors within Subin, Suame and Asokwa sub metros in Kumasi.

- **Exclusion Criteria**

These will include those who pick "NO" in the lottery and those who will refuse to consent to participate.

3.5 Sample size calculation

The formula used; $n = z^2 pq / d^2$

Where:

n= the desired sample size z= the standard normal deviate, usually set at 1.96 which corresponds to 95% confidence level.

P = Proportion of the target population estimated at 70% (0.7) q

= 1-p (1-0.7) =0.3

d = degree of accuracy desired set as 0.04   S =

(1.96) (1.96)*0.7 (1-0.7)/ (0.04) (0.04) = 504

A non – response rate of 10% will be added, giving a total 554, which will then be rounded to 550 as the sample size for the study.

3.6 Method of Sampling

The sampling methods employed were combination of cluster sampling and simple random sampling. The metropolis was clustered into sub metros. Then within the sub metro, the respondents were selected from locations where the individual informal jobs are clustered by random sampling. The three sub metros selected for the study were chosen based on the prominence of the particular informal jobs. All tailors/ dressmakers and traditional caterers within the Subin sub metro were eligible likewise all carpenters in Asokwa sub metro and all mechanics in Suame. Those who consented were interviewed, and the lottery method was used at a shop where there was more than one respondent. During this exercise, papers with inscription "YES" and "NO" was developed and put in a cup for potential respondents who met the inclusion criteria to select. Those who picked "YES" were enrolled while those who pick N"NO" were excluded. In each sub metro, a shop was randomly selected to be the starting point. The number of respondents for the various sub metros was calculated with an assumption that 60% of the population was in the informal sector. The calculation is shown on the table below:

Table 3.1: Population of Respondents

SUBMETRO	POPULATION	60%OF POPULATION	PROPORTION SAMPLED
ASOKWA	87,718	52,630	52,630/180,797x550 =160
SUBIN	113,490	68,094	68,094/180,797x550 =207
SUAME	100,122	60,073	60,073/180,797x550 =183
TOTAL	301,330	180,797	550

Source: www.Stats.Gov.Gh.Com

3.7 Study Variables

Table 3.2: Variable table

Objectives	Dependent variable	Independent variable	Conceptual definition	Scale of measurement	Indicators	Data collection methods	Type of statistical analysis
To assess the utilization of waste management services	Utilization of service	Access to waste management	Extent to which group access service	nominal	Proportion	Questionnaire	Descriptive
To estimate the willingness and ability to pay for waste management services by informal operators	Willingness and ability to pay	Income, education, socio-economic status	Maximum amount a person is willing to pay	ordinal	Proportion/ frequency	Questionnaire	Quantitative

To ascertain factors that influence utilization of waste management services.	Factors that influence utilization	Proximity, perceived quality of service	Consumer perception	nominal	Proportion	Questionnaire	Descriptive

3.8 Data collection tools and techniques

Data for the study was obtained from both primary and secondary sources. Primary data collection tool was structured questionnaire comprising both closed and open ended questions and was used for objectives one, two and three which assessed the utilisation waste management services, estimate willingness and ability to pay and ascertain factors that influence utilisation of service. Additionally, secondary data were from an extensive review of existing literature on the waste management service. Data were also derived from relevant articles from journals and reports of similar researches conducted. The questionnaire was administered with assistance of trained graduate research assistants through face-to-face interview. Moreover, probes were used to clarify and ascertain the truth or otherwise of Kumasi Metro Waste Management Services on issues because they are the main regulators. Additionally, officials from various Waste Managers in some of the sub metros were interviewed for relevant information. Questionnaire and data collected were protected by ensuring that they were kept in files intact.

To ensure the reliability and validity of the study conclusions, 2 days training of research assistants by the principal investigator was done so that they conducted effective interviews. The data collection tools were pre-tested prior to the data collection. Thirty respondents were involved in the pre-testing. It was revealed that some questions were sensitive and respondents were not ready to give their support. Some could not recall the income earned. These questions were revised to make them clearer. The sample size was scientifically estimated and respondents sampled using probability sampling techniques to minimize biases as explained earlier. The data were subjected to rigorous statistical analysis. Data was collected from many sources in order to triangulate or validate the responses.

3.9 Data Analysis

The collected data was validated for completeness and accuracy. The cleaned data was entered using a template that was created in Microsoft Excel. After entry, the data was imported into SPSS for analysis. Data was checked for completeness and accuracy on a daily basis so that irregularities could be detected promptly. Descriptive statistics such as frequency distribution tables, mean and standard deviation were used to analyse the socioeconomic characteristics of the respondents. The Contingent Valuation Method was used to determine the willingness to pay for improved waste management service by the informal sector.

Binary logistic regression was used to predict a categorical (usually dichotomous) variable from a set of predictor variables. In this study, the willingness to pay (WTP) was considered as the dependent variable while the set of independent variables used in this study included; educational level, monthly income level and household size. The binary logistic regression formula for determining the probability of the willingness to pay is given as;

$$Pr\textit{ob of a case} = \frac{\exp(\beta_0 + \beta_1 X_1 + \beta_2 X_3 + ... \beta_p X_p)}{1 + \exp(\beta_0 + \beta_1 X_1 + \beta_2 X_3 + ... \beta_p X_p)}$$

Where; $X_1...X_p$ are the (predictors) independent variables

$\beta_1..._p$ are the coefficients of the predictors

β_0 is the constant value

3.10 Ethical Considerations

Consent of respondents was sought before the study (intent, procedure, expected risks and benefits) were explained to them. In addition, the confidentiality and anonymity and right to withdraw at any stage of the study were elaborated in the consenting process, The study

protocol was submitted to the Committee for Human Research Publications and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology (KNUST) for clearance and approval. Permission was also sought from the Waste Management Department of the Metropolitan Assembly.

3.11 Expected Outputs

1. Masters of Public Health (Thesis).

2. Publications

3. Policy briefs.

4. Presentations

3.12 Assumptions of the Study

- It was assumed that the sample size was a representative of the study area.

- It was also assumed that 60% of the population was from the informal sector.

- Furthermore, responses from the participants were true reflection of what was happening on the ground.

- Tools used to collect and analyse data were accurate.

- The confidence interval was 95% with 5% significant level.

- The study design was appropriate to investigate the issue.

3.13 Limitations of the Study

- The credibility of the study was dependent upon the responses of the respondents and for that matter, genuine responses were expected.

- A weakness lies in the use of the Contingent Valuation Method, which lies on what people say they would do as opposed to what people are observed to do. It is also a method that is quite lengthy and expensive and because it borders on economic costs, non-response bias is a concern when sampling respondents since individuals who do

not respond are likely to have on average different values, (Ecosystem Valuation, Contingent Valuation Method). Another weakness lies in what people say they would do as opposed to what they are observed to do.

- Countrywide study would have been more appropriate as the problem has a national dimension. The sample size of 550 may not be a fair representative and thus can have profound effects on the generalization of the outcome of the study. Although the sample size seemed small, it was rigorously estimated and could thus be extrapolated to represent Ghana.

- This research is limited to dealing with domestic waste that is found littered on the streets of Kumasi comprising of garbage and rubbish such as plastic bottles and cans rubber, food waste, garden waste, sweepings, ash, packaging materials, textiles and electric and electronic waste with organic waste being the major component.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results of data gathered from respondents in the Kumasi metropolis on their utilization and willingness to pay for the waste management services. Before analyzing the data, the questionnaires were cleaned up to remove possible errors to ensure accuracy, consistency, uniformity and completeness. The findings of the study were captured in the forms of Tables in line with the established objectives. Overall, 550 questionnaires were completed and returned to the researcher.

4.2 Socio-Economic Background Information

Table 4.1: Socio-Economic Background Information

Variables	Frequency	Percentage

Gender (n=550)		
• **Male**	**254**	**46.2**
• **Female**	**296**	**53.8**
Age (n=550)		
• **>20**	**100**	**18.2**
• **21 – 25**	**202**	**36.7**
• **26 – 35**	**99**	**18**
• **36 – 45**	**100**	**18.2**
• **< 46**	**49**	**18.9**
Level of Education(n = 550)		
• **None**	**5**	**.9**
• **Primary**	**296**	**53.8**
• **JHS**	**198**	**36**
• **SHS**	**26**	**4.7**
• **Tertiary**	**25**	**4.6**
Marital status (n=550)		
• **Single**	**53**	**9.6**
• **Married**	**347**	**63.1**
• **Divorced**	**51**	**9.2**
• **Widowed**	**5**	**1**
• **Cohabitation**	**91**	**17.1**

Residence (n=550)		
• **Estates**	**51**	**9.3**
• **Zongo/Slum**	**99**	**18**
• **Middleclass neighbourhood**	**400**	**72.2**
Household size (n = 550)		
• **1 – 5**	**102**	**18.5**
• **6 – 10**	**214**	**38.9**
• **11 – 15**	**139**	**25.3**
• **16 – 20**	**95**	**17.3**
Occupation (n=550)		
• **Trading**	**202**	**36.7**
• **Mechanic**	**100**	**18.2**
• **Artisan**	**50**	**9.1**
• **Profession**	**198**	**36**
Amount earned monthly ¢(n550)		
• **>100**	**108**	**19.6**
• **101 - 300**	**203**	**36.9**
• **301 – 500**	**92**	**16.7**
• **501 – 700**	**110**	**20**
• **<700**	**45**	**8.1**

Amount spent daily ¢ (n=549)		
• > 15	111	20.2
• 16 – 35	200	36.4
• 36–55	92	16.8
• 56 – 75	101	18.4
• < 75	45	8.2
Amount Spent on waste ¢ (n=550)		
• > 1	161	29.2
• 2 – 5	121	22
• 6 – 10	96	17
• 11 – 15	87	15.8
• < 16	85	15.4
Rented establishment? (n = 550)		
• Yes	252	45.8
• No	298	54.2
Number of dependents (n=550)		
• None	20	3.6
• 1	149	27.1
• 2	201	36.5
• 3	50	9.1
• 4	50	9.1
• < 5	80	14.5

Number of dependents in school (n=550)		
• None	148	26.9
• 1	80	14.5
• 2	55	10
• 3	100	18.1
• 4	60	10.9
• > 4	107	19.4
Accommodation arrangement (n=550)		
• Rented	251	45.6
• Ownership	299	54.4
Movable property (n=548)		
• Generator	100	18.2
• Refrigerator	251	45.8
• Vehicle	20	3.7
• None	177	32.3

Landed property (n=550)		
• None	186	33.8 11.6
• Farm	64	15.2
• House	84	2.7
• Factory	15	36.5
• Land	201	
Partners Employment History (n=550)		
• Self Employed	201	36.5 27.3
• Unemployed	150	36.2
• Employed by an organization	199	
Bank accounts (n=550)		
• Yes	405	73.6
• No	145	23.4
Insured establishment (n=550)		
• Yes	15	2.7
• No	353	97.2

Source: field survey 2015

Table 4.1: Background Information of Respondents

The Table 4.1 revealed that, there were 296 females representing (53.8%) whilst the males were 254 (46.2%). This implies that the females are responsible for sanitation issues in most houses.

Out of the total of 550 respondents 202 (36.7%) were between the ages of 21-25 and 100 (18.5%) of the respondents were below 20. 99 (18.0%) were within the ages of 26-36 and finally respondents above 46 years were 49(8.9%). This showed respondents were selected without discrimination in age and that most of the respondents were matured. For highest level of education, respondents who had only primary education were 296 (53.8%),198 (36.0%) had JHS as their highest level as of education,26 (4.7%) had SHS level, and 25 (4.6%) had tertiary level. Out of the total 550, respondents who have had no formal education were5 (9.3%).The finding implies that most of the tailors and dressmakers, carpenters, mechanics and food vendors who live around Subin, Suame and Asokwa sub metros in Kumasi are primary school leavers with only few of them studying up to tertiary level.

Responses indicated that 347 (63.1%) were married and 94(17.1%) were cohabiting with partners. Also, 53 (9.6%) were single whilst 51 (9.2%) were divorced. The findings also showed that 5(1%) of the respondents were widowed. This shows that the study captured respondents from different marital status.

A majority of the respondents 400 (72.7%) stayed in the middle class neighbourhood and 51 (9.3%) of the respondents stay in Estate whilst 99(18%) stay at Zongo/slum.

Results also indicated that 202 (36.7%) were traders and 198(36.0%) had professions whilst mechanics were 100 (18.2%) and 51 (9.1%) artisans.

Majority of the respondents representing 38.91% have household size of 6 – 10, followed by those with household size of 11 – 15 with 25.27%, then those with household sizes of 1 – 5 and 16 – 20 with percentages of 18.55% and 17.27% respectively. This shows that the respondents for the study live in different household sizes and this helps to determine how household sizes influence willingness to pay.

Majority of the respondents, 203 (36.9%) earned GHC 100-300 every month, 108(19.6%) earned below 100, 110 (20%) earned GHC 501-700 and92 (16.7%) earned GHC 301-500 whilst 45 (8.1%) earn above GHC 700. This shows that majority of the respondents earn appreciable amount per month from which to pay for refuse collection charges.

Again, 200 representing (36.3%) spent GHC 15-25 per daily whilst respondents who spent below GHC 15 were111 (20.1%) and 101 of them spent GHC 76-105. Respondents who spent GHC 26-75 were92 (16.7%) whilst those who spent above 105(8.2%) were 45.

It was also discovered that 161(29.2%) of the respondents spent below GHC 1monthly on waste disposal, 121(22%) spent GHC 1-5, 87(15.8%) of the respondents spent GHC 11-15, whilst 85

(15.4%) of the respondents spent above GHC16.This shows that while some respondents pay for waste disposal, others do not significantly pay for waste disposal.

It was revealed that 45.8% rent their premises whilst 298(54.2%) do not rent their premises for their establishments. 201 (36.5%) have two dependents, 149 (27.1%) have one, 100 (18.1%) have three, 50 (9.1%) have four dependants, 80 (14.5%) have above five (5) dependents and 50 (9.1%) have three.

148 (26.9%) of the respondents did not have dependents in school whilst 80 (14.5%) had one (1) dependent in school. 55(18.5%) had two (2) with 100 (18.1%) having three (3) whilst 60 (10.9%) had (4) and107 (19.4%) with more than four dependents schooling.

299(54.4%) of the respondents said they owned where they stayed whilst 251(45.6%) said they rent where they stay. From Table 4.1 most of the respondents 251 (45.6%) had refrigerators, whilst 100 (18.2%) had generators.177 (32.3%) had no movable property whilst 20(3.7%) had vehicles. 201 (36.5%) respondents land whilst 186(33.8%) had no landed property. 15 (2.7%) of them had factories with 64 (11.6%) of them having farms.

Again, 201 (36.5%), were self-employed, with 199 (36.2%) being employed by an organization and 150 (27.3%) being unemployed. Table 4.1 identifies the number of respondents having bank account and those whose establishments have been insured. 535 (97.2%) of respondents had not insured their establishments while only 15(2.7%) had insured their establishments. this is not a good attitude and for that matter education must be given to the respondents on the importance of insurance. On the other hand, 73.5% had bank accounts while 26.5% of them have no bank accounts. Though majority of the respondents have bank accounts, the findings still implies that more education needs to be done by the banks to get the rest to own account.

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4.3. Utilization of waste management services

One of the objectives for the study is to assess the utilization of waste management and the findings are presented by table 4.2 below;

Table 4.2: Utilization of waste management services

Variables	Frequency	Percentage
Type of waste generated (n=550)		
• Domestic		
• Industrial	202	36.7
• Both Industrial and Domestic	103	18.7
	245	44.5
Storage of waste (n=550)		
• Plastic container	277	50.4
• Metal container	149	27.1
• Wooden box	31	5.6
• Other	93	16.9
Who disposes off waste at facility (n=348)		
• Girl child		
• Boy child	101	29.0
• Self	80	22.9
	20	5.7
How respondents' dispose off their refuse (n=550)		
• Burning		
• Picked by waste management agent	151	27.5
• Empty in a communal skip		
• Empty unto an open pile of waste	200	36.3
	150	27.2
	49	8.9

Variables	Frequency	Percentage
Farness from dump site (n=199)		
• Yes		
• No	126	63.5
	73	36.5
Period of emptying container (n=399)		
• Daily		
• Once a week	58	14.5
• Twice a week	160	40
• Thrice a week	72	18.1
	109	27.2

Minutes spent during waste disposal (n=200)		
• 1 – 3		
• 4 – 6	58	29
• 7 – 10	39	19.6
• < 10	48	24
	55	27.2
Thus it inconvenient you sometimes (n=350)		
• Yes		
• No	245	70
	105	30
How waste is disposed off when inconvenienced (n=350)		
• Bury	11	3.2
• Burn	130	37.1
• Keep till convenient	209	59.7
Does establishment receive a collection service (n=550)		
• Yes	202	36.7
• No	340	63.2
Which company collect your waste (n=202)		
• Zoomlion	91	45
• Sak-m	48	23.7
• Anthoco	11	5.5
• Don't know	52	25.8
Period containers are empty (n=202)		
• Daily	46	22.7
• Once a week	52	25.7 37.6
• Twice a week	76	13.8
• Thrice a week	28	
Years establishment has enjoyed waste collection service (n=202)		
• 1	28	13.8
• 2	15	17.5
• 3	45	22.2
• < 3	114	56.5
Have you ever dumped unapproved site? (n=512)		
• Yes	286	55.8
• No	226	44.2
Opinion of service (n=530)		
• Very satisfied	50	9.0
• Reasonably satisfied	80	14.5
• Not satisfied at all	400	76.3

If not satisfied, what is your primary reasons (n=420)		
• Services is not reliable		
• Frequency of service – interval is too long	150	35.7
• Location of communal container unsatisfactory	108	25.7
• Lack of clean appearance of communal container	201	47.8
• Collection worker are rude	80	19.0
	11	2.6

Source: Field survey, 2015

Table 4.2: Utilization of waste management services

Table 4.2 indicates that 245 of the respondents represented by 44.54% mentioned that they generate both domestic and industrial waste. Moreover, 103(18.7%) of the respondents generate only industrial waste while 202(36.7%) of them generate domestic waste.

It was also found that 277(50.4%) of the respondents store their waste in plastic containers whilst 149 (27.1%) respondents store their waste in metal containers. 31(5.6%) of the respondents store their waste in wooden containers and the rest represented by 93(16.9%) store theirs in other containers that is accessible at any point in time. The results showed that almost every respondent has a way of storing waste with majority of them storing their waste plastic containers.

Additionally, it was revealed that 20(5.7%) of the respondents mentioned that they themselves handle the disposal of their waste, 147(42.2%) of the respondents have junior apprentices who dispose their waste, 101 (29.0%) of the respondents had their waste being disposed of by girl child while 80 (22.9%) of the respondents have their waste disposed of by boy child. The findings show that each respondent has assigned the responsibility of waste disposal to someone within the facility.

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Table 4.2 also shows that 200 (36.3%) of the respondents'' have their waste being are picked up by waste management agents, 151 (27.5%) of the respondents burn their waste, 150(27.2%) of the respondents empty their waste in a communal skip while 49 (8.9%) of the respondents empty their waste into an open pile of waste nearby. This means that there are more clients for waste management companies if they are able to convince the clients that they are willing to serve them.

Again, 349 (63.5%) of the respondents confirmed that the refuse is emptied into a communal container far from them and the remaining 201 (36.5%) also said it is not far from their establishment. The finding implies that those closer to where the communal containers are placed are likely to be affected by pollution.

63.5% of respondents indicated that the dumpsite was far from their establishments whilst 36.5% said it was favourably near them. 40% also indicated that their containers were emptied once a week whilst14.5% said it is emptied daily, with 27.2% indicating that their containers are emptied three times a week and 18.1% of them indicated that their containers were emptied twice each week.

Moreover, 27.2% of the respondents said that the disposal site is more than 10 minutes far from their establishment whilst 29% of them said they spent 1-3 minutes. 19.4% and 24% of the respondents respectively spent 4-6 and 7-10 minutes when disposing their waste. This means that assessing the disposal site is somehow far and is likely to be a challenge.

Table 4.2 indicates that 70% of the respondents'' establishment to the disposal site inconveniences them while the remaining 30% said it did not.3.1% of the respondents confirmed that they bury the waste when disposing it inconvenience them, 59.7% of them keep their waste till it becomes convenient to dispose it while 37.1% burnt the waste. This means that people have alternative ways of disposing their waste.

202 of the respondents represented by 36.7% indicated that they had a collection service at their establishment, whilst 348 (63.2%) did not receive any collection service. This shows that there are opportunities for waste management companies.

It was also discovered that 91(45%) of the respondents indicated that Zoomlion company Ltd was responsible for emptying their containers, 48(23.7%) indicated SAK-M Company Ltd has been responsible for their waste, 11(5.5%) of them were serviced by Anthoco while the remaining 52(25.8%) were served by companies they do not know. The finding clearly shows that Zoomlion has the largest market share in the industry.

13.8% of the respondents indicated that they had enjoyed waste collection service for one year, 56.5% for more than three years while 7.4% and 22.2% respectively have enjoyed waste collection service for more than two years and three years. Table 4.1 revealed that 324 (58.9%) out of the total respondents had ever disposed off their waste at an unapproved place while 226 (41.1%) of them have not engaged in such act before. This shows that dumping waste at unapproved places is common practice among people in Kumasi.

Table 4.2 identifies that 9.0% of the respondents are very satisfied with the services they receive from the waste management companies, 14.5% also are reasonable satisfied with the service while 76.3% were not satisfied at all. Those who were not satisfied with the services provided by the waste collectors gave many reasons for their dissatisfaction. 2.6% of the respondents confirmed that the collection workers are rude or impolite, 25.7% had a problem with the frequency of service – the interval between collections is too long, 47.8% of the respondents gave a reason that the location of the communal container or pick-up point is unsatisfactory and 35.7% of the respondents confirmed that the service is not reliable while 19% of the respondents said lack of clean appearance of the communal containers makes them dissatisfied.

This means that the waste management companies must improve the services in order to win customers confidence to make them satisfy.

4.4 Willingness to Pay

Another objective for the study was to estimate the willingness and ability of clients to pay for the waste management services offered by informal operators. The findings were recorded in table 4.3 below;

Table 4.3: Willingness to pay

Variables	Frequency	Percentage
Who should pay for waste?(n=550) **Government** • **District assembly** • **Households** • **Firms**	51 200 201 98	9.3 36.4 36.5 17.8
Preferred collection method of waste.(n=548) • **skip collection** • **tricycle collection** • **door to door method**	153 100 297	27.7 18.1 54.2
Preferred container for waste (n=549) • **metal dustbins** • **plastic dustbins** • **plastic/nylon bags**	176 322 51	32 58.7 9.3
Willingness to pay for waste management services(n=550) • **yes** • **no**	301 249	54.7 45.3
If no, why unwilling to pay? (n=249) • **object to pay** • **unable to pay** • **object and unable to pay**	109 79 61	43.7 32.1 24

Reasons for not willing to pay (n=248)		
• can't afford to pay for the full cost	80	32.1
• don't consider the service important enough to pay for	5	2.0
• believe taxes should cover	152	61.2
• don't believe service will be reliable	11	4.4
If yes, how willing are you?(n=300)		
• Very willing	152	50.8 32.5
• Moderately willing	98	16.6
• Less willing	50	
Maximum fee per month, willing to pay in cedis (n= 301)		
• 1-10	95	31.5
• 11-20	100	33.2
• 21-30	76	25.2
• 31-40	20	6.6
• <40	10	3.3
• *Mean(SD)*		*15.4(2.24)*
If willing,preferred collection method (n=301)		
• Daily	201	66.7
• Twice a week	30	9.9
• Thrice a week	70	23.2
If willing, whom do you wants to provide service (n=301)		
• Local government	101	33-5
• Private company	148	49.1
• There is no difference	52	17.2
If willing, whom are you willing to pay to (n=300)		
• To a government fee collector	81	26.9
• Private company fee collector	168	55.8
• All equally satisfied	51	17.2

Source: Field Survey 2015 From Table 4.3, 36.5% of the respondents said households must pay for waste disposal, 36.4% said the municipal/district assemblies must bear the cost of waste disposal,17.8% of the respondents felt that firms must pay for waste disposal while 9.3% of the respondents indicated that the government should bear the cost of waste disposal. The findings show that people have different opinion about who bears the cost of waste disposal but the majority of them think they are responsible for the cost of their waste disposal.

Regarding respondents preferred method of waste collection, majority of the respondents (54.0%) said they preferred an arrangement of a door-to-door collection for a fee. This was followed by 27.8% of the respondents who preferred a skip placed at a central location where each establishment would be expected to carry its container of refuse to dump while18.2% of them preferred a tricycle coming to a curb of an establishment on scheduled basis to collect solid waste. These methods of waste collection when synchronized will lead to effective waste disposal.

Table 4.3 revealed that respondents who preferred plastic and metal dustbins as containers for waste were 58.7% and 32% respectively while 9.3% preferred Plastic/nylon bags as containers for waste collection method. This implies that majority of the respondents preferred plastic dustbin as their container for waste.

Again, Table 4.3 revealed that majority of the respondents (54.7%) was willing to pay for waste management services. However, 45.3% of the respondents were unwilling to pay for waste management services. When respondents who were unwilling to pay for waste management services were quizzed for the stance taken, 109 (43.7%) said they objected to pay, 80(32.1%) said they were unable while 60(24%) said they were unable and object to pay. Again, 80 (32.1%) of the respondents said they cannot afford to pay for the full cost, 11

(4.4%) of the respondents said they doubts the waste management services ability to provide reliable service, 5(2%) of the respondents said they did not consider the service important enough to pay for it while 153(61.4%) of them said they believe the taxes paid should cover the cost of this service. This shows that people have many tangible reasons for not willing to pay for the services of waste management companies and for that matter the reasons given must be given attention.

Forthose who were willing to pay,153 (50.8%) of the respondents said they were very willing to pay,19.2% of them were moderately willing to pay for waste management services while16.6% of the respondents were less willing pay for waste management services. This shows that clients" willingness to pay for the services of the waste management companies is high.

Also, 31.5% of the respondents indicated that they were ready to pay a maximum monthly amount of GHC 1-10, 33.2% were ready to pay GHC 11-20, 25% were ready to pay GHC 2130, 6.6 were ready to pay GHC 31-40 while the minority 3.3% were ready to pay more than GHC 40. This shows that the customers have divergent view on the amount to pay for the collection of waste. Meanwhile an interaction with the waste management companies revealed that the companies have proposed a monthly fee of GHC 35 to be collected in order to be effectively delivering their services.

Respondents also gave their views on how frequent they would like their containers to be emptied in the advent of their preferred waste collection method. From Table 4.3, (23.2%) of the respondents mentioned that they want their waste containers to be emptied twice a week and 66.7% said on a daily basis. as how frequent they would like their waste containers to be emptied. The remaining 9.9% of the respondents preferred thrice a week as how frequent they would like their waste containers to be emptied. This means that if waste management

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companies are able to frequently empty the clients waste containers, they are likely to win the confidence level of the clients.

Again, majority of the respondents (49.1%) who are willing to pay for the services of the waste management companies preferred being served by a private company, 33.5% of the respondents preferred being served by the local government while 17.2% of the respondents said there was no difference. This means that the clients have more confidence in the private companies than the local government.

Moreover, 55.8% of the total respondents said they were willing to pay for the waste collection service to a fee collector working for a private company relative to 26.9% of the respondents who were willing to pay the waste collection fee to the government fee collectors. However, 17.2% of the respondents felt that both government fee collectors and those working for private companies are equally suitable to collect waste collection service fee from them.

4.4.1 Binary Logistic Regression

Binary logistic regression is most useful when there is the need to model the event probability for a categorical response variable with two outcomes. It is used to predict a categorical (usually dichotomous) variable from a set of predictor variables. In this study willingness to pay (WTP) is considered as the dependent variable while the set of independent variables used in this study includes; educational level, monthly income level and household size.

Table 4.4: Binary Logistic Regression coefficients

Variables in the Equation	B	S.E	Wald	df	Sig.	Exp(B)
Educational level			53.704	4	.000	
Educational level (1)	44.803	8038.614	.000	1	.996	2.870×10^{19}
Educational level (2)	40.114	8038.614	.000	1	.996	2.638×10^{17}

Educational level (3)	29.555	8038.613	.000	1	.997	6.850 X 10^{12}
Educational level (4)	21.020	8038.613	.000	1	.998	1.345 X 10^{9}
Income level			41.468	4	.000	
Income level (1)	-16.709	2.864	34.030	1	.000	.000
Income level (2)	-8.514	1.888	20.326	1	.000	.000
Income level (3)	-4.337	1.507	8.279	1	.004	.013
Income level (4)	-1.448	1.251	1.341	1	.247	.235
Household size			62.355	3	.000	
Household size (1)	17.978	2.679	45.021	1	.000	6.421 X 10^{7}
Household size (2)	11.721	1.932	36.797	1	.000	1.230 X 10^{5}
Household size (3)	7.228	1.523	22.517	1	.000	1.3 X 10^{3}
Constant	-39.180	8038.613	0.000	1	.996	.000
Number of Observation	550					
Hosmer and Lemeshow Test	Chi-square = 2.144; df = 6; Sig. = 0.906					
Log likelihood	229.087					
Nagelkerke R Square	0.763					

a. Variable(s) entered on step 1: education level, income level, household size.
Source: Field Survey 2015

Income (1) = Less than GH¢ 100

Income (2) = GH¢ (101 - 300)

Income (3) =GH¢ (301 - 500)
Household size (1) = 1 – 5

Household size (2) = 6 – 10

Household size (3) = 11 – 15

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From Table 4.5, we can deduce an equation for the probability of willingness to pay as;

$$\text{Prob of willingness to pay} = \frac{e\{17.978HshSz(1)\,11.121 \quad HshSz(2)\,7.228HshSz(3)\,16.709 \quad Inc(1)\,8.514Inc(2)\,4.337Inc(3)\,39.180\}}{1 \, e\{17.978HshSz(1)\,11.121 \, HshSz(2)\,7.228HshSz(3)\,16.709 \quad Inc(1)\,8.514Inc(2)\,4.337Inc(3)\,39.180\}}$$

One of the tests conducted is the goodness-of-fit test. Goodness-of-fit statistics help to determine whether the model adequately describes the data. The Hosmer-Lemeshow statistic indicates a poor fit if the significance value is less than the alpha value of 0.05. From table 4.4 the Hosmer-Lemeshow statistic showed a Chi-square value of 2.144 with 6 degrees of freedom (df = 6) and reveals a significant value of 0.906 which confirms that the model adequately fits the data.

Again, Nagelkerke R Square test was performed. The principle behind Nagelkerke R Square is that the closer the coefficients to 1, the stronger the relationship between the variables. The Nagelkerke R Square reveals a value of 0.763, which indicates that, the predictors; educational level, income level and household size, are strongly related to willingness to pay.

From the table, Exp (B) represents the ratio-change in the odds of the event of interest for a one-unit change in the predictor. Wald Criterion demonstrated that educational level, income level, and household size made significant contributions to their willingness to pay with p values of 0.00, 0.00, 0.00, and 0.00 respectively. Although the aggregate educational level as a predictor of willingness to pay recorded a statistically significant main effect, however none of the individual educational levels of the respondents recorded a significant effect. This means that households with no formal education, primary education, JHS, SHS and tertiary education have no significant effect on their willingness to pay. Moreover, households with monthly income category of GH¢ (501 - 700) showed a none significant effect.

From Table 4.4, this was what was noticed the following;

Households with monthly income of GH¢ (301 - 500) showed Exp (B) value of 0.013 which shows that they are more willing to pay for the waste management services than household with monthly income of less than GH¢ 100 and GH¢ (101 - 300) who respectively showed Exp (B) value of 0.000 and 0.000. The Exp (B) values of 0.000 and 0.000 to the households with income levels of less than GH¢ 100 and GH¢ (101 - 300) respectively suggests that they are unwillingness to pay the waste management services.

Households with household size of $1 - 5$ showed Exp (B) value of 6.421×10^7 indicating that they are 6.421×10^7 more willing to pay. Households with household size of 6 - 10 also showed Exp (B) value of 1.230×10^5 which means that they are 1.230×10^5 more willing to pay whereas, households with household size of $16 - 20$ showed Exp (B) value of 1.3×10^3 suggesting that they are also 1.3×10^3 willing to pay.

From the above description, it is very clear that households with high monthly income are more willing to pay for the waste management services than households with less monthly income. Also, households with small household sizes are more willing to pay than households with large household sizes.

Moreover, the contingent evaluation method was used to determine the willingness to pay. Contingent valuation is a method of estimating the value that a person or a user places on a services rendered by the service providers. The method asks respondents to directly report their willingness to pay (WTP) in using a specified services, rather than inferring them from observed behaviours. Based on this understanding, the contingent variation method was used to estimate the mean willingness to pay by the respondents.

Table 4.5: Mean Willingness to Pay (WTP)

		Statistic	Std. Error
Willingness to pay Mean		21.6944	.60668
95% Confidence Interval for Mean	Lower Bound	20.5005	
	Upper Bound	22.8882	
5% Trimmed Mean		20.9579	
Median		20.0000	
Variance		110.786	
Std. Deviation		10.52551	
Minimum		10.00	
Maximum		50.00	

Source: Field Survey 2015

From table 4.5 the mean willingness to pay is GH¢ 22. The upper bond and the lower bond values of GH¢20.50 and GH¢ 23 respectively shows that the amount they are willing to pay for the waste management is not less than GH¢ 20.50 and then also does not exceed GH¢23. This implies that waste management services are not expected to charge less than GH¢ 20.50 and more than GH¢ 23.

4.4.2 Cross Tabulations

Cross tabulation is a statistical technique used for summarizing data from two or more variables in order to find specific values which can be easily read and illustrated (Saunders et al., 2007). It was employed in this research to outline the effect of educational level, monthly income level and household size on willingness to pay for the services of the waste management companies.

Table 4.6 shows the effects of educational level, monthly income level and household size on willingness to pay

	Educational level		Total

Willingness to pay		None	Primary	JHS	SHS	Tertiary	
	Yes	2 (40%)	153 (58.6%)	98 (49.4%)	23 (88.5%)	25 (100%)	301(54.7%)
	No	3 (60%)	143 (41.2%)	100 (50.5%)	3 (11.5%)	0 (0.0%)	249 (45.3%)
	Total	5 (100%)	296 (100%)	198 (100%)	26 (100%)	25 (100%)	550 (100%)
	Pearson ChiSquare	78.517[a]					
	Df	4					
	Sig.	0.000					
	Monthly income						
Willingness to pay		Less than Gh¢ 100	Gh¢ (101 - 300)	Gh¢ (301 - 500)	Gh¢ (501 - 700)	More than Gh¢ 700	Total
	Yes	20 (18.8%)	72 (35.8%)	75 (82.4%)	96 (88.8%)	36 (95.5%)	301(54.7%)
	No	86 (81.1%)	129 (64.1%)	16 (17.6%)	12 (11.2%)	8 (4.5%)	249 (45.3%)
	Total	106(100%)	201 (100%)	91 (100%)	108 (100%)	44 (100%)	550 (100%)
	Pearson ChiSquare	86.076[a]					
	Df	4					
	Sig.	0.000					
Willingness to pay	Household size						
		1 – 5	6 – 10	11 – 15	16 – 20	Total	
	Yes	48 (47.1%)	129 (60.2%)	47 (33.8%)	77 (81%)	301 (54.7%)	
	No	54 (52.9%	85 (39.8%)	92 (66.2%)	18(19%)	249(45.3%)	
	Total	102 (100%)	214 (100%)	139 (100%)	95 (100%)	550 (100%)	
	Pearson ChiSquare	77.194[a]					
	Df	3					
	Sig.	0.000					

Table 4.6: Effects of educational level, monthly income level and household size on willingness to pay

Source: Field Survey 2015

Table 4.6 shows that majority of the households (60%) who have not received any sort of formal education are unwilling to pay for the services rendered by the waste management companies, whereas 40% of them are willing to pay. Majority of the households with primary, JHSand SHS educational background with percentages of 58.8%, 90.9% and 88.5% respectively are willing to pay, whilst 41.2%, 9.1% and 11.5% of them showed unwillingness to pay. All the households from tertiary educational (100%) backgrounds showed willingness to pay for the waste management services. From this it is noted that the higher the educational level of the clients the higher the willingness they are to pay for the waste management services. The 4 degrees of freedom shows that the Pearson Chi Square is significant, as the significant value of 0.000 is less than the alpha value of 0.05, which confirms that there is a significant association between the households" educational level and willingness to pay. The association is that the higher the educational level of the clients greater their willingness to pay.

From table 4.5majority of the respondents who earn less than GH¢ 100 and GH¢ (101 - 300) in a month representing 55.7% and 59.2% respectively are willing to pay for the services rendered by the waste management companies whilst the minority which constitute 44.3% and 40.8% showed unwillingness to pay respectively. However, the difference between those who are willing to pay and unwilling to pay from this monthly income category is not much. Households with income categories of GH¢ (301 - 500), GH¢ (501 - 700) and more than GH¢ 700 are willing to pay with respective percentages of 91.2%, 93.5%, and 95.5%. The least percentage of the households representing 8.8%, 6.5%, and 4.5% from this same income categories are unwilling to pay. In all, the higher the income levels of the households the higher their willingness to pay for the waste management services. With 4 degrees of freedom, it is clear that the Pearson Chi Square is significant (.000), which confirms that there is a significant

association between the households" income levels and willingness to pay, and the association is that the higher the income levels the greater their willingness to pay.

The results from table 4.6 further reveal that, the households with household size of 1 – 5 are not willing to pay for the services of the waste management companies. Majority of this household represented by 52.9% attest to this fact, whilst the remaining 47.1% claimed they are willing to pay. The households with household sizes 6 – 10 and 11 – 15 are willing to pay with percentages of 67.8% and 85.6% of the respondents attesting to this fact. Majority of the households representing 96.8% with household size 16 – 20 are willing to pay, whereas the remaining 3.2% stated otherwise. This implies that as the numbers of household size of clients" increases, their willingness to pay become higher. With 3 degrees of freedom, the Pearson Chi Square is significant (.000), indicating that there is a significant association between household size and willingness to pay

4.5. Factors that influence Utilisation of Waste Management Services

Furthermore, factors that contribute to the utilisation of waste management services were made known by respondents. Figure 4.1 presents responses to these factors.

Figure 4.1: Factors influencing utilization of services

Factors influencing utilisation of service
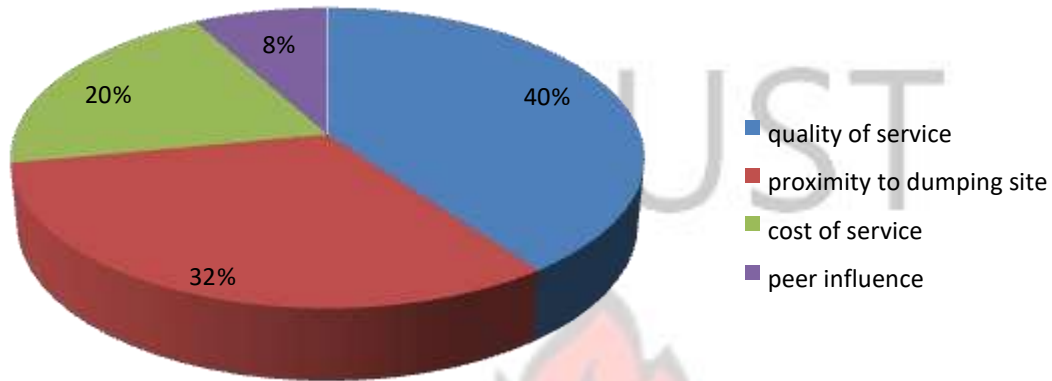
Source: Feild Survey, 2015

From the figure 4.1, 40% of the respondents said the quality of service provided by the waste management companies, influence their decision to patronise their services. This was followed by 32% of the respondents who said they are influenced by the proximity to the dumping size, 20% of them are influenced by the fee charged by the providers while 8% of the respondents are influenced by their peers to patronise the services of the waste management companies. The findings show that the clients are influenced by variety of factors and all these factors must be given attention especially the quality of the service provided by the provider.

CHAPTER FIVE

DISCUSSIONS

This chapter presents discussions of findings interpreted in the preceding chapter. The chapter begins with an introduction and followed by the analysis of the demographic data of the respondents and also discusses the main findings of the research objectives.

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5.1 Introduction

Waste management is expected to be one of the key functions of metropolitan. However, due to the ever growing population which as contributed to the increase of waste in developing countries, private companies are being empowered to enter into waste management in order to help solve the problem of waste management and its consequence. Due to lax government regulation and an ever growing population producing so much waste especially plastics that are not being recycled, waste continues to swallow up every corner around the country. Events of the 20th and early into the 21st century indicate that waste in whatever form or classification-solid, liquid or toxic have become a major consequence of modernization and economic development (Tsiboe and Marbell, 2004). In the quest for „Western-styled‟ development, humanity did not budget for the problems related to the management of waste. Waste that ends up in waste bodies negatively change the chemical composition of the water that can cause various illness when drunk. When vegetables and plants absorb the polluted water from the soil or are watered directly with water they can be affected negatively. Air pollution when contaminants are inhaled and are absorbed from the lungs into other parts of the body cause various ailments by a substantial number of substances that are emitted, some in small quantities and others at extremely low levels. There has been incidences of low birth weight and occurrence of various congenital malformations and certain kinds of cancers in relation to residents near land fill sites. (Environmental Health Perspective Journal, 2000 Mar)

This study therefore assessed the willingness and ability to pay for waste management, and the factors that affect willingness to pay in order to curb illegal dumping and its untoward health effects within the informal sector in the Kumasi metropolis. The study involved 550respondents from the Kumasi metropolis and outcome of the study would provide data and also inform stakeholders to make decisions involving maximising utilisation of waste management services amongst the informal sector.

5.2 Background Information of Respondents

Maturity comes with age and its shapes man to evince decorous behaviour in society. Man"s awareness and behaviour regarding sanitation and waste management is influenced by his/her age. The study found that most of the respondents (81.8%) were 20 years and above, thus in their adult ages and hence must behave responsibly with regards to waste disposal and its management. Consistent with Bradley et al., (1999), who indicated that age is expected to play a significant role as maturity could affect level of awareness on environmental health and sanitation. After examining respondents" sex, females dominated with 53.8% of the total respondents relative to males (46.2%). Mostly, females are responsible for sanitation and waste management in household and hence are major players in waste management. A study by Alhassan and Mohammed (2013) in New Juaben, found that women were willing to be involved and pay for waste management programmes than men as they are mostly responsible for waste management issues at the household level.

Again, peoples" sanitation and waste management behaviour could be positively shaped by their educational level. Most educated people expectedly behave decorously and their waste management behaviour is as such. Most of the respondents had at least tasted primary education and hence are enlightened on better waste management practices.

The income of people also influences their decisions on waste management. Almost all the respondents were employed and hence could afford moderate sanitation or waste management cost. Also most of the respondents were married thus will ensure that the contracting and payment of waste management services will be a shared responsibility. Again, areas designated as middle class, estate or affluent areas have good sanitation behaviour and utilization relative to areas where the poor are mostly concentrated such as shanty towns or slums. People in middle class, estate or affluent areas are also more inclined to pay for waste management

services. This is consistent with the finding of Oduro-Kwarteng (2011), that the willingness to pay more was high in the high income areas compared to the middle income areas. However, Baabereyir (2009) found that Low-income households without access to a dumping site also showed willingness to pay for a home collection service. This refutes the general assumption that the poor are unwilling to pay for waste disposal which has been used as an excuse to refuse them a service.

In addition, income of an individual determines his ability to access some services. People with high income are likely to exhibit better waste management behaviour and patronize waste management services relative to low income earners. The study found that majority of the respondents were willing to pay a most of the respondents earning incomes above GHC 500, and spending below GHC 50 monthly on waste disposal and hence should be able to pay for waste management services if quality and reliability of service delivery is assured. Moreover, higher number of dependents is associated with cost of catering for them and also generation of more waste and hence increases cost incurred in waste management services. Most respondents had less than two dependents and hence must be able to save for waste management. This matches with the study of Sumukwo et al., (2012), who found that high expenditure on house affect disposable income and therefore ability of households to internalise environmental improvement costs. Therefore, people owning apartments or houses who do not incur much renting cost are more inclined to manage waste well than those renting whose cost of accommodation affect their ability to pay for waste management services.

5.3 Utilization of Waste Management Services

Though there is household waste, the majority of the waste as discovered in the study was industrial waste. This kind of waste is mostly from commercial activities such as food waste,

plastic, metal and sand waste and the responsibility of these waste disposal is entrusted in the hands of subordinates mostly children which should not have been the case. The findings support Tchobanoglous et al (1993) who mentioned that most waste in communities are industrial than household with majority of them being food waste. Food wastes are all the animal, plant or vegetable residues resulting from the handling. Therefore commitment from superiors in managing waste is very critical in addressing waste management problems.

It was also discovered that clients keep their waste in many different kinds of containers but most of them keep their waste in plastic and metal container. This is in line with Gage (1998). According to Gage (1998) has revealed that each home has different containers for storing waste but caution that the type of container used for the storage of waste must help to avoid the attraction of disease vectors such as rats and flies which scatter waste that lead to a harmful effect on health of the people and the surrounding community

Again, it was found that most of the responds dispose their waste through the services of the waste management companies, the use of communal skip and burning. Effective methods of waste disposal are imperative for waste management. Agents of waste management providers picking waste from the doorstep of establishments which is consistent with the findings of Monney et al., (2013) that house-to-house waste collection method is where a household stores the waste in a container and puts it at the roadside at designated times for collection is the most patronized waste collection method by the residents of WA Municipality. The practice of burning waste and the use of communal skip support the report of NSWMA (2003) which stated that the common practice in Jamaica is the use of communal skip and the burning of waste. However, the burning of waste is dangerous if the proper measures are not put in place to guide fire outbreak.

Some people desire for waste management services is as a result of the inconvenience they face disposing refuse. This finding is similar to that of Alhassan and Mohammed (2013), who found that respondents who spend much time in walking to dump their waste are willing to pay more for the improvement than those who spend less time walking to dump their waste.

The study also revealed that the containers of majority of the respondents are emptied twice a week and once a week. Emptying containers weekly or twice a week is unhygienic according to Gage, (1998). Gage (1998) considered that containers used to store waste must be emptied frequently in order to prevent the attraction pests due to the odours of decomposition. However, the frequency of emptying of the containers depends on the size and type of waste. Large and waste in a form of food require frequent empting of containers due to easy decomposition.

The issue on the satisfaction of the clients regarding the services of the waste management companies confirmed that most of the clients are not satisfied with the services provided by the waste management companies. Studies on customer satisfaction such as Vinagre and Neves (2008) revealed that satisfied customers serve as an important source of free advertising through referrals and recommendations, whereas dissatisfied customers are more likely to defect and to convey the negative experiences to other potential customers. Therefore, in order for waste management companies to make their customers satisfy and retain them attention must be given to the sources of customers" dissatisfaction as noted in table 4.2 in the previous chapter of this study.

5.4 Willingness to Pay for Waste Management Services

The study has revealed the responses of the respondents concerning their willing to pay for the services provided by the waste management companies. Overall, it was discovered that the respondents are willing to pay for the collection of waste. It was found that some of the respondents (majority) admitted that households must be responsible for the payment of waste

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collection while others service think that the district assembly must be responsible. In deed by constitution, the district assemblies are expected to handle the collection of waste in the district. However, as noted by Buenrostro&Bocco, (2003), budget and infrastructure constraints make it difficult for the metropolitans and district assemblies alone to manage large amounts of solid waste generated. This makes the work of private companies who are in the business of waste management important in most developing companies. Hence, Hagos et al (2012) found in their studies that households in Ethiopia have accepted that they are responsible for the collection of their own waste.

Again, the customers who are willing to pay for the collection of waste indicated that they were willing to pay to private companies and prefer the private companies to handle waste collection management. This shows that people have lost confidence in the government and the district assemblies as well as the metropolitans with regards to the collection of waste. Similar studies including Hagoes et al (2012),Afroz et al (2009) and Aggrey&Douglason (2010) support the finding that people prefer private waste management companies to metropolitans and district assemblies. This implies that there is opportunity for the private waste management service providers to expand their service.

The use of refuse tricycles and door to door waste collection with a fee was the most preferred waste collection methods by respondents as they believe it is the most convenient. The findings are also supported by the World Bank (2001) which found that door-to-door systems, even if by pushcarts, are preferred and this might lead to a greater willingness to pay charge. Other methods such as a skip placed at a central location where each establishment would be expected to carry its container of refuse to dump also complements the other methods of waste disposal.

The results from both the binary logistic regression and the cross tabulations revealed that there is a positive relationship between educational level, income level, and household size of the

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study respondents and their willingness to pay for the services of waste management companies. This means that educational level, income level and household size make significant contributions to customers" willingness to pay. It was found that households with monthly income of GH¢ (301 - 500) and above were more willing to pay while those with monthly income less than GH¢ 300 were not willing to pay. Similar studies including Tamura (2005),Hagoes et al (2012),Afroz, Hanki and HasegawaKurisu (2009)Aggrey and Douglason (2010) support the finding of this study by revealing that the higher the income of people the higher their willingness to pay. Tamura (2005) conducted a study in Ghana specifically in Accra on demand for solid waste collection and found that the higher the income of people, the more willing they are to pay for solid waste collection. This means that willingness to pay is strongly influenced by the income of the people and for that matter waste management companies must consider the income of their customers when taking pricing decisions. On the contrary, Wang et al. (2011) conducted a research on solid waste management in Eryuan in China and found that people with low income were also willing to pay for the collection of waste. The reason was that there was no solid waste management available and for that that the poor were willing to pay for the services of any waste management company available. This is an indication that in the absent of any waste collection site or company, customers are willing to pay whether they have high or low income.

Similarly, the educational level of respondents was found to be a factor that influences their willingness to pay. The cross tabulation revealed that all the respondents with tertiary education were willing to pay. Overall, it was noted that the higher the educational level of the clients the higher the willingness they are to pay for the waste management services. This finding is consistent with the works of Aggrey and Douglason (2010) and Afroz et al (2009). In their study, Aggrey and Douglason (2010) hypothesized that the higher the level of education the more people are willing to pay for the collection of waste. Their reason was that people who

are educated appreciate the consequences of mishandling of solid waste and for that matter they give attention to the management of waste in order to avoid the risk of being a victim of unclean environment. Afroz et al (2009) also defended their position by explaining that education gives a better understanding of the problems caused by improper management of waste and hence educated people are more willing to pay than non-educated ones.

As discovered in the study through the binary logistic regression and the cross tabulations, household sizes also play a significant role in the willingness to pay for the services rendered by waste management companies. It was found that households with household sizes of 1620 people were more willing to pay than household sizes of 11-15. Similarly, the household sizes of 11-15 were also more willing to pay than the household size of 6 – 10 and so forth. This implies that as the number of the household sizes of the clients increases, their willingness to pay become higher. The findings are in line with some previous studies such as

Chuen-Khee and Othman (2002),Afroz, Hanki and HasegawaKurisu (2009)and Aggrey and Douglason (2010). Chuen-Khee and Othman (2002) found in their study that household that were many had a high demand for waste collection than households with few people. Therefore they pointed out that the more the number of people in the household, the more willing the household will appreciate a clean environment.

Aggrey andDouglason (2010) also discovered that, the higher the generation of waste, the more the household faces the challenges of waste disposal and the greater the willingness to pay. This implies that waste management companies that target households with larger population are likely to increase their market share.

The study also discovered that while the respondents were ready to pay a maximum amount of GHC 30 the waste management companies have proposed a monthly fee of GHC 35 to be collected in order to be effectively delivering their services. This means that more education

needs to be done to convince the customers about the need for them to be willing to pay for the proposed amount so that they can be served better. As revealed by Hagos et al (2012), awareness of environmental quality is a major factor that influences the willingness to pay for waste collection charges. On the other hand, the government can also increase its subsidy to the private waste management providers so that they can also reduce the amount charge in order to better serve the customers. Hence, a stakeholder analysis needs to be done in order to agree on the monthly amount to be charged for waste collection.

5.5 Factors that Influence Utilization of Waste Management Services

The study has discovered the factors that contribute to respondents" willingness to pay for waste management. These factors include the quality of service provided by the waste management companies, proximity to the dumping site, the service charge (cost) and peer influence. The findings support some previous studies. For instance, in a study OduroKwarteng (2011) found that customers willingness-to-pay more to improve house-to-house waste management service was low as a result of the service recipient perceived dissatisfaction with the current service quality. The customers were dissatisfied because of low quality service. They were willing to pay appreciable money for the service if the service is improved in terms of regular and prompt door-to-door collection. This shows that quality serve is an important factor which can influence clients to patronise the services of waste management companies in Ghana. Proximity to the dumping site is also a major factor that influences client willingness to patronise the services provided by waste management companies. This finding is in line with the work of Alhassan and Mohammed (2013), who found that customers are willing to pay if door-to-door collection of waste is done. In their study, Alhassan and Mohammed (2013) found that respondents who spend much time in walking to dump their waste are willing to pay more if the dumping site is made closer. This implies that waste management companies that are able to collect waste from the door steps of customers would be able to influence many

customers to purchase their service. Cost is also important in the purchase of any product or service. Marketing scholars like Kotler and Keller (2009) and Blythe (2009) believe that providers must consider the purchasing power of their clients when costing or pricing their services. Again, Kotler and Keller (2009) and Blythe (2009) recommend that to increase market share, new firms must begin with penetration pricing which emphasis on low price for newly introduced product or service. Being relatively in service in Ghana, waste management companies are expected to begin with relatively affordable charge and increase the cost when customers have fully understood their services.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents conclusions deduced from the data interpreted and analysed in the preceding chapter and recommendations for implementation by all major stakeholders in waste management to ensure effective waste management in our society.

6.1 Conclusion

Respondent‟s willingness to pay for waste management services is hinged on reliability, efficiency, affordable cost and quality of service delivery of waste management service. Informal operators‟ ability to pay fell within GHC20.5- GHC23.

Most clients in the informal sector would want private providers to render service to them though others were indifferent as to who provided the service on condition that there was daily collection, door to door service and availability of receptacles.

Waste comes in the form of domestic or industrial waste. Waste are stored in containers and disposed-off by burning, emptying into a communal skip nearby, picked by waste management agents, emptied onto an open pile of waste nearby and dumping into gutters. Collectors of waste are usually from government waste collectors and that of private companies. In the rendering of the waste collection and disposal services, respondents lamented on the unreliability of the service, the unsatisfactory location of communal container or pick-up points, the unclean appearance, stench and flies of the communal container and the impolite nature of waste collection workers.

The payment of waste management activities was seen as a shared responsibility of the government and the district assemblies, firms and households. Respondents" willingness to pay for waste management services hinged on the reliability, efficiency, cost and quality service delivery of waste management providers. Private waste collectors were the preferred waste collectors respondents are willing to pay for their services. However, people"s doubt regarding the reliability in the provision of waste management services and cost prevented people paying for waste management services.

Finally, factors that influence people"s utilization of waste management services were as a result quality of waste management services, cost of waste management services, the proximity of the waste management service providers to the people and peer influence.

In conclusion, waste management services provided by both public and private institutions are patronized by people and their utilization and payment for the services provided is as a result of the reliability, proximity, cost, education, occupation, income and quality of the services provided them.

6.2 Recommendations

Below are recommendations made for the various stakeholders in waste management for policy action and implementation.

6.2.1 Government

Policies

- Government through its ministries, agencies and departments and also the private companies responsible for waste management must revise and improve upon thequality of service being rendered to entice more people to solicit for their service and pay appropriately to rid the environment from filth.

- District assemblies through the local media and their public education units must sensitise the residents on the need to pay for better waste management. This will also positively shape people"s attitudes and behaviours regarding waste management. (Reduce, Reuse and Recycle)

- Government agencies in charge of waste management must be adequately resourced with both human and material resources to effectively undertake their task. Motivations must also be made available for the staff to ensure dedication of service and efficiency.

- MMDA,s and waste managers should fix affordable price between GHC20.5 and GHC 23 to improve informal operators ability to pay

- Metropolitan, Municipal and District Assemblies in government"s drive to achieve better decentralization must be resourced in order to be the main waste management actors in the local level. Their activities must however be monitored and supervised by the government so that better waste management would be achieved.

Partnership

- Partnership must be initiated or consolidated by government and the private sector in the area of waste management so that a complementary approach to successful waste management would be achieved.

6.2.2 District Assemblies

Resources

- Metropolitan/Municipal/District Assemblies must commit more resources to waste management in their localities. Also, refuse or waste management containers must be placed at vantage points in order to ensure easy access and promptness of disposing the refuse to dumping sites to avoid polluting the environment. Again, waste management personnel must be remunerated and motivated well to effectively carry out their duties. Moreover, the door to door services provided by the assemblies must be augmented to commensurate with the increasing demand for such service.

Policies

- Stringent measures or bye laws regarding waste management must be made or enforced by the assemblies so that perpetrators of indiscriminate waste disposal would be brought to book.

Awareness

- District Assemblies through the local media and their public education units must sensitize the residents on the need for better waste management in order to positively shape people‟s attitudes and behaviours regarding waste management.

Revenue

- The Assembly could charge residents moderate levies to provide them with quality and reliable waste management services. The pay as you dump waste management policy must be reinforced and price adjustment must be done in moderation.

Partnership

•   The Assemblies must partner with local waste management firms to undertake
management of waste in the district.

6.2.3 Private Waste Management Companies

Cost of Service

•   Private waste management companies in their bid to provide quality and reliable waste
management services to people must moderate the fees charged. They must adequately resource
their personnel and equipments to expedite quality service delivery.

Partnership

•   They must also partner with the government and its district assemblies in order to provide
efficient and wide reaching waste management services.

6.2.4 Community Residents

Sense of responsibility

•   Community residents must know that they have the responsibility to keep the environment
clean and hence their actions must be geared towards that.

•   They must also be ready to pay for waste management services provided them by waste
management service providers for sustainability of the service.

REFERENCES

Afroz, R., Hanaki, K., and Hasegawa-Kurisa, K. (2009).Willingness to pay for waste
management improvement in Dhaka city, Bangladesh.Journal of Environment
Management Vol. 90, pp. 492-503.

Aggrey, N. and Douglason, O. G. (2010). "Determinants of Willingness to Pay for Solid Waste

Ahmed M. A. et al (2007): Waste Management in Climate change. Mitigation.Contribution of
Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on
Climate Change. Cambridge University Press, Cambridge, United Kingdom and
New York, NY, USA

Ahorlu W. K. (nd).Waste Management in Africa.a look at institutional constraints, hazardous waste,
and public-private partnership options. Ghana: YES-Ghana Publication.

Alberini A. (1995). Testing wiliness to pay model of discrete choice contingent valuation data.Land
Economics Journal Vol. 17(1), pp. 83-95

Alhassan, M., & Mohammed, J. (2013). Households" demand for better solid waste disposal services:
Case study of four communities in the New Juaben Municipality, Ghana.
Journal of Sustainable Development, Vol 6(11), pp. 16-25.

Anomanyo, D. E (2004). Integration of Municipal Solid Waste Management in Accra,
Ghana: Biofactor treatment technology as an integral part of the management process.
Presented to Lund University, Sweden

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

requirements for the award of the Master of Science (MSc) degree in International Environmental Science.

Atkinson, A. (2001): International Co-operation in Pursuit of Sustainable Cities. Development in Practice Journal, Vol 11, pp 273-291

Atkinson, A. B. (1983). Social Justice and Public Policy. Cambridge, MA. MIT Press

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

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. PhD, Thesis submitted to the School of Geography, University of Nottingham,

Babalola, A. (2010).The Practice and Challenges of Solid Waste Management in Damaturu, Yobe State, Nigeria.Journal of Environmental Protection, Vol 5, pp. 102-120

Blythe, J. (2009). Principles and Practices of Marketing.(2nd edn). UK, Cengage Learning, EMEA

Boateng, C. and Nkrumah, D. (2006): Managing Waste! The Attitudinal Change. Daily Graphic, 16th December 2006.

Botkin, B. D. and Keller, A. E. (2003): Environmental science. Earth as a living planet.(4thedn). USA: John Wiley and Sons

Buenrostro, O. and Bocco, G. (2003). Solid Waste Management in Municipalities in Mexico:Goals and Perspectives, Resources.Conservation and Recycling, Vol. 39, pp. 251-263.

Carson, R. T. and Hanemann, W. M. (2005).Handbook of Environmental

    Economics.(2nd edn).Oxford: Elsevier

Carson, R. T., Flores, N. E. and Meade, N. F. (2001). Contingent Valuation: Controversies and

    Evidence. Environmental and Resource Economics, Vol 19, pp. 173– 210.

Chati T. J. (2012): Solid Waste Management in Ghanaian Towns; A Case of Saboba,

    Northern Region. BSc. Thesis submitted to the Department of Planning, Kwame

    Nkrumah University of Science and Technology.

Chazan, D. (2002), A World drowning in litter, BBC. [Retrieved 10th January, 2015]

    Available: http://news.bbc.co.uk/2/hi/Europe/1849302

Chuen-Khee, P., and Othman,J. (2010).Household Demand for Solid Waste Disposal Options in

    Malaysia.World Academy of Science, Engineering and Technology Vol. 66, pp.

    1153–58.

Coad, I. (2005). Private Sector Involvement in Solid Waste Management: Avoiding Problems

    and Building on Successes, A study Commissioned by the Federal Ministry for

    Economic   Corporation   and   Development.Eschborm: Deutsche

    GesellschaftfürTechnischeZusammenarbeit (GTZ) Publishing.

Davidson, G. (2011). Waste Management Practices: Literature Review Dalhousie University

    -Office of Sustainability.

Dijk, M. P. V. (2006).Managing cities in developing countries.Theory and practice of urban

    management. Cheltenham: Edward Elgar.

Dijki, M. P. and Oduro-Kwarteng, S. (2007).Urban management and solid waste issues in

    Africa.A contribution to the ISWA World congress in September 200, Amsterdam.

El-Haggar, S. M. (2007). Sustainable industrial design and waste management: Cradle-tocradle for sustainable development. Oxford: Elsevier/Academic Press

Environmental Health Perspective (2000), March Health effects of residents near hazardous waste landfills

Gage, I. (1998). The effect of the method of household containment on solid waste management, In: Solid waste management: critical issues fordeveloping countries. Kingston: Canoe Press.

Global Partnership on Waste Management (2012): Background paper on research and technology needs in waste management. Biennium Conference of the Global Partnership on Waste Management Osaka, Japan.

Gugssa, B. T. (2012): The Cycle of Solid Waste: A case study on the Informal Plastic and Met Recovery System in Accra. MSc. Thesis in Sustainable Development, Uppsala University.

Hagos, D, Mekonnen, A. and Gebreegziabher, Z. (2012).Households" Willingness to Pay for Improved Urban Waste Management in Mekelle City, Ethiopia.Journal of Environment for Development.Vol 12 (6), pp 1-25

Hardoy, J. E. (2001): Environmental Problems in an Urbanizing World. London and Stirling: Earthscan Publishing

Hoornweg D. and Bhada-Tata P. (2012). What a waste: A global review of solid waste management.Urban development series.

household solid waste in urban areas in Ghana: the case of WA, Civil and Environmental Research, 3(9)

King, D. M. and Mazzotta, M. J. (2000).Ecosystem Valuation. Available online at: http://www.ecosystemvaluation.org/index.html,

Kotler, P. and Keller, K. L., (2009).Marketing Management: Upper Saddle River. New Jersey: Pearson Prentice Hall.

Kwawe B. Daniel (1995). Culture of waste handling: Experience of a rural community. Journalof Asian and African Studies. Vol. 30, pp. 1-20

Longe, E.O., Longe O.O. and Ukpebor E.F. (2009). People''s Perception on Household Solid Waste Management in Ojo Local Government Area in Nigeria. Iran Journal Environment Health Science Engineering. Vol. 6, pp. 201-208

Management in Kampala City."Maxwell Scientific Organization.Current Research Journal of Economic Theory Vol 2(3): pp. 119-122

McDougall, F. R., White, P. R., Franke, M., &Hindle, P. (2001). Integrated solid waste management: a life cycle inventory. Blackwell.

McDougall, F., White, P., Franke, M., Hindle, P., (2001): Integrated Solid Waste Ministry of Food and Agriculture (2000) Agriculture in Ghana: Facts and Figures. Presbyterian Press.

Mensah, A. and Larbi, E. (2005): Solid waste disposal in Ghana. www.trend.wastsan.net

Monney, I., Tiimub, B. M., Bagah, H. C. (2013): Characteristics and management of

NSWMA (2003). Riverton Wasteshed: Waste Characterization Study. Planning and Research Department, National Solid Waste Management Authority. Kingston, Jamaica

Oduro-Kwarteng, S. (2011): Private Sector Involvement in Urban Solid Waste Collection.

Onibokun, A. and Kumuyi, J. (1999).Governance and waste management in Africa.Canada: International Development Research Centre.

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

Rabinovitch, J. (1998).Global, regional and local perspectives towards sustainable urban and rural development. In, FernandesEdesio (ed), environmental strategies for sustainable development in urban areas. Lessons from Arica and Latin America.England: Ashgate Publishing Ltd, England.

Scharfe, D. (2010).Integrated Waste Management Plan.Ontario: Centre & South Hastings Waste Services Board/Waste Diversion Ontario and Stewardship.

Squire, J. N. (2012). Biomedical Pollutants and Urban Waste Management in the Accra Metropolitan Area, Ghana: A Framework for Urban Management of the Environment (FUME). PhD. Thesis presented to the University of Waterloo.

Staniškis, J. (2005).Integrated Waste Management: Concept and Implementation.Environmental Research, Engineering and Management, Vol. 3(33), pp. 40-46

Sumukwo, J., Kiptui, M. and Cheserek, G. J. (2012).Economic Valuation of Improved Solid Waste Management in Eldoret Municipality.Journal of Emerging Trends in Economics and Management Sciences (JETEMS), Vol. 3(6), pp. 962-970

Syme, G. J. and Nancarrow, B. E. (2001). Social Justice and Environmental Management: An Introduction. Social Justice Research, Vol. 14, pp. 343-347.

Tamura, K. (2005). The demand for solid waste collection in Accra (Ghana). Unpublished
   MA Thesis submitted to the Faculty of the Centre for International Studies of Ohio
   University.

Tchobanoglous, G., &Kreith, F. (1993).Handbook of solid waste management (2nd edn).UK:
   McGraw-Hill.

Tilly, C. (2004).Social Movements. Colorado, Paradigm Publishers

Tsiboe, I. A. and Marbell, E. (2004).A look at urban waste disposal problems in Accra,
   Ghana. Denmark: Roskilde University Press.

UK. Environment Council, (2000).The Waste Guide.The Stakeholders‟ Guide to Sustainable
   Waste Management. London, Environment Council

UNEP (2002). Industry as a partner for sustainable development: Waste Management. New
   York: UNEP.

United Nations Population Fund (2001). The State of World Population 2001, Phoenix-
   Trykkeriet AS, Denmark, UNFPA

Venkatachalam, L. (2004). Contingent Valuation Method: A Review. Environmental Impact
   Assessment Review, Vol. 24, pp. 89-124.

Vinagre, M. and Neves, J. (2008).The influence of service quality and patients‟ emotions on
   satisfaction.International Journal of Health Care Quality Assurance, Vol21 No.1
   PP.87-103.

Wang, H., He, J., Kim, Y. and Kamata, T. (2011). Municipal Solid Waste Management in
   Small Towns: An Economic Analysis Conducted in Yunnan, China. Policy Research
   Working Paper 5767. Washington, DC: World Bank.

Waste Management Report, Step By Step (SBS) Group (2004). Including the unsustainable procurement policy) on the United Nations compound, Gigiri, Kenya. Assessment and recommendations

Whitehead, J. C. and Blomquist, G. C. (2006).The Use of Contingent Valuation in BenefitCost Analysis.Handbook on Contingent Valuation.Cheltenham, UK: Edward Elgar Publishing Limited

Zerbock, O. (2003). Urban Solid Waste Management: Waste Reduction in Developing Nations. (www.cee.mtu.edu).

APPENDICES

APPENDIX I

WASTE MANAGERS QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMMUNTY HEALTH

RESEARCH TITLE: WILLINGNESS AND ABILITY TO PAY FOR WASTE MANAGEMENT SERVICES AMONGST THE INFORMAL SECTOR IN KUMASI

INTRODUCTION

Good morning/afternoon. I am a student at School of Medical Sciences, KNUST. I will be conducting several meetings with people like you in the KUMASI METROPOLIS to find out your views and ideas about "THE WILLINGNESS AND ABILITY TO PAY FOR WASTE MANAGEMENT SERVICES AMONGST THE INFORMAL SECTOR IN KUMASI".

Your opinions are highly essential at the same time vital, as they will help us to improve the kind of service being provided. Whatever you say will be treated confidential, so feel at ease to express your candid opinion. Be assured that your responses will not in any way be linked

to your identity. You are kindly requested to answer the questions below by indicating a tick or writing the appropriate answer when needed.

THANK YOU

Questionnaire number_____

Date of Interview: _____

SECTION A: BACKGROUND

1.   Position of respondent_____

2.   Area of jurisdiction_____

3.   Population being served_____

4.   How long in years have you been into waste management?_____

5.   When was the last time you were trained in waste management? _____

6.   What is your highest educational qualification? _____

7.   In your opinion how serious is the problem of solid waste collection in the metropolis? [a] Not serious [b] Serious [c] Extremely serious

SECTION B: UTILISATION OF SERVICE

8.   How much waste is generated in tonnes every week within your area of jurisdiction? _____

9.   What type of waste management services does your institution render?
     a. Collection
     b. Transportation
     c. Separation of waste
     d. Disposal/ recycling/composition/incineration/land filling
     e. Other

10. Who patronises your waste management services? _____

11. How often do your clients use your services? _____

12. What changes have you seen in the numbers of those who use your services in the last 2 years?

     _____

_____

_____

13. What are the waste characteristics generated? (if data is available)

    a. Plastics_____%

    b. Metals_____%

    c. Glass _____%

    d. Food waste _____%

    e. Wood waste and trimmings _____%

    f. Paper_____%

    g. Waste from clothing_____%

    h. Other _____%

14. What do you provide for clients for storage of waste? _____

15. How close are your collection points from your clients?_____

16. What services are available for the informal sector?

    a. Door to door

    b. Communal (in skips)

    c. Curb collection

17. What is the mode of collection of the waste generated?

    a. Tricycles

    b. Compaction tracks

    c. Skip loaders

    d. Pushcarts

    e. Open tracks

SECTION C: WILLINGNESS TO PAY

18. From experience, how willing are your informal sector clients in using your services?

    a. Very willing   [b] Moderately willing   [c]Less willing

19. Within the metropolis is there a tariff structure for solid waste user fee which are payable by the informal sector? [a] Yes   [b] No

20. If so what is it based on?

    a. Quantity of waste generated [b]   Level of income

    [c]   Frequency of evacuation   [c]   other

21. Is the tariff structure for the informal sector served by the private sector system different from that served by KMA? [a] Yes [b] No

22. Is the waste management service being subsidised by government? [a] Yes [b] No

23. If yes, what percentage comes from government transfers? _____%

24. If you have a solid waste user charge, is there a method for increasing tariffs periodically? [a] Yes [b] No

25. How much is being paid for each category of service rendered?

    a. Door to door service

    b. Picking at the curb

    c. Dumping in communal skip

    d. Other

26. Has the tariff changed?   [a]   Yes   [b]   No

27. Are the charges being levied now adequate to render efficient services to the informal sector? [a] Yes [b] No

28. If No, to improve services being rendered, how much would best the best charge for services being rendered?

    a. Door to door service

    b. Picking at curb

    b. Dumping in communal skip

    a. Other

29. How are charges collected?

    a. Separately by door-to-door private bill collectors

    b. Directly by private firms providing services

    c. Separately by door to door by government bill collectors

    d. Pay as you dump

    b. Other

30. Do you encounter problems collecting bills for waste management services from the informal sector? [a] Yes [b] No

31. Is there a way of synchronising the taxes that are paid to KMA?

    a. Yes   [b]   No

32. Generally, what do the informal sector clients say about the cost of your services?

a. Costly   [b]   Moderate   [c]   Cheap   **SECTION C: FACTORS INFLUENCING UTILISATION**

33. Which group of firms use waste management services?

34. Why would some firms not use waste management services?

35. Why would you recommend clients to other waste management service firm?

36. What do you think clients in the informal sector consider in assessing your services? **a.** Quality of service

    b.   Proximity of establishment from collection site

    c.   Peer influence

    d.   Cost of service

    e.   Others

37. If there is need to seek your advice further, may we contact you again?

    a. Yes   [b]   No   [c]   Don't know

38. How can you improve utilisation and willingness of your clients to pay for your services?

APPENDIX II

QUESTIONNAIRE FOR WASTE GENERATORS

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMMUNITY HEALTH

RESEARCH TITLE: WILLINGNESS AND ABILITY TO PAY FOR WASTE MANAGEMENT SERVICES AMONGST THE INFORMAL SECTOR IN KUMASI

QUESTIONNAIRE FOR THE INFORMAL SECTOR

DATE..........................   LOCATION…………………...……………..

SECTION A: BACKGROUND INFORMATION

o   How old are you?

o   Gender: Male   []   Female []

o   What is your highest level of education?

    None []   Primary []   JHS []   SHS []   Tertiary []

o   What is your current marital status?

Single   []   Married   []   Divorced   []

Widowed   []   Cohabitation []

o   Which part of Kumasi do you stay?

Estate [] Zongo/ slum [] Middle Class Neighbourhood []
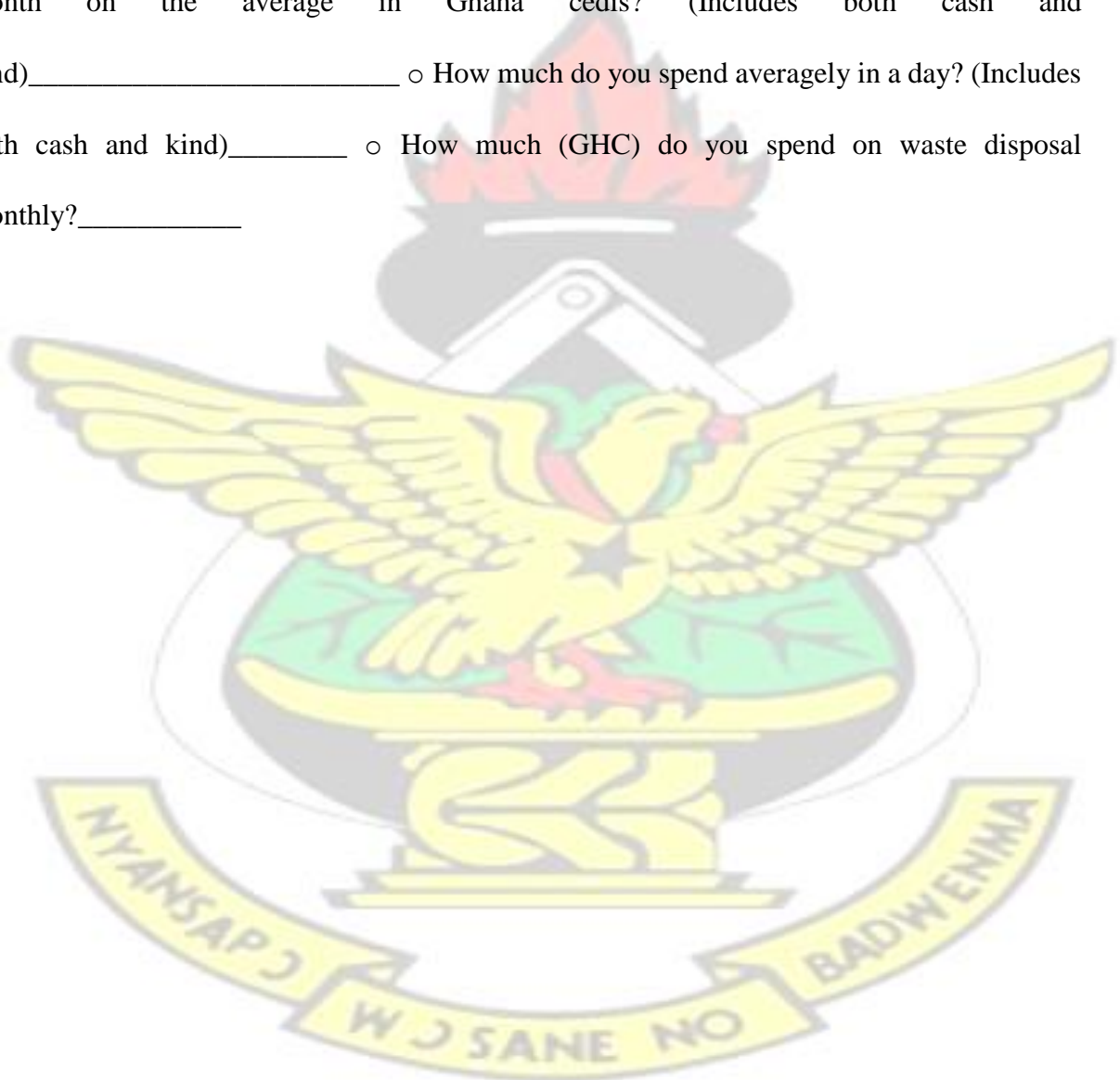
o   What is your occupation?

Trading [] Mechanic [] Artisan [] Profession [] o How much money do you earn every month on the average in Ghana cedis? (Includes both cash and kind)_____ o How much do you spend averagely in a day? (Includes both cash and kind)_____ o How much (GHC) do you spend on waste disposal monthly?_____

o

Are you renting the premises where your establishment is located?

Yes   []   No   []

o   How many dependents do you have?_____ o How many of them are in

school?_____ o What are your accommodation arrangements?

Rented [] Ownership [] living with relatives [] Other [] o What movable

property do you have?

Generator []   Refrigerator []   Vehicle []

Motorbike []   Other, specify_____ o What

landed property do you have?

Farmland []   Housing land []   House []   Factory[]   None []

o   What is the employment status of your partner?

Self-employed   []   Unemployed []   Employed by an organisation []

Retired   []   Other_____ o

Do you have a bank account?   Yes [] No [] o   Is

your establishment insured? Yes []   No []

SECTION B: UTILISATION OF WASTE MANAGEMENT SERVICE

o What type of waste do you generate?

Domestic []   Industrial (both domestic and industrial) []

Other   (specify)_____

o How do you store your waste?

In a plastic container   []   In a metal container   []

In a wooden box   []   On the floor   []

Other specify_____

o   Who is in charge of disposing off the waste in this facility?

Girl child [] Boy child [] senior apprentice [] Junior apprentice [] o How do you dispose off your refuse?

    a.   By burning
    b.   It is emptied into a communal skip nearby
    c.   It is picked from the doorstep of your establishment by waste management agents
    d.   It is emptied onto an open pile of waste nearby
    e.   Dumping into gutters

o   If your refuse is emptied into a communal container, is it far off from your establishment?

Yes [] No [] o If your container is emptied into a skip nearby, how often is it emptied?

Daily	[]	Three times a week	[]	Twice a week []
Once a week	[]	Less than once a week	[]	
Less than once in 2 weeks		[]		

o   How far in minutes in minutes are you from your waste disposal site? [] 1-3mins [] 4-6mins []7-10   [] more than 10 o Does it inconvenience you sometimes? Yes [] No [] o If yes what do you do with the waste?

Bury [] Burn []   Dump in nearest gutter []   keep till it is convenient [] o
    Does your establishment receive a collection service of any type?

Yes []   No []

o   Which waste management service company collects your waste?_____ o
    How frequently is your container usually taken out to be emptied?

| Daily | [] | Thrice weekly | [] | Twice a week | [] |
| Once a week | [] | Less frequently | [] | | |

o   For how many years has this type of waste collection service been provided to your establishment?_____
    Have you ever dumped at an unapproved site?

Yes []   No []

o   What is your opinion of the service being rendered by waste management companies?

Very satisfied []   reasonably satisfied []   Not satisfied at all []

o

If you are not satisfied with service, what is your primary reason? a.

The service is not reliable

b.   Frequency of service – the interval between collections is too long.

c.   The location of the communal container or pick-up point is unsatisfactory

d.   Lack of clean appearance, odors, flies or fires at the communal container.

e.   The collection workers are rude or impolite.

SECTION C: WILLINGNESS TO PAY

o   Who should pay for waste disposal in Ghana?

Government   []   municipal/district assembly   []   households   []

Firms [] waste service companies [] other (specify)_____ o What is your preferred method of collection of waste?

o   A skip   placed at a central location and each establishment would be expected to carry its container of refuse to dump.

o   A tricycle would come to the curb of the establishment on scheduled basis and collect solid waste.

o   A door-to-door collection would be arranged for a fee.

o   other_____

o   If your preferred collection method were introduced, what type of containers would you prefer?

Metal dustbins   []   Plastic dustbins   []   Plastic or nylon bags []

Other_____ o Are you willing to pay for waste management services? Yes [] No [] o If No, why are you unwilling?

Object to pay   []   unable to pay []   object and unable to pay   []

o   What is your reason for not being willing to pay a fee to cover the full cost of a waste collection service?

   a. Can't afford to pay for the full cost

   b. Don''t believe that the service will be reliable

   c. Don't consider the service important enough to pay for

   d. Believe that general taxes should cover the cost of this service

o

o If Yes, How willing are you to pay for waste management services? very willing [ ]

moderately willing [ ] less willing [ ]

What is the maximum fee per month that your establishment would be prepared to pay for your preferred method of collection of waste per month in cedis?_____

o If your preferred collection method were introduced, how frequent would you like your container to be taken out to be emptied?

Daily [ ] Three times a week [ ] Twice a week [ ] once a week [ ]

o If you are willing to pay for a collection service, whom would you prefer to provide the service to you?

The local government [ ] A private company [ ] There is no difference [ ] o If you were willing to pay for a collection service, to whom would you prefer to pay the fee?

a. To a government fee collector

b. To a fee collector working for a private company

c. They are all equally suitable

SECTION D: FACTORS THAT INFLUENCE UTILISATION

o What other factors may contribute to your willingness to pay for waste management services.

a. Quality of service

b. Proximity of establishment from collection site

c. Peer influence (d) cost of service o If there is need to seek your advice further, may we contact you again?

Yes [ ] No [ ] Don"t know [ ]