KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH EDUCATION AND PROMOTION

WASTE DISPOSABLE METHODS AND CHALLENGES AMONG HOUSEHOLDS IN SELECTED COMMUNITIES WITHIN THE KUMASI METROPOLIS

BY

APPIAH GILBERT DEBRAH

SEPTEMBER, 2019

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(BSc. DISABILITY AND REHABILITATION STUDIES)

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SEPTEMBER, 2019

DECLARATION

I hereby declare that this submission is entirely my own work towards the award of a degree of MPH. Health Education and Promotion and that, to the best of my knowledge, it does not have previously published materials by another person, nor material which has been accepted in the University or any other University, except where the acknowledgement has been made in the text.

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(Supervisor) Signature Date

Certified By

Prof. Anthony K. Edusei …… …….

(Head Of Department) Signature Date

DEDICATION

To Mr. Joseph Kingsley Appiah

My dad, teacher, counsellor and role model

And to

Mrs. Esther Appiah

A great woman of substance I have ever known in my life

Thank you so much for your support, prayers and encouragement which impelled me to continue my studies.

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LIST OF ACRONYMS/ABBREVIATION

ABC	-	Aryetey Brother Company Limited (ABC)
AFDB	-	African Development Bank, AFDB
AMA	-	Accra Metropolitan Assembly
CCC	-	Central Communal Container
EGSSAA	-	Environment Guidelines for small-Scale Activities in Africa
EPA	-	Environmental Protection Agency
GSS	-	Ghana Statistical Service
HtH	-	House-to-House Collection
ISWM	-	Integrated solid waste management
KMA	-	Kumasi Metropolitan Assembly
KNUST	-	Kwame Nkrumah University of Science and Technology
KWML	-	Kumasi Waste Management Limited
ML	-	Meskworld Limited
MLGRD	-	Ministry of Local Government and Rural Development
NEP	-	National Environment Policy
NGOs	-	Non-Governmental Organizations
SDGs	-	Sustainable Development Goals
SSA	-	Sub-Saharan Africa
UNSD	-	United Nations Statistics Division
USEPA	-	United State Environmental Protection Agency
USPS	-	United State Postal Service
WGG	-	Waste Group Ghana Limited
WMD	-	Waste Management Department
WHO	-	World Health Organization

WTP - Willingness To Pay

ABSTRACT

Background: Poor waste management remains a major obstacle to many developing countries including Ghana. One of the major environmental problems in Kumasi Metropolis is poor waste management which impede one‟s health. Waste management Department of the Kumasi Metropolitan Assembly and Zoomlion Ghana Limited are usually responsible for waste management in the Metropolis but have challenges to provide an effective and efficient services to the households due insufficient funding and with this, households face many challenges when disposal of waste. It is therefore indisputable the fact that for households to safeguard, control and promote the environment there must be some facilities responsible for waste management.

Objectives: To assess waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis.

Methods: Case study design and Cross-sectional design was adopted for this study. The sample size of 308 households was estimated for collection of quantitative and qualitative data for this study.

Results: All respondents in the three selected communities used house-to-house solid waste collection as their major method of waste disposal as compare to the use of central communal containers. It was recorded that over 70% of the households used house-to-house method of waste collection with less than 30% of the households using central communal containers as a means of disposing their waste due to limited disposing facilities. Households in the selected communities revealed the challenges they faced which includes delay in waste collection, absence of sensitization of the public on issues of management of solid waste, inadequate refuse containers, lack of households‟ awareness on reducing, recycling and sorting of waste, poor attitude of households towards waste handling and ineffective waste management laws. Also over 50% of the respondents bemoaned that the fees charge for disposal of waste was high.

Conclusion: The preference of house-to-house solid waste collection to the use of central communal containers as a means of disposing waste was attributed to the fact that house-tohouse waste collectors are experts and therefore there are some consistency in their waste collection services. Again the patronage of house-to-house service to central communal containers waste collection by households was due to the same amount charge for disposing of waste on daily basis. Moreover, there was a lot of pressure on the central communal containers as two communal containers severs about 560 households in Kotei, 426 in Oduom and 345 in Bomso. This confirms the difficulties households face in attempt to dispose of waste.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Globally, one of the major environmental problems in urban areas is poor waste management which impede one‟s health. Poor waste management remains a major obstacle to many developing countries including Ghana. Wastes are left over materials comprising of household garbage, street sweepings, sanitation residues, construction and demolition debris, commercial and industrial refuse, and biodegradable waste because it is unwanted, which may cause significant nuisance or adverse impact in the environment because it is unwanted (Agunwamba, 1998). High population growth, booming economy, rapid urbanization and the rise in community standard have strongly accelerated the metropolis waste generation rate in the developing countries (Minglua *et al*., 2009). Authority, usually responsible for waste management in the urban areas, have the challenges to provide an effective and efficient services to the households (Sujauddin *et al*., 2008). They often face problem beyond their ability to tackle poor management of waste mainly due to insufficient financial resources, complexity and system dimensionality (Burntley, 2007)

In Sub-Saharan Africa (SSA) in particular, the combined influence of poverty, population growth and rapid urbanization has increased waste generation tendency (Oteng-Ababio *et al*., 2012). In response to the waste challenges therefore, most of the developing countries have embarked on ambitious environmental reforms, recording remarkable advances in best practices and sustainable management of their generated wastes to improve healthy living. Many developing countries including Ghana have joined the global effort in sustainable waste management strategies both rural and urban areas. (Ogawa, 2005). African

Development Bank, AFDB (2002) study on waste management options in some African countries especially Ghana, revealed that waste management in most African countries is characterized by inefficient collection methods, insufficient coverage of the collection area and improper disposal of the waste.

Accoding to the UNDP (2015) the SDGs acknowledge the fact that environmental sustainability is part of global economic and social well-being. However, achieving the third goal (ensuring healthy lives and promoting well-being for all) and the sixth goal (ensuring availability and sustainable management of water and sanitation for all), of the Sustainable Development Goals (SDGs) largely depends on the country‟s efforts to ensure a clean and healthy environment. It is therefore an undeniable fact that for humans to safeguard, control and promote the environment there must be some appropriate facilities for waste management. In the absence of such facilitates, poor waste management will pose significant health problems (Songsore, *et al*., 2005). Centre for Environment and Development (2003) in their study indicated that unsafe water, poor sanitation and hygiene result in countless deaths among households, and a huge burden of disease such as dysentery, malaria, and other parasitic illnesses as poor sanitation corroborate this fact.

1.1 Statement of the Problem

Waste constitutes a major source of environmental hazards which account for an estimated 25% of the total burden of disease worldwide and also nearly 35% of the ill health problems in Sub-Saharan Africa are caused by this environmental hazard (WHO, 2009). Kaseke (2005), emphasized that waste disposal is one of the major problems facing Ghana‟s towns and cities and the problem is increasing with rapid urbanization, increased population, industries and increased use of non-biodegradable plastics and bottles.

According to Ogawa (2005), waste management refers to the integrated control of unwanted materials, which would otherwise have been harmful to the environment. This includes collection, and proper disposal of waste to promote health. Ogawa further emphasized that the collection and proper disposal of waste is a prominent facet of community health promotion and needs to be included in any environmental planning.

Waste in the Kumasi metropolis is not adequately handled to keep the environment clean and aesthetic and this is due to the use of plastic bags as package for drinking water and other wares and the proliferation of fast food joint which package cooked food in styrofoam, and the indiscriminate disposal of these materials in the environment (KMA, 2006).

Despite the concern of governments, organizations and households to ensure waste management in Ghana, they are still faced with problematic ways of addressing poor waste management due to financial constraint and negative attitudes of commutators leading to its negative health and environmental consequences (Freduah, 2004). Thus uncollected waste with its associated public health and environmental risks has become a common phenomenon in the Kumasi metropolis (KMA, 2006). Cooper (1999) asserted that the priority of a waste disposable system must be the availability of a cleansing service that help to keep up the health and safety of households and their environment. It is therefore indisputable the fact that for households to safeguard, control and promote the environment there must be some facilities responsible for waste management. This is because in the absence of such facilities waste management can create vital unhealthiness (Songaore *et al*., 2005).

1.2 Research Questions

1. What are the waste disposal methods of households?
2. Are households willing to pay for waste management services?
3. What are the challenges associated with waste disposal of households?

4. What are the support systems to ensure proper waste disposal of households?

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study is to assess waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis.

1.3.2 Specific Objectives

The specific objectives of this study are

1. To identify waste disposal methods of households.
2. To determine the willingness of households to pay for waste management services.
3. To identify challenges associated with waste disposal of households.
4. To ascertain support systems to ensure proper waste disposal of households.

1.4 Significance of the study

This study therefore sought to contribute to the existing literature of waste management by exploring empirically the methods and support systems for safe waste disposal of households. Explicitly, the study was significant in enlightening the various appropriate waste disposal methods households can adopt with regards to their attempt to keep their vicinity clean and healthy.

The study unveiled challenges associated with waste disposal of households which would crave immediate attention of local government authorities.

It is highly essential to include support systems available at the high level to make the necessary provision to ensure proper waste disposal of households as environmental cleanliness, and proper disposal of waste is crucial and a high standardised approach towards public health.

The attainment of the research objectives would enhance the understanding of local government authorities to provide solution to the problem in managing their waste by the participation of not only private sector operators but also individuals and households that are affected.

1.5 Scope of the Study

The scope of the study is defined by the spatial and conceptual dimension. The spatial scope of the study was limited to the households in some selected communities within the Kumasi metropolis in the Ashanti Region of Ghana and these communities includes Kotei, Bomso and Oduom. With the conceptual dimension, the Ministry of Local Government and Rural Development (1999), indicated that households waste management comprises of all activities aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlement to promote the social, economic and physical wellbeing.

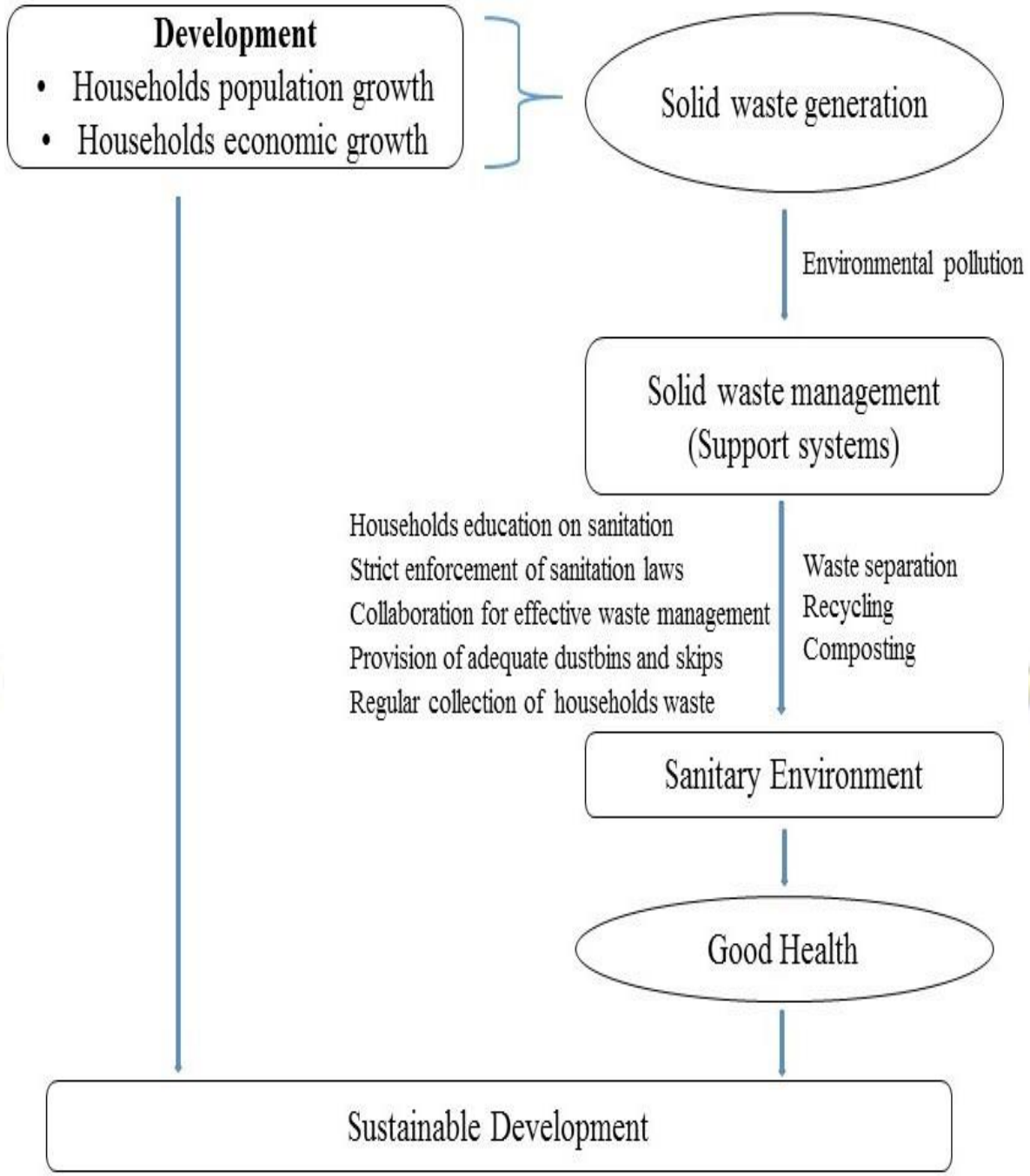
In this regards, the study focused on analysing households waste disposal methods and practices as well as the challenges associate with the selected communities in the Kumasi metropolis. The analysis of this study was based on survey of households and investigates the impact of households socio-economic and waste support systems ascribe on disposal.

1.6 Conceptual Framework

The conceptual framework underpinning this dissertation illustrate how solid waste are generated and support systems that can be adopted for sustainable development. Development of households population and economic growth lead to solid waste generation which has no value to people who possess it and it is discarded as useless. Waste disposal became problematic when the population densities in urbanized areas increased and the available land for waste disposal decreased proportionally. In this case the generator of the solid waste does not appropriately dispose of waste which then lead to environmental

pollution and hence deteriorating health conditions of the people, elevating cost of health and expanding sanitation cost. Particularly in the context of urbanization, littering, solid waste and sewage improperly discharged presents a variety of concern as these promote the breeding of communicable disease vectors as a result of water, soil and air pollution. Therefore, it is indispensable to seek for support systems to address improper waste management and improve sanitation service through the adoption of Integrated Solid Waste Management (ISWM) which enhance solid waste management in an area. Households should be encouraged by institutions responsible for solid waste management to separate waste before final disposal. In this case rubber like polythene bags, empty water sachets can be recycled and also rubber cans, metal and bottles can be reused. Again food waste can be composted for manure to support plant growth. Moreover, households education on sanitation will improve sanitation as it involves activities that would ensure that households understand the consequence of poor environmental sanitation practices and the benefits that would accrue to everyone if people adopt good behaviour towards sanitation. Strict enforcement of sanitation laws is also crucial for protecting the natural environment and the life and livelihoods that depend on it. Collaboration with other institutions for effective waste management, provision of adequate dustbins and skips by the government and regular collection of households solid waste will result in sanitary environment hence promote good health and eventually sustainable development of the country.

1.7 Conceptual framework



Source: Developed by the researcher, 2018

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Literature review is a critical, in-depth evaluation of previous research (Shuttleworth, 2008). This chapter therefore reviews existing literature, published dissertation and articles relevant to this topic of study, taking into consideration the different ideologies, schools of thought and understanding people hold about environmental sanitation, specifically waste disposable methods and challenges among households in their community.

Literature will be reviewed on the following themes;

1. Overview of waste
2. Waste management
3. Waste disposal methods of households
4. Willingness of households to pay for waste management services
5. Challenges associated with waste disposal of households
6. Support systems to ensure proper waste disposal of households

2.1 Overview of solid waste

The term waste refers to any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or an air pollution control facility and other discarded materials, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, agriculture operations and from household activities (US EPA, 2011). Misra & Panday (2005) also added that material becomes waste when it is discarded without expecting to be compensated for its inherent value.

2.1.1 Solid waste

The United Nations Statistics Division (UNSD, 2011) defined solid waste as all material that is not prime products for which the person generate the material has no further use in term of their own purpose of production, transformation or consumption and which the person wants to dispose and that is not intended to be disposed using pipeline. According to the National Environment Management Authority of Uganda (2007, p.275) solid waste is an organic and organic waste materials produced by households, commercial, institutional and industrial activities that have lost value in the sight of the initial user. Solid waste consists of solid materials such as plastics and papers generated by households and other actors in the economy (Government of Ghana, 2010). Solid waste is composed of combustible and non-combustible materials. The combustible materials include paper, plastics, yard debris, food waste, wood, disposable diapers and textiles as well as other organics. Non-combustible also include glass, metal, bones, leather and aluminum (Zerbock, 2003). Metropolis solid waste contains waste products from all aspects of human activity and as such is an enormously complex and diverse material. Increasingly, it has been shown that a few chemical compound within metropolis solid waste contribute significantly to environmental and health impacts (Miller, 2004). The characteristics of solid waste however differ from place to place and the factors that influence the composition are the population, the sources, average income level, climate, social behaviour, industrial production and the market for waste materials Songsore *et al*., (2005).

2.1.2 Types of Solid Waste

2.1.2.1 Food waste

Food waste are the organic residues generated by the handling, storage, sale. Preparation and cooking and serving of food (US EPA, 2010). Food waste are any food substance, raw or cooked, which is thrown away, or intended or required to be discarded and they include

unclean portion of meals and trimming from preparation activities in kitchen, restaurant and cafeterias (Miller, 2004).

2.1.2.2 Hazardous waste

According to Environment Guidelines for small-Scale Activities in Africa (EGSSAA, 2009) hazardous waste endangers many different classes of people and especially waste collectors, landfill workers, waste pickers, waste producers, and nearby residents at risk. They further explained that the leachate from a landfill may be dangerous as well and its level of toxicity is directly related to the quantity and toxicity of hazardous materials mixed in with other solid waste and that management of hazardous waste needs urgent attention in Africa. The variety

and classes of materials and sources from households to industrial and medical facilities make this particularly challenging (EGSSAA, 2009).

2.1.2.3 Special waste

Special waste is defined as any waste material which, because of its physical characteristics, chemical composition, or biological nature requires either special handling procedures or permitting, or poses an unusual threat to human health, equipment, property, or the environment (Miller, 2004).

2.2 Waste management

The term waste management has been viewed differently by many scholars. Kumah (2007) define waste management as the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment and disposal of waste. However, Tchnobanoglous *et al.*, 1993 proposed a more comprehensive definition of waste management. According to them waste management is "the discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal

of waste in a manner that is in accord with the best principle of public health, economics, engineering, conversation, aesthetics and other environment consideration and that is also responsive to public attitudes." In view of this, if waste management is to be accomplished in an efficient and orderly manner, the fundamental aspects and relationships involved must be identified and understood clearly (Tchobanoglous *et al*., 1993).

2.2.1 Approaches to waste management

Denison and Ruston (1990) spelled out the approaches to waste management in the contemporary era which includes the following reduction in waste sources, sanitary landfills. Composting, recycling, and incineration.

2.2.1.1 Reduction in waste sources

Reduction in waste sources as any action that reduces the volume of waste prior to its processing and disposal in incinerator or landfill was viewed by Denison and Ruston (1990). Kreith (1994) also identified similar view. He claimed that reduction in waste sources focuses on reducing the volume of waste generated and this includes the switch to reusable products and packaging, the most popular example being the returnable of bottles. However, Urban Sector Programme Support (2000), in Bhutan their programme to reduce waste challenges in future buttressed the point that reduction in waste sources would be the most essential factor. According to USPS (2000) possible reduction at the consumption level including reuse of container, better buying habits and cutting down on the use of disposable products and packaging can help minimize waste production. Tsiboe and Marbell (2004), stated that Austria, Netherland and Denmark developed a waste management processes to efficiently resolve the waste disposal challenges by essentially coaxing their citizen to separate their domestic waste into glass, paper, plastic categories; thereby enabling easy collection and consequently reuse.

2.2.1.2 Sanitary Landfill

Centre for Environment and Development (2003), revealed that sanitary land filling includes confining the waste, compacting it and covering with soil. According to them it not only prevents burning of garbage but also help in reclamation of land for valuable use. The placement of solid waste in landfills is the oldest and definitely the most prevalent form of ultimate waste disposal (Zerbock, 2003). He further argued that landfills are nothing more than open, sometimes controlled dump. According to him the difference between landfill and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering input, no leachate management, no consideration of landfill gas management, and few, if any, operational measures such as

registration of users, control of the number of "tipping fronts" or compaction of waste (Zerbock, 2003). Moreover, landfills are one form of waste management that nobody want but everybody needs (Kreith, 1994). According to him, there are simply no combinations of waste management techniques that do not require landfilling to make them work and that landfills are the only management technique that is both necessary and sufficient. Kreith (1994) highlighted that some wastes are simply not recyclable, many recyclable wastes eventually reach a point where their intrinsic value is completely dissipated and they no longer can be recovered and recycling itself produces residuals. He further stated that the technology and operation of modern landfill can assure the protection of human health and the environment.

2.2.1.3 Recycling

Recycling is the reprocessing of discarded materials into new useful products, and it is usually a better alternative compared to burning or dumping waste (Cunningham and Saigo, 1995). It also provides the needed raw materials for industries. The United State

Environment Protection Agency (2011) has recommended recovery for recycling as one of the most effective waste management technique. According to USEPA, recycling turns materials that would otherwise become waste into valuable resources and, it yields environmental, financial and social returns in natural resources conservation, energy conservation, pollution preservation and economic expansion and competitiveness. Kreith (1994) also noted that, recycling is the most positively perceived and doable of all the waste management options. According to him recycling will return raw materials to market by separating reusable products from the rest of the metropolis waste stream. Again he added the benefits of recycling as follows; it saves precious finite resources, lessens the need for mining of virgin materials which lowers the environment impact for mining and processing. The Institute of Wate Management cited by Tsiboe and Marbell (2004), claimed that UK recycle only 11% of it households waste, Italy and Spain only 3%, Netherlands 43%, Denmark 29%, and Austria 50% respectively.

2.2.1.4 Compositing

Compositing is applicable to separately collected leaves, yard, and food waste. It is the biological decomposition of the biodegradable organic fraction of waste under controlled condition to a state sufficiently stable for nuisance-free storage, handling and for safe use in land application (Diazl *et al*., 1994). Compositing can thereby reduce the metropolis waste volume destined for land disposal and yield a valuable product that can be used for soil amendment and mulch (Bagchi, 2004).

2.2.1.5 Incineration

The Centre for Environment and Development (2003) defined incineration as a controlled combustion process for burning combustible waste to gaseous state and reducing it to a

residue of non-combustible ingredients. The Centre further explained that, during incineration

moisture in the waste get vapourised and the combustible portion gets oxidized and vapourised. Ash, carbon dioxide, water vapour and non-combustible residue are the end products of incineration. Kreith (1994), noted that incinerators have the capacity to reduce the volume of waste drastically, up to ten fold than any other method. According to him incineration can also recover useful energy either in the form of stream or electricity. He however revealed that the main challenges of incineration are relatively high degree of sophistication needed to operate them safely and economically, the tendency to pollute the environment through emission of carbon dioxide as well as high cost of operation.

2.3 Waste disposal methods of households

According to the United Nation Development Programme (UNDP) survey report, waste disposal is the second most pressing problem facing urban city dwellers after unemployment (Da Zhu *et al.,* 2008). Methods used for household solid waste disposal in most residential suburbs in developing countries include illegal burning, burying, crude dumping in open space, river and drainage basins as well as compositing (Ayotammuno and Gobo 2004). In many households in Ghana such wastes are usually disposed off either by burning or into public dumps either into containers or open dump sites, or are buried indiscriminately or are routinely collected from homes by private operators (Miller, 1988).

According to the 2010 National Population and Housing Census in Ghana, as documented by the Ghana Statistical Services (GSS), the most popular methods of waste disposal by householders is through the use of the public dump; either dumping in a container (23.8%) or dumping into open dump site (37.7%). Further, about 9.1% of households dump waste indiscriminately into open fields, gutters and drains while another 10.7% of household burn

their waste. However, only 14.4% households hire private firms and individuals to collect their waste from their home to recognized and approved waste collection centres (GSS, 2013). Only dumping into public containers and collection of waste from households can be considered as proper methods (38.1%). Increasingly it has become a public policy in urban communities to charge householders who dump their solid waste into public containers some fees. However, Cointreau (1982) noted that household waste disposal methods are influenced by the supply of waste disposal services and other infrastructures: and where waste facilities are readily available, households tend to use them in a better way.

Ayotammuno and Gobo (2004) in their study on sanitation pointed out that indiscriminate disposal of waste had become a common practice in many cities in the developing countries. Improper disposal of waste is caused by social, economic, behaviour and political circumstance and expectation. They added that waste disposal methods from households in Accra Metropolitan Assembly took different forms. Below was the representation of waste disposal methods

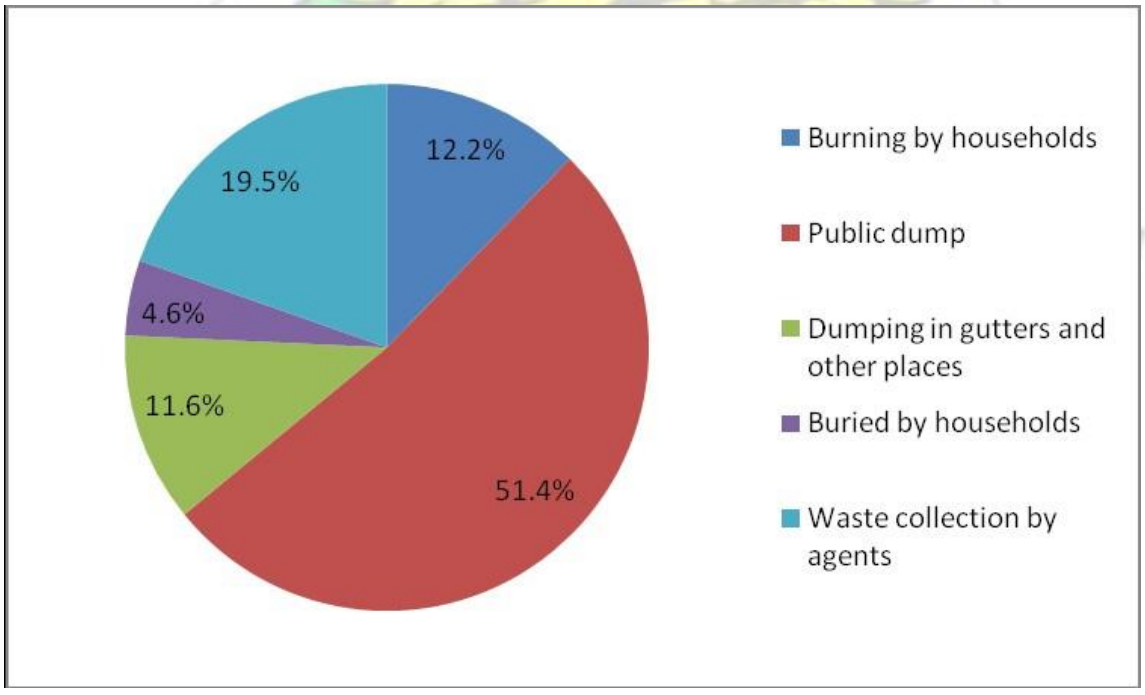


Figure 2.1: Waste disposal methods of households in the Accra Metropolitan

Assembly, 2004

Anomanyo and Gobo (2004) asserted that, about 1800 tonnes of waste is generated per day in the Accra metropolis and the average waste generated per a day was estimated at 0.5 tonnes. This was focused on the projected population of 1,610,867. Kumah (2007), indicated that in spite of the strategies put in place for proper disposal of household waste in Accra metropolis, all is not well for appropriate waste disposal of households. Tsiboe and Marbel (2004) however, indicated the three basic methods of household‟s waste collection in AMA

- Waste Management Department (WMD) curbside collection by trucks directly outside each house. They added that, this collection method was provided weekly in the high income residential area like Cantonment, Airport and Roman Ridge by compactor trucks
- Door-to-door waste collection services in middle income communities like Labadi
- Waste Management Department collected from the central communal containers to which people must bring their own waste. These were restricted to low-income communities like Nima and amounted to some 200 communal containers. Households that could not pay for the house-to-house waste collection services took their waste to any of these 200 communal containers and from which the WMD collected the waste and disposed of it at the landfill site.

Anomanyo and Gobo (2004) stated that for the purpose of proper waste collection, the city was demarcated into waste collection districts where a company was contracted by AMA to collect waste in one or two district. He added that solid waste collection in the city was carried out both on franchise and contract basis. On the franchise basis, a house-to-house collection was done in high income communities and the contractors charged the households some fees with weekly collection frequency. These communities were wellplanned residential area with access road labelled as first and second class communities and it included Cantonment and

Airport residential area where each household had plastic containers with covers. However, these contractors of house-to-house solid waste collection use AMA dump site and then paid a tipping fee to them. On the contract basis, waste contractors were paid by AMA to perform communal container collection.

According to KMA (2006). there are two mode of waste collection in the Kumasi Metropolis namely house-to-house and central communal collection. According to KMA, Kumasi Waste Management Limited (KWML), Aryetey Brother Company Limited (ABC), Sak-M Company Limited, Waste Group Ghana Limited (WGG) and Meskworld Limited (ML) were contracted for solid waste collection. It was on franchise basis for a monthly fee of GH¢ 1 to GH¢ 3 per house. However, 33% of the population enjoys this services but payment for the services was irregular and the total quantities of solid waste collected were weighed at the disposal site and payment was based on a rate of GH¢ 9 per tonne.

2.3.1 Illegal Dumping of Waste

Manyahaire et al., (2009) defines illegal dumping as the improper or unlawful disposal of waste on hand, water or at any location other than a permitted landfill or facility. It is also referred to as "open and midnight dumping" because waste is often dumped in open area from vehicles, along roadsides and late at midnight. Primarily illegally dumped waste is non-hazardous materials that are just dumped to avoid disposal fees or time and effort required for proper disposal (Mubaiwa, 2013). Households waste may be illegally dumped in areas that lack or have costly pick-up services (Saungweme, 2012). Spinardi *et al*., (1998) added that sites used for illegal dumping vary but may include abandoned vacant lots on public or private property and infrequently used alley or road ways. Illegal dumping can occur at any time of the day but is more common at night and in the early morning hours (Masocha, 2005).

2.4 Willingness of households to pay for waste management services

Various studies have showed numerous variable that influence households willingness to pay for waste management services. However, the households‟ willingness to pay for such services depend on many socio-demographic factors. For example, (Yusuf *et al*., 2007) found in Oyo state, Nigeria that high fees of the service, age, educational level, households size and household‟s monthly expenditure affected their willingness to pay for waste management service. Banga *et al*,. (2011) buttressed that the decision and willingness to pay and the amount households are willing to pay for improved solid waste collection services are influenced by income, education, age and home ownership. Moreover, income of household head, lengthy distance of house from dumping site, gender of the household head. Level of environmental concern, age of household head and quantity of waste generated by the households were significant and explained the households‟ willingness to pay for waste management service Ekere *et al*., (2010).

Afroz *et al*., (2009) in their studies on the household‟s WTP for improved solid waste management in Daka city of Bangladesh maintained that age, household size and income possess maintain an increasing function with householders‟ willingness to pay for waste management services. They further indicated that female have positive influence on householder WTP and males have negative influence on householders WTP. Aggrey and Douglason (2010) stressed that these variables and other variables like householder‟s level of education, quantity of waste generated and household expenditure also pose a significant influence on householders WTP.

Aggrey and Douglason (2010) hypothesized that the higher the level of education the more householders would appreciate the consequences of improper disposal of solid waste and the more value the householder would pay in order to stand out the risk of being a victim of

unclean environment. Afroz *et al*., (2009) also reiterated the fact that education relate to a better understanding of improper waste disposal and hence willingness to pay for waste management services.

Chuen-Khee and Othman (2002) stated that the more the number of people in the house, the more willing the householders will appreciate a clean environment. Tamura (2005) in analyzing the individual attributes of the demand for solid waste collection in Accra, Ghana found that the higher the income of people, the more willing they are to pay for solid waste management services.

With regard to age as a factor attributing to households‟ willingness to pay for waste management Afroz *et al*., (2009) pointed out that older people are willing to pay more than younger people. This propose that older people make more mature decisions related to evaluating health and sanitation issues, possibly due to their age, making them to express a high willingness to pay value. Aggrey and Douglason (2010) however believed that age affect WTP for waste management services negatively as they further explained that old people may consider waste collection as government‟s responsibility and could lead to less willingness to pay for it. Whereas the younger generation might be more familiar with cost sharing and could result to their willingness to pay for waste management services.

Satisfaction on waste collection services influence willingness to pay for waste management services. Households who are more satisfied with waste waste collection services are willing to pay more than dissatisfied householders (Afroz *et al*., 2009).

The quantity of waste generated by households also influence willingness to pay for waste management services. Aggrey and Douglason (2010) emphasized that, the higher the generation of waste, the more the households face the challenges of waste disposal and desirable the willingness to pay.

In Ghana, Addai and Danso-Abbeam (2014) revealed that willingness to pay proper waste management service is significantly related to level of education, gender, household size and age of the household head. Alhassan and Mohammed (2013), in the same manner, analyzed households‟ demand for better solid waste management service using the contingent valuation method. According to the study, the most significant and influencing factors that affect WTP are the environmental safety concern of the respondent, level of satisfaction of current waste management services, education, household size, length of stay in the current residence, walking to access communal container centre (CCC) and sex of householders. Amfo-Out *et al*., (2012) claimed that householders‟ sex, level of education, income, expenditure level frequency of payment, frequency of collection and satisfaction with the current waste waste management system do not have any significant influence on the willingness of the householders to pay for waste collection semi-rural towns of Ghana. However, variable like mode of collection, occupation and age are seen to have a significant effect on willingness to pay.

2.5 Challenges associated with waste disposal of households

Amoah (2006) posited that the population of Ghana of was about 26 million as at December 2014, with a daily waste production of about 0.45kg per person and the daily aggregate production of waste approximately 11,700 tonnes. The estimate of the proportion of waste not properly dispose in Ghana were high and these included 60% to 70% by Anomanyo (2004) and 61.9% by GSS (2013). Upon these estimate, the levels of improperly disposal of waste was currently between 7,020 to 8,775 tonnes every day. The problem of improper waste disposal is more common in the urban areas due to the fact that rapid economic growth is concentrated in the urban area with few number of public container placed in these areas for disposal of household waste (Anomanyo 2004).

2.5.1 Environmental Challenge

According to Obirih-Opareh (2002), householders in some communities in the Kumasi metropolis usually have to cope with heaps of refuse over-flowing which are left laying uncollected. In some cases, householders burn or dump it in streams and stagnant gutters, all of which creates breeding grounds for disease spreading insects and vermin OtengAbabio, *et al*., (2012). Many diseases like cholera and gastro-enteritis have been reported due to improper collection and disposal of solid waste, insanitary condition and polluted drinking water (WHO, 2009). This point resonates the critical role of public environmental education and effective monitoring mechanism in achieving efficient and proper management of solid waste. The effort being made are primarily aimed at improving human health, promote environmental quality, and provide support for economic productivity (Henry et al., 2006). To achieving this, successive governments in Ghana could took the needed steps in the early 1990s to manage solid waste efficiently (Kaseva and Mbuligwe 2005).

2.5.2 Challenge associated with local authority on household waste disposal

According to Kumah (2007), there is a paradigm shift in policy from assemblies being solely responsible for waste collection and disposal to the involvement of private waste management companies. In spite of this major step, not much has been achieved in this respect due to the fact that in recent past, solid waste management services in Ghana have consistently failed to keep pace with the amount of solid waste generated in towns and cities. This is against the backdrop that rapid urbanization in Ghana has increase the pressure on urban infrastructure and environment services which has culminated in the waste accumulation and unsanitary environmental conditions Songsore, *et al*., (2005). Suffice to say that, lack of awareness of proper disposal habits on the part of households in these poor urban suburbs and the inefficient monitoring mechanism from the local authorities brings to the fore the complexity of the problem (MLGRD, 1999). Other common drawback that militate against

proper solid waste management are government‟s inability to streamline the responsible institutions to achieve their mandates, poor urban planning with regards to access routes for waste removal, inadequate sanitation facilities, lack of political will with respect to the awareness and dedication among national and local government to efficiently manage solid waste as well as the low technological know-how to manage the waste which is engulfing the cities and towns (Fobil, *et al*., 2010).

2.5.3 Financial Constraints

Ogawa (2005) criticized that, waste management is given a very low priority in developing countries of which Ghana is no exception. He further intimated that, very limited funds are provided to the waste management department by the government and householders not having the enough funds to pay for daily household waste as lead to the levels of services required for protection of the environment and public health are not achieved. According to Ayotamuno and Gobo (2004) weak financial basis of local government can be supplemented by the collection of user service charges. That notwithstanding, householders‟ ability to pay for the services is very limited in poor developing countries, and their willingness to pay for the service which are irregular and ineffective. Kumah (2007) buttressed this point that, the challenge is pressing at the local government level where local taxation system is inadequately developed to eliminate any financial problem on the part of householder with regards to their waste disposal.

2.5.4 Waste Collection Challenge

Kwami and Ellen (2013) claimed that communities where there exist collection services which remove waste from households, often lack standardized containers used to store solid waste prior to pickup or collection. Headley (1998) evidenced that in Barbados, there

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are no standardized container by municipalities o collection companies to set out waste for collection and that it is up to the householders to designate some sort of waste collection container. Often these are plastic barrels or discarded drums, however the majority of households simply place grocery bags full of waste on the street within the communities for collection (Kwami & Ellen, 2013). Tadesse *et al.*, (2008) affirm that sanitary and efficient waste management must be to ensure that all households use some form of corrosion-resistant container with lid in order to facilitate collection.

2.5.5 Waste Transportation Challenge

Transportation of solid waste from households to the dumping site is a growing problem due to urbanization of many communities which has led to poor town planning and layout. Hence garbage dump, with their associated disease and odour could ideally be located separately from households to suitable land (Kwami & Ellen, 2013). They further declared that transportation of solid waste has become longer and more time consuming, more expensive and less efficient, and therefore has compelled many communities to employ neighborhood-level collection points where households are responsible for transport to the transfer point and the municipal or private enterprise transports the waste from there to the suitable disposal location. Tadesse *et al.*, (2008) claimed longer distance increase the probability of waste dumping in open areas and roadside relative to the use of communal containers. Kwami and Ellen (2013) believed that transport of solid waste also relies on operational vehicles therefore, frequent breakdown of such vehicle could immobilize these operational vehicles for some extended period of time. AFDB (2002) estimated that for cities in West Africa, up to 70% of solid waste transport vehicles may be out of action at any time.

2.6 Support systems to ensure proper waste disposal of households

Control over the indiscriminate disposal of waste can help reduce among the best and most appropriate methods. According to Badgie *et al.*, (2012) improper disposal of waste can be addressed by various means, such as enforcement of waste legislation, waste control source, the design of an intelligent system for controlling the composition of solid waste, and a continuous awareness campaign on waste-related issues. The attainment of the above mitigating waste disposal system could be a daunting task with regard to the people attitude toward waste generation among metropolis (Badgie *et al.*, 2012). However, Sule (1981) claimed that the major factors responsible for the poor sanitary condition of many developing countries are weak enforcement of laws and improper waste management. In view of this the following support systems will ensure proper waste disposal of households;

2.6.1 Enactment and Enforcement of Policy

A straightforward, transparent, unambiguous legal and regulatory framework, including functioning inspection and enforcement procedures at the national, regional and local levels, is essential to the proper functioning of metropolis solid waste management strategies (Marshall & Farahbakhsh, 2013). Enacting strong and adequate legislation both from the national and local level to guide waste management decision and strategies is essential (Asase *et al*., 2009). These policies should be focus on promoting knowledge, education, skills, and empowerment of the urban poor as means of promoting their living condition (Murad *et al*., 2012).

Policies are made with the rationale to sever as a guide to decision making to achieve rational outcomes. In 1999, the Ministry of Local Government and Rural Development produced an Environmental Sanitation Policy document which sought to reform the solid waste management sector and allow private secto participation in solid waste collection, transport

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and disposal in the major cities of the country. A critical look at the 2010 revised draft of the Ghana National Environment Policy (NEP) highlights, objectives and strategic goals, which aimed at a more conscientious effort to safeguarding the environment and promote sanitary status. The 1995 Policy identified the Environmental Protection Agency (EPA) to drive the process towards sustainable development while ensuring least damage to the environment. The Waste Management Policy also aims at reducing and managing urban waste generated both from households and commercial activity by introducing effective policies and incentive to encourage households and other waste producers to adopt cleaner production processes and minimize waste generation. These policies were based on a broad vision founded on and directed by respect for all relevant principle and themes of environment and sustainable development.

2.6.1.1 Kumasi Metropolitan Assembly Environmental Sanitation Bye-Laws

Environmental laws and good governance are essential for protecting the natural environment and the life and livelihood that depend on it (Acheampong, 2010). According to him governance in this context refers to the assembly ensuring the use of its range of legal tools to promote desire behaviour. He further indicated that these tools could be traditional regulations, environmental assessments, information disclosure requirements, market mechanisms, economic incentives or public policies which can help promote voluntary action on a scale that will enhance urban environmental protection and environmental sanitation. However, the summary of the environmental sanitation Bye-laws includes the following;

- Kumasi Metropolitan Assembly (Sanitation) Bye-Laws, 1995. This bye-law covers general sanitation. It defines what institutes a sanitation offence and what should not be done by both property owners and pedestrians to cause pollution in the city.

- Kumasi Metropolitan Assembly (Cleansing) Bye-Laws, 1995. The cleansing bye-law regulate activities that promote visual pollution and nuisances and prescribes penalties for such offences.
- Kumasi Metropolitan Assembly (House Owners and Householder) Bye-Laws, 1995. This bye-law also describes the responsibility of house owners, property owners, tenants or other occupants in keeping their immediate environment in a sanitary state. It also prescribes the punishment that should be meted out with offenders of the bye-laws.

2.6.2 Improvement in performance of Local Authorities

Local authorities are responsible for waste generated at households and their responsibility covers the collection, transportation and also devising measure to promote waste prevention and recovery, planning, construction and operating waste disposal facilities (Schwarz-Herion *et al*., 2008). In addition, local authorities subcontract private companies to assist with waste management services (Schwarz-Herion *et al*., 2008). Authorities in developing countries tend to overlook the significance of waste minimization strategies, leading to situations where all "waste" are sent to dumpsite for final disposal, which greatly increases the cost of waste management.

2.6.3 Improvement to Service Operations, Technology, and Accessibility

A study conducted in Palestine suggested that local authorities should increase the number and optimize the distribution of litter bins on the streets and other public places as a measure to discourage people from littering (AI-Khatib *et al*., 2009). Convenient access to these units will cut down on littering and alleviate some of the pressure on metropolis and redistribute resources to help properly dispose of waste. Another improvement could be

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undertaken when it comes to storage containers. Open storage enclosures should be eliminated and converted into closed containe s. Also, the volume of the storage enclosures should be designed by overestimating the generation of waste, not underestimating it, as is currently being done (Hazra & Goel, 2009). This also goes along with upgrading transportation and other equipment, which in the long term will increase operations. However, since distance and access to paved road is often still an improvement to service, transfer stations should be established through the collaboration of communities and metropolis (Parrot *et al*., 2009). This is a great way to reduce transport costs while at the same time increasing services.

Another study conducted in India suggested that labour could replace technology, for instance in collection of waste from communities with poor accessibility. This could be accomplished with the involvement of households of low-income communities, which in turn can create jobs and income for these poorer households. A successful example of this occurred on the North Coast of Honduras, with community member participating in recycling and composting activities as well as establishing localized waste collection and disposal system (Goett, 1998). If this is not a possibility, metropolis need to invest more resources into smaller but more skilled group of personnel instead of wasting money on a large but inefficient and ineffectual workforce. (Aziale and Asafo-Adjei, 2013).

2.6.4 Utilization of Recycling Initiative and Improvement in Disposal

According to O"Connell (2011), the most important determinant of recycling behaviour is access to a structure, institutionalized program that makes recycling easy and convenient. The importance of „visible" and accessible recycling centers as well as financial incentive to encourage participation in recycling is supported by many studies as an effective measure in improving solid waste management services (Bolaane, 2006). In Germany, there are dedicated

waste bins assigned for different types of waste. For example, the grey lid colour is for residual waste, the red lid colour is for reusable waste and the green lid colour is bio-waste. After collection, waste is transported to different destinations for recycling and composting and other treatments (Schwarz-Herion *et al*., 2008). A study looking at waste management in Ghana advocates for communities to network, collaborate, coordinate, and develop common waste treatment and disposal infrastructure in order to improve waste disposal methods (Oteng-Ababio, 2011). He added that there should be state intervention to enhance opportunity for recycling and reuse of waste materials as well as consumer awareness campaigns in cities that do not already have them. Formalization of recycling and encouragement to do so would significantly reduce the volume of waste and could save metropolis a substantial amount of money and resource. This approach could also create informal employment opportunity for low and middle income households.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter provides the available research methods that was used to ensure successful execution of the study. It explains the methods that are specifically important for the purpose of the study and the data collection techniques that was used. It is sub-divided into research setting, research design and approach, population and sampling techniques, instrument for data collection, procedure for administration of instruments, data analysis procedure, validity and reliability, and ethical issues.

3.1 Research setting

Geographically, the study was designed to take place in selected communities within the Kumasi Metropolis in the Ashanti Region of Ghana, specifically in Kotei, Odoum and Bomso all found in Oforikrom sub-metro of Kumasi metropolis, which is centrally located in the Ashanti Region of Ghana. Its unique central position makes it easily accessible from any part of the country.

3.2 Research design and approach

The case study design was adopted for this study. In the opinion of Shuttleworth (2008) case study design is an in-depth study of a particular research problems rather than a sweeping statistical survey or comprehensive comparative inquiry. According to him it is an empirical enquiry that allows the researcher to investigate and understand the current situation like the environmental sanitation phenomenon in some selected communities in the Kumasi Metropolis. This design was preferred because it provides a systematic way of looking at events, collecting data, analysing information and reporting result. It is often used to narrow

down a very broad field of research into one or a few easily researchable topics (Shuttleworth, 2008).

Cross-sectional design was made useful in this study. Bryman (2004) stated that crosssectional design aims at getting data from multiple cases at a given point in time so as to analyse relationship across a number of variables of interest.

To achieve the objectives of this study. The study employed various methods and strategies to obtain relevant data which provided answers to the questions posed and assisted in drawing suitable conclusion after the data had been analysed. A mixed approach of quantitative and qualitative (Q-squared) was used in the collection and analysis of data. The rationale behind the selection of mixed method approach for the study was to achieve the logic of triangulation since no single method such as interview or questionnaire could completely capture all the relevant features of this study (Denzin, 1989). Quantitative method was used to quantify all the measurable variables from the data. However, those aspects that relate to human behaviour and therefore not easily measure was investigated using qualitative methods.

3.3 Study Population

The target population for this study consist of all households within the selected communities and institutions responsible for sanitation in the Kumasi metropolis.

3.3.1 Inclusion Criteria

- Households that are located within the selected communities were considered
- Respondents were the household heads of the respective households
- Institutions responsible for sanitation within the Kumasi Metropolis were included in the study specifically Zoomlion and Waste Management Department of KMA.

3.3.2 Exclusion Criteria

The exclusion criteria covered households within the Kumasi Metropolis which fell outside the three selected communities.

3.4 Sample Size

According to population and housing census, the total number of houses within the Kumasi Metropolis is estimated to be 148,413 of which the total number of houses in Kotei, Odoum and Bomso are estimated to be 1,331 (GSS, 2012).

In this study, the Yamane"s formula was used to determine the sample size (Yamane, 1967). The Yamane"s formula for determining sample size is given as;

$$n=\frac{N}{1+N(\alpha)^2}$$

Where n = the sample size N

= the population size

α= the level of precision

A 95% confidence level which represent 5% (0.05) level of precision. Hence when this formula was applied to above sample the required sample size for this study was

$$n=\frac{1331}{1+1331(0.05)^2}$$

Therefore, the total number of houses recruited for this study

= 308

Table 3.1: Sample size distribution for the communities

Community	Population House	Sample size House	No. of Households for the study
Kotei	560	129	129
Oduom	426	99	99
Bomso	345	80	80
Total	**1331**	**308**	**308**

The sample size estimated for collection of data for this study was 140 households of which the researcher selected only one household from a house within the selected communities that use the central communal container (CCC), house-to-house (HtH) solid waste collection services and other methods of waste disposal. The concept of households in this study refers to a person or group of persons, who live together in the same house or compound and share the same house-keeping arrangements (Ghana Statistical Service, 2012). The study therefore places emphasis on key respondent of households and household heads or their representative who usually direct the daily handling of waste in the home. Institutions responsible for waste management in the Kumasi metropolis such as Kumasi Metropolitan Assembly and Zoomlion Ghana Limited were only considered for the study.

3.5 Sampling Techniques

Convenience sampling technique was used to select the houses from the three selected communities and the procedure of reaching the households to make up the sample for this study was based on simple random sampling and purposive sampling. However, effort was made to have the sample drawn from a dispersed community, to avoid getting the sample from one community. According to Nordtest, (1995) and Gomez *et al*. (2008), collection of data for a study should be done systematically, in order to receive reliable and measureable

data. In light of this, the researcher decided to use the simple random technique when he entered a house which had more than one household and in this case the researcher selected one household per house from the three selected communities namely; Kotei, Odoum and Bomso.

1. Simple random sampling

The simple random sampling was used to select the required sample size from the population that use the central communal container (CCC), house-to-house (HtH) solid waste collection services or any other methods of waste disposal as simple random sampling method purely based on chance or equal opportunity, which is undesirable due to the unsystematic nature and the degree of uncertainty related to it and that households has equal chance to be selected for this study.

2. **Purposive sampling**

The idea of this technique is to concentrate on people with particular information or characteristic who were in a better position to assist the researcher by providing the needed data. Though this sampling procedure may be criticized for being bias, Tongco (2007) reported that, the inherent bias of the method contributes to its efficiency, and the method stays robust even when tested against random probability sampling.

As the method allows the researcher to decide what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Lewis & Sheppard 2006), it is noted that, a list of qualifications is helpful.

In view of this, organisations for this study were KMA department of waste management and zoomlion limited to acquire the necessary information available for this study.

3.6 Instruments for Data Collection

The appropriateness of the instrument used were significant in guaranteeing and authenticating the data for the research analysis. In this study, interview, questionnaire and field observation were combined to collect the data.

In the opinion of Avoke (1997) interview can be describe as a way of purposely and verbally interacting with respondents in conducting research. Interviews are believed to provide a „deeper" understanding of social phenomena than would be obtained from purely quantitative method such as questionnaires (Silverman, 2000).

Semi-structured interview was used in the study and the data was gathered by taking notes and audio recording. The flexibility of this approach is helpful for probing to discover information that is important to the researcher. In view of this, data was collected from face-to face interview with households to identify the challenges associated with their waste disposal. Also interview was conducted by the use of interview guide to collect data from the households and the KMA Waste Management Department with regard to support systems to ensure proper waste disposal of households as far as solid waste management is concern. Householders were given the chance to comment on the quality of solid waste management services they receive from the metropolis and their expectation for an improve services.

Structured questionnaire was prepared taking into consideration the level of literacy of households in the three selected communities. Questionnaire explicitly was developed to take into account on current situation regarding waste collection and waste disposal methods of households. Again, questionnaire which was administered include questions on the households" willingness to pay for waste management services to be provided by the metropolis through private contractors. Other data that the questionnaire seek to collect include the prefer frequency of solid waste collection, the user charges amount that

householders will be willing to pay in addition to the mode and frequency of payment of such charges.

3.6.1 Primary Data

Primary data are data collected and observed from first-hand experience. Primary data collection methods that were employed for this study include the following;

3.6.1.1 Interviews

The research conducted interviews to obtain information from households about the subject matter. Interview which involve the researcher asking question and recording the answers in the interview guide was used to obtain data from the households.

i. Household questionnaires and interviews

The use of interview and self – administered questionnaire were useful to collect data among households. According to Bulmer and Warwick (1983), the checklist approach is preferred to self-administered questionnaires when the literacy level is not so high among the respondents. Questionnaires however were designed in such a way that key questions concerning waste disposal methods of households and their willingness to pay for waste management services were easily understood and well answered. Variables such as availability of public trash can, closeness to public trash can, responsibility for cleaning the immediate surrounding, personal measures to prevent filth and promote hygiene in the immediate surrounding among others were investigated.

ii. Institutional Interview

Formal interview was also conducted in some selected institutions responsible for waste management in the Kumasi metropolis. This helped to assess support systems to ensure proper waste disposal of households. The institutions interviewed included;

1. Kumasi Metropolitan Assembly

2.Waste Management Department (Zoomlion Ghana Limited)

3.7 Procedure for Administration of Instruments

The data was gathered by the use of questionnaires as well as note taking and audio recording with the help of interview guide. Data was gathered on the following aspect of the study; waste disposal methods of households, the place and type of receptacles where household waste are stored, the availability of skips and bins for storing waste, place of disposal of household waste, distance and time covered to dispose of waste at the skip sites, the waste collection method and frequency at which household waste are collect, and the subscription for household waste collection by the waste management departments. The other aspects of the data collection were related to the willingness of households to pay for waste management services, their view of who is responsible for maintaining the surrounding clean, and importance of work of the waste management personnel in the metropolis.

Again data was collected from the Waste Management Department (WMD) and the Zoomlion Ghana Limited on the availability of needed resources to managing waste, and the challenges encountered in managing waste in the selected communities within the Kumasi metropolis.

Moreover, there was face-to face interview with households and the assemblymen of the selected communities to identify the challenges associated with their waste disposal. Also data on support systems to ensure proper waste disposal of households as far as solid waste management is concern was collected from public and private organizations responsible for waste management services as well as households through the use of interview guide. Interview guide and questionnaire that were administered to the sample of households and institutions responsible for waste management were subjected to a pre-test to ensure clear understanding of the questions by respondents to gather the expect data.

3.8 Data Analysis Procedure

Data analysis involves critical examining, categorizing and summarizing data collected to make meaning for interpretation and drawing conclusion (Hecht, 2013).

A thematic content analysis was used in analyzing the data collected. According to (Braun and Clarke (2006, p.79), thematic content analysis is a qualitative analytic method for identifying, analyzing and reporting patterns (themes) within data. It minimally organizes and describes the data set in rich detail. This involved a procedure of transcribing data, coding the data, organizing the data, generating themes, and describing them. Data collected was then categorized by grouping extracts with the same code while taking note of other codes. Themes were then generated to make meaningful interpretation and to highlight important finding. For instance, data was coded similar to this format for analysis and interpretation.

ID Number	Comment	*Theme1: Positive/Negative*	*Theme2: Program Aspect*	*Theme3: Good Quote*
001	I was very unhappy with communication...	*Negative*	*Program process*	
002	My volunteer was fabulous ...	*Positive*	*Volunteer feedback*	*Yes*
003	I enjoyed meetings, but didn't like...	*Mixed*	*Program experience*	

Source: Hecht (2013)

However, questionnaires were administered and was examined to check completeness, accuracy and consistency of responses in order to detect and eliminate error. The data from the study was analyzed with MS-Excel and STATA version 14.0.

3.9 Validity and Reliability

Validity in this work was ensured by purposefully selecting the sample to minimize chances of getting irrelevant data. Also the interview guide and questionnaire were subjected to

expert approval by the research supervisor for content validity. Moreover, pretest was also conducted to ensure validity and reliability.

3.10 Data Handling and Storage

The data collected data was entered and double checked for completeness and accuracy on a daily basis. Also data collected from each community were kept separately in envelopes labelled and kept safely under lock and key for analysis. It was referred to when problem arose during the analysis. Only authorized persons had access to the collected data.

3.11 Ethical Issues

Ethical approval was seeking from the Committee on Human Research and Publication Ethics at the Kwame Nkrumah University of Science and Technology before the commencement of the study. Also the researcher paid special attention to ethical consideration and respect the dignity, autonomy, equality and diversity of participants involved in the research. In relation to this, certain issues were identified and considered in advance to prevent future problems that could arise after the research process. Among the significant issues that were considered includes;

Confidentiality: Confidentiality demand that, the researcher is committed to ensuring and assuring respondents that, their data provided will not be made available to anyone who is not directly involved in the study (Jamison, 2007). This was ensured in the study as the researcher see to it that the data obtained was not made available to any third party.

Informed consent: Informed consent as used in research means that, the prospective research respondents must be fully informed about the procedures and risks as well as the benefits involved in the research and must give their consent to participate in the study

(Trochim, 2008). This was ensured in the study as forms were made available to respondents to sign after they have been briefed on what the research entail as an endorsement of their consent to participate.

Voluntary participation: Respondents were informed of their right to choose to participate and withdraw at any time they choose to do so.

Anonymity: Anonymity in this study implies that the respondent‟s identity will not be included in any aspect of the research unless the respondents requested, probably to lay emphasizes (Trochim, 2008). The identity of the respondents was therefore ignored from this study.

3.12 Limitations of the study

1. The interview and questionnaire interpretation from English to local dialect of respondents affected the content of the study. The effect of this limitation was reduced and that the interview guide and questionnaire developed in English were translate into the local dialect and back into English. This was to ensure that the final the interview guide and questionnaire captured all the requirement and also reflected the original interview guide and questionnaire.
2. Time frame within which the study was carried out also affected the outcome due to the fact that only one household was selected from a house of many households.
3. The study suffers from information bias and that some respondents were not willing to give answers to some question due to the fear that the Waste Management Department of Kumasi Metropolitan Assembly would find out about their illegal practices with regard to waste disposal and implicate them.

3.13 Plans for utilization of results

Findings from this study were compiled and presented to the academic supervisor for proof-reading after which copies were made available to the School of Public HealthKNUST for academic scrutiny and award of marks. There are also plans to make the findings public, especially to the Zoomlion Ghana Limited and the Waste Management Department of the Kumasi Metropolitan Assembly where data obtained.

CHAPTER FOUR

RESULTS

4.0 Socio-Demographic of the respondents

From Table 4.1, it could be seen that 82% responses were received from females while 18% responses were received from males. However, the minimum and the maximum age of the respondents involved in this study were 24 and 75 respectively. Also the age mean of respondents was 43.74 years with a standard deviation of 11.61.

Level of education with mean and standard deviation (3.56 ± 1.78). About 25%, 23% and 21% of respondents in Kotei, Oduom and Bomso, respectively had no education. However, the rest of the respondents have had some form of education, either up to primary, secondary/technical, vocational or tertiary level. It was also indicated that, majority of the respondents from the three selected communities had completed middle/JHS education. The distribution of the level of education shows varied understanding of waste management issue by the respondents. Little or no education could indicate limited knowledge or understanding in waste management issue.

Mean and standard deviation (2.88 ± 1.14) represent occupation. Public servants constituted 15%, 11% and 14% of the respondents in Kotei, Oduom and Bomso, respectively. Majority of the respondents were engaged in petty trading with 34% in Kotei,
42% in Odoum and 37% in Bomso whilst 7%, 9% and 4% of the respondents in Kotei, Oduom and Bomso, respectively were engaged in farming activities. About 27% in Kotei, 28% in Oduom and 33% in Bomso were also engaged in other business apart from the mentioned occupation. However, 17%, 11% and 11% of respondents in Kotei, Oduom and Bomso respectively were unemployed. The occupational distributions of the respondents give ideas of their sources of income and could define their economic status.

Household size recorded mean and standard deviation (3.14 ± 1.25). The highest percentage of household size was between 7-9 people in all the three selected communities which represent about 29% in Kotei, 25% in Oduom and 33% in Bomso. However, household size made up of 1-3 people marked the lowest percentage and was seen in all the three communities with 10%, 13% and 11% in Kotei, Oduom and Bomso, respectively. Also the average household size recorded in Kotei and Oduom was between 4-6 which represent 21% and 22% respectively whilst Bomso had an average household size between 10-12 which represent 23%. The distribution of the number of household size could also determine the quantity of waste that could be generated by the households.

Table 4.1 Socio-Demographic of the respondents

VARIABLE	MEAN ± SD	KOTEI F(%)	ODUOM F(%)	BOMSO F(%)	TOTAL F(%)
Sex					
Male		25(19)	17(17)	15(19)	57(18)
Female		104(81)	82(83)	65(81)	251(82)
Age	43.74 ± 11.61				
Age Range	(24 to 75)				
Level of Education	3.56 ± 1.78				
Primary		12(9)	4(5)	10(13)	28(9)
Middle/JHS		29(22)	22(22)	20(25)	71(23)
Secondary/Technical		15(12)	21(21)	12(15)	48(16)
Vocational		18(14)	14(14)	8(10)	40(13)
Tertiary		23(18)	15(15)	13(16)	51(16)
Uneducated		32(25)	23(23)	17(21)	72(23)
Occupation	2.88 ± 1.14				
Farming		9(7)	9(9)	3(4)	21(7)
Petty trading		44(34)	41(42)	30(37)	115(37)
Public servant		19(15)	11(11)	11(14)	41(13)
Other business		35(27)	27(28)	27(34)	89(29)
Unemployed		22(17)	11(11)	9(11)	42(14)
Household Size	3.14 ± 1.25				
1-3		13(10)	13(13)	8(11)	34(11)
4-6		27(24)	21(22)	16(20)	64(23)
7-9		38(29)	25(25)	30(33)	93(29)
10-12		31(21)	21(21)	16(23)	68(21)
13+		20(16)	19(19)	10(13)	49(16)

Source: Author‟s Survey, 2019

4.1 Waste disposal methods of households

All respondents in the three selected communities used house-to-house solid waste collection as their major method of waste disposal as compare to the use of central communal

containers. In Kotei it was recorded that 74% of the households used house-tohouse method of waste collection as a means of disposing their waste with 26% of the households using central communal containers. Likewise, in Oduom 71% of the households also engaged in house-to-house method of disposing waste with 29% of the households using central communal containers as method of disposing their waste. However, 73% and 27% representing house-to-house and central communal containing method of disposing waste were used by the households in Bomso.

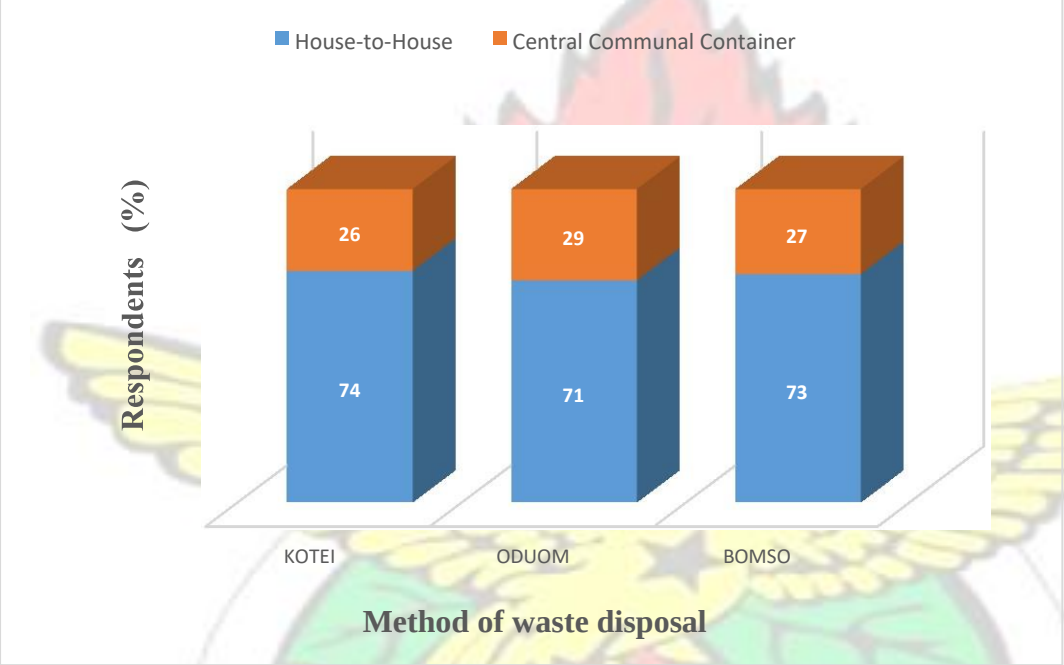

Figure 4.1: Method of waste disposal by respondents in Kotei, Oduom and Bomso

Source: Author"s Survey, 2019

Chi-square analysis was conducted to find out the relationship between the methods of waste disposal: methods of collection and its alternative.

Comparing the relationship between the organizations responsible for waste and the methods of collection a P-value of 0.0001 was found. This p-value is smaller than 0.05 which is the level of significant ($P<0.05$) therefore it is concluded that there is statistically significant relationship between the organizations responsible for waste and the methods of collection.

Also for the relationship between the organization responsible for waste and the alternative methods of waste disposal a P-value of 0.066 was obtained indicative that, there is no statistically significant relationship between these variables.

Table 4.2: Relationship between Organizations responsible for waste collection and the methods of waste disposal.

Variable	KMA	Zoomlion	Aboboyaa	Self-disposal	P-value
Methods of Collection					
House-to-House	39	42	126	17	**0.0001**
Communal Container	3	5	10	66	
Alternative Methods					
Burn	10	8	33	30	
Bury	10	8	30	17	**0.066**
To Disposal site	21	21	57	24	
Throw in Open space	1	10	16	12	

Source: Author"s Survey, 2019 *Chi-Square statistic is significant at the 0.05 level

4.2.1 Households alternative methods of waste disposal

Respondents from the selected communities were asked in case they do not receive collection service from any organization how do they dispose of their waste, and it was noted that 26% of households burn their waste, 21% of households bury waste generated from the house, 13% of households throw waste in open plot or on the street as their mode of disposing waste.

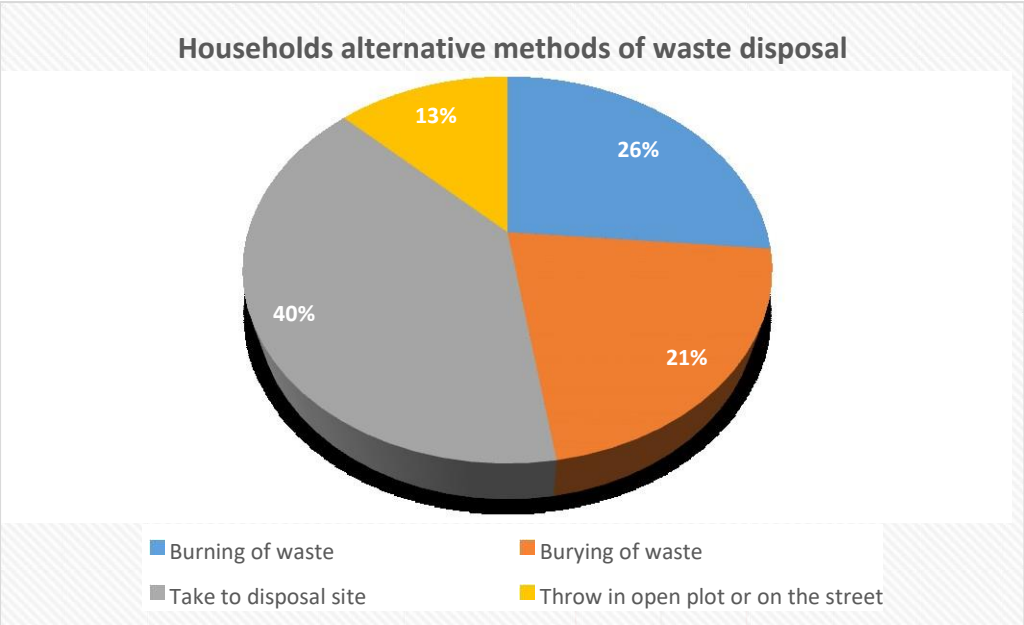

Figure 4.2: Alternative methods of waste disposal by the households

Source: Author‟s Survey, 2019

4.2.2 Waste Generation Rate

Households in respective communities were asked which solid waste do they generate most. Figure 4.5 shows the variation in solid waste generated most by the households in the three selected communities. The solid waste type identified in the study were categorize into food and rubber waste, paper and plastic waste as well as metal and clothing waste. Among the different categories of waste generated by the households in the selected communities, food and rubber waste recorded the highest percentage in all the three selected communities representing 57% in Kotei and Oduom with 70% in Bomso. The next category of solid waste generated by the households was paper and plastics indicating 35%, 39% and 29% in Kotei, Oduom and Bomso respectively. Metal and clothing waste recorded the least percentage with 8% in Kotei, 4% in Oduom and 1% in Bomso. The waste type identified in the three selected communities were similar to what Mensah (2008) reported in Atwima Nwabiagya.

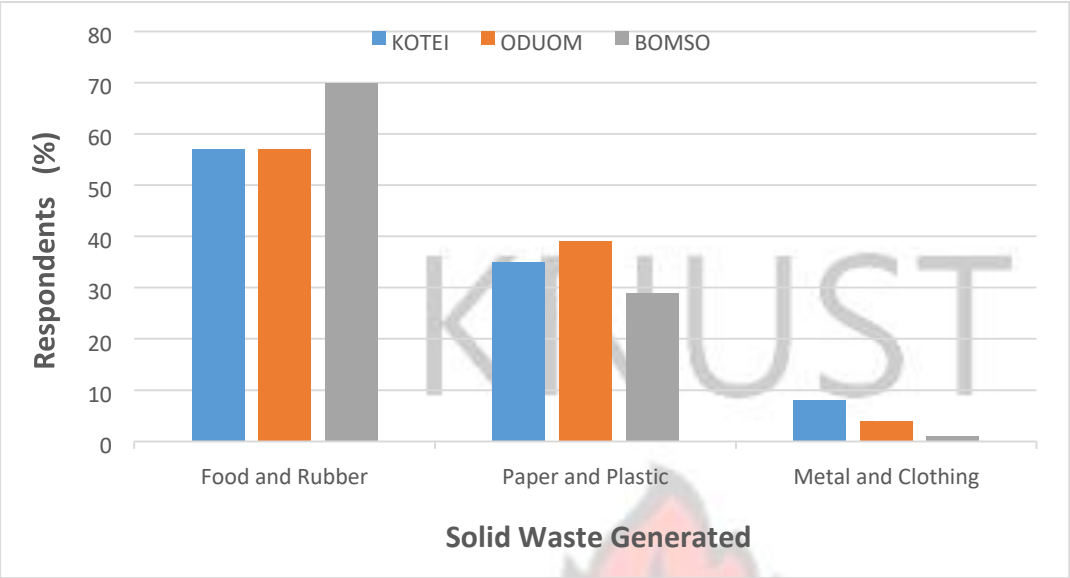

Figure 4.3: Solid waste generated in Kotei, Oduom and Bomso

Source: Author"s Survey, 2019

The similarity of solid waste generated between Kotei and Oduom could be explained by the fact that, the two communities are located within similar geographical area and therefore lifestyles of the residents could be similar. On the other hand, Bomso had high percentages literates than Kotei and Oduom and this might have influenced their lifestyles and hence their waste generation rate. Moreover, Bomso also had relatively high percentage of public servants and their economic status might have influenced their purchasing power and probably translated to the relatively high solid waste generation.

4.2.3 Waste storage containers

Solid waste generated were stored in different bins including plastic containers, ploythene bag and metal containers. Plastic containers was mostly used by all the households representing 48% and this was followed by the polythene bag used by the households as waste storage which constitute 28%. Also 24% of the households used metal containers as waste

storage. The variation in waste containers used by the households are summarized in Table 4.2 below.

Table 4.3: waste storage container used by households

Waste storage container	Frequency	Percentage %
Plastic container	148	28
Polythene bag	89	48
Metal container	71	24
Total	**308**	**100**

Source: Author‟s Survey, 2019

4.2.4 Organizations responsible for waste disposal

Waste disposal in the selected communities is manage by the waste management department of the KMA and the private waste management organizations such as Zoomlion Ghana Lmited and the "*Aboboyaa*" waste collectors. These organizations are responsible for ensuring effective collection and final disposal of the waste in the selected communities with few respondents using the central communal containers. 44% of the respondents use the "*Aboboyaa*" waste collectors for their waste disposal whilst 14% and 15% of the respondents in all the three selected communities depend on the KMA and Zoomlion for their waste disposal. It was also recorded that only 27% of the respondents in the three selected communities used the central communal container as a result of the limited number of communal containers for waste disposal. This finding is depicted in Table 4.4 below

Table 4.4: Organizations responsible for waste disposal

Organizations for waste	Frequency	Percentage %
KMA	42	14
Zoomlion	47	15

Informal Organization (*Aboboyaa*)	136	44
Central Communal Container	83	27
Total	**308**	**100**

Source: Author"s Survey, 2019

Aboboyaa is a tricycle usually contracted by residents for house-to-house solid waste collection service.

4.3 Willingness of households to pay for waste management services

Respondents were of the view that they are willing to pay for waste management service but charges should be moderate to enhance their full participation in waste collection service. They added that, they always wish to enjoy the services provided by waste collection organisations and that they should also play their role as waste collectors to ensure sanitary environment.

4.3.1 Waste disposal charges

Majority of the respondents in all the three selected communities believed the amount paid for disposal of waste was high and should be reduced. About 52%, 53% and 55% of respondents from Kotei, Oduom and Bomso respectively believed that the charges were high and therefore should be reduced so that households can dispose of their refuse at moderate cost whilst 35% of the respondents from each community also indicated that the amount collected for waste disposal at average mean cost of GH¢2.70p was enough and should be not increased. On the other side some respondents representing 13% in Kotei, 12% in Oduom and 10% in Bomso emphasised that the amount was too low. Majority of respondents interviewed, however, indicated their displeasure on the way and manner the attendants at the disposal charge per head. The charges were based on attendant"s weight judgement and not

properly weighed using a weighing balance. This had resulted in several confrontations at disposal sites and with "*Aboboyaa*" waste collectors. If waste is not quantified for payment as many of the respondents objected to in the study areas, then the payment should be standardized to avoid conflicts.

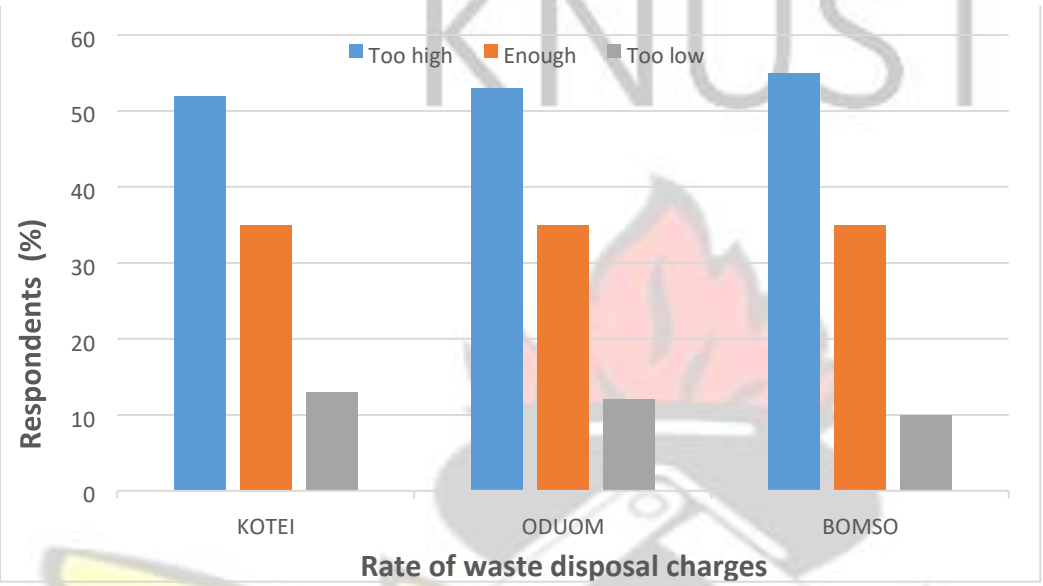

Figure 4.4: Rate of waste disposal charges

Source: Author"s Survey, 2019

4.3.2 House-to-house waste collection services

Regarding to house-to-house waste collection services,72% from Kotei, 73% from Oduom and 70% from Bomso were in support for this service. When asked whether the communities would like to engage the services of private waste collection agencies, about 63% of respondents from Kotei, 69% from Oduom and 66% from Bomso showed interest to engage waste collection agencies. More than 74% of those in support think this could save them some time to attend to other business. The rest would engage their services because they are experts in waste collection and therefore there would be some consistency in the waste collection. The waste collection should be however being done in the mornings.

On the other hand, several reasons were given for those who were not interested to engage the services of waste collection agencies and this include self-disposal (26% from Kotei, 45% from Oduom and 42% from Bomso), re-use of waste (9% from Kotei, 6% from Oduom and 4% from Bomso), inability to pay for their services (59% from Kotei, 39% from Oduom and 36% from Bomso) and unreliability of the waste collection agencies (6% from Kotei, 10% from Oduom and 18% from Bomso). Majority of the respondents (55% from Kotei, 63% from Oduom and 51% from Bomso) were of the view that waste disposal should be charged based of the quantity of waste to avoid cheat by the waste collection agencies.

4.3.3 Payment for house-to-house waste collection services

When asked how much the residents were willing to pay for the house-to-house in a month, majority of the respondents in the selected communities representing 36% were willing to pay GH¢15 per household whilst 25% were willing to pay GH¢10 per household. They were of the view that waste should be collected daily instead of the weekly and monthly collection and payment will be made on monthly basis just like it is done for the payment of utility bills. Figure 4.8 summarises the amount the respondents in the three communities would like to pay monthly for house-to-house waste collection services.

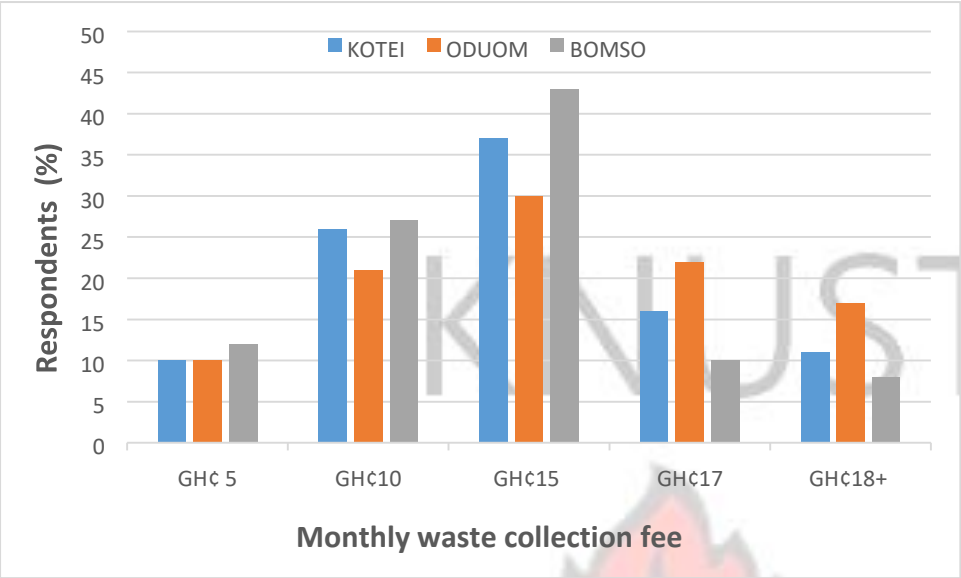

Figure 4.5: Monthly payment for waste collection

Source: Author‟s Survey, 2019

Generally, residents preferred daily payments to monthly payments. This is due to the fact that many of the people in the study communities had daily income and therefore would not be in the position to save for monthly payments for waste disposal. Although, majority of the respondents representing 80% from the study communities have high preference for house-to-house waste collection service, but the prefer daily charge of GH¢1 per household refuse which is attributed to the fact that respondents‟ income is very small seems inadequate in terms of labour involvement and cost of transportation. However, the KMA can employ the use of tricycle and motor cycles in the collection of refuse from homes to hauling points for transportation. This would help minimize cost of labour and transportation and ensure better containment of waste in the study areas and promote better financing and management of waste. Educating residents on the need to pay for waste disposal and the implementation of daily payment for house-to-house waste collection services would be more appropriate for the study areas.

Chi-square analysis was conducted to find out the relationship between the willingness of households to pay for waste management services: daily payment, position to pay, rate of payment, quantification of waste, monthly payment and frequency of emptying

Comparing the relationship between waste collection at home and daily payment a P-value of 0.0001 was found. This p-value is smaller than 0.05 which is the level of significant ($P<0.05$) therefore it is concluded that there is statistically significant relationship between waste collection at home and daily payment. Also it is noted that statistically significant relationship exists between waste collection at home with respect to position to pay ($P=0.0001$), rate of payment ($P=0.0001$), quantification ($P=0.0001$), monthly payment ($P=0.022$) and frequency of emptying waste ($P=0.002$).

Table 4.5: Association between waste collection at home and the willingness of households to pay for waste management services

	Yes	No	P-value
Variable Daily Payment			
0	9	4	
1	33	3	
2	89	16	**0.0001**
3	48	27	
4	20	21	
5	21	15	
6	0	1	
7	1	0	
Position to Pay			
Yes	170	8	**0.0001**
No	49	79	
Rate of Payment			
Too Low	33	4	
Too High	85	77	**0.0001**
Enough	103	6	
Quantification of waste			
Yes	146	28	**0.0001**
No	74	59	
Monthly Payment			
GHC 18+	27	10	
GHC 17	46	5	**0.022**
GHC 15	74	37	
GHC10	54	23	
GHC 5	20	12	
Frequency of Emptying			
Daily	150	65	

Weekly	66	14	**0.002**
Monthly	5	8	

Source: Author‟s Survey, 2019 *Chi-Square statistic is significant at the 0.05 level

4.4 Challenges associated with waste disposal of households

Challenges facing households in the selected communities includes delay in waste collection, inability of households to pay for waste collection charges, absence of sensitization of the public on issues of management of solid waste, inadequate refuse containers, lack of households‟ awareness on reducing, recycling and sorting of waste, poor attitude of households towards waste handling and ineffective waste management laws.

4.4.1 Respondents' opinion toward the Waste Management Department of the Kumasi Metropolis

During the interview respondents had been asked to express their opinion on the relationship between them as the households and the Waste Management Department of the Kumasi Metropolis. The opinions of the respondents were not the best on the part of the Waste Management Department to address the challenge of solid waste in their respective community.

The opinion of the respondents includes the following;

A resident of Kotei mentioned that;

> *"The waste management department does not provide us with any support with regard to waste but my landlady manages my waste at no cost yet the waste management department will ask me to pay for the same services therefore I don't see the need for the waste management department to take responsibility in managing our waste."*

In addition, a resident in Oduom expressed feeling of dissatisfaction about the work of the waste management department, that;

> *"The waste management department has not help us at all in terms of their work, for instance if an animal dies it is the responsibility of the residents to dispose it somewhere since the waste management department in most cases do not show concern. According to them dustbins are placed at vantage points yet they do not empty it frequently and the truck that picks the refuse always demand our payment for the services."*

A resident in Kotei explicated reservation on how waste management department of the Kumasi Metropolis manages solid waste in their community. She complained that;

> *"The truck of the waste management department only collects the solid waste in the rich man's house while the waste of those in unfenced house are not collected. They see some of us as poor and they do not see the need to collect waste from our house just as they do for the rich people"*

A household in Bomso also reported that;

> *"The main challenge is the decomposition of solid waste which makes the community stink as the KMA refuses to collect some waste on daily basis because of limited transportation facilities."*

A resident in Oduom expressed that the waste management department of KMA has nothing good to offer them with regards to waste management service. She explained that;

> *"Workers of the waste management department are pretenders; in fact, there is no difference between them and the politicians because they always deceive us with their services and that they are not already for solid waste management in this community,*

It is therefore our solely responsibility of seek for a way forward to dispose of our waste. In critical days we just engage the "aboboya" for their help as the KMA always tell us stories about their faulty trucks."

On the part of the KMA they lamented that limited number of seven vehicles are available to pick the refuse from the whole Metropolis of which only one vehicle collects the refuse from the selected communities. The limited number of vehicles for the waste collection had made it burdensome for them to provide the necessary waste management services. The Director of the WMD of the KMA, in his own words, he said;

"The challenge now, is that we do not have landfill and proper dumping sites in Kotei, Oduom and Bomso but we have secured a place in the metropolis which serves as a landfill and proper dumping site to dispose refuse there. With this, vehicle to collect and dispose of the waste is a challenge. We are limited by transport facilities to collect the voluminous waste generated in Kotei, Oduom and

B*omso."*

4.4.2 Waste collection fees

A resident in Bomso expressed feeling of dissatisfaction about the charge for the collection of waste that;

"Waste collection fees of KMA, Zoomlion and Aboboyaa is quite exorbitant and this compel households to give their waste to other collectors who claim they have a place to dispose it of but dump it illegally."

Nevertheless, few people do not depreciate the charge for the collection of waste as they stated that it is the order of the day and residents should just cope with it. Household head in Kotei expressed that;

"Not often but once awhile a truck from the waste management department of the

Kumasi Metropolis come over for waste collection and households are expected to pay for such service. Paying for the collection of waste the households generated should solely be their responsibility and this will help manage illegal dumping."

A resident in Bomso added that;

Paying for waste collection service is nothing but is a way of helping the waste collector to be equipped with the necessary equipment to enable them manage the waste in the community properly."

The Deputy Director in agreement with the Director said;

The Metropolis is currently engaging the service of the private organization like the "aboboyaa" to support the collection of waste in these communities and that residents also patronize their service at a moderate charge. They have their own truck for the collection of the solid waste of which they also pay to the attendant at the disposable site. Notwithstanding we are planning a program that will authorized the private waste collectors to fully carry out their services in the management of waste but as it stands now they are operating as entities for their own interest.

4.4.3 Waste Management Department and Zoomlion Ghana Limited staff of the Kumasi Metropolis opinion

The study revealed that financial constraint of some residents compel them to dump solid waste legally at unauthorized places. Zoomlion staff and the Deputy Director of the waste management department acknowledged that some residents do not complain about the fees for the collection of solid waste but others also find it costly to pay for the collection of solid waste. According to them residents who find it expensive in paying for the collection of waste are those who dump waste indiscriminately

The Deputy Director of the waste management department added that the main impediment to sanitary environment in the Kumasi Metropolis can be attributed to the negative attitude of some residents in the community. He explains by saying,

> *"Residents do not care anymore with regards to waste management and for that matter they do not acknowledge the effort of the waste management department. They see separation of waste as a waste of time and therefore do not see the need to do so."*

Staff at Zoomlion Ghana Limited added that

> *"Some residents leave in fenced houses and it becomes difficult for us to get access to their receptacles containing solid waste for disposal because they usually fasten the main door and they are the same people who come out and complain that we are not been helpful."*

Limitation of resources was also a problem on them. He complained that;

> *"Limited resource such as transportation facilities to manage waste is a serious obstacle to us since the waste generated in these communities are voluminous and the vehicles for the waste collection services are also few. What happen is that residents dump anyhow with view that if the CCC is not full they would have dispose of their waste at the appropriate place."*

4.4.4 Illegal dumping

Residents explicated their concern with regards to the way some people dump waste at unauthorized place within the Kumasi Metropolis. For instance, a resident in Kotei uncovered that;

"The cost involved in waste disposal in many case compels us to dump waste at anyplace of choice without payment. We have been warned severally by KMA officials yet some residents still dispose waste indiscriminately in the community."

Another resident in Oduom complained that;

"Daily payment for just solid waste collection by the aboboyaa waste collector is a headache to some residents so they see it to be cost free when waste is disposed at a reserve bushes as dumping space."

During the data collection the researcher observed that the residents prefer to dump solid waste anywhere other than to take it to the disposable site. The residents see reserve bushes as a place of disposal and that disposing waste at such places safe them from the charges of waste collection.

The Deputy Director complain about the illegal dumping practices of the residents in the Kumasi Metropolis. He explained that,

"Currently residents have developed negative attitude toward waste disposal, what they now do is that they throw their garbage in gutters and drains hoping that it will rain and carry it away. This practice of disposing of waste is very serious as it can surely cause flood in community. Even at all the residents should burn, bury or engage the service of the aboboyaa waste collector."

4.5 Support Systems in Solid Waste Management

To ensure sanitary environment support systems should be put in place in the selected communities and these includes regular collection of waste, subsidizing waste collection fee, educating the public on solid waste management issues, provision of waste receptacles for households to waste, creating awareness on reducing, recycling and sorting of waste and ensure legal implementation and effectiveness of sanitation laws.

4.5.1 Future collaboration between the households and the Kumasi Metropolitan Assembly

During the interview views of the respondents were seek on the essence to work with the Kumasi Metropolitan Assembly in ensuring sanitary environment. A resident elaborated by saying;

> *"When the waste management department of the Kumasi Metropolis refuse to support us, then it will be a mightier challenge for us as residents. We solely depends on the KMA for our waste disposal because securing a plot as disposal site for the residents in this community will be a problem and even so I don't think anyone will volunteer to take charge of the place."*

The residents expressed their thoughts on the way forward to attain a maximum collaboration as well as what the department responsible for waste management opt to do in ensuing greater engagement of the respondents.

The Deputy Director of the waste management department of the Kumasi Metropolis showed how determine they are to help secure sanitary environment for the residents in these communities.

The Deputy Director claimed that some residents in these communities are willing to resourcefully support to secure sanitary environment and that all they need to do is to follow up on them and discuss their measures put in place in the attainment of the clean environment.

4.5.2. Need for formal waste collection and disposal facilities

Households interviewed expressed the need for the Zoomlion and waste management department of KMA to provide them dumping site to facilitate the residents in ensure proper solid waste management in their environs. These sentiments were expressed through such responses as below;

A resident of Bomso suggested that;

"KMA should provide us dumping sites and make it known to all the residents in the community as this will help stop illegal dumping of waste. Residents who practice indiscriminate dumping will quit such an act because of the availability of the dumping facilities.

One resident of Odoum had the opinion that;

"KMA after the providing us with dumping site, it will also be necessary for them to continue with their solid waste collection services so that those who find it difficult to dispose of their waste at the dumping site would be assisted."

However, a resident in Kotei amused from the recommendation of dumping facilities and rather entreated that;

"Purchasing of vehicles by the KMA will help the households in the collection of their waste even when it associated with a moderate cost."

One resisident in Kotei appealed that;

"Purchasing of trucks will help but we as residents are also expected to patronized their service in the management of waste so that they get some funds for the maintenance of the trucks when they break down."

Another recommendation from one respondent at Oduom about dumping facilities was that;

"Provision of enough communal containers for residents in this community would be very helpful. Even that KMA should provide us with enough trucks as well to carry the waste in the communal containers when it is full. This will help ensure that the people dump waste at the authorize places rather than the going indiscriminate dumping."

The distance to the dumping facilities was also seen as problem by a respondent in Oduom so she pleaded that;

> *Inasmuch as our dumping facilities are not enough, the one available has been located at a distance which is not closer to our house in anyway. We want it to be little closer to our house so that we can fully utilize it."*

A resident in Kotei has the opinion that the Zoomlion Ghana Limited is solely accountable for the waste management service in the community. Her point of view was that;

> "*There is no need for us to inform them about their responsibility, after all they know best their duty as waste management institution and they should do so to promote sanitary environment."*

The Deputy Director of waste management department mentioned that:

> *"We have regretted as an institution that we have not yet secured a formal solid waste disposal site at some vantage areas within the selected communities."*

The Deputy Director of waste management department of KMA further expresses his view about their inability as an institution to acquire a plot for waste disposal. He emphasized that;

> *"We as waste management department of the KMA have to secure a plot of land for residents in these selected communities to dispose of their waste. The KMA in many cases has made an attempt to acquire lands but the challenge is that most of the lands procured for dumping sites were located closely to the market areas. The implication is that this could inhibit the health of the people. However, we shall address this challenge to ensure sanitary environment."*

4.5.3 Monetary Instrument

Respondent expressed their opinion on the ways forward to ensure fair monetary charges for the collection of waste by the various waste management organizations.

A respondent raised concern about the moderate waste fee that should be charge by waste collector for their services. She mentioned that;

> *"KMA waste management department and the Zoomlion should continue with the collection and disposal of our waste at a fee that is acceptable to all residents."*

From Oduom, one resident suggested that;

> *"Since our house is closer to the street, pedestrians and people in the house generate a lot of waste but the charges for collection she be considerable like GH¢2 daily, but if it exceeds that I would have no option than to bury it."*

Notwithstanding some respondents seem to have the view that waste generated by them should be collected free of charge.

One resident of Bomso explained that;

> *"Collection of waste at no charge would be helpful to us since there will be opportunity for all residents to dispose waste free of charge and this will go a long way to prevent illegal dumping and hence promote sanitary environment."*

Some respondents also suggested that even if it is impossible for the collection of household waste to be free, it should be affordable to all residents. A resident of Kotei said that;

> *"Some households have a very low income and that they find it very difficult to pay for daily waste collection service. With this situation the KMA should provide trucks that will collect waste at no charge."*

Some respondents were so much concerned about the number of times waste were collected by the organization responsible for the collection services. This was due to the fact that waste generated by these respondents were voluminous. Resident whose house is closer to the street and also engaged in selling of food in Kotei explicated that;

I wish the Zoomlion performs their waste collection service not less than twice a day at a cost that can be paid by the residents because we generate much waste and we are already to patronize their services to secure sanitary environment to attract more customers."

Respondent were asked the amount they were willing to pay per month for the collection of waste. They all have their own prefer price for this service. The preference of a resident in Oduom was that;

"The Zoomlion or "Aboboyaa" could offer us cheaper fee like GH¢10 per month for collecting waste."

Another resident of Bomso also indicated that there should a lawful charge for the waste collection. She emphasized that;

"Just like it is done for the payment of the utility bills residents should do same for the waste collection service say GH¢ 15 per month and their waste will be collected on daily basis. This could be implemented when it is established on legal ground to promote clean environment."

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Fr m Kotei, one resident explicated that;

> *"Authorities of the waste management department in the KMA should consider us and collect our waste at no charge with their trucks because we are all Ghanaians and we pay direct and indirect taxes for the development of the nation."*

The Waste Management Department are yet deciding on an authorize fee to be charge for waste collection

The Deputy Director of the Waste Management Department mentioned that;

> *"We are looking forward to charging a fee which will formally acceptable by all residents in the collection and disposal of their waste."*

4.5.4 Legal implement

Residents see it essential for the Kumasi Metropolitan Assembly to consider activities of the waste management department lawful by establishing laws and policies to govern their services. It was observed that respondents hardly take the responsibility of waste management upon themselves as most of see illegal dumping as the other of the day. With regard to the households interviewed, it was stated that formulation of sanitation laws and it implementation will go a very long way to address the challenges in waste disposal.

Resident from Oduom indicated that;

> *"As communities increase in number of households and physical structure it becomes highly essential for the KMA to formulate sanitation laws that will ensure proper waste disposal."*

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Fr m Kotei a respondent explicated that;

> *"Policies and laws regarding to sanitation is essential since the effects of waste can inhibit one's health. Residents may not be interested in the law at it initial stage but will later appreciate it."*

Respondents see the enforcement of the sanitation law as a major means to ensure proper sanitary environment.

A resident from Bomso was eager to notify that;

> *This is the time for KMA to formulate sanitation laws and also sensitize the residents about the law as this could save the KMA from being guilty."*

Another resident in Bomso elaborated by saying;

> *"The sanitation laws are of much important to us but it will be very difficult for the residents to act in accordance if the KMA fail to provide us with dumping facilities where we can dispose of our waste."*

A resident in Kotei was of the view that;

> *"There is a need for the enforcement sanitation law and to see to it that residents do not dump waste indiscriminately due to the fact that some children easily pick things from the ground which can be hazardous to their health. Residents should be made to face the law when they act ignorant."*

Another resident of Kotei pointed out that;

> *"When sanitation laws are implemented residents will quit illegal waste dumping practices. Hence promote sanitation in the residential areas and serve as appropriate place to elevate healthy living."*

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Ab ut the legal opinion, the KMA Deputy Director of waste management department claimed that,

> *"We are formulating a policy for all the communities including these selected communities to contribute some money to private organization like the Aboboya to collect solid waste and then the KMA will care of other garbage hips such communities."*

Another respondent from Oduom had different perspective about the issue of legal instrument. He pointed out that;

> *"The whole idea is to mobilize households in the communities and educate them on sanitation, this will help them stop the indiscriminately dumping practices. It is also important to encourage them to actively engage in communal labour activities to tide up the environment."*

The staff of KMA waste management department and the Zoomlion Ghana Limited indicated that measures regarding to sensitization of the residents on waste management have been put in place and that residents will be educated on the financial benefits they can attain from waste. The Deputy Director of Zoomlion Ghana Limited also added the strategies to sensitized the residents to bring to their understanding the need to pay for the daily collection of waste services.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter discusses findings acquired from the specific objectives. It compares the results to the previous research mentioned in the literature review. The purpose of this study is to assess waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis, looking into waste disposal methods of households, the willingness of households to pay for waste management services, challenges associated with waste disposal of households and support systems to ensure desirable waste disposal of households.

5.1 Waste disposal methods of households

Most households in the three selected communities prefer the house-to-house(HtH) waste collection services to central communal containers(CCC) method of disposing of waste due to the fact that their service save them some time to attend to other business. It was also indicated that HtH waste collectors are experts and therefore there are some consistency in their waste collection services. Again the patronage of HtH service to CCC waste collection by households was due to the same amount charge for disposing of waste on daily basis. In an instance where households do not receive collection of waste service from the waste collectors, they dispose their waste by adopting various methods which include taking to disposal site, dumping on open plot, burning and burying. This finding is consistent with views expressed by Ayotammuno and Gobo (2004).

Limited number of communal containers was the main challenge affecting waste disposal within the selected communities particularly, Oduom where most of the households depend on the CCC as a means of disposing of their waste. The distance between where the residents

reside and the CCC was lengthy and therefore have difficulties in disposing the waste into the CCC. This in many cases compels residents to practice illegal dumping of waste such as dumping waste into gutter, backyards and other unauthorized places. This is consistent with the claim made by Tadesse *et al*. (2008), that longer distance increases the probability of waste dumping in open areas and roadside relative to the use of communal containers.

Additionally, there was a lot of pressure on the CCC as two communal containers severs about 560 households in Kotei, 426 in Oduom and 345 in Bomso. This confirms the difficulties households face in attempt to dispose of waste. At a point where the few communal containers are full and have been transported to landfill site without replacement, it also discourages households and serves as a possible contributing factor of dumping at unauthorized places.

The waste management department of the KMA needs to institute proper structure system of communal containers to ensure conveyance and maximum supervision of the movement of the waste track. The Zoomlion Ghana Limited employs an irregular routine waste collection method where they wait until communal containers are full to the brim and sometimes overflow before they are conveyed. The effect of this situation is that residents dump their waste in opened space and in most case bury or burn as an alternative to disposal at the CCC.

5.2 Willingness of households to pay for waste management services

Variables like moderate charges for waste collection, frequency of emptying, quantification of waste generated and level of education have a significant influence on households willingness to pay for waste management services. It was indicated from the study that households are willing to pay for waste collection service if the charges are moderate. This is not different from the observation made by Aggrey and Douglason (2010), that moderate

charge for waste collection service positively affects willingness to pay for waste management. It was further observed that households with low income consider waste collection as the government‟s responsibility and could be less willing to pay for it. On the contrary, households with high income are more familiar with cost sharing and see it as their own responsibility and hence show more willingness to pay. This observation is in line with the finding of Tamura (2005), that the more income people have, the more willing they are to pay for solid waste collection.

Frequency of emptying of waste bin and communal container influence willingness to pay for improved waste management. Households who are more satisfied with waste collection services are willing to pay more than dissatisfied households. This is consistent with the finding of Afroz *et al*. (2009), that households willingness to pay for waste disposal service is dependent on the quality of service they get. Again it was revealed from the study that households willingness to pay for waste disposal service is also influence by the quantity of waste they generate. This result leads credence to finding of Aggrey and Douglason (2010), who pointed out that the higher the generation of waste, the more the household faces the challenge of waste disposal and the greater willingness to pay.

Moreover, households willingness to pay for such services also depend on level of education. This confirms the study conducted by Addia and Danso-Abeam (2014), and Aggrey and Douglason (2010), as they all hypothesized that the higher people‟s level of education, the more they would appreciate the consequences of mishandling solid waste, and the more they would be willing to pay in order to avoid the risk of being victims of an unclean environment.

5.3 Challenges associated with waste disposal of households

5.3.1 Limited resources

The households within the selected communities comprehend that it is the responsibility of the KMA to provide services to them in terms of waste management services. The irony is that though residents have to take foremost responsibility of managing the solid waste at a basic level, they constantly desire the KMA to come out with a plan and structure that would help them to engage in the waste management activities. Households expect the KMA to perform its responsibility through the provision of proper management services which encompass disposal facilities and transportation. The KMA is currently constrained by the absence of such facilities. The resource constraint on the part of the waste management department of the KMA is in a way contributing to terrible environmental sanitation of the households. This result confirms that of Asase *et al*. (2009), who found that what the KMA contribute in term of facilities is what acts as a motivation for the residents to engage in management of the solid waste.

5.3.2 Illegal dumping

Illegal dumping within the selected communities of the study indicates deficiency in terms of authorize place for solid waste disposal. The obvious restricted quantity of landfill facility in the KMA should be one of the reasons in the back of the profound illegal dumping phenomenon. This finding is tandem with that of Saungweme (2012), who expressed that households will continue to dump indiscriminately if communal containers are always full and there is no suffice landfill for final disposal. There being no legal place to dump the solid waste, residents discover solace in dumping at any open location where they can feel convenient to. The KMA also seem to face a setback in deterring this unlawful dumping because they would have to present an alternative place to the public, which is currently not available.

Households, especially those who do not have enough money to pay for solid waste collection services and who have waste that by way of any reason cannot be buried or burned, lead to indiscriminate dumping. The indiscriminate dumping is disguisedly accomplished generally at night, though in some cases it could even be done at some point of the day. This is consistent with the finding of Masocha (2005), who claimed that indiscriminately dumping of solid waste is seemingly becoming the order of the day as it is practice by many households. The respondents revealed that for some households, any open location beneath no operation is viewed to be a potential place for dumping of solid waste. This result leads credence to findings of Mubaiwa (2013).

5.3.3 Weak enforcement of the Sanitation laws

The structure for the enforcement of the sanitation laws is additionally weak in the sense that the vice is recognized nonetheless, there is no one to make sure that culprits are fined. Even when prohibitive notices are placed at these places, the people continue to dump the solid waste at such places. The concerned community members do not have the authority to arrest and punish those people who smash the legal guidelines of proper waste management and this may additionally give an explanation for why illegal solid waste dumping continue to be a common phenomenon. Moreover, this result confirms the findings of Manyahaire *et al*. (2009), that the people do not have the mandate and besides, if the waste dumping place is no longer one‟s plot of land, then one has no authority to rebuke anyone else dumping waste at such a site. Thus it becomes a no man‟s land and consequently no one may have the audacity to workout authority over it. The justification for the laws and policies on solid waste management seem no longer to be valid. There is concern about the risks of uncontrolled dumping of solid waste as it makes the communities incline to communicable diseases, and additionally the reality that the communities are growing in terms of population and structural development. This result leads credence to findings of Marshall & Farahbakhsh

(2013), that when the population continue to grow in the absence of legal guidelines involving issues like household solid waste management, it becomes very tough to reverse the environmental effects they may have caused.

5.4 Support systems to ensure proper waste disposal of households

The KMA has laid down support systems to address the poor solid waste management issue. On the other hand, the residents additionally have their idea on what need to be done to make certain that the households play their part in proper solid waste management. This section therefore discusses the suggestions given in this regard.

5.4.1 Authorize disposal facilities

Provision of authorize disposal facilities will address the problem of illegal dumping within the selected communities. This attests to literature evidence that when there is the presence of authorize place to dump solid wastes, residents will not find it solace in dumping at any open place at all Ogawa (2005). The residents want communal containers placed at vantage point so that they can dump their waste in such containers and then the KMA truck can pick them when they are full to landfill. This is contrary to literature evidence which reveals that not all residents would manage to carry their household solid waste by themselves to the communal containers, some of them would rather pay private waste collectors to do that for them (Burntley, 2007). The private waste collector on their part also need landfill facilities nearby so that the amount they charge for solid waste collection could be reduce. Certainly, the residents believe that the KMA needs to come to their rescue by securing landfill facilities for waste management. This finding also corroborate Kaseke (2005), but contradicts that of Sujauddin *et al*. (2008), who argued that not only landfill facilities but additionally the transport facilities that the residents expect the KMA to provide would be effective when there is a authorize place to dispose of the household solid waste. It is quite clear from the findings that the preferred type of waste management that is convenient in the KMA would

be provision of enough landfill facilities. This means that there is little consideration for the first activities in the integrated strategy for solid waste management as outlined by USEPA (2002), but rather the last which is landfill facilities.

5.4.2 Legal instrument

Both the KMA authorities and the residents of the communities acknowledge that the legal instrument is a helpful rather than a burdensome alternative in the management of solid waste in the KMA. A number of residents hold the view that laws and regulations on solid waste management are long overdue. This finding support the results of Tsiboe and Marbel (2004), that some people in the community can only do something right when there is a law for reference and a penalty when conformity is evaded.

5.4.3 Education on sanitation

It was revealed the residents are not aware of or not satisfied with the role played by the KMA in solid waste management. The residents express their resentment that the KMA has not done anything while other acknowledge that the KMA had tried to do something although they needed to do more. Residents of the selected communities expect the KMA to openly come out on the issue of solid waste management. Also the residents expect the waste management department of KMA to embark on sensitization of the public to raise their awareness on the effect associated with the poor solid waste disposal practices which are common in the selected communities as well as on the proper ways of managing solid waste. This finding is rightly consistent with the view expressed by Ogawa (2005), that sensitization should come prior to provision of waste receptacles, transportation and landfill facilities. Most of the households seem to practice poor disposal methods either because they are ignorant of the implications or because they lack alternative. This result leads credence to findings of Freduah (2004), that solutions and answers can be obtained through education of the residents to address the problem of poor disposal of solid waste. The KMA officials has

sensitization of the people as part of the strategy to ensure massive engagement of the households in solid waste management. This include the plan to sensitize the people on the law as well as the fees to be paid for collection and management of solid waste. This finding support the results of Murad *et al.* (2012), that sensitization in most cases bring the residents and the authorities closer to form a synergy for the management of solid waste.

5.4.4 Monetary instrument

The KMA authorities have looked at the monetary instrument as one that can be effective when introduced within a legal framework. This support a study conducted in Nigeria when the introduction of the monetary instrument in this way together with sensitization of the public help them to appreciate the rationale for its introduction, give grounds to potential engagement of the residents in a way (Yusuf *et al.*, 2007). Sensitization of the monetary instrument covers for the fear by the people of the closeness of the state like Evans(1996a), argues and at the same time forms a background for acceptance of waste collection fees. The waste collection fee could also work as an encouragement for waste reuse as a way of avoiding or at least minimizing it on the side of the people. The introduction of the monetary instrument will influence the willingness of the households to pay for waste collection and management hence see it as prominent. This confirms to literature evidence that residents do not seem to have much reservation about paying for solid waste apart from the extravagant amount that may be charged (Alhassan and Mohammed, 2013). Thus, there are already a considerable proportion of people who pay for waste collection. There was almost unanimous agreement among the respondents that it would be prudent to pay for waste collection in future. For example, a study conducted by Badgie *et al.* (2012), reveals that even those who do not pay for waste collection and management services including those who practice the cost free burning expressed

willingness to pay for solid waste collection in future.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study was conducted to investigate waste disposable methods and challenges among households in Kotei, Oduom and Bomso in the Kumasi Metropolis and to assess their willingness to pay for waste management service as well as support system that will ensure proper waste disposal of households. A survey was conducted to sample three hundred and eight households for this study.

The first objective of the study was to identify waste disposal method of households. The study reveals that majority of the respondent used house-to-house solid waste collection as their major method of waste disposal than the central communal containers for waste collection due to same amount charged for the waste disposal. However, some respondents who cannot afford to pay for the waste management service also engaged in burning or burring while others dump at unauthorized place.

The second objective of the study was to determine the willingness of households to pay for waste management service. Majority of the respondents were not satisfied with the fees paid for waste management service as they see the charges to be exorbitant and hence they are ready to pay moderate fees for such services.

Concerning the third objective, the study was to identify challenges associated with waste disposal method of households. The results indicated that limited disposal facilities, attitude problem related to poor disposal of waste, high fees charged for both house-to-house waste collection services and central communal waste collection centres, and weak enforcement of sanitation by-laws by government authorities were the main challenges.

The fourth objective of the study was to ascertain support systems to ensure proper waste disposal of households. The study indicated that provision of authorize disposal facilities, strictly enforcement of legal instrument and sanitation, education of the general public on sanitation issue as well as monetary instrument to help to charge moderate fees for waste management were the major support systems needed to be put in place to enhance sanitary environment within the selected communities.

6.2 Recommendations

Based on the above results, the following recommendations are being made to the Waste Management Department (WMD) of the Kumasi Metropolitan Assembly (KMA), Zoomlion Ghana Limited, Informal waste collectors and Non-Governmental Organisations (NGOs) to consider for sanitary environment and sustainable development.

1. Key stakeholders in the solid waste management such as WMD, private organization and Non-Governmental Organisations in collaboration with prominent traditional rulers, Assemblyman, women and heads of household should organize series of durbars, at which sanitation officers could be invited to educate households on proper waste management and the benefits the practice has on households and community at large, so as to help households overcome poor practice of mishandling waste.
2. WMD, Zoomlion Ghana Limited and NGOs should adopt a recycling programme at communal waste collection centres. Thus the integrated solid waste management (ISWM) model could be adopted by these stakeholders to ensure effective and efficient solid waste management.
3. Waste Management Department of the KMA and Zoomlion Ghana Limited should increase the number of disposal facilities and communal containers at the waste collection centres.

4. In order to the repel heaping and over flowing of waste at the waste collection centres, WMD and Zoomlion Ghana Limited should ensure regular maintenance of disposal facilities as well as regular transfer of the waste from collection centres. Again WMD should ensure regular monitoring of waste collection as this will go a long way to promote sanitation and improve health.
5. WMD, Zoomlion and NGOs should ensure effectiveness in the implementation of the sanitation bye-laws and apprehend offenders for improper solid waste disposal. Thus there should be partnership which incorporates residents, private waste collected organization and government entities to enforce sanitation laws and regulations as this will ensure effective household solid waste management.
6. Authorities of KMA should ensure low charges of fees for waste collection services both at the waste collection centres and at the house-to-house collection service. This would encourage low-income households to dispose their waste properly as they patronize such service.
7. Service operators of WMD, Zoomlion Ghana Limited, NGOs and other informal waste collection organizations should concentrate on awareness creation about the negative consequences of indiscriminate waste disposal and benefit of proper management of solid waste. Thus awareness campaigns through the mass media for instance community centre and FM stations would target the subjective norms to inform the residents about the need to patronize the services of waste collection organization.
8. Waste Management Department of the KMA and the Zoomlion Ghana Limited should collaborate with the NGOs to solicit funds for financing and maintaining waste collection centres and disposal facilities.

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APPENDICES

APPENDIX I

DATA COLLECTION TOOLS

QUESTIONNAIRE FOR HOUSEHOLDS

Kwame Nkrumah University of Science and Technology

Department of Health Education and Promotion

Master of Public Health (Health Education and Promotion) 2018/2019 Thesis Field Research

This questionnaire is intended to gather data geared toward assisting Gilbert Debrah Appiah, a Master of public Health student in the Department of Health Education and Promotion, School of Public Health, Kwame Nkrumah University of Science and Technology for his Research Thesis titled "*Waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis*"

Declaration: *Information supplied herein will be used only for academic purposes and will be treated with utmost confidentiality.*

Instructions to respondents

- Do not write your name or contact details on the questionnaire.
- Tick in the space provided for closed questions
- Fill in the space provided for closed question

SECTIO
N A

Background Information

Please tick the appropriate and applicable box

1. What is your sex? Male [ ] Female [ ]
2. What is your age? ……
3. What is your level of education? None [ ] Primary [ ] Middle/J.H.S [ ] Secondary/Technical [ ] Vocational [ ] Tertiary [ ]

   Other please specify…….
4. What is your major occupation? Farming [ ] Petty Trading [ ] Business [ ] Public servant [ ] None[ ] Other please specify…….
5. How many people reside at your house? 1-3 [ ] 4-6[ ] 7-9[ ] 10-12 [ ] 13+[ ]

SECTION B

Waste generation, collection and disposable methods

6 (i) Which of the following solid waste do you generate most?

Food and Rubber [ ] Paper and Plastics [ ] Metals and clothing [ ]

(ii) Of the waste you generate other than council collection what other waste management option do you use? Please indicate below

METHOD	TYPE OF WASTE
Reuse	
Recycle	
Compost	
Burn in open air	
Other please specify	

7(i). Do you have a refuse bin? Yes [ ] No[ ]

(ii) What type of bin is it? Use polythene bag [ ] Plastic container [ ] Metal container [ ]

Other specify……..

(iii) Where did you get your bin from? Donors [ ] KMA [ ] Self [ ]

8(i). What is the mode of collection of waste in your area?

Door-to door [ ] Communal container [ ] Other specify……

(ii)Who is responsible for the disposal of waste generated in your households?

Waste Management Department (Metro Assembly) [ ] Zoomlion [ ] Private

Organisation [ ] Self [ ] Other specify……

(iii) How often is refuse collected by the authorities? Daily [ ] Weekly [ ] Monthly [ ]

Never [ ]

(iv) What time is the refuse usually collected? Morning [ ] Afternoon [ ] Evening [ ]

Night [ ]

(v) In case you do not receive any collection service from anyone, how do you dispose of your

waste? Burn [ ] Bury [ ] Take to disposal site[ ] Throw in open plots or

on the streets [ ] Other specify……

9. Do you separate your waste? Yes [ ] No [ ]

10.Some people dump household waste in unauthorized places because?

No facilities [ ] To save cost [ ] No penalty [ ] Inadequate information [ ]

N C

Willingness of households to pay for waste management services

11. Do you wish your waste could be collected by at your home? Yes [ ] No [ ]

12. Would you like to employ any waste collection agency eg Zoom;ion to collect your

SECTIO

refuse periodically from your house? Yes [ ] No [ ]

13. If yes, give reason: to save time [ ] they are expert [ ] consistent waste disposal [ ]
14. If no, give reason: self-disposal [ ] re-use of waste [ ] cannot afford [ ] not reliable [ ]
15. How much would you like to pay for daily collection of your refuse? Specify the amount GH¢……
16. Are you in position to pay? Yes [ ] No [ ]
17. If no, give reason: I am not working [ ] I don"t see the need [ ] My income is very small [ ]

    Other specify……
18. Do you think the amount paid for disposal at the communal containers is too low [ ] too high [ ] enough [ ]
19. Do you think the payment should be based on quantification of the waste? Yes [ ] No [ ]
20. How much do you think you can pay to a waste collection agency monthly for emptying your waste bin in the house? GH¢18+ [ ] GH¢17[ ] GH¢15[ ] GH¢10[ ] GH¢5[ ]
21. How often would you like your waste bin to be emptied should you employ a waste collection agency eg Zoomlion Daily [ ] Weekly [ ] Monthly [ ]

SECTIO
N D

Waste management support system

22. (i) In your own view, give ways you can effectively manage the disposal of solid waste in your area **(You can tick more than one answer).**

Contributing to buy waste containers [ ] Paying for the disposal and collection of waste [ ]

Stop dumping waste any how [ ] Other specify…….

(ii) Are you able to do any of these? Yes [ ] No [ ]

(iii) If yes, mention those that you are able to carry out.

Contributing to buy waste containers [ ] Paying for the disposal and collection of waste [ ]

Stop dumping waste any how [ ] Other specify……

I am grateful for your time and cooperation.

INTERVIEW GUIDE FOR HOUSEHOLDS

Kwame Nkrumah University of Science and Technology

Department of Health Education and Promotion

Master of Public Health (Health Education and Promotion) 2018/2019 Thesis Field Research

This interview guide is intended to gather data geared toward assisting Gilbert Debrah Appiah, a Master of public Health student in the Department of Health Education and Promotion, School of Public Health, Kwame Nkrumah University of Science and Technology for his Research Thesis titled "*Waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis*"

Declaration: *Information supplied herein will be used only for academic purposes and will be treated with utmost confidentiality.*

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N A

Challenges associated with waste disposal of households

1. What challenges do you experience with solid waste disposal?
2. What challenges do you experience with solid waste collection and transportation?
3. What are the challenges facing solid waste management in your community?

SECTION B

Support systems to ensure proper waste disposal of households

4. In what ways do you participate in solid waste management in your community?
5. What support systems would you suggest to ensure effective solid waste management?
6. What is your role in controlling illegal dumping of wastes?
7. What interventions would you suggest to address the above challenges?

I am grateful for your time and cooperation.

INTERVIEW GUIDE FOR THE KEY INFORMANTS IN ORGANISATION

Kwame Nkrumah University of Science and Technology

Department of Health Education and Promotion

Master of Public Health (Health Education and Promotion) 2018/2019 Thesis Field Research

This interview guide is intended to gather data geared toward assisting Gilbert Debrah Appiah, a Master of public Health student in the Department of Health Education and Promotion, School of Public Health, Kwame Nkrumah University of Science and Technology for his Research Thesis titled "*Waste disposable methods and challenges among households in selected communities within the Kumasi Metropolis*"

Declaration: *Information supplied herein will be used only for academic purposes and will be treated with utmost confidentiality.*

1. Who is your employer and what is your job title?
2. Kindly describe your job in relation to waste management?
3. What is the mission statement of your organization?
4. What is household solid waste management?
5. Briefly highlight the role of your organization with regard to SWM
6. In what ways do your organization participate in solid waste management in Kumasi metropolis?
7. What is the role of your organization in controlling illegal dumping of waste?
8. What are waste management support systems and which ones are used in Kumasi metropolis?
9. Do you think Kumasi metropolis is using effective support systems for household solid waste management? Please explain?
10. Do you recommend any other support system for the city of Kumasi?

11. How do you assess the waste management situation in Kumasi?
12. Is the city of Kumasi doing anything significant in managing household solid waste? Please explain.
13. In your opinion, which factors hinder the city from doing proper household solid waste management?
14. What do you think can be done to ensure proper waste management in Kumasi metropolis?
15. What is your organization doing to ensure proper waste management?
16. Do you think poor support system for household solid waste management has some effects on the environment and human health? Please explain
17. Any other information concerning solid waste management as a whole?

I am grateful for your time and cooperation.

CONSENT FORM

Researcher's Details

Name: Gilbert Debrah Appiah

Position: Master of public Health student in the Department of Health Education and Promotion, School of Public Health, Kwame Nkrumah University of Science and Technology

Student Reference Number: 20610678

Contact Address: P.O.Box, 19 Mankessim-Central Region

Email address: appiahgilbert34@gmail.com

Phone: 0501458356 or 0501367669

Respondent Confirmation Form

Please tick a box

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask question.

   Yes [ ] No[ ]

2. I understand my participation is voluntary and that I am free to withdraw at any time without giving reason.

   Yes [ ] No[ ]

3. I agree to take part in the above study

   Yes [ ] No[ ]

4. I agree to the interview being audio recorded

   Yes [ ] No[ ]

5. I agree to the use of anonymity quotes in publication

   Yes [ ] No[ ]

6. I agree that my data gathered in this study may be shared in a specialist data centre and may be used for future research

   Yes [ ] No[ ]

Name of Researcher……. Date……

Signature…….

Name of Researcher……. Date……

Signature…….

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/414/19 3rd July, 2019.

Mr. Gilbert Debrah Appiah
Department of Health
Education and Promotion
School of Public Health
KNUST-KUMASI

Dear Sir,

LETTER OF APPROVAL

Protocol Title: ***"Waste Disposable Methods and Challenges among Households in Selected Communities within the Kumasi Metropolis."***

Proposed Site: ***(Bomso, Kotei and Odoum, and Zoomlion Company Limited) Kumasi Metropolis.***

Sponsor: ***Principal Investigator.***

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 29th May, 2019 from the Kumasi Metropolitan Assembly (study site) indicating approval for the conduct of the study at the Metropolis.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire and Interview Guide.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning 3rd July, 2019 to 2nd July, 2020 renewable thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

Osomfo Prof. Sir J. W. Acheampong MD, FWACP
Chairman

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Kumasi Metropolitan Assembly

Ref No: KMA/ WMD/GEN/4 **Date: 29th May, 2019**

COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH
PROMOTION AND EDUCATION
KNUST

Dear Sir/ Madam

LETTER OF ACCEPTANCE
APPIAH GILBERT DEBRAH

With reference to your letter dated 29th April, 2019 concerning APPIAH GILBERT DEBRAH a MPH student at the Department of Health Promotion and Education;

I write to indicate our willingness to support the student in this regard.

We hope that the study would yield findings and recommendations to feed into policy formation and deal with the enormous sanitation challenge in the Kumasi Metropolis.

OSSEI ASSIBEY BONSU
DEP. DIRECTOR - WMD

"Where Ghana Happens"

ZOOMLION GHANA LIMITED

Location: Behind Ghana Commercial Bank, Ahinsan
Address: P.O.Box KS 6900 Adum-Kumasi **Telephone:**03220 43871/ 0208 630 859 / 0208 630 946
Fax: 03220 43782 E-mail: ashanti@zoomlionghana.com / ashantiregion@zoomlionghana.com

10TH JUNE, 2019

COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH
KNUST

Dear Sir/Madam

LETTER OF ACCEPTANCE APPIAH GILBERT DEBRAH

With reference to your letter dated 29TH April, 2019 concerning APPIAH GILBERT DEBRAH a MPH student at the Department of Health Promotion and Education;

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We hope that the study would yield findings and recommendations to feed into policy formation and deal with the enormous sanitation challenge in the Kumasi Metropolis.

.....
EUGENE AMO - ASAMOAH
PUBLIC JOBS MANAGER

Head Office: Ashaley Botwe, Niama Djorn, near Ayensu River Estates, University Farm Road, Address PMB 117 Madina ,Accra
Telephone: 022 252204, 0244 335139/40 Fax: 022 252137 E-mail: info@zoomlionghana.com / zoomlionghltd@yahoo.com

APPENDIX II

Waste collector waiting for households to dump their waste

Resident disposing her waste in Aboboya

Household waste put for house-to-house waste collector

Central communal container for waste collection

Aawfssas

Communal container filled to the brim at waste collection centre

Household waste sorted for recycling

School compound used as open dumpsite due to limited dumping facilities