PUBLIC SATISFACTION TOWARDS MUNICIPAL SOLID WASTE COLLECTION SERVICES IN HO MUNICIPALITY, GHANA

BY

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DECLARATION

I, hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor

material which to a substantial extent has been accepted for the award of any other degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgment is made in the thesis.

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ABSTRACT

Solid waste management has been one of the most crucial issues facing authorities in fastgrowing cities in developing countries. This research assessed public satisfaction towards municipal solid waste collection services in Ho Municipality, the capital of Volta Region of

Ghana. The study gathered data through questionnaire administration, interviews and observation. The findings from the study indicated that, 56.5% and 32.5% of the respondents rated the quality of service as "Good" for the door-to-door and communal collection services, respectively. This suggests that the clients of door to door solid waste collection services managed by a private company were more satisfied than patrons of the communal container collection system. There was significant association among demographic characteristics/satisfaction determinants and service indicators of public satisfaction towards the quality of service ($p \leq 0.05$) for both the door-to-door and communal container collection services. Age, educational level and overflow of containers with waste were the factors that determined patrons' willingness to pay for the door-to-door collection services. With these factors, about 68% of the patrons of communal container collection services were willing to pay in order to have the door-to-door waste collection services at their premises. Lifting frequency, provision of bins, bins overflowing with waste, and safety at the container sites were the main drivers that influence the public satisfaction towards waste collection services in Ho Municipality. Generally, residents were "moderately satisfied" with the waste collection services rendered by both private waste management company and the Municipal Assembly. This indicates a relatively acceptable level of waste collection service. Waste collectors need to increase their lifting frequency to curtail overflowing bins and improve safety conditions at the communal container sites for enhanced satisfaction towards the quality of service of the public. This could be achieved when adequate resources are allocated for solid waste management.

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LIST OF ABBREVIATIONS AND ACRONYMS

CAC	Command and Control Instruments
EIs	Economic Instruments
GNP	Gross National Product
HH	Household
HMA	Ho Municipal Assembly
JHS	Junior High School
MMDAs	Metropolitan Municipal and District Assemblies
MSW	Municipal Solid Waste
PAYD	Pay as you dump
PPE's	Personal Protective Equipment
PPP	Public Private Partnership
UNEP	United Nations Environment Programme
US	United States
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WMD	Waste Management Department

DEDICATION

To my lovely wife, Mrs. Susana Larbi-Tettey and family.

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God richly bless you all.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Waste is anything that has outlived its expected need and is being disposed of or put away, preceding being disposed. As a result, there is no human action that does not result in waste generation (Abdulai, 2011). All survival, life change and formative activities run with the creation of one kind of waste or the other. This reality demonstrates that waste is everybody's business and all endeavours must guarantee its collection, transfer, treatment, recovery and disposal. Solid waste can likewise be portrayed as any material which comes from local, business, and modern sources emerging from human endeavours and has no incentive to individuals who have it and is to be disposed of as useless. The management of waste is an exceptionally fundamental part of environmental sanitation since it has general wellbeing and natural preservation concerns.

In time past, the disposal of waste was not much trouble due to the availability of land for a few human populations, unlike these days where the population has overgrown and land is scarce for proper disposal of waste. Waste disposal has therefore become a problem for urban areas where individuals are in search for occupations and livelihoods (Ofoli and Quarcoo, 2014). The management of solid waste standout amongst the most vital issues confronting authorities in rapidly developing urban areas of developing countries. In developing countries for example, solid waste is viewed as the second most imperative environmental concern, aside from water quality as expressed by the World Health Organization (Puopiel, 2010).

The public sector has been in-charge of managing waste in most cities and towns in developing countries in Africa. This has largely been deemed as source of the problems faced in the control of solid waste (Obirih-Opareh and Post, 2002). The public sector generally is constrained by lack of good managerial output, logistics, technological knowhow, bureaucratic procurement processes and lack of funds (Amoah and Kosoe, 2014; Sager, 2011). These constraints have brought about an increased enthusiasm for private public partnership in urban solid waste management in many developing nations with the goal of enhancing waste collection, decreasing expenses and improving the efficiency in waste collection in public places (Akaateba et al., 2013). Currently in the Ho Municipality, waste management is a shared responsibility between the Local Authority and a private waste management company. The private waste management company is in charge of collection and disposal of about 80% of the waste generated in the Township (HMA, 2015). The remaining 20% is indiscriminately disposed in crude dumping and burnt openly

Obirih-Opareh (2002) in assessing the performance of solid waste collection in Accra, Ghana by private companies uncovered that private interest in refuse collection has profited the public in terms of dealing with a bigger area and service dependability. In surveying the adequacy of the tasks of the public and private elements in refuse handling in Kampala, Uganda, it was discovered that the private entity was more successful in solid waste management with more clients' satisfaction in contrast with areas where the public entity works (Katusiimeh et al., 2012). They however contented that customers of both public and private sectors viewed the issue of solid waste to be intense and that the handling of waste is still a huge concern for many individuals even with the involvement and numerous

investments of the private sector. However, with most studies on solid waste management being conducted in the Northern and Southern Regions of Ghana, with virtually none done in the Eastern part of the country, there is the need to conduct this study to provide some information about waste management situation in the Eastern part of the country. The focus of this study therefore was to assess households and the general public's satisfaction towards the services of waste collection by the private waste management company in conjunction with the Municipal Assembly, in controlling solid waste within the Ho Township, the administrative seat of Volta Region of Ghana.

1.2 Problem Statement

Literature indicates that, in the two most populated cities in Ghana (Accra and Kumasi), more than 3,000 tons of solid waste is generated on a day by day basis with approximately 2/3 being managed (Addaney and Oppong, 2015; Monney, 2013). In Tamale, Puopiel (2010) inferred exclusively that, 1/3 of the 810 tons of waste produced daily is managed. This points to the fact that difficulties still exist despite the numerous interventions made by private sector in collecting waste in the country to aid government interventions. The circumstance in the Ho Municipality may not be distinctive in light of the studies done in the three largest cities in Ghana. Improper waste collection and disposal is causing a public health issue in the Municipality with high occurrence of ailments, for example, cholera, intestinal sickness and so forth (HMA, 2015).

Comprehensively, the wellbeing of an individual suggests a sound personality in a sound body in a sound environment. These make the social prosperity and the environment of the individual a noteworthy contributory factor to his/her wellbeing. At a point when waste is

inappropriately disposed or left in the environment unattended to, it makes the general population disappointed and dissatisfied in the collection and disposal services. This negatively thereby influence them and therefore their unwillingness to contribute towards managing waste (Awunyo-Vitor et al., 2013). In this way, waste generated must be appropriately collected and disposed of so as not to jeopardize the environment and threaten the existence of man. These persistent problems of wastes left unattended to in the environment and open spaces and with some refuse containers overflowing with wastes in many communities have necessitated this study to determine the general population satisfaction level towards waste collection services.

1.3 Significance of the Study

Previously, interest groups, governmental and non-governmental organizations teamed up to identify solutions for the aimless disposal of solid waste in our immediate environment. Decisions arrived at were numerous, yet they settled on public private partnership (PPP) and to some degree, pay as you dump (PAYD) principles which entreats people to pay when they go to dump their waste into communal containers. However, the public (individuals in the communities) do not see the motivation behind paying before they can dump their waste into a public container and subsequently resort to dispose of their waste indiscriminately. The World Health Organization in its 2001 report about macroeconomics and health underscored the fact that the weight of the numerous ailments in sub-Saharan Africa had a conspicuous obstruction to human improvement and financial development

(Monney, 2013).

It ought to be noticed that plans for development and improvements in the standard of living can't be made whole if matters concerning waste management and sanitation get next to no consideration and swept under the carpet by individuals, policy planners, politicians and government officials. Better solid waste management and a sound environment might be one of the major and less expensive approaches to social protection and greater wellbeing and prolonged life. This study therefore seeks to provide the premise for the formulation of effective waste collection and disposal services. Also, it will provide the opportunity for service providers and patrons to identify their specific roles in waste gathering and discarding. The service providers would be aware of the service indicators that influence the public satisfaction levels and improve upon them for the public to be satisfied with their services and be willing to pay for it.

Since keeping old customers cost less than finding new ones, it is therefore very important for service providers to know the public satisfaction towards their services. This knowledge would enable the service providers identify practices which drive customers satisfaction. If one customer is not satisfied, he/she might tell colleagues, friends, family members about the poor deeds of the company. This might lead to loss of customers and revenue as well. When such situation occurs, the service provider would have to spend money to re-brand the company and to advertise for new customers. This could have been avoided if the company had taken the pain in determining the satisfaction levels of its customers and to address its shortfalls. When customers are satisfied, they develop loyalty and trust towards the service provider and as such introduce others to the brand at no cost to the service provider. Aleman et al. (2017) reports that when public agencies are aware of the satisfaction levels of their

clients, it enables the agency raise the level of satisfaction of the public and thereby gain their trust.

1.4 Study Objectives

The general objective of the study was to evaluate the public perception towards municipal solid waste (MSW) collection services in the Ho Municipality.

Specific objectives of the study were to:

1. Determine the perceived satisfaction level of clients of door-to-door solid waste collection services.
2. Determine the perceived satisfaction level of patrons of communal container collection services.
3. Assess the factors contributing to willingness to pay for waste collection services.

1.5 Research Questions

The following were the questions that the study sought to answer\:

1. Which demographic characteristics and satisfaction determinants have significant association with service indicators of the door-to-door and communal waste collection services?
2. What are the effects of satisfaction determinants and services indicators on satisfaction levels of the public on door-to-door and communal waste collection services?

3. Which service indicators predict the public's willingness to pay for door-to-door waste collection service?

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

According to Wilson et al. (2006), waste is 'anything which is no more useful and should be disposed'. An item is considered to be waste when it has finished serving its purpose or no longer serve the intended purpose. Basically, there is no human activity that does not result in waste generation. From the inception of productions, waste is generated till products are

no longer useful and must be disposed. The accumulation of the generated waste without proper handling in the immediate environment is what must be of great concern to man. Adewole (2014) categorized waste according to the three states of matter thus solid waste, liquid waste and gaseous. Be that as it may, with the study objectives, consideration is being given to solid waste and its management.

2.2 Solid Waste Management

Population size is a major factor that influences the management of solid waste. The mere volume and quantity of waste generated is however not the main problem but the consequences afterwards. Contamination of surface water and groundwater sources and the breeding of vectors and pest which spread diseases and other nuisances are the major reasons for managing waste (Abdulia, 2011). These related problems of solid waste management in our present society are complex as a result of the amount and waste type generated. The advancement of urban sprawl zones, the financing constraints for public management in numerous substantial urban communities, the effects of innovation, and the rising demands on both energy and raw materials complicate waste management.

However, if proper solid waste management practice is to be achieved in an effective and methodical way, then the major perspectives and connections included should be recognized, balanced to ensure consistency and clear understanding of outcome (Takele, 2004).

The terminology of solid waste management has been looked at distinctively by different scholars as cited by Puopiel (2010), characterized solid waste management as "the organization of activities that accommodate the accumulation, sorting, storage,

transportation, transfer, processing, treatment, and disposal of waste". However, Tchobanoglous et al. (1993) give a comprehensive meaning of solid waste management as the "discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes".

Waste management activities differ from advance nations to developing nations, from city to rural areas, and residential to industrial users (Adewole, 2014). The activities required for managing solid waste from "cradle to grave" are segmented into several workable components: waste generation; on site handling, storage and processing; collection; transfer and transport; processing and recovery; and disposal. The implication is that the generated waste, it is initially dumped into bins then finally dumped at the final disposal sites. Additionally, when waste is gathered it can very well be transported by smaller haulage trucks to larger haulage trucks for final disposal. The total municipal solid waste (MSW) generated internationally was 2.02 billion tons, representing a yearly increase of 7% from 2003 up to date. In the United States of America, yearly MSW generation had consistently expanded from 88 million tons in 1960, to 243 million tons in 2009.

2.2.1 Waste Generation

A standout amongst the prominent parameters controlling solid waste is the rate at which waste is produced. Usually, to evaluate the amount of solid waste that will be generated in a community, knowing the category of waste to be generated is very important in order to

determine its appropriate management practices. Different assets recommend that there is a strong relationship between per capita Gross National Product (GNP) and the per capita waste generation of a nation (Mines, 2014). Refuse generation has grown relentlessly since the 1960s, however demonstrated a decrease in 2007, which was related to the slowdown of the US economy. Material recovery for recycling and compositing were generally irrelevant all through the 1970s. The contrast between generation and disposal mirrors the recovery and recycling activities. As indicated by the United Nations Environment Program (UNEP), Accra with a population of roughly 4.3 million as of 2010 census generates about 900,000 metric tons of waste every year, around 67% being organic waste (Mines 2014). The average per capita household waste generation rate got for metropolitan urban areas in Ghana was 0.47 kg, with the exception of Tamale which was 0.72 kg (Miezah et al., 2015).

2.2.2 Storage

Puopiel (2010) explains storage to mean the putting away of an unwanted material prior to its collection. It can be put away into receptacles or bins and not disposed of aimlessly. From his indication, storage is of significance in view of the natural consideration of the environment. According to Takele (2004), the handling, storage and processing of solid waste at the point of generation prior to gathering is ranked 2nd out of the six practical components in the solid waste controlling framework. These sub components have significant effects on the characteristics of waste, on subsequent practical components on public health and on public attitudes concerning the operation of the waste management framework.

Monney (2013) classified the storage system of solid waste into two; primary collection gathering framework, where waste generated on daily basis is stored at the premises before it is collected; and the public collection framework, where waste stored at the premises has amassed to specific amounts, are deposited into nearby communal containers. In controlling of solid waste before it is dumped into bins or receptacles prior to collection, some handling processes need to be initiated prior, during or after storage. These processes are termed by Takele (2004) as the source control techniques, which are; differentiating, cutting into pieces, milling and composting.

Generally, there are some protocols which need to be observed when it comes to the storage of solid waste. These are; nature of receptacles to be used, the position it would be placed at, public health, the collection technique and frequency of lifting. Waste generated in the cooking areas and other working areas should be gathered and stored in appropriately manufactured water-proof dustbins. These bins could be made from galvanized iron sheet or plastic materials, with tight fitting covers that can be lifted effortlessly by an individual (Monney, 2013). It should be placed at a shady area and on a platform some few meters above ground level. Monney (2013) additionally made the claim that, in the design of bins for primary storage of waste, particularly for households, the accompanying components should be considered; family size (household size), generation rate, bulk density, material density, labour capacity of lifting and offloading, area and volumes of geometrical shapes, frequency of collection, additional volume (factor of safety), practical size and stable shape, lids and handle, local materials and acceptable colour.

Storage bins can be classified as movable bins and immovable bins. Monney (2013) explained the types by saying immovable containers are stationary facilities for the storage of waste and are usually made of wooden or metallic screens, examples are; enclosures, depots and hatched storage bins, while movable containers can be moved from one point to another or tilted to dispose of waste from them. The movable containers are adaptable in transportation yet ailing in toughness, while the immovable containers are more solid, however their positions can't be changed once they have been built and introduced. Basement and outdoor storage locations are systems used in storing waste in low to medium rise apartments. Basement storage involves the provision of an area in the apartment for storage of waste (Tchobanoglous et al., 1993) where different types

(recycling and solid waste containers) of containers are position and occupants carry their waste to the storage area and deposit it into the corresponding container for onward collection by the maintenance staff. However, the outdoor storage involves the provision of large containers outside in a special enclosure for storing waste. Occupants of the apartment carry their waste and deposit it into the containers marked as recycling and solid waste. Collection vehicles equipped with loading and unloading mechanisms comes along to empty it or the maintenance staff would move the containers to the collection areas for onward collection.

2.2.3 Collection

The removal of waste from place of generation to final disposal site is what is referred to as waste collection. The gathering component incorporates not only the gathering of solid waste, but also the transporting of waste after collection to the place where it would be

emptied (Puopiel, 2010). Collection of waste generally takes place by loading from the storage containers unto a vehicle, e.g. hand-cart (simple), donkey-cart (complex), tractor with trailer (sophisticated), lorry or special garbage truck (Adewole, 2014). According to Takele (2004), it is the most costly aspect of solid waste management as opposed to operation and management procedures, because it requires exceptional equipment and technical individuals to oversee, workers, equipment, and additional funds for fuel, compensation and upkeep. Collection cost has been evaluated to represent 50 to 80% of the combined expenses of controlling solid waste considering the type of disposal facility to be employed. Indicating that if the techniques employed is enhanced there will be huge turnover in the estimated prize for the technique. Monney (2013) indicated that, in developing countries, it is the responsibility of households to convey waste to the communal bin due to lack of funds. He went further to give four collection types which were; communal, block, kerbside and door-to-door collection systems.

- **Door-to-door**: crew entering the premises and take out waste bags or containers from a compartment, empty it into a haulage vehicle. Containers are returned to the storage area.
- **Block collection**: vehicle travel a predetermined route and residents bring the waste to the vehicle as it arrives.
- **Kerbside collection**: closed containers are placed outside the house for collection on certain fixed days. Receptacles are sent back after emptying.
- **Communal collection**: communal container is placed at a focal point located in the community with a demarcated distance from a premise.

The lifting frequency of waste within a period of time (usually in a day or a week) depends on; size of storage container, generation rate of household, composition of waste, rate of decomposition of putrescible matter and the cost of collection (Monney 2013). The collection of waste from communal storage facilities and its transportation to the final disposal site involves picking up MSW from various sources; hauling to the emptying location; and emptying of the container, therefore, in high-income countries, primary collection of waste is a highly mechanized process using large vehicles thereby enhancing capacity and speed.

2.2.4 Waste Reduction, Reuse and Recycling

Strategies for waste reduction reuse and recycling are the favored choices when ranking waste management. There are numerous natural advantages that can be gotten from the utilization of these techniques. They decrease ozone depleting substance emission, decrease toxins, preserve assets, spare vitality and lessen the interest for squander treatment innovation and landfill space. (Wilson et al., 2006). Prevention of waste generation is achieved by strategy of waste reduction and reuse of products. It prevents the generation of waste at the source and prevents the need for much treatment facilities for disposal. Techniques for waste reduction include the production of items with fewer wrappings, motivating clients to use their own bags for packaging, giving incentives to the public by choosing the use of recycled products such as cloth napkins and reusable plastic and glass containers, encouraging individual household composting and giving out used material rather than discarding them.

Involvement of the public in the above mentioned methods is key and for that matter educational programmes and training must be organized for the public to indicate to them the part they would play to achieve the maximum outcome of the method. Moreover, mandatory standards need to be set for manufactures to reduce the quantity of packaging used for their products (Wilson et al., 2006). Recycling refers to the turning of used items into a resource that can be used for a new product. Initially, the waste is separated and recyclables are gathered and used to generate the new resources which are then used for a different product. The separation is usually done at the point of waste generation within individual houses for optional collection by agencies to recycle stations. Another option is to put everything together for collection and separation to be done by the agencies at the recycling stations. This option removes the reliance on the public and ensures that recycling actually takes place. The disadvantage of this option is that the quality of the recycled product is affected because of putting all generated waste together (Ambat, 2003). In the city of Yala in Southern Thailand, an innovation of controlling waste was proposed known as "Refuse for Eggs" through which the public would hand over their waste for eggs. The goal was to reduce the generation of waste in the communities and alleviate poverty among the poorer communities, thereby reducing the reliance on the local authority(Ambat, 2003).

2.2.5 Compositing

Compositing is the process of turning waste into manure just like nature reuses deteriorated natural things to enrich the soil. Anything that was once living will deteriorate. Fundamentally, fertilizing the soil with compost is speeding up of a similar procedure natural

process (Fei-Baffoe & Osei, 2016). The procedure of common disintegration is imperative to one sort of waste transfer. Fertilizing the soil is a type of waste transfer where natural waste decays normally under oxygen-rich conditions. Albeit all waste will in the end break down, just certain few waste materials are viewed as compostable and ought to be added to compost compartments. Sustenance of waste, for example, banana peels, animal waste, leaves, and eggshells are important things to compost. Adding meat items to compost ought to be maintained at strategic distance from on the grounds so that as it breaks down, it does not create any smell nuisance in the environment. According to FeiBaffoe and Osei (2016), in addition to reducing the quantity of waste for disposal, composting as a biological decomposition process degrades organic matter to achieve inorganic nutrients and stable material at the end. The Composting Council in 2000 identified some beneficial uses of compost:

- Supplies beneficial microorganisms to soil and growing media
- Improvement and stabilization of the soil pH
- Improves soil porosity and structure and density creating a conducive environment for roots.
- Improves growing media's ability to hold nutrients for plant use.
- Improves water holding capacity and reduces water loss and leaching in sandy soil.

2.2.6 Treatment and Incineration of Waste

Incineration is a treatment innovation which incorporates the ignition of waste for recouping vitality. Amid the procedure of burning, the waste material that is dealt with is changed over into gases, particles and warmth. These items are later utilized for usage as power. The gases,

vent gases are first treated for destruction of toxins before it is released into the atmosphere (Slocum, 2015). Among waste-to-energy technologies, incineration stands taller. Other advancements are gasification, anaerobic digestion and pyrolysis. Sometimes incineration is conducted without the reason for recovering energy. Previously, incineration was conducted without separating materials, thus causing harm to environment. This un-separated waste was not free from bulky and recyclable materials. This resulted in risk for the plant workers health and environment. Most of such plants and incinerations never generated electricity. Incineration reduces the mass of the waste to about 95%. This reduction depends upon the recovery degree and composition of materials. This indicates that burning does not eliminate the need for landfilling but it decreases the quantity to be disposed of (Slocum, 2015).

2.2.7 Disposal

Disposal is the definite destiny of all waste generated in the communities and transferred to the engineered disposal site (Puopiel, 2010). Per the Ho Municipal Assembly's Waste Management Plan, the current disposal system in the Municipality consists of a normal refuse dump with little or no monitoring where waste is generally thrown at the site without any control compaction or covering. Hai et al. (2005) wrote that in Dhaka City, the household, commercial and industrial wastes are disposed from the source into collection bins located on the streets where in some areas, demountable containers are used for onsite storage of municipal solid waste and in cases where there are no bins, waste is simply dumped on the ground. Due to the lack of control, at the final disposal site, the ability of the site to receive more waste is gradually but steadily being used up. This indicates the improvement of systems for collection but not catering for the disposal site. Consequently,

activities at the final disposal site must be controlled daily to efficiently use the available space and eliminate environmental hazards.

2.3 Constraints Facing Solid Waste Management

Population growth and increases in the living standards have contributed to the type and quantity of solid waste to increase dramatically. This has however disabled the solid waste management systems which are visible through the unsightly heaps of waste along streets, drains, ditches, canals and open space in the communities (Babanawo, 2006). The lack of any scientific study on solid waste issues has left communities with no proper strategy for militating the problem. Any concept for controlling waste is faced with a number of issues made up of limited area of operation, irregular lifting frequencies, combustion of waste and its pollution problem (Ogawa, 2005) which are classified into technical, financial, institutional and social constraints which militate against the successful running of all solid waste management protocols.

2.3.1 Technical Constraints

There is lack of human resources to manage waste in most developing countries, particularly at the national and rural levels. The few available do not have the required expertise to tackle issues regarding waste management (Puopiel, 2010). Due to these uncertainties, authorities are not up to scratch with plans to achieving and avoiding unfavorable environmental hazards and may end up choosing the wrong approach and incurring high cost in trying to tackle the waste problems (Monney, 2013). Waste management operations requires knowledge in both an engineering and management and due to the lack of experts in this

field, officials find themselves ill-equipped in plan operations which can meet current trends and tackle the problem at the root. In cases where remediation options are to be chosen, due to the lack of expertise wrong choices are made thereby leading to financial loss.

2.3.2 Financial Constraints

Solid waste management is given a low attention in most communities, with just a few bigger cities receiving some substantial attention. Subsequently, exceptionally restricted funds are allocated for in managing solid waste by the local authorities, and the levels of service required to be achieved in ensuring public safety and environmental excellence is defeated (Ogawa, 2005). The weakness of the financial muscles of local government authority complies it to institute taxations program which is inadequately in generating enough revenue, thereby rendering them powerless in controlling solid waste. This frail monetary premise of local government authorities can be supplemented by collecting charges on goods and services. Be that as it may, clients' ability to pay for the controlling of waste is constrained in poorer developing nations, and their readiness to pay for the collection services is sporadic and inadequate

2.3.3 Institutional Constraints

Usually, participation by government organizations is at a minimal in managing waste at the national level. Roles and duties are not properly spelt out to the organizations concerning control of solid waste with no single body to serve as conduit for programs (Ogawa, 2005). As a result, different organizations connect with international organizations to work on some programs on solid waste due to the inability of the local organizations to network with each

other in handling waste issues locally, leading to duplication of programs. In the end, programs duplicated cause financial loss and wastage of resources.

2.4 Challenges of Solid Waste Management in Ghana

One of the important environmental issues confronting managers in developing economies is the control of solid waste. Issues relating to the control of waste in Africa has been graded the second most crucial environmental health concern, excluding water wholesomeness as indicated by the World Health Organization (Zerbock, 2003). Local government authorities find it extremely hard in handling huge amount of waste produced on a daily basis. This comes about as a result of the populace engaging in crude dumping as the only available way of getting rid of waste from individual premises leading to accumulation of waste in the streets (Puopiel, 2010). Available records in Ghana portrays the fact that some quantity of generated solid waste are not attended to, thereby ending up in unauthorized places, threatening the health of mankind and the environment. These resultant effects include flooding, water pollution, and the spread of diseases and unsightly huge collection of solid waste with its associated foul odour in some parts of urban areas
(Puopiel, 2010; Monney, 2013).

Three thousand (3000) tons of waste is produced daily in Accra and Kumasi, (Anomanyo, 2004; Monney, 2013). But nearly 70% of it is really collected for disposal. With only 27% of waste generated daily in Tamale being collected (Puopiel, 2010), these data points to the fact that some demanding situation still exist in the collection of waste operations in the country despite the numerous intervention from government and individuals in tackling these

situations. Oduro-Kwarteng (2011) noted that collection of waste operations in Ghana are in three distinct folds, thus; kerbside, Door-to-door and public ways of collecting solid waste. The choice for a particular area depends on the wages level of individuals in the area, the specific housing stock in the area and the operational level of the service required. Whereas kerbside and door-to-door are usually operationalized in high wages areas, the opposite is said for the public way of collection.

Significant statistics shows the existence of differences between performance levels of services in these areas (Monney, 2013). Low performances are usually recorded mostly in low wage areas compared to high performance in high wage areas. These disparities in performances are due to the ability of the high wage areas to pay for the services delivered to them whereas the governments usually foot the bills for services in the low wage areas. Aside the lack of financial inputs in the waste management sector, Anomanyo (2004) noted that inadequate data on the amount and nature of waste generated in Ghana is an important factor in waste management. Furthermore, he pointed out the fact that some basic fundamental aspects of waste management such as reuse, recycling and treatment have not been properly incorporated into the mainstream waste management systems in Ghana, contributing to the huge challenges associated with the sector.

However, Tchobanoglous et al. (1993) indicated that the background knowledge on nature of waste generated is an integral part of any waste management process because it can aid authorities in planning for the best option in tackling waste management issues, including the choice of right equipment, facilities to be used. Different surveys in this area have been

centered on the northern and southern parts of the country (Accra, Kumasi, Tamale and Wa), where conditions (composition, generation rate, weather, population) widely vary from that of the Volta Region (precisely, the Ho Township). Against this background, this study seeks to assess the service level of the solid waste collection system in the Ho Township. The privatization of solid waste management collection activities has being actively pursued by Local Government Authorities in urban cities while the semi-rural areas are offering the traditional free social services through public and private sectors.

CHAPTER THREE
METHODOLOGY

3.1 Background of the Study Area

The study covered Ho Municipality, the capital of the Volta Region of Ghana (Figure 3.1). According to the Ghana Statistical service (2010), the Ho Municipal Assembly is one of the five municipal authorities in Volta Region which has boundaries with Adaklu and Agotime-Ziope Districts toward the south, Ho West District to the north and west and the Republic of Togo toward the east. Its aggregate land area is 2,361 square kilometres, representing 11.5 percent of the total land area of the region with population of 177,281 individuals. Ho is located at 6.6^0 North latitude, 0.47^0 East longitude and 154 meters high above sea level. The Ho Municipal Assembly has a housing capacity of 31,832, representing 8% of the aggregate housing stock in the Volta Region. The average household size is 5.6, with greater part of the masses being occupants. Over half (55.4%) of houses are compound houses; 31.9% are individual houses and 5.8% are semi-detached houses (Ho Municipal Assembly, 2015). The systems for solid waste collection in the Municipality are door-to-door and communal container collection services.

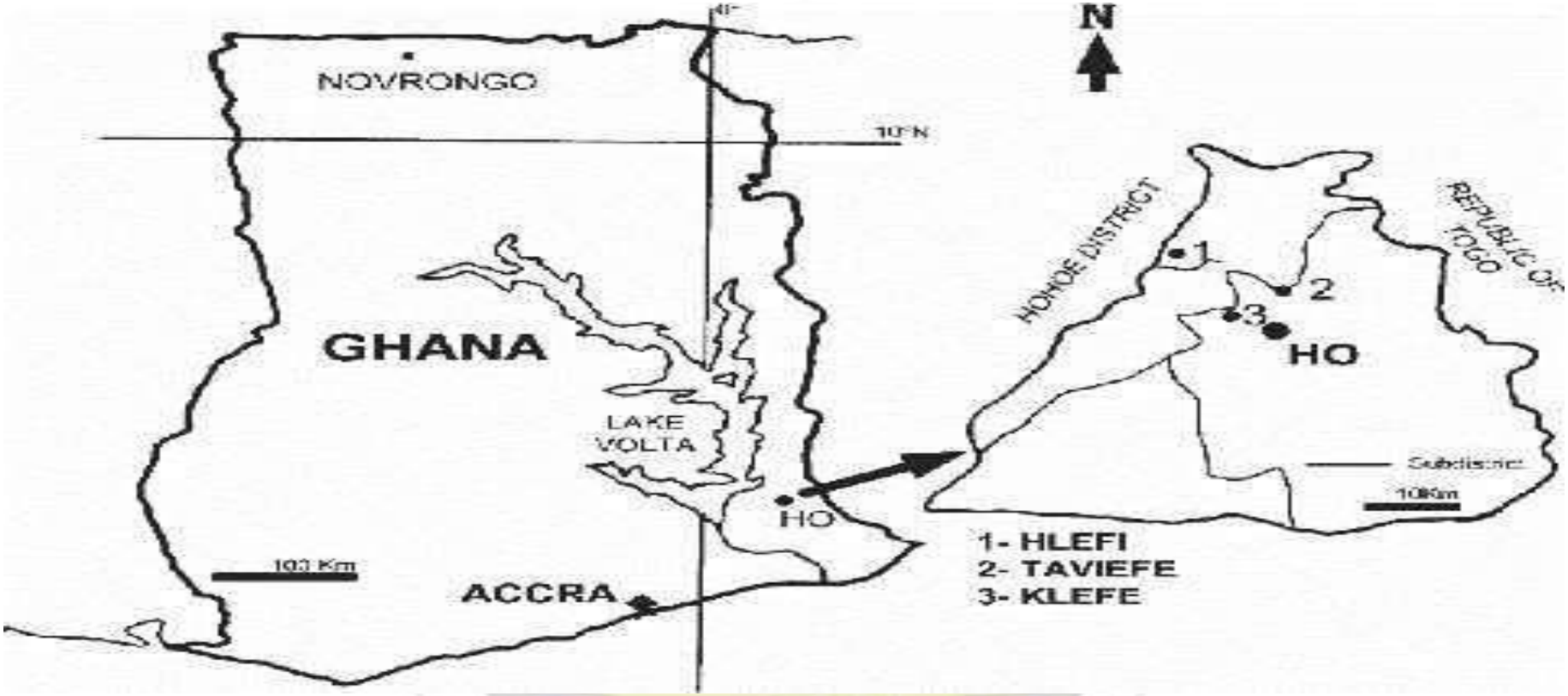

Figure 3.1: Map of Ghana, showing the study area

3.2 Research Design

A cross-sectional survey was utilized in convenience and purposive sampling techniques to administer questionnaires to respondents. As indicated by Monney (2013), dumping into communal containers is a common practice of refuse disposal in Wa. Regarding their study, about 71% of the respondents uses the publicly placed receptacles designated areas in the locality whiles 22% use door-to-door mode of waste collection. About 79.2% of the respondents in the urban area of Sunyani discarded their waste at transfer stations (communal container sites) while a couple of others (13.3%) utilize bins provided by the private waste management company (Aforo, 2010) on an examination conducted in Sunyani Municipality. In view of these realities and anticipating estimates to suit current circumstances, out of the 400 sample size estimated for the study, 200 focused on clients of the door-to-door mode of collecting waste rendered by the waste management company, with the remaining (200 questionnaire) directed at patrons of the skip container sites within the Ho Municipality.

3.3 Sampling Procedure

Convenience and purposive sampling procedures were utilized in selecting respondents for the study. Houses in the different communities which have subscribed to the door-to-door solid waste collection services in the Ho Municipality were chosen. The communities comprised of the following: Bankoe Area, Dome Area, SokodeEtoe Area, SokodeGbogame Area, Voradep Village Area, Medical Village Area, Trafaga Area, Market Area, Police Barracks Area and SSNIT Flat Area.

3.3.1 Convenience Sampling Technique

Since one of the research goals was to evaluate the services at the communal waste collection sites and to interview individuals from households who do dispose their waste at the communal collection sites in each community, the researcher chose respondents by meeting the initial 20 individuals who came to dump waste at the communal collection site in each selected community. In the event that individual reached was not willing or prepared to answer the questionnaires, the next accessible individual was contacted.

3.3.2 Purposive Sampling Technique

In adherence to the study objectives, persons who subscribed to door-to-door collection services in the municipality were selected. Also, people who were involved in waste disposal having the requisite information and knowledge about waste collection were interviewed.

3.4 Data Collection

The data collection was by administering of questionnaires and interviews. People who could read and write were handed with the questionnaires to answer, while those who could not read and write were assisted. Prior to the main survey, a pre-test survey was carried out in June, 2018. The pre-test was conducted by using 15 questionnaires with respondents selected randomly so as to check for correct wording, accuracy and to remove any errors or ambiguity in the questions before conducting the main field and interview surveys. The main survey was conducted during the dry season from March, 2018 to July,

2018.

3.4.1 Field Survey

The field observation involved exploring the study area to assess the following.

Communal container or skip container sites and skip containers in the approved zones of the study area.

A formal contact was made with the Ho Municipal Assembly-Waste Management Department and also the private waste management company.

Observations were on stacks of solid waste in skips containers and dust bins overflowing which aided in the survey questions formulation.

3.4.2 Interview Survey

Individual houses information was gathered through administering of structured questionnaire. The major components that were dealt with included the demographic characteristics, mode of collection, services entailed in the mode of collection in a particular area, and factors which determines the respondents' satisfaction. The criteria for scoring the services rendered were:

1. Very poor (0-20%) indicating a level of "Very dissatisfied"
2. Poor (21-40%) indicating a level of "Dissatisfied"
3. Fair (41-60%) indicating a level of "Moderately Satisfied"
4. Good (61-80%) indicating a level of "Satisfied"
5. Excellent (81-100%) indicating a level of "Very satisfied".

3.5 Determination of Sample Size

A population figure of 177,281 was obtained from the Ho Municipal Assembly's Waste Management Plan (2010), representing the number of residents living in the Township.

Below is the equation used in determining the sample size;

$$\text{Formula:} \quad S = \left[\frac{N}{1+N(\alpha)_2}\right] \qquad \text{Eq. 1}$$

Where **S** = sample size, **N** = Population (177281) and α = error margin (5%) with a confidence level of 95%.

By substituting 177,281 and 0.05 into the formula:

$$\text{Formula:} \quad S = \frac{177281}{[1+177281\,(0.05)^2]}$$

$$S = 399.10$$

$$S \cong 400$$

Therefore, a population of 177281 gives an approximate sample size of four hundred (400).

3.6 Data Analysis

To eliminate errors, administered questionnaires were examined to check for completeness, accuracy and consistency of responses. Chi-square analysis and logistic regression were used to analyze the data.

3.6.1 Chi-square Analysis

Service indicators such as the lifting frequency, provision of bins, capacity of bins, monthly service charges, safety at the container site,practice when container is absent, practice during container overflow, condition of collection vehicles, attitude of collection crew, response to clients complaints were run against the demographic characteristics of respondents and the satisfaction determinants such as attitude of crew, neatness/use of

PPE's, reliability of the collection, timeliness of collection, sanitary condition around container, attitude of attendants at the container sites, response to complaints. This was done to determine the factors that contribute significantly to clients and patrons' satisfaction levels of the waste collection services rendered.

3.6.2 Logistic Regression

Ordinal logistic model was used to predict the effects of service indicators on the overall satisfaction levels of clients and patrons of the door-to-door and communal waste collection services respectively. Binary logistic model was employed to determine the service indicators affecting the willingness of patrons of the communal container services to pay in order to have the door-to-door services. Willingness to pay was defined as the preparedness (YES/NO) of a patron to pay for the door-to-door waste collection services.

"Yes" response to the question was interpreted as being willing to pay.

3.7 Description of Study Variables

Demographic Characteristics

This term dealt with the bio-data about the respondents involved in the study. The following were taken into consideration:

- Age of the respondent
- Educational background
- Household size
- Occupational status.

Service Indicators

These indicators were practically the daily activities undertaken during the service delivery either by the municipal assembly or the private waste management company. The following were also taken into consideration under the services indicators for door-to-door collection services and Communal collection services (Table 3.1).

Table 3.1: Service indicators of door-to-door and communal collection services

Door-to-door service indicators	**Communal collection service indicators**
Lifting frequency	Lifting frequency
Provision of bins	Practice when container is absent
Capacity of bins	Practice during container overflow
Crude dumping	
Replacement of bins	
Over-flow of waste	
Monthly service charge	

Satisfaction Determinants

These are the factors that influence the respondents' satisfaction levels of the services rendered to them. The following were considered:

Table 3.2: Satisfaction determinants of door-to-door collection services

Door-to-door satisfaction determinants	Communal collection satisfaction determinants
Reliability	Timeliness of collection
Neatness / use of PPEs	Sanitary condition around container
Condition of vehicles	Attitude of site attendants
Attitude of crew	Response to complaints
Response to complaints	Overall satisfaction
Overall satisfaction	Safety at the container site

CHAPTER FOUR

RESULTS

4.1 Demographic Characteristics of Respondents

Table 4.1 presents the demographic attributes of the respondents. Regarding the age distribution, majority of the respondents (42%) who subscribed to the door-to-door collection services were between the age ranges of 35-44, 61 respondents representing 30.5% were between 25-34 years and few respondents (4.5%) were between 55 years and above. Concerning respondents who used the communal waste collection containers,

(38.5%) were between the age group 15-24years, 46 (23.0%) were between 25-34 years, 42 (21.0%) were between 35-44 years, 25 (12.5%) were between 45-54 years and 10 respondents, representing 5.0% were 55 years and above. For the educational level of the respondents, 1 respondent representing 0.5% whose waste was collected through door to door, had primary education, 28 respondents representing 14% had JHS education, 75(37.5%) had secondary education and 96 respondents representing 48% which was the majority, had tertiary education. For respondents whose waste was collected communally, 11(5.5%) had primary education, 45 respondents representing 22.5% had JHS education, majority, which was 97(48.5%), had secondary education and 47(23.5%) had tertiary education.

With regards to the household size, for those whose waste is collected by door to door, 16 respondents (8%) had a household size of 1, 21 respondents (10.5%) were 2 in a household, 29 respondents, 14.5% were 3 in a household, 55 respondents, 27.5% were 4 in a house and 79 respondents, representing 39.5% were 5 and above in a household. For those whose waste

was collected communally, 16 respondents representing 8% had a household size if 1, 26(13.0) were 2 in a house, 34(17.0%) were 3 in a house, 67(34.5%) were 4 in a household and 55 respondents representing 27.5% had a household size of 5 and above. The occupational status of respondents subscribed to the door-to-door services showed that most of the respondents (51.5%) had formal jobs, 72 respondents representing 36% had informal jobs and 25 respondents (12.5%) were unemployed. With patrons of the communal containers sites, 48 respondents representing 24% had formal occupations, 72 (36%) had informal jobs, while majority of the respondents (80) representing 40% were unemployed.

Table 4.1: Demographic characteristics of respondents

	Door-to-door		Communal	
	N	**%**	**N**	**%**
Age				
15 – 24	15	7.5	77	38.5
25 – 34	61	30.5	46	23.0
35 – 44	83	41.5	42	21.0
45 – 54	32	16.0	25	12.5
55 and above	9	4.5	10	5.0
Educational Level				
Primary	1	.5	11	5.5
Middle/JHS	28	14.0	45	22.5
Secondary/Technical	75	37.5	97	48.5
Tertiary	96	48.0	47	23.5
Household Size				
1	16	8.0	16	8.0
2	21	10.5	26	13.0
3	29	14.5	34	17.0
4	55	27.5	69	34.5
5 and above	79	39.5	55	27.5
Occupational Status				
Formal	103	51.5	48	24.0
Informal	72	36.0	72	36.0
Unemployed	25	12.5	80	40.0

4.2 Association of Demographic Characteristics and Satisfaction Determinants with Service Indicators of Door-to-Door Collection

The analysis revealed that the lifting frequency of the waste containers was significantly associated with satisfaction determinants such as neatness/use of PPE's and attitude of crew whiles provision of bins was significantly associated with the reliability of collection (Table 4.2). The age of the client had a significant association with the capacity of the collection bins. Reliability, attitude of the collection crew and response to client's complaints were also significantly associated with capacity of the bins used for the doorto-door services. The household size and occupation of the clients respectively had significant relationship with the replacement of bins when they break down. The condition of the collection vehicles, reliability of the collection services, and attitude of the collection crew towards the clients and the response of management to client's complaints

significantly affected replacement of bins.

The bins' overflow with wastes was significantly associated with the following demographic characteristics and satisfaction determinants: educational level, household size, occupational status, reliability of the collection, neatness of the collection crew, condition of the collection vehicles, attitude of the crew towards the clients and response to their complaints. Reliability of the collection time, the condition of the collection vehicles and the response to client's complaints were significantly associated with crude dumping practices. The age of the clients as well as the reliability of the collection time and attitude of the crew towards clients significantly affected monthly service charges.

Table 4.2: Association of demographic characteristics and satisfaction determinants with service indicators of Door-to-door waste collection services

Service Indicators	Demographic characteristics and satisfaction determinants	Chi-square value	P-value
Lifting frequency	Neatness/use of PPE	29.038	.004
	Attitude of crew	29.055	.024
Provision of bins	Reliability	95.519	.001
Capacity of bins	Age	220.166	.000
	Reliability	41.179	.001
	Attitude of crew	84.978	.000
	Response to complaints	39.198	.001
Replacement of bins	Age	154.714	.007
	Household size	94.547	.000
	Occupation	23.335	.001
	Reliability	54.063	.000
	Condition of vehicle	64.503	.000
	Attitude of crew	43.486	.000
	Response to complaints	40.397	.000
Overflow of waste	Education level	8.936	.026
	Household size	29.139	.023
	Occupation	7.874	.020
	Reliability	37.556	.000
	Neatness/use of PPE	29.456	.000
	Condition of vehicle	11.438	.022
	Attitude of crew	17.307	.002
	Response to complaints	21.703	.000
Crude dumping	Reliability	20.554	.008
	Condition of vehicle	19.913	.011
	Response to complaints	23.349	.003
Monthly service charge	Age	165.133	.001
	Reliability	41.122	.000
	Attitude of crew	21.920	.038

4.3 Perception of service quality of Clients of Door-to-Door Waste Collection Services

From Figure 4.1, 113 respondents of the door-to-door waste collection services, representing the majority (56.5%) rated the service rendered to them as "Good", 18% of the 200 respondents representing 36 people said the services was "Excellent". 5, 11 and 35 respondents representing 2.5%, 5.5% and 17.5% graded the services rendered to them as "Very poor", "Poor" and "Fair", respectively.

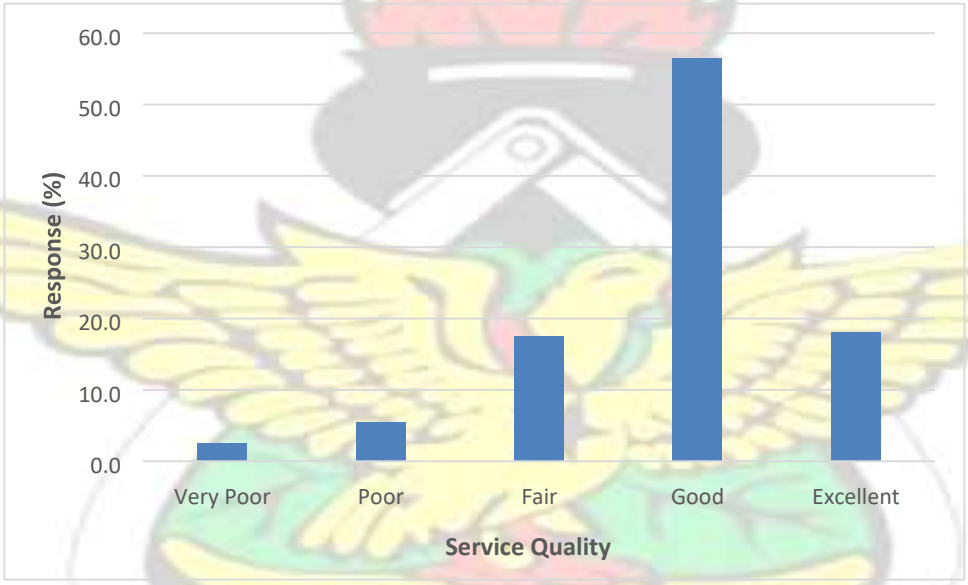

Figure 4.1: Perception of service quality of clients of door-to-door services

4.3.1 Effects of Satisfaction Determinants and Service Indicators on Satisfaction Levels of Clients of Door-to-Door Services

The findings from ordinal regression indicates that provision of bins ($p = 0.025$), waste overflowing containers ($p = 0.000$) and the practices of crude dumping ($p = 0.010$) were significant predictors of clients' overall satisfaction levels of the waste collection services

(Appendix II). With a chi-square value of 83.635, the logistic regression model was significant (p = 0.000) and explained about 38% of the variation in overall satisfaction of clients. With a chi-square value of 83.635, the practice of waste overflowing the containers significantly predicts the satisfaction level of the clients (p=.000). The provision of bins to clients was also found to be a significant predictor with the satisfaction level of the clients (p-value = 0.025).

4.4 Association of Demographic Characteristics and Satisfaction Determinants with Service Indicators of Communal Collection Services

Safety at the communal container sites was significantly associated with the age of users and occupational status of the respondents (Table 4.3). Again, safety at the communal container sites was significantly associated with timeliness of collection, sanitary condition around the container site (Plate 4.1), as well as the attitude of the site attendants. The age and occupational status as well as timeliness of collection, sanitary conditions at the site, attitude of attendants and response to complaints respectively had significant association with practices when container is absent at the site.

Table 4.3: Association of demographic characteristics and satisfaction determinants with service indicators of patrons of communal container services

Services indicators	Demographic characteristics and Satisfaction practices	Chi-square value	P-value
Safety at the container site	Age	92.081	.000
	Occupation	8.038	.018
	Timeliness of collection	35.872	.000
	Sanitary condition around container	10.561	.014
	Attitude of site attendants	18.928	.001
Practice when container is absent	Age	204.188	.000
	Occupation	23.400	.001
	Timeliness of collection	71.120	.000
	Sanitary condition around container	32.293	.000
	Attitude of site attendants	37.338	.000
	Response to complaints	29.549	.003
Practice during container overflow	Age	256.841	.000
	Occupation	19.776	.003
	Timeliness of collection	78.826	.000
	Sanitary condition around container	31.503	.000
	Attitude of site attendants	50.939	.000
	Response to complaints	34.473	.001

4.5 Perception of Services Quality at Communal Container Sites

From Figure 4.2, 3 respondents who use the communal waste collection container rated services rendered to them as “Excellent” representing 1.5%. 17(8.5%) respondents said the services were “Very Poor” while 30 respondents representing 15.0% indicated that the services were “Poor”. However, 85 and 65 respondents representing 42.5% and 32.5% indicated that the services rendered to them were “Fair” and “Good”, respectively.

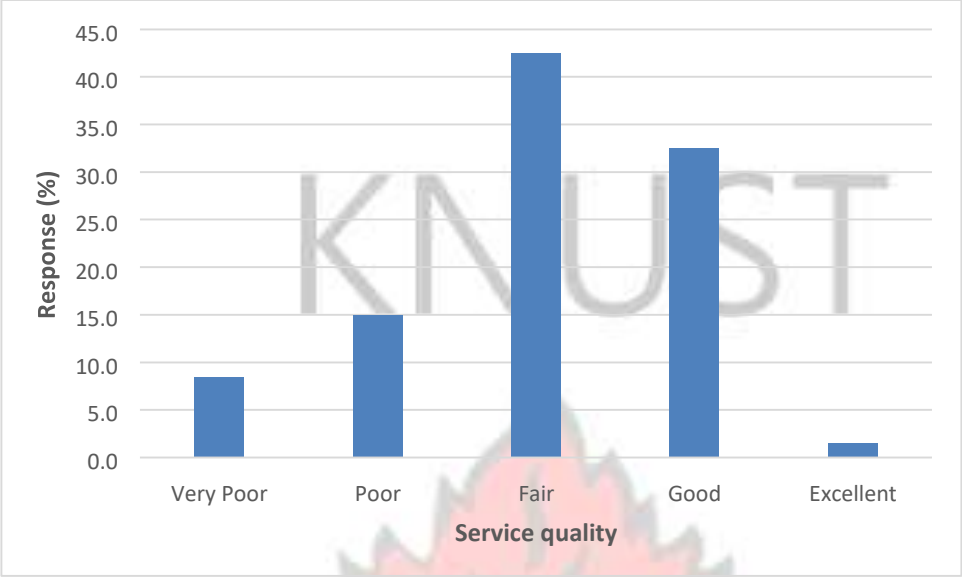

Figure 4.2: Perception of service quality of patrons of communal container sites

4.5.1 Effects of Satisfaction Determinants and Service Indicators on Satisfaction Levels of Patrons of Communal Container Sites Services

Safety at the container site (p = 0.000) was significant predictor of patrons' overall satisfaction levels of the communal container waste collection services rendered to them as shown in Appendix III. With a chi-square value of 20.298, from the logistic regression model was significant at p = 0.000 and explained about 97% of the variation in overall satisfaction of patrons.

Plate 4.1: Insanitary conditions at the communal container site

4.6 Determinants of Willingness to Pay for the Door-to-door Waste Collection Services

Majority of patrons who utilized the communal container collection service were willing to pay Twenty five Ghana cedis (GHc 25.00) per month for the door-to-door waste collection service (Figure 4.3). Binary logistic regression model was used to identify the factors that would significantly predict patrons' willingness to pay for the door-to-door waste collection services (Appendix IV).The finding revealed that the age, educational level, and container overflow were the factors that predicted patrons' willingness to pay.

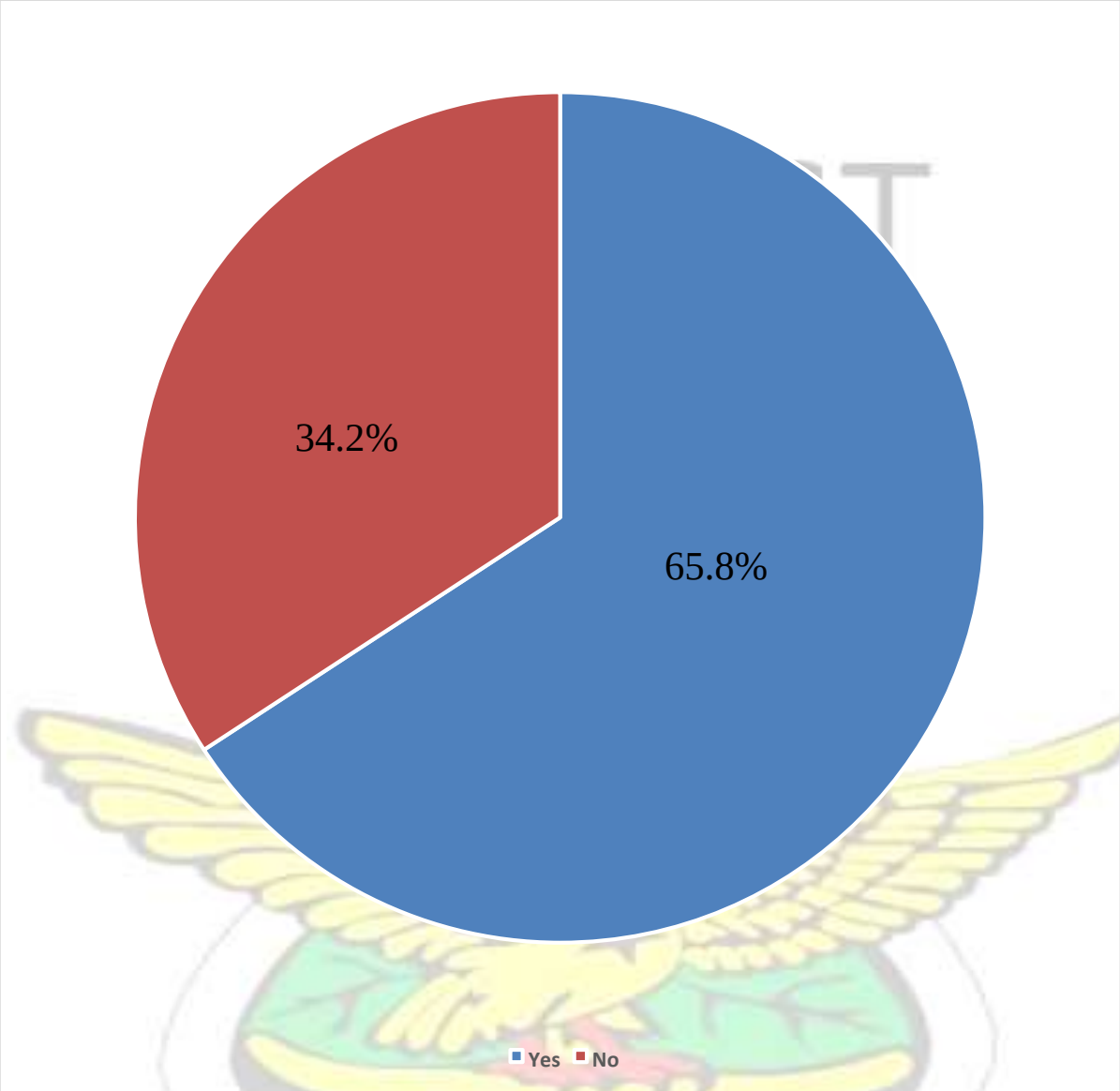

Figure 4.3: Willingness to pay for door-to-door collection service

CHAPTER FIVE

DISCUSSION OF FINDINGS 5.1 Demographic Characteristics of Respondents of Door-to-Door Services and

Communal Container Sites

Out of the total of 200 respondents interviewed for the door-to-door services, 30.5% and 41.5% were within the ranges of 25-34 and 35-44 years respectively, indicating that they

were within the working class and as such can afford to have the door-to-door waste collection service in their premises. The majority of respondents (38.5%) within the age range of 15-24 were responsible for the communal collection services. This implies that the young ones in most households are tasked to dispose of waste at the communal container sites.

A greater proportion of the respondents had attained a higher level of education, thus 48% of the 200 respondents have reached their tertiary level. With this educational qualification, one is likely to be gainfully employed. This is supported by Katusiimeh et al. (2012) that individual waste management firms prefer serving areas with a higher educational background. The reason assigned to this fact is that with their greater understanding of waste management practices, the highly educated individuals are much concerned with proper solid waste management and can also afford or be willing to pay for waste collection services provided by the private waste management company. The majority 48.5% of the respondents, who used the communal containers, had attained Secondary/Technical level of education.

Households with 4 and 5 people, representing 27.5% and 39.5% respectively for respondents of the Door-to-door collection services were the majority. Respondents of the communal container collection services also had majority households' size of 4 people. This is confirmed by GSS (2010) that Ho Municipality has an average household size of 4.Again, about 52% of the respondents for the door-to-door waste collection services were working in the formal sector. Katusiimeh et al. (2012) indicated that private waste management firms prefer to serve in the working-class areas due to their ability to pay for the services rendered.

Communal container sites recorded 40% of unemployed respondents, which is in accordance with the earlier findings that majority of their respondents had attained secondary/technical as their educational status.

5.2 Association of Demographic Characteristics and Satisfaction Determinants with Service Indicators of Door-to-Door Collection

In view of the public increasing demand these days for quality services, waste managers should continuously look out for ways to enhance customer satisfaction. The study assessed the factors that contribute to client's satisfaction of the door-to-door waste collection services delivered by the private waste collection company. The factors (satisfaction determinants) such as neatness of the collection crew members and their use of personal protective equipment during their service delivery had significant relationship with the lifting frequency of waste generated. Crew members with good attitude and welldressed have easier access to households and are not engaged in verbal exchanges with households. This increases the rate of the collection, hence increased lifting frequency. The good attitude of the collection crew shown during the lifting process further enhances clients' satisfaction levels with the service. These facts are corroborated by findings that customers are satisfied because of the lifting frequency of the waste reported by ObirihOpareh and Post (2002) and Katusiimeh et al. (2012).

The provision of storage containers had significant association with the reliability of collection service and this influences clients' satisfaction. It is therefore imperative for the company to ensure that they always provide clients with storage bins to enhance their

satisfaction levels. This is supported by Puopiel (2010), who indicated that waste generated on a daily basis in the households must be stored in waste bins (containers) to prevent indiscriminate disposal and to maintain the aesthetic beauty of the environment.

Table 4.2 indicated that the capacity of the storage bins was significantly associated with the reliability of the waste collection (p = .001); attitude of collection crew (p = .000) and response to client's complaints (p = .001). This indicates that managers of waste have to locate clients who generate more waste so as to provide them with storage container with the appropriate capacity to help store their waste. Also, those who generate less waste can be given smaller capacity bins so they can be charge the commensurate fees. This would influence their level of satisfaction since those who generate less would feel cheated, as paying the same amount with those who generate more because they are using the same capacity of containers.

The condition of the collection vehicles had significant relationship with replacement of bins. This is supported by Katusiimeh et al. (2012), who reported that customers of the private waste companies in Kampala were not satisfied because of the company's continuous use of rickety trucks in their operations which ends up polluting the streets and destroy their bins. From Table 4.2, container overflowing with waste had significant association with neatness/ use of PPE's, condition of collection vehicles which informed clients' satisfaction of the service. This confirms Akaateba et al. (2013) who indicated from their study in Wa that residents feedback showed that, they were largely satisfied with

services rendered to them as a result of the use of appropriate tools and equipment. The practice of crude dumping was significantly associated with the reliability of the waste collection service, the condition of the collection vehicles and management responses to clients' complaints. This practice lowers the client's satisfaction levels of the services rendered which confirms Hai et al. (2005) findings that, in Dhaka city, households simply dumped on the ground in cases where the bins are not available, trucks are down and containers are overflowing. Regarding monthly charges from the private company as a service indicator, it was significantly associated with the reliability of the collection which influences greatly clients' willingness to pay for the service.

5.3 Effects of Satisfaction Determinants and Services Indicators on Satisfaction Levels of Clients of Door-to-Door Collection

The collection services rendered by the private waste management company was largely rated as "Good" (56.5%) with just a few rating the service as "Very Poor" (2.5%). The reliability of the collection, neatness/ use of PPEs, condition of vehicles, attitude of crew towards clients and response of management to clients' complaints were the factors which influenced clients rating of the service. This confirms the conclusion made by Akaateba et al. (2013) that respondents were greatly satisfied with the services rendered by the private waste collection company.

Findings from the ordinal logistic regression (satisfaction determinants against satisfaction levels) revealed that provision of bins to clients for waste storage is a significant predictor of clients' satisfaction of the door-to-door service. This might be due to the fact that client

satisfaction is influenced by them having the requisite bins for storage of waste. Therefore, the private waste management company needs to continue providing bins to clients to maintain their satisfaction, as affirmed by Akaateba et al. (2013) that managers of waste need to provide containers to clients to enhance their satisfaction. Overflowing of containers with waste significantly influence clients' satisfaction levels (Appendix V). This might pave way for clients to resort to the practice of crude dumping, thereby causing unsightly conditions in the environment. The perception of service quality can further be enhanced if managers of waste in the MMDAs improve significantly the satisfaction determinants and service indicators.

5.4 Association of Demographic Characteristics and Satisfaction Determinants with Service Indicators of Communal Container Collection

The study assessed the factors that contribute to patrons' satisfaction of the communal container collection services delivered by the Ho Municipal Assembly. The factors (demographic characteristics and satisfaction determinants) such as the age and occupation of the patrons, the timeliness of collection, sanitary condition around the container sites, attitude of site attendants and response to complaints had significant association ($p \leq 0.05$) with the safety at the container site. If skip containers are lifted on time and it is not allowed to be overflowing with waste to create insanitary conditions at the site whereby patrons would have to walk through waste before they can dump into the container. Patrons would not be satisfied with such situation and such influence their satisfaction level in the use of the service.

5.5 Effects of Satisfaction Determinants and Service Indicators on Satisfaction Levels of Patrons of the Communal Container Collection

As at the time of survey, conditions at most of the communal container sites within the various communities in the township were unsafe for waste dumping, with the exception of those in the heart of the township. At some sites, heaps of solid wastes were on the floor with some overflowing containers. Though these factors could clearly drive citizens to dump waste indiscriminately, most patrons saw the need not to, therefore dumped their waste at the site to be cleared into the skip containers when they are emptied. It was also realized that, users at some communities had to travel long distances to dispose waste at the site. Despite this fact, respondents had varying degrees of satisfaction towards the service at the communal container sites. 30% rated the service as "Poor", while 8.5% rated the service "Very Poor". However, with a combined percentage of 76.5% thus (1.5%, 32.5% and 42.5%), patrons rate the service as "Excellent", "Good" and "Fair" indicating that most patrons were largely satisfied with the services at the communal container sites.

From the statistical analysis, only 1 out of the 3 parameters (i.e. safety at the communal container sites) significantly predicts the satisfaction levels of patrons (Appendix VI). This is in agreement with Yohannis (2018), who indicated that households were not satisfied with services of the Ho Municipal Assembly due to the insanitary conditions at the communal container sites. This can be attributed to the fact that if the sites are not safe enough for dumping, there could be associated health risks. This goes to prove that the assembly needs to ensure that the sites are safe with provision of staircase for patrons to have easy access to dump their waste into the containers. Further observations indicated that some patrons have created their own pathway in order to get access to the container to dump their waste. Some

container sites also had no staircase to aid in dumping which create an unsafe condition at the container site. The remaining two parameters, thus absence of the skip container at the site and skip container overflowing with waste had no significant effect on patrons' satisfaction at the 5% significance level. Thus users are satisfied provided they have a space to dump their waste.

5.6 Determinants of Willingness to Pay for the Door-to-door Waste Collection Services

Out of the 200 respondents of the communal container sites users contacted, 135 representing 67.8% were willing to pay to have the door-to-door waste collection services.

The factors that determined the outcome of patrons' willingness to pay for the service were age of the respondent, the educational level and the overflowing of skip containers with waste. The age had a significant effect on the patron willingness to pay because at an old age, walking a long distance to dump waste becomes a hectic duty and as such the individual would prefer his/her waste to be collected at the door step. Also, people in the working-group would have the ability to pay while the young ones will not be willing to pay for the services as a result being in school or not employed and for that matter are unable to pay for the service.

Educational attainment was another factor which had a significant effect on the willingness to pay to have household waste collected at their door step. This can be attributed to their enlightenment on good sanitary practices. This finding confirms Anomanyo (2004), who indicated that the door-to-door collection contractors' deals mostly with the higher education class who also live in high income areas. With a higher educated populace as confirmed by

the GSS (2010) after the population and housing census that out of 133,307 people of 12 years and above, 56.7% have had basic education in the Region. Higher educational levels therefore imply the ability of the individual to get employed and thereby have the ability to pay for the services. Furthermore, overflowing of containers with waste significantly affected the patrons' willingness to pay to have the door-to-door service. Patrons were willing to pay to have the door-to-door collection service due to the frequent overflow of the skip containers which creates insanitary conditions at the site as well as related safety issues. Also, as a result of their higher level of education, patrons are more inclined to contribute to waste management since they have the capacity to get good paying job which can aid them to pay for the service.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The demographic characteristics of respondents were assessed since the knowledge on this characteristic would aid in targeting educational programs by the Municipal authorities and other Non-Governmental Organizations (NGO's) to the appropriate group of people in the communities. The range of age for respondents was 15 to 70 years with the minimum of 11 and the maximum being 64 years. Conclusion can further be made from the study that the Municipality has a high class of an educated populace as 78.8% of the respondents had a form of education from the middle/JHS level to tertiary level. Regarding occupational status,

it can be concluded from the study that majority of the people leaving in the Ho Municipality work in the informal sector as 72% of the respondents indicated.

The following service indicators (lifting frequency, provision of bins, capacity of bins, replacement of bins, overflow of bins the practice of crude dumping and monthly service charge) had significant association with the demographic characteristics and satisfaction determinants at significance level of 5% for the door-to-door services. With about 38% variation of the overall satisfaction of clients, the ordinal regression model was significant implying that clients were moderately satisfied with the service. Communal collection service was rated as Fair by most patrons and reported that safety at the site, absence of the skip container and practices of crude dumping influence the choice of satisfaction levels. These service indicators had significant association with the demographic characteristics satisfaction determinants. About 78% of patrons were willing to pay to have the door-todoor services in their premises due to insecurity at the container sites and the frequent overflowing of the skip containers.

6. 2 Recommendations

The sustainability of any solid waste management system depends on several factors. However, the most important factor is the will of the community members to change the existing system and adopt a better way of dumping waste. In view of the findings of the study, the under listed recommendations are made in order to improve on the solid waste management practices in the Ho Municipality:

- An extra bin should be added to clients of the doo-to-door waste collection services whose dustbins keep overflowing before collection, to avoid the overflow of waste. Additional skips containers and new collection points should be provided and created by the Municipal Assembly for residents in the Township for waste storage. The skips should be placed at most 50 meters so as to reduce the distance from their premises to the skip container sites.
- Consistency of waste collection must be ensured by the private waste management company and the Waste Management Department of the Municipal Assembly, particularly in communities with skip container where waste generated outweighs the capacity of skips containers. This would help avoid heaping of waste and over flowing of containers.
- Adequate financing should be provided for waste managers to ensure effective and efficient management of waste. The Municipal Assembly should use more of its internally generated funds to support the agencies in the management of waste.

  Provision of enough equipment must be ensured for effective waste collection and disposal.
- Residents of the Municipality should be made much aware through education, mass media programs among others, about the need for good sanitation practices within their communities and to continue keeping the communities clean. Some users of the skip containers need to be educated to put a stop to the addition of hot ashes and embers to waste disposed at skip container sites, since they end up weakening the skip containers.

- A further study is recommended to determine the factors which prevented other patrons of the communal containers to subscribe to the door-to-door collection services.

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APPENDICES

APPENDIX I: STUDY QUESTIONNAIRE

The research is mainly for academic purpose. Therefore, answers given will be treated confidentially.
Thank you.

Location of Community: .....
Date of Interview: .....
Questionnaire Number: .....

Background Information

1. Age of respondent: .....
2. What is your highest level of education?
   [ ] None [ ] Primary [ ] Middle/J.S.S [ ] Secondary/Technical [ ] Tertiary
3. Household size: _____
4. What is your major Occupation? _____

Information on Waste Collection

1. What is the mode of collection of the waste at your area?
   [ ] Door-to-door [ ] Communal (skip container)

If DOOR TO DOOR, answer question below but if NOT skip to Question 19

2. How frequent is your solid waste collected**?**
   [ ] Thrice within a week [ ] twice within a week [ ] once within a week

3. Do you have a container for storage of solid waste? [ ] Yes [ ] No

4. What is the capacity of this container? ..... litres.

5. Who provided the container?
   [ ] WMD-Municipal Assembly [ ] Private Waste Company [ ] Personally

6. If not from personal funds, do they replace them when it breaks down?
   [ ] Yes [ ] No

7. Does the waste overflow the container before it is collected for disposal?
   [ ] Yes, all the time [ ] Yes, sometimes [ ] No

8. Due to overflow of waste in container, do you sometimes practice crude dumping?
   [ ] Yes [ ] No

9. How much do you pay for waste collection, in GH¢.....per month.

10. What is your opinion on cost of collection per month?
    [ ] Very expensive [ ] Expensive [ ] Economical [ ] Cheap

On a scale of 0-100%, rate the following practices pertaining to Door to Door solid waste collection.

1. **Very poor** (0 - 20%)
2. **Poor** (21-40%)
3. **Fair** (41-60%)
4. **Good** (61-80%)
5. **Excellent** (81-100%)

Practice **Response**

11. Reliability of solid waste collection
12. Neatness of collection crew/ use of PPEs
13. Condition of collection vehicles
14. Attitude of collection crew towards users
15. Response to user complaints *(If a user has complained to service provider before)*
16. Overall satisfaction to collection service rendered

17. Do you know the contact number of the waste management company in charge of door-to-door collection? [ ] Yes [ ] No

18. Would you like to continue your contract with them? [ ] Yes [ ] No

Why? _____

Solid waste collection at the communal skip container site

19. What is your perception on the location of skip container relative to your house?
    [ ] Too far [ ] Too near [ ] Okay
20. Is it safe to dump at the communal container site? [ ] Yes [ ] No

For those in charge of waste disposal at the household level

21. What do you do when

a) The skip container is not at the site as at time of dumping?
   [ ] Dump on ground [ ] Bring waste back home [ ] Dump waste elsewhere
   Any other: _____

b) Container is overflowing with waste?
   [ ] Dump on ground [ ] Bring waste back home [ ] Dump waste elsewhere
   Any other: _____

On a scale of 100%, rate the following practices pertaining to skip container solid waste collection.

1. **Very poor** (0 - 20%)
2. **Poor** (21-40%)
3. **Fair** (41-60%)
4. **Good** (61-80%)
5. **Excellent** (81-100%)

Practice	**Response**
22. Timeliness of collection of waste	
23. Sanitary conditions around skip container site	
24. Attitude of container site attendants towards you during dumping	
25. Response to user complaints by authorities	
26. Overall satisfaction to collection service rendered	

27. Would you be willing to pay to have the Door to Door waste collection system? [ ] Yes [ ] No

28. How much would you want to pay ..... per month?

Observation check list (only researcher) Access to container (staircase)

Condition of container

Safety at container site to users

Sanitary conditions at the container sites

Location of the container

APPENDIX II: EFFECTS OF SATISFACTION DETERMINANTS ON SATISFACTION LEVELS OF DOOR-TO-DOOR COLLECTION

		Estimate	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Threshold	[Overallsatisfactiontocollectionservicerendered = 0]	-3.046	1.437	1	.034	-5.863	-.230
	[Overallsatisfactiontocollectionservicerendered = 1]	-1.713	1.389	1	.217	-4.435	1.009
	[Overallsatisfactiontocollectionservicerendered = 2]	-.068	1.374	1	.960	-2.761	2.625
	[Overallsatisfactiontocollectionservicerendered = 3]	3.517	1.403	1	.012	.767	6.268
Location	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=0]	1.329	.497	1	.008	.355	2.304
	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=1]	.438	.512	1	.392	-.566	1.441
	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=2]	0[a]	.	0	.	.	.
	[Whoprovidedthecontainer=0]	.548	1.140	1	.631	-1.687	2.783
	[Whoprovidedthecontainer=1]	-.782	.339	1	.021	-1.445	-.118

[Whoprovidedthecontainer=2]	0[a]	.	0	.	.	.
[Howfrequentisyoursolidwastecollected=0]	.683	1.285	1	.595	-1.835	3.201
[Howfrequentisyoursolidwastecollected=1]	.025	1.425	1	.986	-2.768	2.818
[Howfrequentisyoursolidwastecollected=2]	-.668	1.624	1	.681	-3.852	2.516
[Howfrequentisyoursolidwastecollected=3]	-.234	1.293	1	.856	-2.768	2.299
[Howfrequentisyoursolidwastecollected=4]	0[a]	.	0	.	.	.
[Howoftenisyourcontainerreplaced=0]	-.372	.441	1	.399	-1.236	.492
[Howoftenisyourcontainerreplaced=1]	.783	.509	1	.124	-.214	1.780
[Howoftenisyourcontainerreplaced=2]	-.204	.512	1	.690	-1.208	.799
[Howoftenisyourcontainerreplaced=3]	0[a]	.	0	.	.	.
[Doesthewasteoverflowthecontainerbeforeitiscollectedfordisposal=0]	2.603	.434	1	.000	1.753	3.453
[Doesthewasteoverflowthecontainerbeforeitiscollectedfordisposal=1]	0[a]	.	0	.	.	.

APPENDIX III: EFFECTS OF SATISFACTION DETERMINANTS ON SATISFACTION LEVELS OF COMMUNAL COLLECTION

	Estimate	Std. Error	df	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
[Overallsatisfactiontocollectionservicerendered = 0]	-1.999	2.307	1	.386	-6.522	2.523
[Overallsatisfactiontocollectionservicerendered = 1]	-.705	2.299	1	.759	-5.211	3.801
[Overallsatisfactiontocollectionservicerendered = 2]	1.279	2.300	1	.578	-3.229	5.788
[Overallsatisfactiontocollectionservicerendered = 3]	4.883	2.373	1	.040	.232	9.534
[Isitsafetodumpatthecommunalcontainersite=0]	-1.615	.458	1	.000	-2.512	-.718
[Isitsafetodumpatthecommunalcontainersite=1]	0[a]	.	0	.	.	.
[WhatdoyoudowhenTheskip						

Threshold	containerisnotatthesiteasattimeofdumping=0]	3.081	3.187	1	.334	-3.165	9.328
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=1]	1.037	1.888	1	.583	-2.663	4.738
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=2]	.287	2.300	1	.901	-4.222	4.795
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=3]	.784	2.295	1	.733	-3.714	5.281
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=9]	0[a]	.	0	.	.	.
Location	[WhatdoyoudowhenContainerisoverflowingwithwaste=0]	-4.433	2.865	1	.122	-10.049	1.182
	[WhatdoyoudowhenContainerisoverflowingwithwaste=1]	.287	1.366	1	.834	-2.391	2.965
	[WhatdoyoudowhenContainerisoverflowingwithwaste=2]	.034	.465	1	.943	-.878	.945
	[WhatdoyoudowhenContainerisoverflowingwithwaste=3]	0[a]	.	0	.	.	.

APPENDIX IV: EFFECTS OF SATISFACTION DETERMINANTS ON SATISFACTION LEVELS OF COMMUNAL COLLECTION

	Estimate	Std. Error	df	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
[Overallsatisfactiontocollectionserviceendered = 0]	2.149	3.407	1	.528	-4.529	8.826
[Overallsatisfactiontocollectionserviceendered = 1]	3.690	3.408	1	.279	-2.990	10.370
[Overallsatisfactiontocollectionserviceendered = 2]	6.126	3.429	1	.074	-.595	12.847

Threshold	[Overallsatisfactiontocollectionservicerendered = 3]	10.052	3.495	1	.004	3.203	16.902
	AGE	.057	.022	1	.009	.014	.099
	[Isitsafetodumpatthecommunalcontainersite=0]	-1.889	.514	1	.000	-2.895	-.882
	[Isitsafetodumpatthecommunalcontainersite=1]	0a	.	0	.	.	.
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=0]	1.655	3.397	1	.626	-5.002	8.313
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=1]	.817	2.002	1	.683	-3.106	4.741
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=2]	-.425	2.489	1	.864	-5.303	4.452
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=3]	.120	2.484	1	.961	-4.749	4.989
	[WhatdoyoudowhenTheskipcontainerisnotatthesiteasattimeofdumping=9]	0a	.	0	.	.	.
Location	[WhatdoyoudowhenContainerisoverflowingwithwaste=0]	-5.697	3.039	1	.061	-11.653	.260
	[WhatdoyoudowhenContainerisoverflowingwithwaste=1]	-.863	1.565	1	.581	-3.930	2.203
	[WhatdoyoudowhenContainerisoverflowingwithwaste=2]	-.330	.502	1	.512	-1.314	.655
	[WhatdoyoudowhenContainerisoverflowingwithwaste=3]	0a	.	0	.	.	.
	[EDUCATION=0]	.289	1.523	1	.849	-2.696	3.275
	[EDUCATION=1]	-1.306	1.141	1	.253	-3.543	.931
	[EDUCATION=2]	-.899	.736	1	.222	-2.342	.543
	[EDUCATION=3]	-.005	.681	1	.994	-1.340	1.331
	[EDUCATION=4]	0a	.	0	.	.	.
	[HOUSEHOLD=1]	4.342	2.225	1	.051	-.019	8.703
	[HOUSEHOLD=2]	2.573	2.095	1	.219	-1.534	6.680
	[HOUSEHOLD=3]	2.137	2.113	1	.312	-2.003	6.278
	[HOUSEHOLD=4]	3.029	2.071	1	.144	-1.030	7.088
	[HOUSEHOLD=5]	2.160	2.079	1	.299	-1.914	6.235
	[HOUSEHOLD=6]	2.020	2.112	1	.339	-2.120	6.160
	[HOUSEHOLD=7]	1.307	2.158	1	.545	-2.922	5.537
	[HOUSEHOLD=8]						

[HOUSEHOLD=9]	1.962	2.117	1	.354	-2.188	6.111
[HOUSEHOLD=10]	2.596	2.243	1	.247	-1.801	6.993
[HOUSEHOLD=12]	.660	2.242	1	.768	-3.733	5.054
[HOUSEHOLD=15]	2.124	2.567	1	.408	-2.906	7.154
[OCCUPATION=0]	0a	.	0	.	.	.
[OCCUPATION=1]	1.954	.727	1	.007	.529	3.378
[OCCUPATION=2]	2.048	.706	1	.004	.666	3.431
	0a	.	0	.	.	.

APPENDIX V: REGRESSION ON SERVICE INDICATORS AGAINST SATISFACTION LEVELS OF DOOR-TO-DOOR COLLECTION

	Estimate	Std. Error	df	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound

Threshold	[Overallsatisfactiontocollectionservicerendered = 0]	-3.299	2.485	1	.184	-8.169	1.571
	[Overallsatisfactiontocollectionservicerendered = 1]	-1.968	2.456	1	.423	-6.782	2.845
	[Overallsatisfactiontocollectionservicerendered = 2]	-.321	2.445	1	.895	-5.112	4.470
	[Overallsatisfactiontocollectionservicerendered = 3]	3.264	2.456	1	.184	-1.551	8.078
Location	IfyesWhatisthecapacityofthiscontainer	-.002	.003	1	.491	-.008	.004
	Howmuchdoyoupayforwastecollectionpermonth						
	[Whoprovidedthecontainer=0]	.004	.086	1	.963	-.164	.172
	[Whoprovidedthecontainer=1]	.453	1.154	1	.694	-1.809	2.716
	[Whoprovidedthecontainer=2]						
	[Howfrequentisyoursolidwastecollected=0]	-.762	.340	1	.025	-1.428	-.096
	[Howfrequentisyoursolidwastecollected=1]	0a	.	0	.	.	.
	[Howfrequentisyoursolidwastecollected=2]						
	[Howfrequentisyoursolidwastecollected=3]	.829	1.312	1	.528	-1.743	3.401
	[Howfrequentisyoursolidwastecollected=4]	.122	1.444	1	.933	-2.709	2.953
	[Howoftenisyourcontainerreplaced=0]						
	[Howoftenisyourcontainerreplaced=1]	-.545	1.643	1	.740	-3.766	2.676
	[Howoftenisyourcontainerreplaced=2]						
	[Howoftenisyourcontainerreplaced=3]	-.129	1.312	1	.921	-2.702	2.443
	[Doesthewasteoverflowthecontainerbeforeitiscollectedfordisposal=0]	0a	.	0	.	.	.
	[Doesthewasteoverflowthecontainerbeforeitiscollectedfordisposal=1]	-.357	.441	1	.419	-1.221	.507
	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=0]	.758	.519	1	.144	-.258	1.775
	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=1]	-.203	.512	1	.693	-1.207	.801
	[ifyesdoyousometimespracticecrudedumpingasaresultoftheoverflow=2]	0a	.	0	.	.	.
		2.577	.438	1	.000	1.719	3.434
		0a	.	0	.	.	.
		1.302	.503	1	.010	.316	2.288
		.415	.514	1	.419	-.591	1.422
		0a	.	0	.	.	.