

Adoption of critical success factors for effective waste management in Ghana: A case of Ga-West municipality

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Abstract

Waste management (WM) is becoming key important issue in most municipalities as a result of rapid urbanization and population growth. In view of this, the study investigated waste management in Ga-West Municipality in the Greater Accra region. This study sought to critically assess how people disposed of domestic waste, how often waste was collected and disposed of, and challenges faced by Ga-West Municipal Assembly when it comes to solid waste management and suggested possible measures to tackle this menace.

The study is purely qualitative research design which used evaluative case study. The target group for this study was made up of residents, officials of Ga-West Municipal assembly, officials and fieldworkers of waste management companies, assembly men and women, members of the zonal councils, official of EPA and a landfill site operator. A total of 23 respondents were used for the study. The study identified door-to-door, communal waste container (skip), burning and burying, and open dumping as the common methods of disposing waste in the municipality. Furthermore, it was observed that the major challenges of solid waste management within the Municipality included inaccessible roads, non-payment of service fees, poor maintenance of compact vehicle and waste bins, and dropping waste from compact vehicle carting waste from other municipalities to the recycling plant and landfill sites which are sited within the municipality. In the light of these problems enumerated above, the research recommended segregation of waste before dumping, building capacity of waste management companies, adequate supply of waste bins and skips and enhance monitoring on individuals in-charge of skips as the critical factors for managing waste in the municipality

Keywords: Waste management, Solid waste, waste segregation,

Introduction

In recent times, waste has become a major concern not only in the developing world but also among civilized societies. As human population increased and became more sedentary, moving to settle in urban areas, management of waste has become more difficult and complicated. Waste disposal became challenging with the growth of towns and cities where huge numbers of people start to congregate in relatively small areas in pursuit of livelihoods (Shafiul and Mansoor, 2003). While the population densities in urbanized areas and per capita waste generation increased, the available land for waste disposal decreased proportionately (Puopiel, 2010). Poor waste management serves as a threat to economic activities of the citizenry in the country. Report released by World Bank's Water and Sanitation Program (WSP) 2012 shows that Ghana's economy loses 420 million Ghana Cedi annually due to poor sanitation. A global competitiveness report by the World Economic Forum (WEF) (2016) states that poor sanitation is destroying the image of Ghana and hampering the attraction of foreign investments. Poor management of waste would obstruct attraction of foreign investors which eventually compound unemployment situation in our cities.

Waste management system is an essential part of a general environmental management system. A waste management system may be described as the management of all tasks, practices, processes, methods and resources for establishing a system that manages waste and conforms to environmental regulations. Waste management system also involves strategies used to avoid or reduce waste generation in the first place. It encompasses all activities and action required to manage waste from its inception to its final disposal, thus from cradle to grave. This means waste management is merely manipulation of discarded things. It involves strategic planning, prescribing options, prevention of the contamination of environment and conservation of resources, and minimizing the amount and toxicity of waste creation (Sushi, 1990). Waste management is the generation, inhibition, characterization, monitoring, treatment, handling, reuse and residual disposition of wastes (Pongracz, 2002). Efficient waste management is vital for health and enhancement of the well-being of human beings (Puopiel 2010)

The prominent importance of waste management is evident in recent development of sustainable development goals. The sustainable development goal six, talks about ensuring availability and sustainable management of water and sanitation for all. Philip et al (2017) argue that management of waste is central to the sustainable development debate. They espouse that sustainable development goal six cannot be achieved without significant reduction in waste production with much increase resource efficiency. An efficient and hygienic method of human waste disposal available in a dwelling unit is a critical indicator of the sanitary condition of the unit and is an indirect measure of the socioeconomic status of a household (GSS, 2012)

Rapid urbanization is making waste management difficult to handle. Farvacque-Vitkovic, et.al (2008) argue that the current rapid and largely frenzied urban growth is stressing the capacity to efficiently deliver infrastructure and services and is resulting in urban sprawl and inefficient use of land. The sight of visual devastation in the urban areas in Ghana, serves to portray the physical problems that are characterized with the manner of urban development in this country (Okonkwo 2014). Urbanization influences rapid population growth and high consumption of goods, which culminate into production of large volumes of waste in our cities and towns. The increasing volumes of garbage being generated would not be a problem if rubbish was viewed as a resource and managed properly (UNEP, 2001). However, garbage is seen as a menace to the environment and human health which ought to be managed well.

Conceptual and Theoretical framework

The term waste is considered as subjective term and has resulted in the lack of clear definitions of it. Since Opinions diverge sharply on the proper definition of waste, there are different techniques of defining the concept. One means of defining the concept is by stating activities or substances which come within the range of definition. Alternatively, waste can also be defined by reference to the purpose of the regulations. The term waste emanated from Latin word vastus meaning devastate, ravage, ruin or desolate regions.

In the context of United Nations, waste is defined as materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose" (UNEP, 2001). The Basel convention defines wastes as any substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law. While the first definition intends to be absolute, this second definition is relative to national law. Womack and Jones (2003) define waste as any human activity that absorbs resources but creates no value

Hollander defines waste as something that needs to be expelled in order that the system continues to function. Man has become a proficient maker of waste (Tchobanoglous, et. al. 1993; Oteng Ababio). This is a tacit recognition of waste as being a human-related value concept. Gourlay defines waste as what we do not want or fail to use. Pongrácz defines waste as a man-made thing that has no purpose or is not able to perform with respect to its purpose.

The compositions of waste differ from community to community. These variations are occasioned by differing lifestyle, season, demographic, legislative impact, fashion, taste and geographical location. Invariably, it means that there is no one common approach to managing waste streams. There is popular opinion that waste management methods cannot be uniform across regions and sectors because individual waste management methods cannot deal with all potential waste materials in a sustainable manner (McDougall et al. 2001; Scharfe, 2010; Staniškis, 2005). This creates immense variation and presents unique challenges in waste management (El-Haggar, 2007)

Component of solid waste

Solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitudes (Kogler, 2007). No matter the method of solid waste management being considered, an understanding of the characteristics of the waste stream is a must (Tchobanoglous et. al. 2002). Cheremisinof (2003) assets that the need for reliable information on waste stream is paramount to the waste management program's success. He identifies planning, recycle, compost, waste-to- energy technologies, transportation and separation as waste stream. The amount and component of solid waste being generated in Greater Accra varies based on income levels (Boadi and Kuitunen 2003).

The waste generated has a high organic content. The organic content of the solid waste contain putrefaction. Asomani-Boateng and Haight (1999) identify example of solid waste that contain organic fraction as the kitchen waste which include rotten fruits, vegetables, leaves, food leftovers, crop residues, animal excreta and bones. Drechsel and Kunze, (2001) see urban food supply as significant contributions to the generation of urban waste. The prevailing high temperatures and moisture, couple with high organic content calls for regular collection, which put extra load on an over strain collection system (Boadi and Kuitunen, 2003).

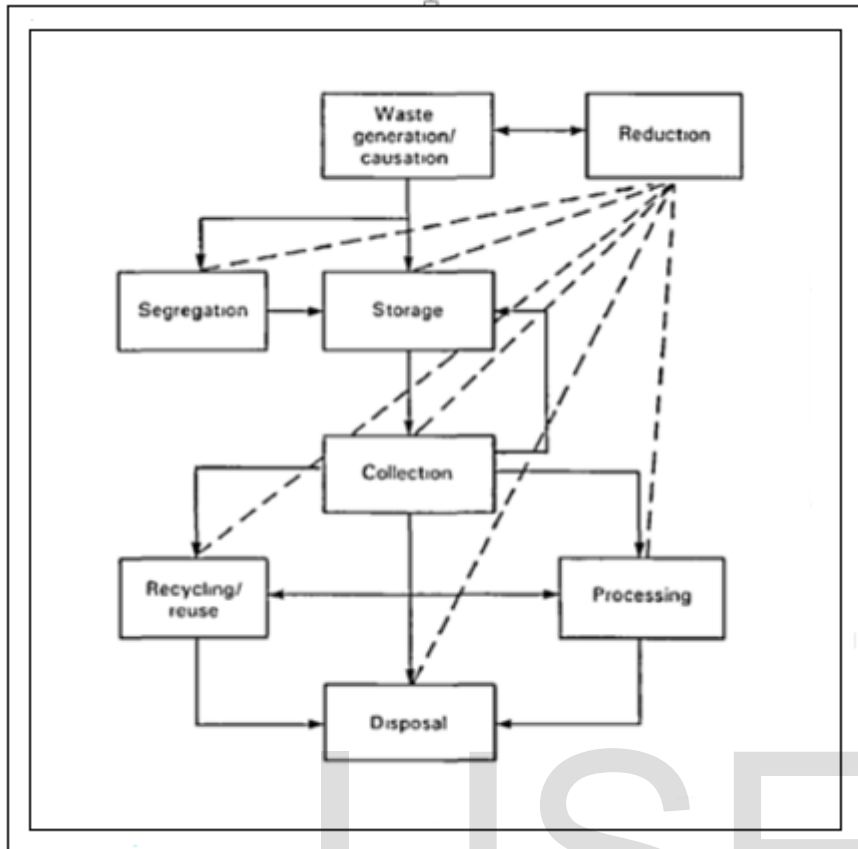
To design an efficient management system that consider the appropriate final treatment of managing waste based on their physical and chemical characteristics, is important to consider the following basic parameters: volumetric weight, per capital generation, and composition of (Tchobanoglous et al.,1994). Knowledge about the properties of solid waste is crucial for assessing the management tools, machines, systems, programs and plans that are relevant to the implementation of waste streams; resources, recovery, energy and disposal options. Solid waste management may be defined as the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste” (Kuma, 2007).

Integrated waste management

Integrated waste management (IWM) can be defined as the selection and application of suitable techniques, technologies, and management programs to achieve specific waste management objectives and goals (Nemerow 2009). IWM is a holistic approach that integrates waste streams, collections and treatment methods, environmental benefit, economic optimization and social acceptability into a practical and sustainable system for specific regions (Morrissey and Browne 2003). Integrated waste management is a frame of reference for designing and implementing new waste management systems and for analyzing and optimizing existing systems (UNEP 2005).

Waste management systems must remain flexible in light of changing economic, environmental and social conditions (McDougallet al., 2001; Scharfe, 2010). This integrated solid waste management approach takes into consideration the geography of the area, economics, politics, social conditions, and composition and generation of waste (MacDonald et al. 2015). An integrated approach to waste management which is tailored to local conditions can lead to more sustainable solutions.

The diagram below shows integrated waste management streams



Source: Sushi 1990

Waste Generations: It is established that population growth significantly contributes to an increase in waste production, it has also been empirically established that waste generation has increased speedily over the years (Martin, 2011). According to Bilitewski, the waste generation arena includes direct and indirect actors. Solid waste can take a variety of forms and is generated from a wide range of sources during diverse social, economic and industrial activities (Suleman et al., 2005). Report shows that about 3.4-4 billion tonnes of municipal and industrial waste are produced every year, of which non-hazardous industrial waste accounts for 1.2 billion tonnes (Chalmin and Gailloch 2009). Benneh (1994) states that the residents of Accra, in total, generate an estimated 1200 tonnes of solid waste per day with an annual increase of 6 per cent (Songsore, 1994; Kuitunnen, 2004).

Storage: One important activity of waste management system is how we handle waste at places where it is generated. This means that storage of waste is conspicuous sign of successful or unsuccessful waste management system. The best form of storing waste at the source of generation does not only minimize the cost in the waste management system but also take care of public health concerns and beautification considerations. In developing countries, waste are stored in communal or individual containers. Storage can be seen from two perspectives, namely place of generation and place of recycle. Storage at the source of generation involves taking care of the waste at its origin. When waste is not handled well, it would produce pungent odor and serve as a hub for pest and insect in our homes.

Waste segregation: This is the process whereby waste generated is separated into different elements for processing and disposal. Segregation is a process of dividing waste into 'reduce', 'reuse' and 'recycle' materials. Waste separation is crucial due to large volumes of waste that is generated. The separation of recyclable materials into individual components, either by the generator or at curbside by the collector, is known as source separation (Tchobanoglous 1993).

Disposal: This is the last option in waste management system. It's the traditional method of discarding waste and is common in most developing countries. Waste disposal serves as the last or resting place for non-recyclable material. Disposition is normally done in consonance with local environmental regulations or laws.

Waste Management in Ghana

Managing waste has been a major obstacle to almost every Metropolitan, Municipal, and District Assemblies (MMDAs) throughout the country. Our MMDAs increasingly becoming urbanized. Urbanization provides an impetus to immense generation of waste that makes difficult for MMDAs to manage it effectively. Also, as the population is soaring, managing people become problematic and people take advantage over the situation by resorting to reckless dumping of debris (Sam Jr., 2009). The rising problem on solid waste management in Ghana is due to various factors such as rapid expansion, financial ineptitude of MMDAs, lack of suitable planning and management of equipment for solid waste disposal have together worsened the already serious problem of solid waste disposal (Web Government, 2011).

In Ghana each able person generates 0.45 Kilograms of daily. Based on this premises, Mensah and Larbi (2005) estimated that Ghana generates 3.0 million tons of solid waste annually with the population of 22 million. Ga-West municipality generate 13,700 tons of solid waste (Nsumia Sanitary Landfill, 2015). This is attributed to high rate of population growth in the Municipality which is pegged at 3.4 percent. The common form of waste in the municipality include canned foods, fruits and vegetables, textile, garden waste, sweeping, e-waste, polythene and plastics. Waste management was solely managed by department of waste managements under the auspices of municipal assembly. However, in recent times the horizon of waste collection has been expanded to involve private companies.

Methodology

The study adopts a case study design to explore the critical success factors responsible for efficient waste management in a developing country. Primary data was collected through face-to-face interviews with the respondents. In-depth interviewing is qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspective on a situation, idea or program (Boyce 2006). The target populations for this study included staff of Ga-West Municipal assembly, Assemblymen and women, waste management companies, Agency of EPA, and operator of landfill site which are directly involve in environmental and sanitation issues within the municipality. The inclusion of the residents in the area brought to bare the problems of regular collection of waste in their vicinities. The study involved both simple probability and purposive sampling techniques. Simple probability sampling technique was used to select inhabitants of the area, zonal council members and the assemblymen for interview. Purposive sampling technique was used for other key informants in order to get the necessary information, adequate knowledge and experience on the challenges and solution to effective waste management in the Ga-West municipality. In all, 23 respondents interviewed including two official from municipal assembly, one officer from Environmental Protection Agency (EPA), two official from waste management companies operating in the area of study and four assembly members, three from zonal councils and ten residents. The purpose of the study is to identify the various methods of collecting waste and the inherent challenges impeding efficient collection of waste in the municipality and come up with the critical success factors for waste management.

Table 1; Distribution of interviews

Agencies	No. of respondents	Job descriptions
Landfill site operator	1	Operation manager
EPA	1	Sanitation officer
Assemblymen and Women	4	1. Amasaman electoral area 2. Medie electoral area 3. Achiaman electoral area 4. Mayera Electoral area
Waste management companies	2	1. Operation managers
Staff of the municipality	2	1. Director in-charge of municipal water and sanitation 2. Municipal budget officer
Zonal councils	3	1. Chairman, Ayikai Doblo 2. Chairman, Amansaman 3. Chairman, Kotoku
Residents	10	

Discussion and analysis

An efficient and hygienic method of human waste disposal available in a dwelling unit is a critical indicator of the sanitary condition of the unit and is an indirect measure of the socio-economic status of a household (GSS, 2012). The success of waste management largely depend on how waste is disposed of.

From the interview conducted, it reveal that door-to-door collection is the most common form of disposing waste in the area under the study. This is how a resident puts;

“Every morning the aboboya (tricycle) people come around and I give the waste to them and give them 50 pesewas or 1 Ghana cedi base on the volume of the waste I have that morning”.

This form of disposing waste is prevalent in the middle and upper class residential areas of the municipality. These areas include Amasaman, Pokuase, Tantra hills, Fise, ACP estate, Ofanko. This finding is consistent with Puopiel (2010) who conducted a similar study at Tamale municipality in the northern region. For example, Quarcoo (2014), referred to the practice in the local parlance as “Kaya Boola” who move from house to house in some localities to collect waste. They collect waste using either mechanized tricycles or hand drawn trolleys and charge the households or individuals some fee.

The next common way of disposing refuse in the municipality is the communal waste collection or skip. Communal waste container for about 23 or 15 cubic centimeter place at some vantage points in the municipality where residents who deposit waste in them pay for the service. The use of skips according to Puopiel (2010) and Quarcoo (2014) is highly popular and patronized by residents of low class areas in Tamale and Effutu respectively.

The study reveals crude dumping of waste as a form of disposing waste. This is a form of disposing waste at the backyard through burning and burying of the waste. This form is prevalent in the emerging areas of the municipality. This finding is consistent with the Anomanyo (2004) who identified this form of disposing waste in Accra metropolitan area.

Lastly, open dumping of waste in the municipality was also revealed by the studies. The residents resorted to dumping waste in either along the roadside, open spaces, nearby gutter or backyard. These methods of waste disposal also happened in the low class residential areas especially in the surrounding communities. This resulted in littering and heaping of waste thereby making the environment filthy. According Ghana Statistical service (2014) this phenomenon is commonly practices in the remote areas of the municipality.

Challenges of waste disposal in the municipality

The study identified inaccessible road as a major challenge impeding effective disposal of waste in the municipality. This finding is consistent with the finding of Quarcoo (2014). The waste compacting vehicles are very heavy and because of poor roads network due to poor planning of the municipality, these vehicles often get stuck in the mud, especially during rainy season. Sometimes it takes about three to five days for authorities to either repair or tow the vehicle. For that reason, during rainy season, the truck drivers avoid plying waterlogged roads thereby living huge pile of waste unattended to for several days generating pungent odour.

Another challenge revealed by the study is irregular payment of service fees. Many residents who engaged the services of waste management companies more often than not renege in payment for service fees. This makes it difficult for waste management companies to pay their employees and at the same time fuel the compact vehicles. Thus, pay as you dump and since the residents cannot afford to pay, they resort to crude means of dumping of waste.

Also, Poor maintenance of waste collection vehicle and bins was one of the banes established in this study as a challenge to effective waste disposal in the municipality. The residents do not take good care of the waste bins or containers giving to them and this affects the life span of the containers. On the other part, the waste management companies as well as the municipality renege on constant servicing of compact vehicles and other equipment that aid in waste management. This observation is consistent with the finding of Boadi and Kuitunen (2004) who indicated that poor maintenance of service vehicles affect effective waste management.

One major challenge confronting the municipality as identified in the study is that the municipality is a waste receiving municipality when it comes to waste management. There is a landfill site at Nsumia and the zoomlion recycling plant at Adjen Kotoku in the municipality. Some municipalities such as Accra metropolitan, Adenta municipality, La-Nkwantanan municipality send their waste through Ga-West municipality to Nsumia landfill and Adjen Kotoku recycling plant. In the process of carting waste from these municipalities litters drop from the compact vehicles thereby inundating major streets within the municipality thereby creating the scene as if the streets have been deserted for many years. This how the municipal sanitation officer put it; *“Every day compact vehicle from other municipalities pass through our municipality to send theirs waste to both Nsumia land fill site and Zoomlion recycling plant at Adjen Kotoku. When these vehicles are passing because they don’t pack the waste well, the waste drop on our roads making these roads dirty. By the close of the day when you see the state of our roads you will think these roads have not been swept for the past three months”.*

The solutions to effective waste management practices in the area.

This research uncovered that waste separation which is one of the initial steps to reduce the volume and/or toxicity of waste was not carried out before final disposal. Similarly, if waste is not segregated before dumping in landfill, the intention of decomposition of waste in the landfill for reclamation of land for use will fail since about 57.5 per cent of the waste in the Metropolis is plastic. Through segregation, waste disaggregating, reusable products and packaging such as returnable bottles could be diverted from the landfill. In this vain, the most effective way is sorting and segregation of waste. Waste destined for collection either through door-to-door or through skip must be packaged base on its property by the originators. This is consistent with integrated waste management

Another solution is to increase the capacity of fourteen waste management companies that the municipality has engaged. Analyses of the equipment of the companies show that, for there to be efficiency in the system the companies must increase their capacities. When these companies’ capacities are enhanced they would be able to collect the waste on time. Also, increase in supply of waste bins and skips in the municipality would contribute to efficient waste management system. The municipal assembly should buy more bins for individual household and provide more skips for communal waste dumping. The study revealed that most of the emerging areas do not have these waste bins or skips. Even some of the existing ones are broken and need replacement.

Revenue maximization is seen as a critical factor in managing waste in the municipality. Again, to increase revenue for waste management, the assembly should insist that all officials in charge of communal waste containers issue receipt for all monetary transactions. The municipality should also expedite prosecutions of defaulters of service fees to deter others from defaulting. With regard to litters dropping from compactors carrying waste from other municipalities, the assembly should liaise with those municipalities to find a lasting solution to the problem. The municipalities whose waste compactors ply through Ga-West should be made to pay some amount of money to the receiving municipality. This money should be used to employ people who would constantly clear the streets with the dropped waste. Also, the receiving municipality of waste should endeavor to purchase a towing vehicle which would be used to tow broken down waste vehicles carrying waste to disposal sites and are more often left unattended to for a number of days

Conclusion and recommendations

This study revealed that the commonest waste disposal method is the door-to-door collection in lower, middle, and upper class residential areas, Communal waste containers or skip is common in the lower income areas of the municipality, the third one is the crude method of dumping, that is burning and burying of debris and Open dumping which is prevalent in the emerging areas of the municipality.

Some of the problems confronting efficient waste management include irregular door-to-door collection of waste by the companies. The companies are supposed to collect the waste twice every week but sometimes it is done once in a week. The study identified insufficient supply of waste bins and communal waste containers in the municipality as one of the challenges. Some of the dustbins have been damaged without being replaced by waste companies and the assembly. Not all, there are areas in need of the bins but the assembly and waste companies have reneged in supply of the bins. In connection with skip or communal waste container, the residents accused those managing the containers of charging exorbitant fees. It revealed that parents who dispatch their wards to send refuse to the skip give the children monies as service fees and because the children want to pocket the money they dispose the waste in unauthorized places. Some residents also expressed reservation on the proximity of location of skip site to theirs houses. In addition, the municipal officials who were interviewed bemoaned the fact that those managing the skips always under-declare the returns to the assembly since there are proper records on the revenue.

Based on the findings of the study, the following measures are recommended for efficient and effective disposal of waste in the municipality. Adequate dustbins and skips should be supplied by the waste management companies in collaboration with Environmental health departments and Municipal Assembly for residents in the Municipality for waste storage. Approximately six hundred (600) skips should be supplied. This should be provided particularly for the low class residential areas to avoid dumping in unauthorized places. At least, four- hundred (400) houses to a skip and at most six- hundred (600) people to skip. These should be placed at least within 30 metres radius and at most 50 metres radius in the low class residential areas. With this, residents in the low class residential areas will spend less time to dispose-off their domestic waste at the skip site. Also, wastebins should be extended particularly for the middle and high class residential areas.

Interaction with municipal officials revealed that certain percentage of common fund is allocated for sanitations. Also, all the waste management companies operating in the municipality pay some percentage of revenue to the assembly. Even the assembly does not pay for lifting of communal waste containers because the assembly have acquired trucks for lifting. Since the low class residential area is identified as poverty striking area and to introduce pay as you dump would prove difficult for the residents. Because the people cannot afford to pay for the service fee, they would resort to the crude means of dumping. This will invariably defeat the relentless effort of assembly to get rid of waste in the municipality. Based on this, the researcher recommends for fee free for those who use the skip. Even if the municipality is unable to imbibe the total cost of service fees, the fees should highly be subsidized to make it affordably to the residents.

There should be regularity of waste collection among waste companies in the middle and high-class residential areas. Also, those managing communal waste containers should endeavor to empty the waste promptly to avoid heaping of waste and over flowing of skips with solid waste. At least, waste should be collected twice a week in these areas and thrice in the Middle and high-class residential areas. There should be regular monitoring of waste collection by the assemblymen in their areas for which reports would be made to the assembly. This will help to keep the place constantly clean and prevent any possible outbreak of communicable diseases such as cholera and typhoid.

The study contributes to growing debates on the methods and challenges to waste collection in Ghana. It suggests some standard data for which future studies on waste management could be conducted and evaluated. However, the study is limited by several factors: it is based on a small qualitative sized sample of waste management actors in Ga-West municipality. A larger quantitative sample size may enhanced precision or dissimilar results. Future research should endeavor to increase the validity of this study using different sources of information

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