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Decentralization and Solid Waste Management in Urbanizing Ghana: Moving beyond the Status Quo

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Abstract

Waste management is competing with more pressing economic and social issues such as social protection programs, education, and health. The government of Ghana has therefore decentralized the waste management system in the country. With this development, local government authorities and private sector actors are now playing key roles in waste management in the country. This study sought to examine decentralized solid waste management in the Berekum and Dormaa Municipalities in the Brong Ahafo Region of Ghana. Specifically, it analyzed the involvement of the private sector in solid waste management, and the quality of waste management services in the two selected municipalities. Through a survey of 312 households, the study analyzed the performance improvement, regulatory policy, and sustainable service delivery of solid waste management in the municipalities. The study found that there were no mechanisms for full cost recovery to include majority of the residents, who patronize communal collection service. The study therefore recommends the adherence to normative standards and agreed rules, adoption, and use of appropriate cost recovery strategies for low-income groups as well as the restructuring of institutional arrangements to ensure user involvement and enforcement of legislation to improve municipal solid waste management in Ghana.

Keywords: decentralization, municipal solid waste management, municipal authorities, private sector, urbanization

1. Introduction

Waste management remains a major challenge to management governments in Africa. In Ghana, the increasing rate at which waste is generated in the cities is alarming; yet government has not been able to respond in an equal measure. The proportion of populations living in urban areas in Africa is expected to increase from 40% in 2010 to about 57% in 2050 [1]. This incomparable rise in the level of urbanization in the first half of the twenty-first century Africa has goaded a variety of questions, apprehension, and agitation about the possible connotations of this

development on the quality of life of Africa's rising population, and for environmental health in general [2]. This phenomenon has unquestionably buoyed a proclivity to consider the twenty-first century as marshaling in a period of predominantly urban civilization in Africa where urbanism is rapidly dominating ruralism [3]. Yet, the challenge of considerable transformation in the manner and pattern of urban functionality becomes ever more complex in the midst of unsustainable waste management problems [4].

The last three decades have seen a tremendous shift in government policies toward decentralization in the developing world. These policies are typically a component of comprehensive process of political, economic, social and technical reforms [5]. This has been inspired by new efforts of democratization and process of 'modernization' of the state. It can be argued that these initiatives combined to foster accountability, cost consciousness and competition in the public sector as well as develop a new role for the state in enabling and regulating rather than taking the place of the private sector. On the flipside, solid waste management (SWM) has become an important part of the urban environment as well as the planning of the urban infrastructure to safeguard a safe and healthy human environment. Continuous urbanization of developing countries at a very high rate has created serious problems of waste disposal as a result of uncontrolled and unmonitored urbanization [6]. Waste is a continually growing problem at the global, regional and local levels. The World Bank [7, 8], reported that there will be 70% increase in urban solid waste globally with a projected rise in the amount of waste, from 1.3 to 2.2 billion tonnes per year from 2012 to 2025, which will lead to a rise in the annual global costs of global waste from \$205 billion to \$375 billion. Within the same 13 years span, developing countries are facing the greatest challenges in the waste management sector.

In Africa, the poor state of solid waste management in urban areas is not only an environmental problem but also a major social handicap. In Kenya, it is expected that the amount of solid waste generated will increase from 2000 to 10,171 tonnes per day by 2025 [9]. The problem is further aggravated by the lack of financial as well as technical expertise in SWM technology and management especially in the sphere of collection, transportation, processing and final disposal. Whereas aspects like recycle, reuse and recovery of the solid waste is disorganized in most cases. In this context, the responsible persons or agencies concerned with public health and environment protection face the crisis of ineffective SWM. In the Ghanaian context, the situation is not different. Due to rapid urbanization, Ghana's major agglomerations have been growing quickly but have lacked a concurrent expansion in SWM. Addaney and Oppong [4] observe that Ghana like other developing countries has over the years had difficulties in municipal solid waste management with regards to infrastructural and technical inefficiencies. In view of this, the government has attempted to decentralize the SWM service delivery. These efforts have often become embroiled in politics, with less emphasis on efficient SWM delivery. In isolated cases where services have been decentralized, there have been inadequate policy direction and limited resource transfers to the lower levels of governance. Consequently, effective decentralized solid waste management has not been forthcoming.

The solid waste management subsector has been bedeviled with ineffectiveness despite the adoption of a number of policies and reform programs. Principally, decentralization has been designed to ensure efficiency and better service delivery at the local level. Despite this, there still exist challenges such as asymmetrical waste collection, waste overflow from bins, inadequate storage containers, and disposal of waste in unauthorized space in most municipalities in Ghana [4]. These challenges lead to public health hazards, esthetic nuisance, and environmental pollution. The

public health implications have been facing, accounting for about 5% of the GDP [10]. Data from the Ghana Health Service indicate that six (6) out of the top ten (10) diseases in Ghana are linked to poor environmental sanitation, with malaria, diarrhea and typhoid fever jointly constituting 70–85% of out-patient cases at health facilities [10]. The Berekum and Dormaa Municipalities are no exception to these undesirable environmental problems.

Therefore, this study attempts to unpack the difficulties face by the municipal authorities in keeping pace with solid waste facilities development and management. It is driven by the question of how decentralized SWM has evolved to ensure quality and sustainable service delivery in the medium-size towns of Berekum and Dormaa in the Brong Ahafo Region of Ghana. It analyzed the evolving practices of decentralized solid waste collection for sustainable service delivery, the service quality of decentralized urban SWM institutions; and the factors which explain the differences in service quality of the decentralized SWM of the two municipalities. It adopts the assertion that the inability of municipal authorities to effectively manage their solid waste usually leads to inefficient use of time and resources, and which eventually leads low productivity and poor service quality [4, 11].

2. Municipal solid waste management: theories and normative practices

Generating solid waste (SW) is inevitable. Cities in developing countries have frequently been unable to keep up with the provision of basic services [12]. About 40% of the solid waste generated in developing countries is uncollected, piles up on streets and in drains, contributing to flooding and the spread of disease. In addition, domestic and industrial effluents are often released into waterways with little or no treatment [12]. Solid waste has been a major challenge for municipal authorities for about 6000 years now [13]. The concept of waste is relative in two main respects. Firstly, something becomes waste when it loses its primary function for the user. Hence, one person's waste output is often someone else's raw material input. Secondly, the notion of waste is also relative to the technological state of the art and to the location of its generation ([14], p. 70). Waste is therefore a very dynamic concept and must be looked at within these two contexts. Many transnational organizations including the United Nations Environment Programme (UNEP) have their own definitions to the notion of waste. The UNEP [15] defined waste as any substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by national law.

Wastes that are solid are termed to as “refuse” or solid waste [16]. Waste has been defined differently by many Authors with different meaning. One definition is that waste is ‘unwanted’ by the first user. It is therefore anything that is no longer ‘unwanted’ dependent on the time and the prevailing circumstances. Solid waste today is increasingly defined as “natural resources out of place” or as “new materials for technologies not yet found” [17]. Many governments now regard waste as a useful source of income and as such policies have been geared toward this potential by both the government and the public sector to harnessing this potential. The recycling subsector for example, is an essential industry generating revenues and jobs for a larger number of people in the world today. Waste Watchers [18] defined solid waste management as everything that must be done to handle all the solid waste produced in a community, including collecting, transporting, processing and disposal of waste. Similar to this is the one put forward by Tchobanoglous et al. [19] that SWM involves the collection, treatment and disposal of non-hazardous waste.

Waste generation is the most important aspect to look at in order to have effective SWM system. The generation of waste varies considerably between countries based on the culture, public awareness and management [20, 21]. Waste generation comprise those activities in which materials are identified as no longer of any value by the owners/users and either thrown away or gathered for disposal [22]. Generally, developed countries generate more waste than developing countries [23]. Countries in Asian and African region produce waste in the range of 0.21–0.37 tonnes/capita/year, while European countries generate higher amount of waste with 0.38–0.64 tonnes/capita/year [24]. The waste generated by a population is a function of consumption patterns and thus of socioeconomic characteristics and the interest in and willingness to pay for collection services ([25], p. 35).

Disposal is broadly defined to include the collection, storage, treatment or processing, utilization, or final disposal of waste. It involves the process of getting rid of the waste materials that people generate [26]. Information on waste generation is important to determine the most suitable waste disposal options. The main purpose in implementing best practice for solid waste management is to prevent pollution. Pollution is a threat to human and other living organism and it may also damage the ecosystem and disrupt the natural cycle and climate on earth [27]. There are many disposal options available to suit the nature of waste and a country's preference and interest. Economics and environmental aspects of waste disposal option are always the main issue in choosing the right technology [28]. Most developed countries, are on their way to eliminate land filling while some other countries still have problems with open dumping [29, 30].

Despite the development of many waste disposal option, landfills remain the most prominent system applied worldwide [30, 31]. Although a lot of improvement had been possible in the land filling system and the regulation on the type of waste that can be treated at landfill is stringent, most of landfills operated remain primitive [31]. Ayomoh et al. [32] had listed few problems related to improper landfill operation including, health deterioration, accidents, flood occurrences, pollution of surface and underground waters, unpleasant odor, pest infestation and gas explosion. Although the impacts from landfills are known, impacts from other alternative remain unanswered thus subject to critics [31]. Incineration has been the choice for developed countries as they have sufficient financial input and are looking into energy recovery from waste [33, 34]. Small countries such as Singapore adopt incineration as their waste disposal option due to scarcity of land [35]. Even that, incineration is also associated with some other risks. This includes the generation of carcinogenic and toxic compound.

Some scholars have observed that the impacts from incineration are overemphasized and the advancing technology had highly reduced the environmental impacts [31]. However, many of the countries prefer waste minimization compared to waste treatment such as landfill or incineration [35, 36]. Technology is advancing every day and chemical recycling of plastic wastes has also been made possible in these developed countries [37]. Regardless of the technology chosen, each has its advantages and disadvantages. The information on each disposal option needs to be clarified to determine the suitable option for each particular country. Few tools had been used in the environmental evaluation including in determining best waste disposal option. For example, life cycle assessment determined that the most economically feasible option for traditional market waste management in Indonesia is composting at a centralized plant, while biogas production option has the lowest environmental impact [28]. SW Plan software particularly to calculate capital and management cost is also available to determine the best integrated technology in waste management [38].

2.1 Solid waste management system in Ghana

Before 1985, incinerators were the technology used for handling waste in the urban centers of Ghana. This could not be sustained due to the lack of funds as a result of economic hardship in early 1980 and technical knowhow. In view of this by 1985 solid waste were dumped on all bola locations [39]. Thereafter a special department called the waste management department (WMD) was set up in the urban centers in 1985 to manage the waste in Ghana with financial and technical assistance from the German Agency for Technical Co-operation (GTZ). The first house to house collection started in Accra using animal drawn carts using donkeys in the high income residential areas. Waste collected was dumped into central containers. Using only 15 donkeys and 10 staff the carriage could collect 3–4 trips daily which covered 75–100 houses [39]. The GTZ project helped to improve the deteriorated waste management in Ghana. However their exit saw more deterioration in level of service quality and service coverage due to the fact that the public provision alone could not handle the growing urbanization of the towns and cities. This however calls for further decentralization to include the private initiative in solid waste management.

The waste companies provided house-to-house and communal services. The communal service was mostly provided in the lower middle income areas using central containers. Residents who patronize this kind of service disposed of their waste by taking it to a central containers site. These containers are lifted full of waste and disposed of at designated disposal sites [39]. Private Sector Initiative (PSI) started in Accra and Tema in the early 1990s and later extended to Kumasi in the mid-1990. Afterwards, this initiative was extended to Takoradi and Tamale in 2000 and 2002 respectively. The year 2004–2007 saw the inclusion of more private companies in to waste business all over Ghana. The companies in Accra and Tema increased to 18 and 6 respectively by 2006. As a result, contracts were open up for competition. The first competitive bidding for solid wastes took place in Kumasi in 2007 and later in Accra in year 2008 [39]. The rapid population growth in Ghana has resulted in increased waste generation in the country. The amount of solid waste generated per day in Accra was 750–800 tonnes in 1994 [40]; 1800 tonnes per day in 2004; 2000 tonnes per day in 2007 this figure increased to 2200 in 2010 [41].

The methods for solid waste disposal in Ghana are uncontrolled dumping of refuse, controlled dumping, sanitary land filling, composting, and incineration [42]. Open refuse dumps are most commonly located at the perimeter of major urban centers in open lots, wetland areas, or next to surface water sources. Open dumps are generally sited based on considerations of access to collection vehicles rather than hydrological or public health considerations. In rural areas and small towns, there are often no vehicles for collection hence uncontrolled dumping occurs within the built up areas with all its attendant health hazards and negative environmental impact [42]. Problems from landfills in Ghana include odor, insufficient covering material, flies and other vermin infestations and smoke from open fires. The increasing amount of waste received by these landfills make it necessary to find other disposal options since constructing new landfills may be difficult due to the scarcity of land, increase of land price and demand for a better disposal system. Effective solid waste management therefore calls for competent and responsible institutions as well as sound managerial systems.

The Ministry of Local Government and Rural Development (MLGRD) is the institution responsible for waste management services at the national level. This institution formulates waste and sanitation policies and also provides oversight role to the assemblies and gives subsidies for the provision of SWM services. The Ministry supervises the activities of local Assemblies and passes orders as required by

law to the various Waste Management Departments of the local Assemblies who are directly responsible for effective solid waste management. As part of the decentralization process in Ghana, in 1988 the waste management functions became a sole responsibility of the Assemblies [43]. About 90% of the Assemblies budget is supported by the Central Government to carry out their obligations in the locality through the various departments. The WMD is responsible for all the waste collection, disposal and monitoring of all the activities of companies engaged by the Assemblies. On the legal and regulatory frameworks for effective solid waste management, the policy which regulates waste management in Ghana is primarily reflective of legislation enacted at the national level and decisions made in pertinent case law. The Central Government bestows local authority status, onto any town or city in accordance with Act 462 which come to replace the previous act enacted in 1988 [39]. In spite of this, the Government continues to exercise controls over the Metropolitan, Municipal, and District Assemblies (MMDAs). The Central Government usually gives directives that affect the Assemblies. The most important is the fact that, a considerable amount of the Assemblies revenue is a direct disbursement from the Central Government. This makes it very difficult for the assemblies to be free from government interference. However, the MMDAs have a constitutional mandate under the 1993 (Act 462) to effectively handle sanitation issue which includes solid-waste management and therefore needed to operate independently to benefit the people. This responsibility is farfetched due to lack of independence. The 1960 (Act 29) of the Criminal Code of Ghana, state in no uncertain terms that whoever places or permits to be placed, any refuse, or rubbish, or any offensive or otherwise unpleasant material, on any yard, street, enclosure, or open space, except for the reason that such a place has been designated by the Assembly for such intent and purpose commits an offense. The law requires individuals to take full responsibility for the streets, drains and space closer to their premises [39].

In addition, the legal regime in Ghana mandate the Assemblies as owners of all the waste generated in municipalities and as a result has the mandate to collect, recycles and discards solid waste. The National Building Regulations, The 1996 (LI 1630) which is the national building regulation stipulates that a building for residential, commercial, industrial, civic or cultural use shall have a facility for refuse disposal, a standardized dustbin and other receptacles approved by the Assembly in which all the waste generated shall be stored pending final collection by the trucks to final disposal site [39]. SWM in Ghana is greatly influenced by the Environmental Sanitation Policy of 2008. This policy is an update of the 1999 policy with the view to meet the prevailing development objectives and address the aspirations of the principal actors in the sector after 8 years of slow implementation with very little impact [10]. With reference to environmental sanitation, the policy requires the Assemblies to control environmental sanitation and check pollution in all forms [39]. The policies tend to reflect prevailing ideas on solid waste management and give an overall evaluation of the prevailing circumstance in the country. It further ensured private sector participation and the provision of 80% of SWM in all the assemblies [39]. The Ministry of Local Government is mandated to regulate the waste business. The regulation works to promote competition via legal restrictions and regulatory rules and controls concerning market entry and exit, the capacities of companies operating in the waste market, user charges and the service standards. The local assemblies are mandated to outsource solid waste collection to decentralized agents service by contracts and also embark on frequent monitoring and evaluation of the service quality provided by the companies and sanction any insubordination according to the dictate of the contract.

The policies and regulations and the contractual agreement that connect the assemblies with the companies are important factors that contribute to effective

solid waste collection, treatment and disposal. These regulations include the Local Government Act, National Procurement Act, Local Governments By-law, Environmental Sanitation Policy, and other state conventions that provide rules for solid waste management. The Procurement Act [44] requires the Assemblies Tender Boards to use competitive bidding to select companies [39]. This call for appropriate mechanisms suitable for the local conditions from an environment, social and fiscal perspectives, and at the same time being more capable to be sustain over long period of time without reducing the resources it needs [45]. Based on this the conceptual framework of the study focuses on four key variables, namely: evolving practice of SWM, households' involvement for service sustainability, private company capacity and lastly, regulatory mechanisms and control for solid waste management in relation to service quality.

3. Methodology and study setting

3.1 Study setting

This study focused on two municipal areas (Berekum and Dormaa) located in the Brong Ahafo region of Ghana (see **Figure 1**). These municipalities were selected based on their rapid expansion and urbanization [46]. The total land size of the Berekum Municipality is 1635 km². This area covers about 0.7% of the entire land area of Ghana (233,588 km²). The Berekum Municipality lies between latitudes 6° 27' N and 7° 00' N and longitude 2° 52' W. According to the 2010 Population Census of Ghana, the population of the municipality stood at 129,628. The annual average population growth rate is 2.2%. The 2015 population of the municipality was 144,528. This growth rate compares favorably with both the regional and national rates of 2.3 and 2.5% respectively. Dormaa Municipality, on the other hand, lies between latitude 7° and 7° 30' N and longitude 3° and 3° 30' N. It covers a land area of

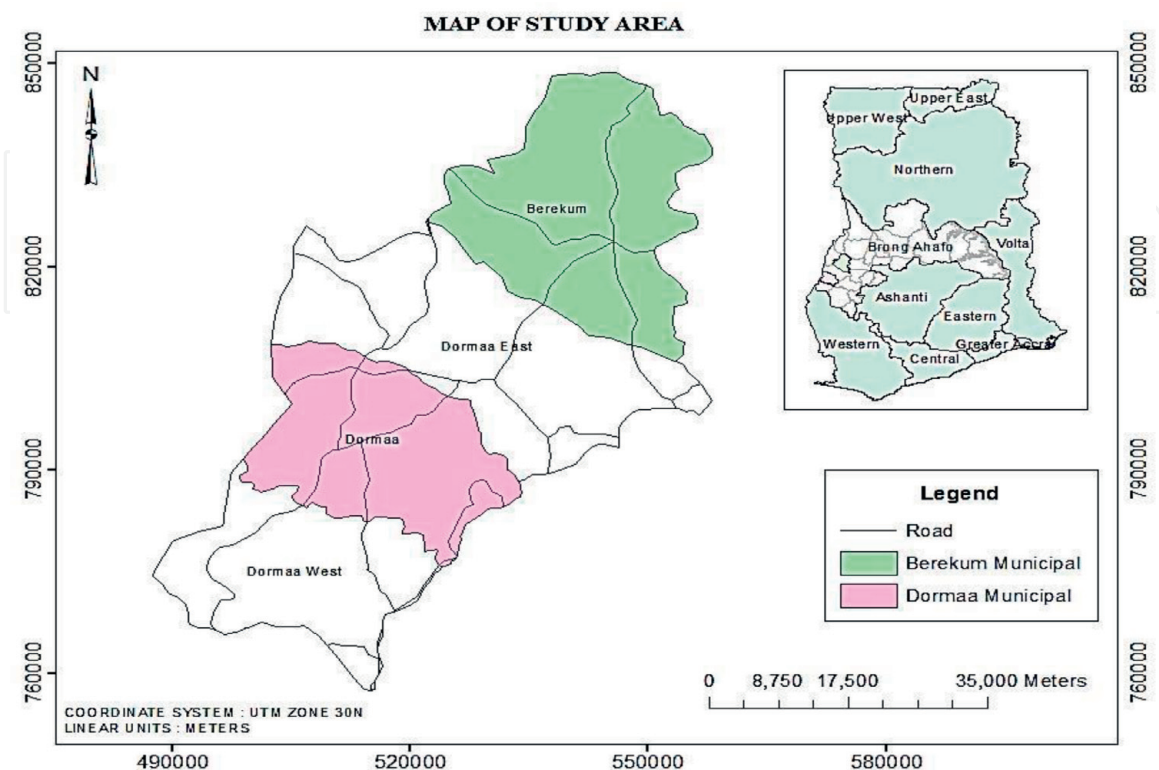


Figure 1.
Map of study area.

912 km². The 2010 housing and population census of Ghana put the total population of Dormaa municipality at 159,789 with an annual growth rate of 2.4%.

3.2 Research design

The study adopted the case study research method [47]. Purposive sampling [48] was used to select 12 communities from the two municipalities. Firstly, the study area was zoned into two clusters namely: Berekum municipality and Dormaa municipality. Secondly, purposive sampling was used to select twelve (12) areas from the two municipalities for the survey. Through a mixed methods design [49], both qualitative and quantitative research methods were used for the data collection and analysis. A household survey was conducted with household respondents to understand solid waste management and service delivery across the 12 selected communities. Using Slovin's formula: $n = \frac{N}{1 + N(\alpha)^2}$, where 'n' is the sample size, 'N' is the total number of households, 'α' is the margin of error (0.05), a total sample size of 312 households across the 12 case study communities were randomly selected and involved in the household survey. The sample size of 312 was divided equally among the 12 selected communities. This gave a sample size of 26 for each selected area. Finally, accidental sampling method was used to select the respondents for interview. That is, the first person to be contacted in each selected house was interviewed. If the first person contacted was not ready, the next available person was interviewed. To gather statistical and policy information on solid waste management and service delivery the two municipalities, semi-structured interviews were also undertaken with an official of the Assemblies (Berekum and Dormaa), responsible for the environmental health and waste management of the municipalities. In analysis, the study used a cross-case analysis procedure to analyze the interview data. In this approach, responses to a common question from all interviewees in each category are analyzed together. The findings of the study were validated and verified through focus group discussions with household respondents in each of the 12 case study communities. This approach was appropriate in addressing the inconsistencies that had occurred during the data analysis.

4. Results and discussion

4.1 Evolving trend of decentralized SWM

Coverage of service in these two municipalities as a result of GTZ assistance in the 1980s were not available it is believe that coverage were very high. This is seen in the numerous waste dumping site which became known as "bola" in the old communities of these two municipalities. As these municipalities expanded the waste departments did not build new site for waste. With this, the coverage continued to fall from the 1990s of about 75–50 percent by the year 2006 according to the municipal waste directors of Berekum and Dormaa. The fall off called for the involvement of the private companies. Checks by the study revealed that the private companies formally started in Berekum and Dormaa in 2006. These municipalities were not group into zones. One company provided SWM services in the municipalities, there was no competitive bidding, and one company was given the contract to provide house to house and community collection service. This discovery confirms what Oduro-Kwarteng [39] indicated of the evolution of decentralized SWM in the country.

4.2 Modes of waste disposal in Berekum and Dormaa

Basically results from the data analyzed on waste disposal in the Berekum Municipality confirmed that three ways of waste collection exist in Berekum including House-to-house collection, communal dumpsites and open dump site (**Table 1**). From the survey, majority (62%) of the respondents disposed of their waste into communal containers. This is followed by 29% of the respondents who indicated that their waste was collected directly from their houses (which are mostly found in the new residential areas). A total of 16% indicated that they emptied their waste into open dump sites. Similar responses were observed in the Dormaa Municipality as most (63%) of the respondents indicated that waste was disposed of into communal containers. While 20% of the respondent said that waste was collected directly from their house, 17% also indicated that they emptied their waste into open dam sites.

In the Berekum Municipality, the data analyzed shows that the House-to-house service of refuse disposal is primarily practiced in the new residential areas including Nyamenae and Awerempe-Estate. Similar results showed the same trend in the Dormaa Municipality as residential areas such as Kumidaa Street and Asikafo Amantem were found to be practicing house-to-house waste collection. These modes of waste collection were verified with key stakeholders (the Assemblymen, WMD and Private waste company). The introduction of this service in the municipalities reflect the trending urban form of solid waste management since such areas compose of settlements which house middle to high income earners who are in the position to pay for such service. As Oduro-Kwarteng [39] asserted in the formal introduction of this service in the urbanized areas in the two major cities in Ghana (Accra and Kumasi). Other towns and cities have grabbed this concept to enhance service delivery as far as SWM is concerned. All the respondents from these residential areas where house-to-house waste collection service takes place in the Berekum Municipality are required to pay a monthly charge of GH¢15 (US\$3) per 120 liter dustbin. In the Dormaa Municipality, service beneficiaries pay an amount of GH¢10 (US\$2) per 120 liter dustbin. The results show that service beneficiaries in the Dormaa Municipality slightly pay lower price than amount paid in the Berekum Municipality. According to the Assemblymen this charge was exorbitant and as a result accounted for the lack of patronage in the Municipality. Secondly, there was lack of patronage because the companies did not regularly and routinely collect waste in these areas. In view of this some people turned to burning as a means of dealing with their waste.

Communal collection was mainly carried out in the old town residential areas of Kyiritwede Zongo and Amangoase for Berekum and Atoase, Ahantrase Ahenbronofor Dormaa Municipal. This mode of waste collection does not require

	Do you pay for collection service?					
	Berekum			Dormaa		
	Yes	No	Total	Yes	No	Total
Door to door	41	0	41	31	0	31
Communal collection	0	97	97	0	98	98
An open dump	0	18	18	0	27	27
Total	27	91	156	23	85	156

Source: Field Survey, 2015.

Table 1.
 Modes of waste disposal in Berekum and Dormaa.

any monthly fee or pay as you dump charges. Residents go to a central container and dispose of their waste. The next mode of collection is the open dump site collection this is seen in the suburbs; communities, who dispose of their waste at the open dump site, are emerging communities that the Assembly together with private companies have failed to supply with containers. In view of this, the people throw their waste in open dump pit this is seen in some part of Atonotia and the light industrial area of Berekum municipal and in New Dormaa for Dormaa Municipal. This findings supported studies by [42] who asserted that open refuse dumps are most commonly located at the perimeter of major urban centers in open lots, and are generally sited based on considerations of access to collection vehicles.

4.3 Households involvement in solid SWM in Berekum and Dormaa

This study also examined the extent to which the various households in the two municipalities participate in waste management services in relation to the mechanism for cost recovery, the eagerness-to-pay for service charge, eagerness to separate waste at source and monitoring of service quality. **Table 2** presents the household's views on the assessment on who ought to bear the cost of waste collection in the municipality. The study shows that, 58% of the respondents within the two municipalities who utilize the house-to-house waste service perceived both the Assembly and the individuals who generates the waste have to work very hard to recover more than 50% of the cost incurred if not all in waste collection and disposal. On the other hand, 24% opted for the generators to incur all the cost involved in waste management without any prejudice. Whereas 18% said the Assembly alone should incur the cost for waste management services.

Regarding communal collection about 54% of the respondents said the Assembly alone should pay for the cost of waste collection, while about 45% indicated that the generator and the Assemblies have to collectively pay for waste services. Moreover, only 5% said only generators should pay for waste services. In view of the above, it is quite obvious that the companies need to be more responsible for results and to be more responsive to their client. This also implies that much attention must be given

	N	Berekum	Dormaa	%
House-to-house	72	41	31	
Generator only	17	10	7	24
Generator & Assembly	42	18	24	58
Assembly only	13	13		18
Communal collection	195	97	98	
Generator only	10	7	3	5
Generator & Assembly	87	34	53	45
Assembly only	98	56	42	50
Open dump	45	18	27	
Generator only	2	0	2	5
Generator & Assembly	14	14	0	31
Assembly only	29			64

Source: Field Survey, 2015.

Table 2.
Opinion on who ought to bear the cost of waste collection services.

to household involvement to make sure the households are well informed about the fiscal problem confronting the Municipalities and the necessity to pay for service improvement.

4.4 Eagerness to pay for service charge

To further ascertain the household involvement in solid waste management, the resident's eagerness to pay more for waste services was assessed. **Table 3** indicates the results of the eagerness-to-pay service charges. To improve the effectiveness of the house-to-house service, the respondents were asked on their willingness to pay more. The result on this shows that a total of 21% of the people interviewed were willing to pay more for waste services. This was due to the fact that the respondents were not satisfied with the existing service quality. However, the majority (53%) of the respondents confirmed their eagerness to pay the existing tariff for the service rendered, whereas a total of 26% were eager to pay less than prevailing tariff. This group saw the service quality to be very poor and that, wanted an improvement in service quality levels before tariffs are increased. This finding supports what many call the need for government to encourage the principle of polluter-pays which financially resource service providers in service delivery.

The result further indicated that, all the respondents were ready to pay any considerable tariff for the service if the service would be improved along frequent and routine waste collection of two times a week. It was again realized that the respondents wanted the tariffs to be charged on waste volumes and rate with which waste is being picked up. Regarding communal service, it came out from the study that all the respondents did not pay for services. However, over 65% from the survey were eager to pay for the tariff under one condition that service improves. The implication is that more effort should be geared toward educating the public and for that matter the customers to come to terms with the need to pay for services to recover cost to ensure better service quality. Moreover, the companies ought to be more responsive to complaints of the customers so as to improve service quality.

Households eagerness to pay for services	Berekum	Dormaa	Total	%
House-to-house collection	41	31	72	
Eagerness to pay more	9	6	15	21
Eagerness to pay current user fees	21	17	38	53
Eagerness to pay less than the current user fees	11	8	19	26
Communal collection	97	98	195	
Pay tariffs at time of survey	0	0	0	
Eagerness to pay for the service	76	63	139	71
Open dump	18	27	45	
Pay tariff at time of survey	0	0	0	
Eagerness to pay for the service	12	10	22	49

Source: Field Survey, 2015.

Table 3.
 Respondents' eagerness-to-pay user charges.

4.5 Involvement of households' in waste minimization

On the residents' readiness to separate and recyclable their waste at the house (source) for collection, the result indicates that majority (50 and 49%) of the respondents in Berekum and Dormaa respectively were ready to separate their waste at the source given the necessary incentives. They pointed the increase in collection rate to two times a week, the free provision of plastic bags with variety of colors, and to be provided with free bins by the companies or the assembly for separate collection as the incentives needed for effective waste separation. Over 40% accepted to purchase their own receptacles for storing organic waste. Whereas 33% called the enforcement of by-laws to ensure everybody separate their waste. The respondents acknowledged their awareness on waste reuse, recycling, as well as composting. Majority indicated that they use food waste to feed livestock, salvage used plastics and cans, and sachet rubbers for the informal buyers or scavengers. Moreover some continue to engage in burning waste. Small number of them uses organic waste as manure for vegetable garden. Notwithstanding, the residents' awareness on reuse and recycling of waste in the municipalities are very low as more reusable and recyclable materials continue to be seen in the streets, drains and streams. This implies that the existing collection system does not ensure recycling as varied wastes are sent to the dumping grounds with very little or no recycling by scavengers.

4.6 Service quality of waste management in Berekum and Dormaa

The quality of SWM was assessed by asking the respondents to indicate service satisfaction by responding either satisfied or not satisfied with the quality of service on a five-point scale from very poor to very good in terms of two service quality attributes (reliability of collection and sanitary conditions at bin/container location). To rate the quality SWM of the service providers effectively, all the communities served by the waste management company were selected for the survey. The study shows considerable disparities in terms of quality in the existing SWM system as practiced in the municipalities. In the Berekum Municipality, a total of 65% of the respondents who patronize house-to-house collection service rated their liability of service and sanitary condition and waste overflow as fair and good. Areas such as Estate, Nyamebekyere and Osofokyere which have larger number of high and medium income households' fall in this category of the respondents rated the quality of service of the company in their vicinity as good. The level of service quality could be attributed to the perceived quality of service by the people. This is because they pay for waste services that recover full cost and therefore they expect the service to be devoid of waste overflow from bins located in front of their house. The service reliability and sanitary conditions of communal collection in the low income areas of Atonotia, Kyirikwede and Amangoase were largely rated as poor by residents. Surprisingly, a total 76% of the respondents for communal collection rated the service as poor. This is because the waste overflow from communal containers unto the ground was widespread. The people in these areas confirmed that collection is irregular and the containers 'sites are not desirably maintained by the company and the Assembly.

In the Dormaa Municipality, the survey revealed similar results. There were also considerable disparities in terms of quality in the existing SWM system as practiced in the municipality. About 71% of the respondents who patronize house-to-house collection service rated the sanitary condition and waste spill over as good. In addition 59% said the reliability of waste collection was also good. Areas such as Kumidaa Street and Asikafo Amantem which have larger number of high and

medium income households' fall in this category of the respondents rated the quality of service of the company in their vicinity as good. The service reliability and sanitary conditions of communal collection in the low income areas of Atoase, Ahantrase and Ahenbrono were generally rated as poor by residents. Interestingly, about 67 and 74% in these areas rated the sanitary condition and Reliability of waste collection respectively as poor. To them, the rate of waste overflow, from communal containers unto the ground at the container sites were high. The households confirm that collection is irregular and the containers 'sites are not cleaned by the company. Comparatively, more of the residents in Dormaa Municipality rated the service quality for the house to house as good than those from Berekum Municipality. Approximately 71 and 59% of the residents from Dormaa Municipality rated the sanitary condition at the container site and the reliability of waste collection respectively as good whereas 65 and 54% also rated the sanitary condition at the container site and the reliability of waste collection respectively in Berekum Municipality. Similar, results came out regarding communal collection. A total of 43 and 36% rated the sanitary condition at the container site and the reliability of waste collection respectively as good from the Dormaa Municipality whereas 27 and 24% also rated the sanitary condition at the container site and the reliability of waste collection respectively in Berekum Municipality.

4.7 Mechanisms for solid waste management regulation

To monitor the quality of service effectively, the companies are mandated to furnish the Local Assembly with information on monthly basis. This comprises of performance targets, vehicle tour schedule, proceeds and expenditure from house-to-house collection and tonnage of waste disposed of. The key informants revealed that the performance targets as well as the formal rules and regulation for private waste companies were obviously elucidated in the contract signed. In addition, they affirmed that, the company cooperate with the Municipalities and provide information on tonnage on waste collected. This information is kept and used as the basis for paying the companies. With reference to house-to-house service, the companies further admitted that they (companies) provide the municipalities with information on revenues from the house-to-house services. In contrast, the staffs of the WMD were of the view that actual revenue from house to house collection is not properly accounted for in the reported to the Assemblies. Further result from them pointed out that detailed document on claims and revenue collected always lag behind time and the revenue figures usually were far below expectation. There was a clear evident of information asymmetry with the reports on cost and revenue in all the two municipalities. The information asymmetry in the report of the companies did not arguer well for the Assemblies to have a firm grip on cost and revenue to make any meaningful plan for effective cost recovery mechanism.

The results further revealed that the Assembly alone set up the service charge for the communal as well as house-to-house service. They further pointed out that the tariff for house-to-house services devoid of any central government support are fixed by the individual companies and submitted to the Municipal Assemblies for approval. The Assemblies specify an indicative levy for house-to-house collection to be collected monthly and a unit price per emptying the skips for communal collection service as specified in the contract document. The final levies and the unit prices at are susceptible to changes using the price escalation formula in the contract after the award of contract. Concerning waste collection charges and fee (unit price) and cost recovery, the companies providing the house-to-house collection takes approved service fees from their client on monthly basis in both Berekum and Dormaa. The house-to-house collection fees for waste management were GH¢12

(US\$2.50) Berekum and GH¢10 (US\$2) for Dormaa but those who patronize the communal services do not pay for user charges. However the cost for lifting a tonne of waste keep increasing with time and over time, this has become a burden on the assemblies. It was further revealed that the user charges were not regularly reviewed. This has resulted in big cash flow problems for the companies due to the continuous increase in exchange rate of the cedi, inflation and fuel prices. The user charges need to be reviewed by the Assembly and published the new fees in national gazette as by-law for it to be legally binding on residents. This according to Assemblies is cumbersome and requires political will on the part of the central government and municipalities. This indicates clearly that there is a look warm attitude from the Municipal Authorities to implement full cost recovery through charging of all households in the two municipalities.

Also, the key informants revealed that the Assemblies hardly conduct public education. There was only two and four count for Berekum and Dormaa Municipalities respectively. This has adversely affected the residents' attitude toward waste management. The residents continue to litter indiscriminately. In relation to the Assembly's commitment to bye-laws it revealed that the two assemblies had bye-laws fully gazetted to keep the companies and the residents within the confines of SWM best practices. However, the bye-laws were not strictly enforced. Subsequent result shows that the Assembly finds it difficult to fulfill the terms of payment as stated in SWM contractual arrangements with private companies. More so, there had not been any occasion where interest had been paid on delayed payments beyond the 3 months as stated in most contracts. The difficulties and holdups identified in the Assemblies commitment to its contractual obligations are basically lack of financial resources. The key informant from the waste management department said they keep on changing their schedule for educating the masses on waste management year in year out all because of the lack of funds. Conversely, according to the companies, the cost recovery mechanism is inadequate. With this the assemblies find it difficult to generate enough revenue to pay the companies. There was also weak mechanism in place to deal with residents who refuse to pay for the waste collection services rendered. The Assembly delays so much with the payment of monies and this in effect affects service quality. It can be concluded that Assemblies' non-adherence to contract obligations have a major influence on service quality and productivity of companies.

Also, concerning the companies' commitment to contractual obligations, indicators used includes company achieves daily collection target in the contract, company's cover waste containers during transporting, company collection crew use protective clothing, company keeps container site free of litters and clean. The directors of both the private companies and the WMD interviewed said the companies were able to achieve their daily targets of about 80%. It was confirmed together with other key informant and the resident in the household survey that the collection crew have protective clothing and use them their activities, however very few about 10% refuse to wear theirs in most cases. The few workers who do not in most cases use the protective clothing started with the informal sector and believed they are responsive to the waste collection without protective clothing. Regarding the companies obligation to keeping the container sites clean especially with the communal collection. Twenty-five out of over 100 container sites were kept clean and tidy while the others had litters all over. Large heaps of waste remains at these container sites after solid waste has been move to the disposal sites. In relation to this is the companies' obligation to repair and maintain communal waste skips. The key informant said the company barely does this function it is only the assemblies that squeeze some funds out of pressure from the residents for few repairs works on these containers.

Regarding the enforcement of legislation and sanctions, the municipal assemblies have the sole responsibility to enforce legislations and sanctions on the provision of public services. The Assembly uses bye-laws as well as terms and condition in the contract as the basic mechanism to managing solid waste collection services in their area of jurisdiction. It was realized from the companies' point of view that the bye-laws were enforced. In addition they were also of the view that the monitoring of compliance was done effectively. In addition, they opined that the sanctions for noncompliance to the bye-laws were punitive enough. They also revealed that the environmental health standards and sanitation were strictly observed and enforced. However, the household survey shows a different picture. It indicated that very little have been done to enforce bye-laws. It was realized that, the Assemblies find it very difficult to sanction offenders due to the frequency at which these bye-laws are flouted. The residents show lax attitude toward effective waste management. It was also observed that there were inadequate waste containers and low frequency of waste collection especially with the communal collection. Relating to this is the lack of environmental sanitation courts in these areas. This hinders the enforcement of solid waste and sanitation regulation.

The fines for non-compliance are the same in the two municipalities and are subject to review. They may be changed by the Assemblies after the service provider has been informed of such changes. The fine ranges from GH¢100 (US\$20)-GH¢200 (US\$40). The study revealed that the municipal assemblies have so far not been able to apply any sanction to the companies though evidence from the household survey shows the companies fail enormously in waste pick up as well as the cleaning up of the container sites. This study is therefore consistent with the finding of Oduro-Kwarteng that there is lack of sanctions in the waste management sector. In a similar study involving five cities, Oduro-Kwarteng [39] discovered that many of the contracts had credible threats of sanctions that required sanction, but non-complying companies were not penalized.

5. Conclusion and recommendations

5.1 Conclusion

The study focused on the evolving SWM practices, the quality of service as well as the factors that influence the private sector performance and their implications for solid waste collection in the medium towns. The study revealed that there were no significant disparities in service quality among the two municipalities. But more difference do exists among different communities due to the difference in the methods of waste collection. The service quality of house-to-house collection practiced at well-organized residential areas was higher than that of communal collection at old town lower income residential areas. The study further revealed that more waste is now been collected than before due to increasing role of the private sector in the waste business. Over 80% of waste generated in these municipalities are collected and send to a designated site for final disposal by the private sector waste management firms. This is much better than the 2006 figure of about 50–80% waste collection. In addition, the participation and involvement of households at any level of the SWM has been very slow principally due to the lack of funds and public education. Moreover, a shift toward cost recovery through charging all households a fixed charge for house-to-house collection is in places. However there were no mechanisms for full cost recovery to include majority of the residents who patronize communal collection service. The assembly therefore faces problems of

financing bins, providing for other resources which resulted in to illegal dumping by some households.

Furthermore, the study revealed that there were weak regulatory practices and non-adherence to contractual obligations and these consequently provided no incentives for full cost recovery and better service quality. The weak regulatory practices such as no competitive bidding, prolonged periods before upward review of collection fees and service charges, no interest on monies delayed, and delay in payment of subsidy does not provide incentive mechanism for private sector growth and does not enhance better waste management service delivery. Again, the study revealed that there is a weak institutional capacity (inadequate personnel and logistics). The responsibility over solid waste collection and disposal is well beyond the capacity of waste management institutions. They could not collect the 20–80% waste as stated in the contract document due to lack of personnel and logistics for monitoring and supervision. However, it was revealed that the involvement of the private companies in the management of solid waste has strengthened the capacity of the municipal assemblies. Yet, this is still deemed inadequate to meet the required levels of urban solid waste collection. Finally, the study revealed that there is a lack of strict monitoring and enforcement of sanitation bye-laws in the municipalities. However, the study found that the bye-laws were punitive enough but lacked strict enforcement. The non-enforcement of the bye-laws has contributed immensely to the indiscriminate dumping in the municipalities.

5.2 Recommendations: emerging interventions

In order to address the problem of municipal solid waste in the study areas in particular and Ghana in general, it is strongly recommended that the policy mechanisms and strategies adopted should be holistic and comprehensive. The nature of the issues and challenges identified require multidimensional interventions in order to provide sustainable solutions. There is the need for clearly defined standards and service quality in the contract for regulating the private sector activities. This will facilitate a well-managed SWM system in the municipalities as the private companies were not abreast with these standards and the terms of the waste management contract. The study also recommends a capacity building training on waste management for the officials of Waste Management Department in the municipalities as well as the technical operation officers of the private sector waste management companies.

There should also be full cost recovery for waste services. This requires the ‘pay as you throw’ (PAYT) mechanism for communal collection to ensure financial sustainability and quality service delivery. Although such mechanism has failed at initial stage in Accra in 1995, it worked well in Kumasi. The success of the PAYT in Kumasi was due to the participation and creating of public awareness, household participation and involvement at all levels as well as the enforcement of bye-laws on indiscriminate dumping. The prevailing system where communal collection is free for resident is not sustainable. Also, Assemblies should to be encouraged to be responsive to effective and quality service delivery. The environmental health unit should be restructured to make it more responsive to the challenges of SWM. The environmental health personnel can also be attached to the private companies to enforce bye-laws on paying for service and prevention of indiscriminate dumping of waste. Furthermore, the establishment of recycle firms should be encouraged by the Assemblies. They can start by forging partnership with the private sector companies. Also, the coordination for waste management should be encouraged within the context of environmental education and stricter enforcement of sanitation bye-laws. This is because environmental education creates environmental awareness

and makes people conscious of environmental and sanitation issues. The enforcement of bye-laws is important in view of the fact that environmental awareness is not sufficient enough to ensure change in behavior. Therefore, stricter law enforcement is needed to deter people from dumping indiscriminately.

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