DEPARTMENT OF PUBLIC ADMINISTRATION AND HEALTH SERVICE MANAGEMENT

THE ROLE OF INFORMAL OPERATORS IN SOLID WASTE MANAGEMENT IN GHANA: THE EXPERIENCE OF ASHIAMAN MUNICIPALITY

BY

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DECLARATION

I declare that this study is the result of my own original research and has not been presented by anyone for any academic award in this or any other University. All references used in the work have been duly acknowledged.

I bear sole responsibility for any shortcomings in this document.

…… ……

JOSEPH KORLEY COMMODORE DATE

CERTIFICATION

I hereby certify that this research was supervised in accordance with procedures laid down by the University.

……. …….

DR. ALBERT AHENKAN DATE

(SUPERVISOR)

DEDICATION

This work is dedicated to God Almighty my creator for the strength, knowledge and wisdom throughout this program. I also dedicate this work to my wife, Cephra who has supported me all the way and to my children Jollene, Jo-Ann and Joelle who have been affected in every way possible by this pursuit.

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LIST OF ABBREVIATIONS

AMA	Accra Metropolitan Assembly
ASMA	Ashaiman Municipal Assembly
CCWL	City and Country Waste Limited
ISWM	Integrated Solid Waste Management
KMA	Kumasi Metropolitan Assembly
MLGRD	Ministry of Local Government and Rural Development
MPHD	Metro Public Health Department
MPHD	Metro Public Health Department
SWM	Solid waste management
UNEP	United Nations Environment Programme
WMD	Waste Management Department

Abstract

This study investigated the role of informal solid waste collection in the Ashaiman Municipality and its challenges. The study comes at the back of the increasing use of informal waste collection as a common means for disposing off waste for the urban poor and yet appears untapped by the authorities.

Using primarily qualitative research methods, the case study strategy was deployed, with interviews as the main tools for collecting data. The primary data was augmented with secondary data drawn from Municipal Assembly documents, books, reports and other scholarly publications. The study found that, the informal waste collection systems have become predominant in the Municipality. For most people, they serve as a useful alternative to augment waste collection by formal companies. In spite of their prevalence however, authorities have not integrated these collectors into their Solid Waste Management (SWM) architecture. Others challenges are stigma from the community and lack of resources both financial and technical. To help improve the effectiveness of informal waste collection activities, it is recommended that city managers recognize and integrate informal solid waste collectors into their SWM architecture. This will not only help them acquire capital to procure the necessary tools and equipment, but also improve their image in the eyes of the community. The proper integration of the sector into the existing solid waste management policies can lead to sustainable management practices and possibly help alleviate poverty.

CHAPTER ONE

GENERAL INTRODUCTION

1.0 Introduction and Background

Solid waste management (SWM) has been an important developmental issue over the years (Boateng et al., 2016). In recent years, the issue has intensified due to population and industrial growth, which have increased the volume of solid waste generated, particularly in the cities. Currently, about 1.3 billion tons of solid waste is generated in the world's cities annually; a figure that is projected to increase to 2.2 billion tones by 2025 (Suleman et al., 2018).

The increasing solid waste and its management present both economic, social and health challenges for city managers across the globe. It has become a daunting task for local and central authorities, throwing up several challenges. The challenges range from lack of capability and logistics to deal with the escalating waste situation (Ma &Hipel 2016); the lack of necessary resources to shoulder the burden of providing services. Nyenje, (2011), and the lack of cooperation and support from the citizenry in managing solid Waste. These problems are even more profound in developing countries where lack of resources is a major challenge in dealing with solid Waste. Kretchy et al., (2019), indicates that city authorities in developing countries are unable to collect even half of the wastes generated, most of the urban slums do not have access to waste disposal facilities.

In Ghana, SWM has been a major challenge haunting city authorities over the years. Saidou&Aminou, (2015), indicate that SWM poses a lot of economic and health challenges for various assemblies, but is more profound in the urban areas. For instance, is has been established that, the haulage of solid waste and upkeep of dumping sites in the Accra Metropolitan Assembly of Ghana (largest city) costs approximately 799,070 US dollars every month, and that city authorities use about 91 per cent of their annual budget on managing solid waste management alone (Oteng-Ababio et al., 2013). Sekyere Boateng et al., (2018), indicates that most municipalities lack efficient collection techniques and as a result, not all of the waste generated is collected. The situation is complicated by the increasing dumpsites and abandoned wastes deposited on the city streets and open places in residential areas. This uncollected waste piles up and becomes a breeding ground for disease carrying organisms causing diseases such as cholera and malaria. Ahenkan et al., (2008) had earlier noted that close to 75 per cent of diseases that takes people to the hospital in Ghana are traceable to unpleasant environmental health and sanitation as well as inefficient solid waste management. 4,000tons of solid waste is generated daily, waste management departments still grapple with the collection of this huge amount of solid waste.

1.2 Problem Statement

SWM is one of the topical environmental issues in Ghana. Like other developing countries, the country has challenges in managing its solid waste and this has attracted a lot of scholarly attention over the years (Alhassan& Asante 2017). Specific issues that have been focused on by scholars include, the rising volumes of E-waste in Ghana (Oteng-Ababio 2010); recycling of solid waste as a means of addressing solid waste challenges (Ofori-Boateng, Lee & Mensah

2013); and the involvement of private actors in SWM (Boadi&Kuitunen 2005). In the discussions on the involvement of private actors however, attention has been concentrated on formal private sector waste collection actors like Zoom lion, Jekora Company, J. Stanley etc. and how they partner sub- national governments to manage waste in Ghana (Samine et al., 2017). Such studies have enhanced understanding of SWM in Ghana and the challenges involved.

However, a relatively new phenomenon in waste collection in Ghana is the use of informal waste collection systems, particularly the use of truck pushers and motor tricycles. This is common in the low income areas and according to Kretchy et al., (2019), close to 30% of waste collection in these areas is handled by such private self-employed and local community-based informal actors. Indeed, in Ghana, anecdotal evidence does not only underscore the prevalence of these informal actors particularly in low income areas, but also a preference for them due to low fees charged and reliability in their services. Oteng Ababio et al (2013), highlight the importance of recognizing the innovations of informal waste pickers and legitimizing them with the formal system In spite of their intensive participation in the waste collection process however, not much work has been done to understand the extent of their involvement; the coordination between them and the formal actors and how these collaborations contribute to SWM in the municipality. This fits into the observation by Chong et al., (2016, pg. 16), that there a lack of empirical studies on the involvement of other stakeholders in SWM in developing countries. This study therefore examines the participation of the informal actors in SWM in the Ashaiman Municipality and the challenges involved. This will not only broaden understanding of the general SWM in Ghana, but also highlight the challenges that these informal waste collectors face in their activities.

1.3 Research Objectives

Generally, the study examines the involvement of the informal actors in SWM in the Ashaiman municipality and the challenges involved. The specific objectives are

1. To determine the extent to which informal waste collection systems prevails in the Ashaiman Municipality.
2. To investigate the areas of collaboration between informal waste actors and formal waste collectors in the Ashaiman municipality.
3. To assess the effectiveness of informal waste collection in SWM the Ashaiman Municipality.
4. To identify the challenges of informal SWM in Ashaiman Municipality and explore ways of addressing them.

1.4 Research Questions

1. How prevalent are the informal waste collection systems in SWM in the Ashaiman Municipality?
2. In what ways do the informal actors collaborate with the formal waste collectors?
3. How has the involvement of informal actors helped in managing solid waste in the Ashaiman municipality?
4. What are the challenges in SWM in the Ashaiman Municipality and how can they be addressed?

1.5 Significance of the Study

SWM is of major concern to individuals, the state and society in general. This is because of the implications it has on their lives and health of people. Therefore a study into SWM is important in a number of ways.

In terms of the literature, the study generates an additional insight that helps to broaden understanding on the role of the informal waste collection systems in developing countries like Ghana.

The study also generates strategies for streamlining the activities of informal waste collectors into the Assemblies' policy framework. In this regard, the study is relevant for policy because informal waste collection has become vital and indispensable and therefore the only option for city authorities is to develop effective policies to integrate them into the sector. This study has useful information to help in this regard. In terms of practice, the study offers city mangers important lessons on how to manage solid waste management in their respective areas of operation.

1.6 Chapter Disposition

The study is organized into five chapters. Chapter one is the introductory section and it provides a background to the study. In this chapter, the key issues which make up the research problem are stated. The issues are later expressed as research objectives and questions to guide the study.

The second chapter reviews relevant literature as a means of identifying the areas that have not been addressed by scholars. The chapter also discusses the principal agent theory to provide a theoretical underpinning to the study. Chapter three presents the research methodology that is followed in the research process. It discusses the research approach, design, and population, sampling methods, data collection tools, data management and analysis techniques. Chapter four

presents the findings and analysis. The chapter synthesizes the data collected with the reviewed literature and the principal agent theory to see whether it confirms or disconfirms them. The final chapter, chapter five concludes the study and on the basis recommendations. Issues of further research are also identified in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature on solid waste management. Key themes discussed include, the concept of solid waste, waste management's systems, solid waste management in Ghana and the challenges of solid waste management in Ghana. The phenomenon of informal waste collection is also reviewed with a focus on the challenges facing the sector. In the final part of the chapter, the principal agent theory is presented as a theoretical framework for analyzing the data collected in the study. The chapter is relevant to appropriately position the study in the midst of the vast literature that exists on the topic and also identify the areas that have not been well addressed by scholars.

2.1 The Concept of 'Waste'

The concept of waste is more easily described than defined. According to the World Bank (2012 pg 12), the term is primarily used to refer to anything that is no longer useful to the owner or when something is used and fails to fulfill its purpose. The literature on waste management identifies two main types of waste; namely liquid and solid waste. According to Zerbock, (2003 pg. 4), solid waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted. He adds that solid waste includes non-hazardous industrial, commercial and domestic waste such as household organic trash, street sweeping, institutional garbage and construction waste.

2.2 Sources and Types of Solid Waste

Tchobanoglouset al.(1993) categorizes the types of solid waste in terms of the sources and generation facilities, activities or locations associated with each type. The major types include;

a. Food waste: which are animal, plant or vegetable residues resulting from handling, preparation, cooking and eating of foods. The most important characteristics of these wastes are their high putricibility and rapid decomposition features especially in warm weather (Tchobanoglous*et al.*, 1993).

b. Rubbish*:* this consists of combustible and non- combustible solid waste of households, institutions and commercial activities. This excludes food wastes or other decomposing materials. Typically, combustible rubbish consists of materials such as paper, cardboard, plastics, textiles, rubber, leather, wood, furniture, and garden trimmings. Non-combustible rubbish consists of glass, tin cans, aluminium cans, ferrous and other non-ferrous metals, and dirt (Tchobanoglous*et al.*, 1993).

c. Ashes and Residue*:* These are materials from the burning of wood, coal, coke and other combustible wastes for purposes of heating, cooking and disposing of combustible wastes. These are referred to as ashes and residues (Tchobanoglous*et al.*, 1993).

d. Special waste*:* Special waste includes street sweepings, roadside litter and litter from municipal containers, catch-basin debris, dead animals and abandoned vehicles.

Beyond these, the center for Environment and Development (2003) has also classified types of solid waste based on origin (food waste, rubbish, ashes and residues, demolition and construction, agriculture waste), characteristics (biodegradable and non-biodegradable) and risk potential (hazardous waste. The Centre also outlined various sources of solid waste as residential, from shops, commercial establishments, hotels/restaurants/eating stalls and slaughter

houses. This has confirmed the sources and types of solid waste outlined by Tchobanoglous*et al.* (1993) and Centre for Environment and Development (2003).

2.3 Solid Waste Management

Numerous authors have provided different definitions for Solid Waste Management. Kumah (2007 pg. 16) defines solid waste management as the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste. On their part Sadef et al., (2016)conceptualize SWM as that discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes. These views suggest that SM is accomplished in an efficient and orderly manner, the fundamental aspects and relationships involved must be identified and understood clearly.

In terms of outlook, it is projected that, low income countries are expected to generate 213 million tonnes of solid waste a day with the population rising to 676 million by 2025. Lower middle income ones are also projected to generate 956 million tonnes of solid waste per day. According to a World Bank Report, (2012; pg. 55) population growth in the lower middle income countries has been predicted to reach 2.08 billion. Solid waste generation will hit 360 million tonnes per day by 2025 in upper middle income countries with expected population of 619 million. It is anticipated that waste generation in the high income nations will reach 686 million tonnes in a day by 2025. These projections suggest that the challenges surrounding Municipal solid waste are going to be enormous, far greater than the challenges the world is currently experiencing with climate change (World Bank, 2012 pg. 58).

2.4 Solid Waste Management (SWM) Strategies

In recent years, several approaches have been developed to manage solid waste across the globe. Most of the strategies are technologically driven and include source reduction, composting, sanitary landfills, recycling, and incineration. According to UNEP, (2009), the choice and use of any particular strategy depends on existing social, political and economic conditions in a given country.

2.4.1 Source Reduction

A common strategy for managing solid waste is source reduction, which involves any action that reduces the volume or toxicity of solid waste prior to its processing and disposal in incinerators or landfills (Denison & Ruston, 1990 pg. 12). According to Kreith, (1994), source reduction aims at decreasing the quantity and /or noxiousness of waste generated and it necessitates the switch to reusable products and packaging, the most familiar example being returnable bottles.

Two key aspects of source reduction are source separation and resource recovery. These aspects hinge on the assumption that wastes that are disposed of by someone or in a particular setting, may be of substantial value in another setting, but of little or no value to the person who wants to dispose of it Tsiboe&Marbel (2004). Therefore, separating waste will lead to better recovery, and for the use of the other person or entity. Several countries in the developed world, including Denmark, Austria, Norway and Netherlands, have developed their waste management processes along these lines to efficiently address their waste generation and disposal challenges. These countries have invested time and resources in educating their citizenry to separate household and industrial solid waste into paper, glass, and plastic to facilitate easy assemblage collection and reuse.

2.4.2 Sanitary Landfill

Sanitary land fill is another popular strategy of waste management and it comprises confining the waste, compacting and finally capping (covering with soil). Not only does it avert burning of garbage but also helps in lane reclamation for valuable use (Centre for Environment and Development, 2003). The placement of solid waste in landfills is the oldest and definitely the most prevalent form of waste disposal (Zerbock, 2003). He further argued that "landfills" are nothing more than open, sometimes controlled dumps. According to him the difference between landfills and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leachate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of "tipping fronts" or compaction of waste (Zerbock, 2003).

Furthermore, landfills are one form of waste management that nobody wants but everybody needs. There are simply no combinations of waste management techniques that do not require landfilling to make them work (Kreith, 1994). Of the basic management options of solid waste, landfills are the only management technique that is both necessary and sufficient. Some wastes are simply not recyclable, many recyclable wastes eventually reach a point where their intrinsic value is completely dissipated and can no longer be recovered and recycled.

2.4.3 Recycling

Recycling of solid waste has been an important strategy for reducing the amount of household solid wastes that enter the dump sites (Momoh&Oladebeye 2010). The approach is also preferred because of its advantage of also providing raw materials for various industries. According to them, recycling is the best, efficient and effective method of solid waste management system

even though it may not be cost effective in developing countries like Ghana. According to USEPA, recycling turns materials that would otherwise become waste into valuable resources yielding environmental, financial, and social returns in natural resource conservation, energy conservation, pollution prevention, and economic expansion and competitiveness. More importantly, a sizeable portion of what is thrown away contains valuable resources like metals, glass, paper, wood and plastic that can be reprocessed and used again as raw materials (USEPA, 1999).

Kreith (1994) also added that, recycling is the most positively perceived and doable of all the waste management options. Recycling returns raw materials to the market by separating reusable products from the rest of the municipal waste. The benefits of recycling are many. It saves precious finite resources, lessens the need for mining of virgin materials which lowers the environmental impact for mining and processing. For example, UK recycles only 11% of its household waste, Italy and Spain only 3 %, Netherlands 43 %, Denmark 29 %, and Austria 50 % respectively according to Institute of Waste Management (Tsiboe and Marbel, 2004).

2.4.4 Incineration

Incineration is controlled combustion process for burning combustible waste to gases, reducing it to a residue of non-combustible ingredients (Centre for Environment and Development, 2003). During incineration, moisture in the solid waste gets vaporized and the combustible portion gets oxidized and vaporized. Carbon dioxide, water vapour, ash and non-combustible residue are the end products of incineration. Incinerators have the capacity to reduce the volume of waste up to nine fold than any other methods (Kreith, 1994). According to him incineration can also recover useful energy either in the form of steam or electricity. The main constraints of incineration are high cost of operation, relatively high degree of sophistication needed to operate them safely and

economically as well as the tendency to pollute the environment through emissions of carbon dioxide (Kreith, 1994).

2.4.5 Composting

Composting is the process of turning organic household waste into fertilizer through aerobic fermentation. This fertilizer can be used in lawns, parks, and gardens. Composting process uses microorganisms to degrade the organic content of the waste. Aerobic composting proceeds at a higher rate and converts the heterogeneous organic waste materials into homogeneous and stable humus (Centre for Environment and Development, 2003). The United Nations Environment Programme (UNEP) (2009) has also defined composting as a biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture. According to Zerbock (2003), a low-technology approach to waste reduction is composting. He further stated that in developing countries, the average city's municipal waste stream is over 50 per cent organic material.

SWM in Ghana

Like most developing countries, solid waste management in Ghana is becoming more complex and a difficult issue to handle due to the changing nature of waste and its management. Apart from the increasing involvement of the private sector, co-operation among city authorities, perhaps due to chronic financial constraints, is on the ascendancy (Ljunggren 2000). It is also becoming obvious that waste has both economic and environmental value with new or modified treatment technologies emerging (Furedy 1997). Under Ghana's Local Government act (Act 462), the district assemblies have been tasked with the oversight of Municipal Solid Waste Management Strategies in their jurisdiction. Yet in recent times, municipalities seem to have lost

that entitlement and are experiencing challenges due to pressures from international organizations (World Bank; IMF) and globalization forces, which have left the decision-making process more market-based. Originally, the district assembly Waste Management Department (WMD) and Metro Public Health Department (MPHD) provided collection and disposal services, but the poor quality of services including collection of only 60 to 65% of waste generated in the city eventually resulted in a transition to public-private partnerships (PPP), mostly in the form of contracting services out to private operators. One such policy intervention was AMA's partnership with the Chagnon City and Country Waste Ltd (CCWL), a Canadian company (Oteng-ababio et al., 2013).

By June 2010, the Accra Metropolis introduced a fee-based performance collection system, where each service contractor is "zoned" a specific area within a sub-metro through a tender process. Under this arrangement, each house owner and/or landlord, office building, business, and street-vending kiosk is required to register with the contractor and pay a fee, which is tiered according to income status. Upon registration, the dwelling is entitled to a free refuse bin as provided by the municipality or the contractor (Oteng-ababio et al., 2013).

Currently, waste collection in AMA is almost fully privatized, with approximately 8 contractors operating within the city as of 2010 (Oteng-Ababio, 2010), notwithstanding reports on beneficiary satisfaction have been discouraging despite observed improvements in coverage. A study by the World Bank and Accra Metropolitan Assembly (2010 pg. 23) revealed that 70% of respondents were unsatisfied with quality of waste management service, citing the city as "dirty". This data reflects enduring difficulties in providing an acceptable level of solid waste management strategies in Accra. Aside from the transition to PPPs, the city authorities have engaged in a number of large-scale projects aimed at introducing advances in waste management

technology. One such attempt was the Teshie Compost Plant. However, it did not have the managerial capacity to source-separate the feedstock and composted mixed waste, resulting in the production of insufficient quality compost to be utilized as fertilizer by vegetable growers (Oteng-ababio et al., 2013).

2.5 Informal Solid Waste Management System: Practices and Experiences

Research on Ghana reveals that in most cases, even though informal systems of solid waste removal are discouraged rather than appreciated and legitimized by the city authorities, they continue to exist and may flourish hand-in-hand with the formal system. In the main, informal waste collector or 'Kaya Bola' activity (i.e. porters who carry solid waste from residencies, markets, etc. in sacks, baskets, etc. to a dumping/container site for a fee) is not confined only to the low-income neighbourhoods but equally prominent and conspicuous in high- and middle-income areas. Currently, this sector works alongside the official sectors, albeit in an officially non-recognized capacity. The extent of its participation depends on a number of factors, including the demand for the service, ability to pay, poverty and regulations (Ahmed & Ali, 2004). It can be deduced by inference that the continuous existence of the informal Kaya bola service implies that there is a gap that has not been reached by both public and private sectors, possibly signalling to the effect that any initiatives to stop the informal sector will contribute to a decline of cleanliness at the household level hence the integration of the formal and the informal sector will invoke a better solid waste management system than currently being observed (Oteng-ababio et al., 2013).

2.6 Problems of Managing Solid Waste

According to Ogawa (2005), a typical solid waste management system in a developing country is characterized by an array of problems, including low collection coverage and irregular collection services. The many challenges confronting solid waste management in developing countries including Ghana are considered as the bed rock for their inability to rid the streets, gutters and drains of solid waste. The lack of political will of various governments to implement proper solid waste technology in developing countries can also not be over-looked.

2.6.1 Technical Constraints

Also characterizing developing countries are inadequate human resources at both the national and local levels with technical expertise necessary for solid waste management planning and operation. Many officers in charge of solid waste management, particularly at the local level, have little or no technical background or training in engineering or management (Ogawa, 2005).

2.6.2 Financial Constraints

Ogawa (2005) points out that, SWM is given a very low priority in developing countries. As a result, very limited funds are provided to the solid waste management sector by governments, and the levels of services required for protection of public health and the environment are not attained. The problem is acute at the local government level where the local taxation system is inadequately developed and, therefore, the financial basis for public services, including solid waste management, is weak. The problem is more prevalent at the District and

Municipal Assembly levels where the revenue generation system is inadequately developed which makes the financial basis for public services including solid waste management weak. This weak financial basis of the local governments can be supplemented by the collection of user service charges including pay as you dump system. However, users' ability to pay for the

services is very limited due to high poverty level and their willingness to pay for the services which are irregular and ineffective.

2.6.3 Institutional Constraints

In addition there are several agencies at the national level are usually involved at least partially in solid waste management. There are often no clear roles or functions of the various national agencies defined in relation to solid waste management and also no single agency or committee designated to coordinate their projects and activities. The lack of coordination among the relevant agencies often results in different agencies becoming the national counterpart to different external support agencies for different solid waste management collaborative projects without being aware of what other national agencies are doing. This leads to duplication of efforts, wasting of resources and unsustainability of overall solid waste management programmes. The lack of effective legislation for solid waste management, which is a norm in most developing countries, is partially responsible for the roles/functions of the relevant national agencies not being clearly defined and the lack of coordination among them (Ogawa, 2005). Zurbrugg (2009) further added that, solid waste collection schemes of cities in the developing world generally serve only a limited part of the urban population. The people remaining without waste collection services are usually the low-income population living in peri-urban areas. According to him, one of the main reasons is the lack of financial resources to cope with the increasing amount of generated waste produced by the rapid growing cities. Often, inadequate fees charged and insufficient funds from a central municipal budget cannot finance adequate levels of service. He indicated that, apart from financial constraints that affect the availability or sustainability of a waste collection service; operational inefficiencies of solid waste services such as deficient management capacity of the institutions and inappropriate technologies affect

effective waste management. Zurbrugg (2009) therefore points out the key challenges of waste management which include financial and institutional constraints.

2.7 Solid Waste Generation

According to Mensah and Larbi (2005) an average daily waste generation per capita of 0.45 kg, Ghana generates annually about 3.0 million tonnes of solid waste. Boateng and Nkrumah (2006) further added that, solid waste generated daily in Accra was between 1500-1800 tonnes. According to Anomanyo (2004), about 1800 tonnes of municipal solid wastes and estimated 0.5 kg per capital were generated per day in Accra. Anomanyo (2004) attributed this to the rate of population growth in the Metropolis at 3.5% per annum. Waste from domestic sources include, food waste, garden waste, sweepings, ash, packaging materials, textiles and electric and electronic waste with organic waste being the major component. These constituted about 65 % of total waste generated in Accra.

According to Anomanyo (2004), the high proportion of food and plant waste was due to the fact that Ghana's economy largely depended on agricultural products for export and domestic consumption. AMA (2009) estimates waste generation to be about 2000 metric tonnes a day with per capita waste generation of 0.45 kg. According to KMA (2009), the current domestic waste generation in Kumasi was approximately between 1000 and 1500 tonnes a day. This was based on the projected population of 1,610,867.

2.8 Solid Waste Collection in Ghana

According to Stephens et al., (1994), there are three basic methods of household waste collection in Ghana. The first is Waste Management Department (WMD) curbside collection of waste through placement of waste collection trucks directly outside houses. This collection method was

provided weekly in the high-income residential areas like Roman Ridge, Airport and Cantonment by compactor trucks.

The second is WMD collection of waste through placement of communal containers at strategic locations in communities for households and businesses to dump. These were restricted to low-income areas like Nima and amounted to some 200 communal containers. Households that could not afford the house to house collection service 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.

The third is door-to-door collection services in middle-income areas like Labadi.

Solid waste collection in Accra and Kumasi has been carried out both on franchise and contract basis. On the franchise basis, a house-to-house collection has been done in high-income and middle-income areas and the contractors charge the households some fees with weekly or twice a week collection frequency. These areas are well-planned residential areas with access roads described as first and second class areas and include areas as Airport residential area and Cantonments. Each household has plastic containers with covers. These contractors then pay a tipping fee to the Accra Metropolitan Assembly (AMA) for the use of its dump site. On contract bases, waste contractors are paid by AMA to perform communal container collection.

Approximately 75 % of the wastes generated are collected in these areas. Central communal skip collection occur in low income high population density and deprived residential areas such as James Town, Nima and other parts of Accra where houses are not well planned with poor or even no access roads (third class areas). Market places are also covered under this arrangement. Residents deposit their waste in such communal containers and the frequency of collection is at least once daily. Waste generators here do not pay user charges.

2.8.1 Problems of Solid Waste Management

Like other developing countries, there are several problems associated with solid waste management in Ghana. Boadi & Kuitunen (2004) identify a number of issues that constrain effective solid waste management. These consist of: lack of adequate resources, both human and financial, weak institutional capacity and lack of government support. They also indicated that collection of waste is limited to high and some middle income areas while the poor communities are left to contend with the problem on their own. The Ministry of Local Government and Rural Development (MLGRD, 2014 pg. 12) summed up the challenges of solid waste management in Ghana as follows: poor planning for waste management programmes; inadequate equipment and operational funds to support waste management activities; inadequate sites and facilities for waste management operations; inadequate skills and capacity of waste management staff; and negative attitudes of the general public towards the environment in general.

Oteng Ababio (2010, pg. 12), identifies two main modes of solid waste collection systems in Ghana namely: door-to-door collection and communal container placement systems. In the use of these methods however, poor supervision by city authorities has led to the practice here some individuals unscrupulously dispose solid waste into gutters, drains and roadside among others.

A recent phenomenon is the use of informal solid waste collectors to supplement the operations of formal solid waste management companies in many Ghana and other developing countries. The Informal Solid Waste Collectors use push carts, wheel burrows, woven baskets, borla taxies, and tricycles to enter into areas where large waste management trucks are unable to enter and collect waste for disposal. The UN-Habitat (2010) indicates that informal Waste collection in smaller quantities for disposal makes segregation and separation of recyclable material easier.

This consequently makes scavenging for recyclable material simpler for industrial consumption. However, the industry has suffered set-backs ranging from repression, neglect, stimulation, discrimination and stigmatization (pg. 15). Beyond these, other scholars indicate that the problems of SWM in Ghana emanates from ineffective collection and disposal. According to Wilson et al. (2006), the primary methods of disposing solid waste, thus engineered sanitary landfills, composting, recycling, incineration and Integrated Solid Waste Management (ISWM) have not been effectively utilized in Ghana. They argue that in Ghana poorly engineered landfills used for waste disposal is associated with several challenges for surrounding communities.

2.9 Theoretical Framework

The study is guided by the principal-agent theory which explains the relationship between two parties, principal and the agent in political/administrative relations provides theoretical focus for this study. The theory assumes that an agent appointed to execute an action may have his or her own parochial interest. His interest might not be in line with that of the appointing agent. Inherent in the relationship are agency problems, resulting from information asymmetries and conflict of interests.

Driven by profit motives, the private sector which is the agent is not disposed to pursue the public interest. They would attempt to exploit the citizenry; defeating the very rationale for privatization. The theory helps to explain the challenges that are likely to occur as a result of contracting out waste collection responsibilities to private actors. It highlights the need for the municipal authorities to supervise and monitor solid waste collectors to bring some efficiency in SWM.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter provides a detailed account of the research process from its conception and design. The chapter covers the adoption and positioning of the study in a qualitative ambience and its suitability. The various sub-themes discussed include the study approach, the design, sampling regime, data sources and collection tools, data management and analysis. The chapter is important for the study because it provides a methodological frame to guide the study the methodological choices, their justifications and associated challenges.

3.1 Research Approach

The study was conducted using the qualitative approach of social science research. According to Creswell (2014), the qualitative approach is based primarily on the multiple meanings of individual experiences, social and historical constructions with the intentions of developing a pattern or participatory perspective. Therefore, the approach was used because it made it possible for the researcher to establish the role of informal operators and their challenges from the context and perspectives of participants. The approach allowed for a comprehensive assessment of the participation of the informal sector and its role in SWM.

Creswell (2014) further indicates that the qualitative approach allows researchers to understand processes, subjects' situations and related complexities, emotional circumstances of participants, values and cultures within which a study occurs. Due to its ability to engender interaction between the researcher and the researched, the approach enhanced understanding through an in-depth engagement between the researcher and municipal officials, waste collectors, and selected

householders (Boateng 2016). This made it possible to understand the deep seated reasons behind the prevalence of the informal sector and its challenges in SWM in the Ashaiman municipality (Creswell 2014).

3.2 Research Design

For the qualitative approach, research can be designed as phenomenology, ethnography, narratives, grounded theory studies, or case studies. This study was however designed as a case study to enhance in-depth understanding of the issues. The design made it possible to investigate the "how" questions that were explored in the study (Yin 2009).

Furthermore, the design allowed for a detailing of the SWM arrangements in the Ashaiman municipality and the role of the informal sector in the scheme of things, as well as the associated challenges. The design enabled the coverage of a specific area, in this case, the Ashaiman municipality, giving respondents the opportunity to share their personal and professional experiences on SWM in the area (Yin 2009).

3.3. Sampling

According to Saunders et al., (2011 pg. 12), sampling is the process of selecting respondents from a study's target population. It forms a key part of research in general because it is often impossible or difficult to study an entire population, and hence a segment, referred to as the sample, is usually chosen and studied. Yin (2009), identifies several types of sampling including; random, systematic and stratified sampling cluster, multi-stage sampling and purposive sampling.

For this study, the purposive sampling technique was used to select respondents. This made it possible to select individuals who have the requisite information to answer the research

questions. The technique made it possible to select areas and individuals with distinctive characteristics that were relevant for the study for the study. Ashaiman was purposively selected on account of socio-economic characteristics; i.e. being a low income municipality.

3.3.1 Sample size

The sample for the study comprised of three groups. The first group comprised six officials drawn from the Ashaiman municipal office in charge of sanitation/SWM. The second group comprised of various households and landlords purposively drawn from the Ashaiman municipality. The third and final group comprised of private formal and informal solid waste collectors who work in the Ashaiman municipality. Each category was made up of six persons making up the total sample of 18 respondents for the study (see table 3.1).

Table 3. 1: Breakdown of Respondents *Source: Fieldwork data (2019)*

Category of respondents	**Position of respondent**	**Number**	**Years of Service**
Municipal officials	○ Municipal Solid Waste Engineer	1	25
	○ Administrator/Supervisor	2	15, 10
	○ PRO/Sanitation officer ○ Prosecutor	2 1	2, 15
Informal Waste collectors	○ Tri cyclers	2	9
	○ Borla taxi's	2	6
	○ Scavenger	1	4
	○ Push carts	1	5
House owners/landlords		6	
Total		**I8**	

3.4 Data collection sources

The study obtained its data from both primary and secondary sources. The primary data was collected from in-depth interviews, which aided in providing new empirical data for the study. The secondary data on the other hand, was collected from a review of relevant literature on SWM from peer reviewed articles, books, assembly policies and other publications. Whereas the secondary data helped in framing the study, by setting the background and helping to refine the research questions, the primary data provided new and empirical data from the field. The use of both sources gave the researcher a comprehensive view of the issues and also helped in triangulating the data.

3.5 Data Collection Tools

The study used in-depth interviews as the main instruments for collecting primary data. The use of in-depth interviews enhanced interaction and understanding of SWM in the municipality. It allowed respondents to express themselves freely and enhanced the collection of detailed information through follow up questions and probing for further details. The interviewer prepared questions along the key research questions and that served as a guide to lead the interviews. The interview process took about 30 minutes on average and they were recorded upon permission by respondents.

3.6 Data Management and Analysis

To begin with the data analysis, all recorded interviews were transcribed into text using word processing programs. The researcher read over the transcripts to immerse himself into the data and identify interesting issues in them. They also made it possible to correct errors in the transcription process.

Following the thematic analysis process, the transcribed data as categorized and analyzed according to the study objectives in order to answer the research questions and achieve the research objectives respectively. Discussions were done by relating findings with the literature and the principal agent theory. Extracts from interviews were used to support the analysis and discussions.

3.7 Ethical Considerations and Access Negotiation

In keeping to the ethics of social science research, this study complies with several ethical principles. This was to ensure that the confidentiality, anonymity, interest and safety of the study organization and research participants are protected. The study also complies with the ethical guidelines/policies on research of University of Ghana which include: informed consent, no pressure on individuals to participate, respect for individual rights, avoidance of harm, maintenance of anonymity and confidentiality.

An introductory letter from the Department of Public Administration before was sent to the Ashaiman Municipal Assembly together with the data interview protocol in due time to enable them make arrangements that would suit their work schedules. The researcher used the opportunity to familiarize with officials and explain the overall objectives of the study to them. Officials were also assured of the use of the findings for academic purposes only. This helped to build a sense of trust and rapport with them.

Before the commencement of the interviews, participating respondents were assured of their anonymity and hence their freedom to express any view provided it was the truth. To ensure their anonymity, respondents were not asked to provide their names. Respondents were also given the opportunity to ask questions at any stage of the interviews and were informed of their rights to voluntary participation and withdrawal at any time (Tracy 2010; Carling 2013). The importance

of avoiding plagiarism and observing copyright regulations in research was very much considered in this study. University of Ghana's policy on research ethics, which forbids any form of plagiarism, distortion or the fabrication of results at any stage of research, was taken into account. As a part of ensuring compliance with these ethical standards, all sources used are accordingly referenced.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter reports the findings and analysis of data collected in response to the study's main research questions. The chapter is the outcome of thematic analysis of qualitative data collected from eighteen (18) in-depth interviews sourced from participants who were purposively selected from officials of the Ashaiman municipal office, various house owners in the Ashaiman community and selected informal operators. The analysis involved comparing the interviews responses with those obtained from documents collected from the municipal office. This was followed by synthesizing the data with existing empirical and theoretical literature on SWM in Ghana and other areas. Throughout the analysis, key responses obtained from the interviewees are extracted to buttress the findings of the study. They are presented in italics and vignettes to enrich and contextualize the discussion.

4.1 Study Area

As has already been hinted in the methodology chapter, Ashaiman was selected as the area of study. According to the 2010 Population and Housing Census, the Ashaiman Municipality, has a total population of 190,972 representing 4.8 percent of the region's total population and is home to people from many ethnic groups. Ashaiman municipality is a sprawling "urban settlement", parts of which exhibit characteristics of a slum. This pertains especially around the core business arena of the community. Ashaiman Municipality is located about 4km to the North of Tema and about 30km from Accra, the capital of Ghana. Ashaiman falls within Latitude 5° 42' North and Longitude 0° 01'west. It shares boundaries to the North and East with Kpone-Katamanso District

and to the South and West with Tema Metropolis and covers a total land area of 45km2 (Ghana Statistical Service, 2010).

4.1.1 Prevalence of Informal waste collection in the Ashaiman Municipality

This objective was to determine the extent to which the informal waste collection prevailed in the Ashaiman municipality. It was to find out how pervasive the phenomenon was, and the reasons for their use. Interviews with respondents showed that the use of informal operators was very widespread in the municipality. Five out of the six households interviewed in the communities indicated that they used informal collectors with tricycles and push carts to collect solid waste for disposal. Various house owners and officials from the municipal office were unanimous that the informal collectors are very dominant in the area. This was emphasized by a respondent;

"As for the private waste collectors thus, kaya bolas, truck boys, waste pickers or cart pushers they are very predominant in this area. That is what I have depended on for a long time and I can tell you that most people around here also use them to dispose of their solid waste. They move from house to house, through the markets, businesses and shops using specially built carts and tricycles to collect the waste for a fee".

This position was given further support by an official of the municipal office who did not have actual figures but made deductions from data on the formal companies;

"The informal guys are very predominant in the area. We don't have actual data on them because they are not registered like the big companies, but if you check the records it is clear that they are here. Our records show that only forty percent (40%) of households in the municipality have subscribed to the services of formal solid waste companies. The rest have not

signed up for any waste collection by the companies that operate in the respective zones. What it means is that this 60 percent of households either employ the services of informal Waste collectors or dump their waste at unapproved sites".

An informal operator also shared his view on their dominance;

"We are very predominant in this community. I can count as many as more than thirty of us in this zone C alone. Even in the night you hear some of them riding through the community to collect waste. So there is no doubt about that, we are in control here".

These views give an indication of how pervasive the phenomenon of informal waste collection is in the Ashaiman municipality. It shows that for such areas, most people depend on informal operators for disposing of their waste. These findings are interesting and revealing, albeit not a unique trend, as previous studies by Oteng-Ababio (2008; 2010), also reported similar findings. Back then he noted that, compared to wealthier neighbours, a sizeable number of residents in deprived communities dispose of their solid waste through informal operators. Similar findings have also been reported by Salahuddin & Shamim, (2012) on India where over 20,000 women work as waste collectors in Ahmedabad city while an estimated 150,000 operate within the municipal area of Delh (Chaturvedi 1998). The experiences from the Ashaiman municipality shows that this trend has come to be a key part of the solid SWM system and the earlier authorities factor them into the SWM architecture, the better it would be for SWM in general.

4.1.2 Arrangements with the Municipal Office

While it was established beyond doubt that there are several informal operators in SWM in the Ashaiman municipality, it was fascinating to find that the municipal assembly did not have any information on them and much more, no arrangement with them. Officials were clear that they are very much aware of the activities of the informal operators but they did not have any formal

relationship with them, because they refused to register when they gave them the opportunity. Beyond that, there was no formal arrangement between the municipal office and the operators.

"No we don't have any formal arrangements with them. In fact the Assembly has not given license to the informal sector to operate, so technically, their activities are considered as illegal. Over the years, we made efforts to regularize their activities by registering them but they refused to register because they feared we were going to tax them. So as I speak to you now, we only have speculated data on them".

A concerned resident noted;

I know for sure that the Assembly does not have any bye-laws to regulate and support activities of the Informal Solid Waste Collectors. They therefore operate in free-range without any monitoring and supervision by the Municipal Assembly. And that is the problem because how can you be in the office for all these things to go on and do nothing about them. Their activities need to be streamlined so that they will be monitored"

A solid waste collector observed;

"They don't even recognize us so how can they have any arrangements with us. They accuse us of dumping at authorized places and are always hounding us. Last week, a friend of mine had his push cart seized and sent to the office. They claimed he dumped his Waste under the bridge. So they pretend we don't exist and can't have any relationship or arrangement with us".

These insights show that the municipal authority has no plans currently to integrate the informal solid waste collection system into the formal arrangement. At best, they consider the operators as some kind of nuisance and are therefore reluctant to stretch a hand to them. A review of the municipal records however shows that as far back as 2015, the assembly had expressed an

integrated waste management strategy that incorporated informal operators into the system in the medium and long term plans to begin in 2016. Section 5 of the theme on strategies on page 63 of the document reads;

"*Upgrading the existing informal activities through integration into the formal sector will be looked at very seriously in view of the potential for job creation at the grassroots level" (ASHMA, 2015)*

However, this strategy is yet to see the light of day and implementation. These findings are instructive because they do not only show how city managers can be inactive in stepping up to the task, and being proactive in nipping teething challenges in the bud, but also reflects the general lack of control and supervision of the sector by the Assembly. The findings are consistent with other findings by Chaturvedi et al., (2015), who raised questions about how managers tend to ignore informal waste management groups leading to a protracted tension among stakeholders. It confirms studies by Sekyere Boateng et al., (2018) that city authorities in Ghana are aware of the activities of informal solid Waste operators, but pretend as though they don't exist.

4.1.3 Collaborations between formal and informal waste collectors and its impact on effectiveness in handling Solid Waste

This theme examined whether there were any forms of cooperation and collaboration between the informal waste collectors and their formal counterparts. The interviews revealed that there was some form of collaborations between the informal operators and the formal operators especially by way of dump sites. It was also found that the informal operators served as feeder points who collected solid waste from the hinterlands and sent them to sites owned by the big companies for a fee. Some of them were also hired on contract basis by the big companies to sort

out the waste before they collected them. In their estimation, this had also contributed to effectiveness in SWM. One waste collector intimated;

"I don't think we have any serious collaboration only that when we collect waste from the various communities, markets and stores in the community, we dump them at the Presby site which is for zoom lion for a fee".

An official from the municipal office observed;

"Yes… in a way, there is some form of collaboration and arrangement between them and the big companies, because they collect the waste and send to a transfer site at Presby for Zoomlion at a fee. They also collect and segregate recyclable material for sale to the manufacturing companies. By that, the informal sector also helps to make recycling and composting possible through the segregation"

In spite of these positive developments however, informal solid waste collectors indicated that they were usually not treated well by the formal companies and that their relationship was characterized by some kind of hostility. This is because the formal companies did not trust them.

"The formal companies don't trust us and that is why they don't want to collaborate with us. The thing is that they see us as outcasts and criminals and don't want us to come near their sites. There has been some suggestions in the past that they hire us to work for them as their regular employees so that they pay us but most of us kicked against that. So yes, that is it…"

4.1.4 Participation of the Informal sector, collaborations with the formal companies and effectiveness in SWM

Another issue that came up in the interviews was the issue of whether the participation of informal operations and their collaborations with the formal companies led to effectiveness of the SWM in the municipality. On this, the responses were mixed, with some respondents holding the view that the informal operations helped to augment the collection of tonnes of solid waste especially from areas that are inaccessible by the big companies on a daily basis. The scavengers also helped to sort out the garbage for easy processing and recycling. They however pointed to the fact that informal operators themselves had a lot of challenges that made their operations ineffective. A respondent shared this view;

"Yes… they help to collect waste from the various homes and that has helped the situation but they also create problems. Because they don't use the right tools and equipment, they end up just transferring the waste from one joint to the other. They also dump at unauthorized places in the community. Those days when they were not in the system, we didn't have waste flying all over the city like we have today. So in one breath, they have helped but in another breath, they are ineffective"

These sentiments show that informal operators are important for SWM in the municipality. However, the fact that they are poorly resourced and unregulated makes them undercut the system and create ineffectiveness in the long term. These findings are consistent with other empirical studies from other assemblies and other countries see for Kretchy et al., (2019), who found that close to 30% of waste collection in low income areas are handled by such private self-employed and local community-based informal actors, but the attention has been overly focused on the formal private companies to their neglect.

As has been demonstrated in the study, the informal collection systems collect a huge chunk of solid wastes. Their predominance and resilience shows that in developing countries like Ghana, reliance on formal companies alone to address solid waste challenges will not address the problems of SWM. The informal ways of doing things are a key part of the society and policy makers should be open to accommodate them. Their predominance calls for the enactment of bye-laws to regulate the activities to enhance effectiveness.

4.2 Prevalence of informal operators in SWM in Ashaiman: what are the underlying drivers?

Given the predominance of the informal solid waste collectors in the Ashaiman municipality, this theme sought to find out what accounted for such dominance in the municipality. The interviews revealed a complex mix of factors that explain why the community members preferred to use them and thereby keep the operators in business. These factors include affordability, accessibility and reliability in services.

4.2.1 Affordability

This study found that a major reason why the informal operators are preferred in the municipality is because their charge for lifting solid waste is affordable for community members. House owners indicated that they preferred the informal collectors because compared to the big companies like zoomlion, the services of informal collectors are inexpensive and are more affordable. A respondent shared her experience;

"These guys don't charge much so that is why we like them. Apart from that, they are flexible and can collect the waste for weeks so that you can pay later. So even if you don't have money readily available they come for it anytime you have it. So that is why I use them. As for the big

private companies, their charges are high and they are not ready to negotiate anything with you. Apart from that, I hear they don't even pick the waste when it is time"

An official for the municipal office corroborated this view;

"Yes I think it's because the informal collectors are comparatively affordable and so those who cannot afford the charges of the large companies fall on them. That is why they are very predominant in the Ashaiman area".

The operators are very much aware of the fact that the residents prefer to use them because their services are comparatively cheaper. They are of the view that they will always be in business because they serve those who are in deprived areas that nobody is thinking about. One of them opined;

"Those big companies are thinking of the high class residential areas where they can charge so much and have less work. Working in this area is so tedious and the volumes of waste generated is overwhelming. So it only those of us who are really under pressure who will come here and collect the waste".

4.2.2 Accessibility

Beyond the affordability factor, it was also established that an important reason why the informal waste collectors are very much used in the Ashaiman community is because they provide services, when or where the formal service providers are not available. Respondents agreed that because the Ashaiman community layout is not like those well planned areas, the big companies are unwilling to come to them. This was also because these companies tend to use bigger trucks which are not able to have access to some of the homes. However, because most of the informal

operators use carts and tricycles, they are able to meander their way through to every nook and cranny of the community to lift the waste. This point was emphasized by a respondent;

"You can see for yourself where our house is. There is no clear access and so the formal companies will not even think of coming here. But these other guys will go anywhere because they need money. So that is why most of the people here prefer them. As you are well aware, the whole Ashaiman community is not well planned and so the tricycles and carts are what we can use".

This position was corroborated by an informal operator;

"It is because we go to the deepest places in the community. As for that, the other private formal companies cannot compete with us. For all those communities like this, we are very much sought after because they need us, otherwise the people will just find places to dump their solid waste anyway"

Fig. 4. 1: Informal Solid Waste Collectors with their push carts in Ashaiman

Source: Fieldwork data, 2019

4.2.3 Reliability of services

Related to the accessibility factor driving the prevalence of the informal solid aste collectors in the Ashaiman municipality is the issue of reliability of services. The head of Municipal Solid Waste at the municipal office explains why the informal operators are preferred;

"People prefer the informal guys because they tend to be more reliable than the formal ones and that is also one of the challenges we have with those big companies. Waste Management Contractors are supposed to provide Door to Door waste collection services to all the homes in their respective zones twice in a week or once a week depending on the size of household and waste generated. However we have information that some of them collect only once a week. The uncollected wastes generated due to irregular service by contractors are kept on the ground around the waste bins for days breeding flies and spreading diseases. When that happens, the residents become frustrated and look for other options. The informal guys collect waste anytime any time and they are more reliable".

Overall, the findings show that, the informal solid waste collection is a key part of SWM in the Ashaiman municipality. Most people in the communities depend on them for their waste disposal for a number of reasons including affordability accessibility and reliability in services. For low income areas, these factors are vital in their use of collectors.

4.3 Challenges of informal SWM in Ashaiman Municipality

This objective sought to explore the challenges that confront informal solid waste collection in the Ashaiman municipality. The issues found are presented under the following sub-themes

4.3.1 Financial constraints

A major challenge confronting the informal waste collection in the Ashaiman municipality is the lack of adequate finance to support their operations. Operators indicated that they have had to depend on improvised tools and equipment because they don't have the financial resources to procure good ones. The financial challenge was also the result of the fact that they are not able to secure credit from banks to support their activities. A waste collector shares insights on the financial challenge;

"*Our major challenge is financial. Unlike the other big companies we don't have the finance to procure the requisite equipment and logistics for efficient and effective operations in solid waste collection and disposal. Because our activities are mostly not recognized by the society and other financial institutions, we are unable to access financial assistance from the banks and financial institutions to purchase Personal Protective Equipment (PPE) and other logistics including rakes, long brooms, waste pickers and others to provide efficient services to the public"*

Corroborating the sentiments expressed by informal collectors, officials of the assembly seemed aware of the financial challenges that the informal operator face. They agreed that streamlining their activities and formalizing them will solve the problem.

An official from the municipal office argued;

"Informal solid waste collectors face a lot of financial challenges and also work under very dangerous conditions. All these are happening without taking into consideration, the impact and contribution of the workers in the sector to solid waste management in the Ashaiman

Municipality. But I think their work can be made safer if they are given standards to meet and some financial support".

4.3.2 Lack of adequate tools and equipment

Related to the financial challenges is the issue of adequate tools and equipment to work with. It was established that because they are large unrecognized, the informal collectors are not able to secure the funds to buy the right equipment to work with. They therefore use that are improvised equipment most of which are worn out. This exposes them to all sorts of hazards which does not only affect their health but overall effectiveness of their work. A respondent observed;

"We really struggle with acquiring the relevant tools and equipment to work with. E cannot get the right equipment to work with so most of us have to improvise and that is why you us using see all these rickety trucks sometimes with iron sheets and all of that. This is another problem for us".

A solid waste engineer at the office corroborated this challenge;

"We are aware of the precarious conditions under which the informal operators work largely as a result of the financial challenges to procure the right tools and equipment this increases the risks and hazards related to their jobs. Their activities need to be streamlined to forestall the occurrence of these hazards"

4.3.3 Poor attitude of householders; lack of support from the householders

Another challenge facing informal waste collection in the Ashaiman municipality is the attitude of householders towards collectors and the lack of support from them. Collectors indicated that they faced hostilities from house owners with most of them seeing them as outcasts ho are not genuine but come to spy and steal in the community. A respondent noted;

"We are branded by the public as outcasts, vagabonds, criminals and thieves. We are mostly prevented from entry into many households and businesses because we are considered by the public as thieves or spies for armed robbers. People do not even want to sit by us in public transports and eating joints in the municipality".

These findings are in line with Samine et al., (2017), who also found that informal waste collectors do not only get support of the community but are seen as threats in the very communities from which they collect waste.

4.3.4 Operational inefficiencies

Another major challenge associated with the informal waste collection system is the operational inefficiencies associated with it. These resulted from the lack of expertise and the use of inappropriate equipment for solid waste collection compared to formal collectors. Apart from the challenges discussed above, the informal waste collectors also have several operational inefficiencies. A resident argued;

"They use carts and tricycles that are not covered so when they lift the aste they end up splashing them all over the community. Sometimes they only pick from your house and collect the fee and dump them at the field down there. In the end they only spread diseases".

An environmental officer at the municipal office noted;

"There are problems when the formal collection crews also indulge in waste separation, which may lead to increases in loading time and affect efficiency. Similarly, the presence of scavengers at container and landfill sites can interfere with vehicle movements, which can be dangerous and increase vehicle turnaround times and reduce efficiency".

4.4 Strategies for addressing the challenges

This final objective follows from the challenges identified with informal solid waste collection. It was to explore avenues for addressing the challenges confronting informal solid waste collection in particular, and SWM in the Ashaiman municipality in general. It offered various groups in the study (officials, house owners, and informal waste collectors), an opportunity to proffer suggestions from their own experiences. The interviews brought up a number of interesting insights which are detailed below.

4.4.1 Formalizing/Regularizing the activities of the informal operators by the Assembly

Following the finding that the informal waste collectors have become a key part of the SWM architecture, respondents agreed that an important strategy for addressing the challenges in the sector will be to formalize and regularize their activities. This is primarily because they are used by most people especially in the low income bracket and therefore formalizing their activities will supplement the formal SWM companies. Formalizing their activities will also ensure effective supervision and monitoring by officials and enhance overall effectiveness in the disposal of solid waste in the municipality. Respondents believed that regularizing them will also serve as an employment opportunity for the youth. A resident argued;

"The sector provides employment to a significant number of youth who have turned out to be the bread-winners of their families. More income is earned by collectors as a result of lower fees charged for services rendered to households and businesses. Although the informal sector activities take place outside official and formal channels of the Ashaiman Municipal Assembly, unlicensed and untaxed, they nevertheless contribute significantly to the national economy".

This point was given further support by another respondent;

"I think that the indifference towards informal collectors and their activities symbolizes a policy of neglect. They have become a vital part of the SWM process now and officials should not pretend but integrate them properly. I think it can be an avenue for creating employment for them. This has been done in other countries and can be done here too".

Contrary to the position of the assembly that the informal waste collectors did not want to be formalized, it was found that informal operators thought otherwise. Most of them lamented that although they provided vital services, they were not given recognition by the community because they did not have legitimacy. A collector opined;

"We help in collecting a huge chunk of the waste in the communities. If you come to the communities, we have become a force to reckon with and the officials cannot pretend anymore. They need to regularize our activities and streamline them with the formal solid waste collection companies. Regularizing our activities will help reduce the stigmatization and lack of recognition by the public. It will also help us form unions in order to be able to access financial assistance from banks and financial institutions to acquire requisite equipment for effective and efficient operations".

Formalizing the activities of informal waste collectors is particularly significant because of the many benefits it will bring to the system. The findings are instructive and ties in with other examples from elsewhere. For example, a study by Medina (2017), in three Mexican cities, where integration has been successfully implemented, found that nearly 3,000 informal refuse collectors collect 353,000 tonnes of waste a year, earning up to five times the minimum wage. This validates the study's findings and shows that formalizing the informal operations is key in addressing the SWM challenges in the Ashaiman municipality.

4.5.2 Supporting Informal Waste Collectors with Logistics and Equipment

Given that most informal solid waste collectors are constrained in terms of resources to procure the necessary equipment, respondents suggested that a useful way of making them efficient will be to for the assembly and government to support them with the necessary logistics to make them. This point is made by a respondent;

"*The push carts and tricycles they use are mostly not in good shape and they are mostly not covered. They also don't wear any PPE's and that exposes them a lot of dangers and health hazards. But they are also Ghanaians who are helping to do something for themselves and for the communities, so the assembly and government should come in and support them with the necessary logistics"*.

A collector argued;

"Helping us with the necessary equipment will make them more effective. If they can supply fishermen with outboard motors, and sometimes buy cars for party people, why can't they help us with locally manufactured tricycles to cart solid waste to ensure effective and efficient services and keep the city clean?"

Once again, these sentiments go to the core of the issue of lack of recognition by the municipal authorities. The study demonstrates that recognizing and regularizing informal collection activities will go a long way to ensure that they are given the necessary support to discharge their duties in a more effective and efficient manner. It will also enable them improve their systems and access loans to get the right equipment. The observations echo with (Ahmed & Ali 2004) who recommends that the regularization and integration of informal collectors be facilitated through the provision of effective incentives, possibly through capacity building.

4.5.3 Enhanced Road Network

In the view of respondents, another means by which SWM in the Ashaiman municipality could be improved is to develop the road network in the area. Following the concern that the Ashaiman municipality is characterized by poor road infrastructure, which constrained the accessibility of homes by waste collectors, respondents indicated that improving the road network will really help to improve the SWM in the area. In the reckoning of respondents, improving the road network will ensure accessibility to households and businesses by both the formal waste companies and the informal collectors for swift and quick delivery of services. A resident noted;

"…if they want to improve the whole SWM system, they should improve the road network in the municipality so that waste can be picked easily and quickly like it is done in other areas like Tema and East Legon. The municipal assembly should use some of its resources to fix the roads. I think they can"

This poor road network and its implications for SWM is something that has been established by earlier scholars in Ghana and other jurisdictions. In a study on SWM in Kumasi, Asare&Frimpong, (2013) found that accessibility was one of the factors that hindered waste collectors from collecting waste. Similarly, Ogawa (2005) established that in China and other places, poor access constrained SWM.

4.5.4 Intensifying education on SWM in the municipality

Another strategy that came up as vital for improving the overall waste management situation in the municipality is through intensifying education of residents in the municipality on waste management. Views expressed by respondents go to the effect that at the heart of most of the challenges of waste management is lack of public education on solid waste management. In the view of respondents, the problem could be mitigated if the municipal assembly educated the

residents on effective waste disposal strategies and its implications for the whole community. A resident shared her view;

"I think that is another important area that the assembly should focus on. Most of the people here are illiterates and do things that they are unconscious of. Educating them will orient them to understand their own actions and the implications it has on the environment and the future generations. It may sound like the usual cliché we hear every time but I think we should intensify it because it can influence people's actions".

4.5.5 Enforcement of sanitation bye-laws in the Municipality

Another area that almost all respondents agreed on is the enforcement of sanitation bye laws in the municipality. The major concern among most respondents was that the authorities are not proactive when it comes to enforcement and that is why people blatantly dispose of waste without any fears. Respondents suggested that sanitations laws are toughened and offenders prosecuted to serve as deterrent to other offenders. A respondent argued;

"It is as if there are no solid waste management by-laws in Ashaiman municipality. Individual households and companies dispose of waste on the ground, into gutters and unapproved dump site without prosecution. If waste management can be enhanced, the authorities must enforce the rules. That is what separates us from those countries that have made headway with solid waste management"

Overall, the findings and analysis so far, shows that informal waste collectors play a key role in solid waste collection in the Ashaiman municipality. Beyond the pale of the formal private sector (i.e. registered companies who have the financial strength, technical know-how, etc.) are vibrant informal' waste collectors also contributing significantly to SWM. Factors underlying their preference include demand for the service, the ability of prospective beneficiaries to pay. These

findings resonate with Yeboah Assiamah (2014, pg 12), who argues that even though informal solid Waste collectors play a significant role in SWM, they tend to be "treated as an expendable nuisance and often accused by the authorities and many residents of marring the image of the city". This had earlier been noted by Wilson et al. (2006) that though the informal private sector also plays a role in SWM they appear to be at the backburner of policy makers, mostly harassed, and at times, hounded by city authorities. As has been demonstrated in this study, the informal waste management sector is quite vibrant in the Ashaiman municipality, which when managed well, it could help in addressing the challenges of solid waste disposal in the communities. The sector could be a viable employment creation avenue creating several jobs and also contribute to healthy environments. The study has demonstrated the role and importance of the informal sector in SWM in the Ashaiman community. Taking into consideration the important role of the informal solid waste collectors in waste collected and disposed daily in Ashaiman Municipality and the challenges facing these collectors particularly the bad nature of equipment and logistics used for operations, it becomes imperative for the managers to extend support to them.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the entire study which sought to examine the role of informal waste collectors in the Ashaiman municipality. The study also explored the challenges facing the sector and strategies for improving the system. After analyzing and discussing the findings in the previous chapter, this chapter sums up the study and draws the relevant conclusions. Some recommendations to inform practice and research are also offered in the latter part of the chapter.

5.1 Summary of the study

In this section, key aspects of this study are summarized. The section is organized under the specific objectives for which this study was conducted, methodological approach used and a summary of findings.

5.1.1 Research Objectives

The study's primary objective was to investigate the role of informal solid waste collection in the Ashaiman municipality and its challenges. This objective was relevant due to a limitation identified in the literature on SWM that although the phenomenon seems to be prevalent in recent years, there is less research on their role in SWM especially in poorer communities. This had clouded an important aspect, thus, their role and the challenges faced, although their activities have implications on overall SWM. The specific objectives were to determine the extent to which informal waste collection systems prevails in the Ashaiman Municipality; investigate the areas of collaboration between informal waste actors and formal waste collectors

in the Ashaiman municipality; assess the effectiveness of informal waste collection in SWM the Ashaiman Municipality and identify the challenges of informal SWM in Ashaiman Municipality and explore ways of addressing them. By addressing these challenges, the study provides new empirical data and subsequent analysis to inform theory, policy and practice. The study drew insights from the SWM literature.

5.1.2 Research Methodology

The study was approached qualitatively. The case study design option for qualitative research was adopted to examine the issue in depth. Primary data was collected by semi structured interviews with various homeowners, municipal officers and informal solid waste operators in the municipality. Through a review of existing documents, reports and other scholarly publications, the primary data was effectively triangulated to enhance validity and reliability. Analysis was done by the thematic process. The study validates existing literature on SWM in developing countries but also discovered new and interesting findings which are summarized in the following section. The findings are presented in accordance with the study's objectives.

5.2 Summary of key findings

5.2.1 Prevalence of Informal solid waste operators and their underlying drivers

This study found that the informal waste collection systems have become predominant in the municipality. The reasons for their prevalence include accessibility, affordability and reliability in services.

5.2.2 Challenges of informal waste collection in Ashaiman

The study established that the informal waste collectors face a number of challenges. These include the lack of recognition by the assembly and subsequent integration into mainstream plans

of the assembly and lack of adequate financial resources both financial and technical, lack of support from residents, and operational inefficiencies.

5.3 Conclusions

From the findings and discussion outlined above, the following conclusions are drawn.

SWM remains a challenge for city authorities in the Ashaiman municipality. To deal with the challenge, there is an emerging phenomenon of the informal waste collection systems which is has become predominant in the municipality. The informal systems serve as a useful alternative to augment waste collection by formal companies.

The prevalence of informal systems is fuelled by socio-economic circumstance of residents, and increasing networks between them and the community members as well as other formal operators like Zoomlion.

The major reasons behind their predominance include the ability to access even the remote parts of the municipality, affordability, and reliability of their services.

In spite of their predominance, the informal collectors face several constraints. Chief among them is the lack of recognition by authorities and the failure to regularize and formalize their activities into the mainstream waste collection framework of the municipality. Others are stigma from the community and lack of resources both financial and technical. To help improve the effectiveness of informal waste collection activities, there is the need for city managers to recognize and integrate them into the solid waste collection architecture. This will not only help them acquire capital to procure proper tools and equipment but also improve their image in the eyes of the community. Other general areas to strengthen include, improving the road network in

the community, intensifying waste management and sanitation education and enforcing waste management bye laws.

5.4 Recommendations

Based on the findings and conclusions drawn above, the following recommendations are offered.

1. Given the prevalence of the informal waste collectors in the Ashaiman municipality and other parts of the country, there is need for the assembly to regularize and integrate the informal sector into mainstream solid waste collection. This will not only generate relevant data on their activities but also enhance effective supervision, monitoring and evaluation to maximize efficient operations.
2. It is also recommended that sanitations bye-laws are toughened and offenders prosecuted to serve as deterrent to other offenders.
3. To improve the overall SWM and sanitation in the communities, there is the need for education to be intensified. This will create awareness among residents on the implications of people's actions and inactions and hopefully, cause a change in their attitudes.
4. There is the need for a strong local assemblies with the capacity to effectively manage and engage relevant actors (both formal and informal), as well as residents to regulate and monitor the activities of private partners.
5. City managers must adopt a holistic approach in the bid to improve SWM in developing countries. They should not just contract out zones to private operators but also look out for informal and indigenous ways of managing waste because as shown by this study, they can be better alternatives of addressing the problems of SWM.

6. The informal waste collection must also be seriously focused on by city mangers. They are a vital part of the waste management process especially in low income communities. They must be given adequate recognition and supported financially and technically.

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APPENDICES

APPENDIX 1: INTERVIEW PROTOCOLS

UNIVERSITY OF GHANA BUSINESS SCHOOL

DEPARTMENT OF PUBLIC ADMINISTRATION AND HEALTH SERVICES MANAGEMENT

Interview Guide for Municipal Officials

This exercise is to collect data for my research on the topic "**SOLID WASTE MANAGEMENT IN GHANA: THE EXPERIENCE OF ASHIAMAN MUNICIPALITY"**, towards fulfilling the requirement for the award of MPA Degree at the University of Ghana, Legon. I humbly crave your indulgence to ask you a few questions on the topic. Please be assured that any information collected is solely for academic purposes and you are guaranteed strict confidentiality.

SECTION A: Background of Official

1. Department: …….
2. Current Position: ……..……
3. Number of years worked in the office…….....

SECTION B: Prevalence of informal waste collection systems and existing arrangements for SWM in the Ashaiman Municipality & Challenges

4. How prevalent is this phenomenon of informal waste collection (the use of use of truck pushers and motor tricycles) in the municipality?
5. What do you think are the reasons for their use/prevalence in the municipality?
6. Does the municipal office have any arrangements for such informal actors in the waste collection business?
7. How does the informal collectors of solid waste fit into the municipality's waste collection arrangement?
8. What forms of collaborations exist between these informal collectors and the formal ones?
9. To what extent have such arrangements been effective in managing solid waste in the municipality?
10. Has the existing arrangements been effective in managing solid waste in the municipality? Why/why has it not?
11. What are the challenges in managing solid waste in the municipality?
12. How do the following constrain SWM in the municipality?
    1. financial factors
    2. poor socio-economic infrastructure
    3. Poor attitude of householders; lack of support from the householders
    4. Operational inefficiencies
13. Kindly suggest any three ways by which these challenges can be addressed?
14. What do you think can be done to improve SWM situation in the Ashaiman Municipality?

INTERVIEW GUIDE FOR INFORMAL WASTE COLLECTORS

1. For how long have you been working in the solid waste collection business in this municipality?
2. What do you use to collect waste a. Truck b. Moto-Tricycle c. Wheel Barrow d. Bola Taxi
3. How extensive is your coverage? Do you have many clients in the municipality?
4. How prevalent is this collection system in this municipality? I mean, are there many of you in this business around here?
5. If there are, why do you think it is prevalent here?
6. Where do you dispose of the waste collected?
7. Are there any relationships/collaborations between you and the bigger private waste collectors? In what ways do you collaborate?
8. In what ways do these collaborations enhance effective solid waste management in the municipality?
9. Are there any relationships/collaborations between you and with the Municipal Assembly? What is the nature of the relationship?
10. Do you think your participation in SWM in the municipality has How has your involvement in the enhanced effective of SWM in the municipality
11. Would you want your activities to be regularized? Why do you say so?
12. What challenges don you face in doing your work?
13. Kindly suggest any three ways by which these challenges can be addressed?
14. What do you think can be done to improve the SWM situation in the Ashaiman Municipality?

INTERVIEW GUIDE FOR HOUSEHOLDERS

1. Do you use the informal waste collectors to dispose of your waste
2. Since when have you used them
3. Why do you use them?
4. How prevalent is this collection system in this municipality, I mean is there many of such waste collectors in this area?
5. Comparing the informal collectors to the formal private companies, which ones are more predominant in the area?
6. Do you think the informal ones are preferred? Why?
7. Do you think that the operations of informal collectors should be formalized in the Municipality?
8. What do you think of the participation by these informal actors; does it augment the waste collection system to make it more efficient or it rather exacerbates the situation?
9. What challenges do you have with the informal collectors?
10. How can the challenges be addressed?
11. What do you think can be done to improve the overall SWM situation in the Ashaiman Municipality?

THANK YOU FOR YOUR TIME