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Unpacking the processes and factors affecting household solid waste collection within a democratic decentralised governance system: Experiences from the Wa Municipality, Ghana

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ABSTRACT

Decentralising solid waste collection to local authorities is expected to respond positively to the enigma of solid waste collection. The study contributes to a contextual understanding of household solid waste collection governance in rapidly growing secondary cities within democratic decentralised government systems. Specifically, the study examined the processes and factors affecting household solid waste collection in a rapidly growing municipality in the Upper West Region, the Wa Municipality. Eleven key informants were purposefully selected and interviewed for data. The results show that the main waste collection modes were house-to-house and communal container collections, although unorganised dumping sites and organised dumping through dugout pits were also found. There was also a mismatch between the quantity of waste generated and that collected. The study found that the local government context - arrangements for financing the local government, partisan politics in the local government, and weaknesses in skills and logistics affect the local government's ability to collect waste effectively. The study recommends intense education complemented with necessary bylaws to effect positive attitudes on solid waste collection in residents. The beneficiaries of the communal container collection system should be made to pay for service delivery to cater for container repairs. At the same time, the Municipal Assembly should prosecute households that practise indiscriminate dumping.

1. Introduction

The enigma of solid waste management continues to be an arduous task for city authorities in developing countries. Rapid population growth, which leads to the generation of vast volumes of solid waste continues to fuel cities' solid waste problem (Taiwo, 2011; UN-HABITAT, 2010). With the proportion of the population of Africa living in urban areas expected to be over 57% in 2050 (Cobbinah et al., 2017; UNDESA/PD, 2012), solid waste generation is equally likely to increase, with severe impacts (both environmental and socio-economic) on urban areas (Lagerkvist & Dahlen, 2019). Evidence shows that the amount of solid waste generated globally is increasing faster than the collection rate (Hoornweg & Bhada-Tata, 2012) and that urban growth is overwhelming city authorities' capacities to manage solid waste effectively (Owusu, 2010; Ogwueleka, 2009). Globally, solid waste generated by cities in 2016 was estimated to be around 2.01 billion metric tonnes, constituting 0.74kg per person per day (World Bank, 2019a). Given the rate of urbanisation, the annual rate of solid waste generation is expected to increase by 70% from the 2016 levels to 3.40 billion metric tonnes in 2050 (World Bank, 2019a; World Bank, 2019b).

A study by Monney et al. (2013) in Ghana showed that much of the uncollected generated waste ends up in open spaces and drains, a practice that creates life-threatening human conditions. They further observed that over 3,000 metric tonnes of solid waste are generated daily across the country while in the case of Accra and Kumasi, only about 70% waste generated is collected. A study by Miezah et al. (2015) on solid waste characterization and quantification in Ghana showed a solid waste generation rate of 0.47 kg per person per day, an indication that the 27,043,093 people generate 12,710 metric tonnes of solid waste per day. Unsurprisingly, the per capita solid waste generation rate is higher in large urban areas than in small urban areas. Metropolitan areas generate higher quantities of waste (average 0.63 kg per person per day) than the municipalities (0.40 kg per person per day) and the less populated districts (0.28 kg per person per day) (Miezah et al., 2015).

Solid waste collection techniques have advanced in the developed world and vary significantly from the developing world (Odonkor et al., 2020). The phenomenon of house-to-house collection is widespread, particularly for household Municipal solid waste collection, in most developed nations (Satterthwaite et al., 2018), but very low in developing countries due to several challenges, which include financial, population expansion, and other economic difficulties (Bezama & Agamuthu, 2019; Awuah, 2018). On the other hand, solid waste collection through the communal container collection method, which is most dominant in many developing nations, is plagued by several challenges, including overflow of solid waste, and ground dumping at collection sites (Atkinson, Davila, & Mattingly, 2019; Lagerkvist, & Dahlen, 2019; Lloyd, 2019; Awuah, 2018).

Significant research, including Monney et al. (2013), Amoah and Kosoe (2014), Peperah et al. (2015), and Bowan et al. (2019) highlights the nature, characteristics, disposal, and impacts of improper solid waste management in the Wa Municipality, the study area. Odonkor et al. (2020), Boateng et al. (2019), Kretchy et al. (2019) and Owusu-Nimo et al. (2019) highlight gaps in Ghana's efficient and effective management of solid waste. Some critical issues which have eluded contemporary research on solid waste management in the study area are the governance processes and their effects on household solid waste collection within a decentralised governance system. Without a comprehensive understanding of the context of the governance of household solid waste, significant progress cannot be made in household solid waste management in the developing world.

This current study examines solid waste collection and institutional arrangements for waste collection, the mode of waste collection, and the challenges associated with solid waste collection and management. The effectiveness of the governance system in outlining effective strategies for solid waste collection is also analysed to contribute to ongoing discussions on ensuring sustainable solid waste management in Africa's urban areas.

2. Institutional and legal provisions for waste collection in Ghana

Solid waste management in Ghana is a complex issue. Consequently, the governance of solid waste management is complex and layered, with different responsibilities across several national and sub-national-level institutions. However, despite the complexity, Ghana has put in place policies and legislation at local and national levels to guide solid waste management, many of which are outlined below:

i. Health Care Waste Management Policy for Ghana, 2020 (which replaced Guidelines for the Management of Health Care and Veterinary Waste in Ghana, 2002
ii. National Plastics Management Policy, 2018
iii. National Environmental Quality Guidelines, 1998. This is now divided into (a) the Ghana Standard for Environmental and Health Promotion Requirements for Effluent Discharge (1212, 2019); (b) the Ghana Standard for Environmental and Health Promotion Requirements for Ambient Air Quality and Point Source Households/Stack Emissions (GS 1236, 2019); (c) the Standard for Environmental and Health Promotion Requirements for Noise Control (GS 1222, 2018); and (d) the Standard for Environmental and Health Promotion Requirements for Motor Vehicle Emission (GS 1219, 2018)
iv. Local Government Act (Act 936), 2016
v. Hazardous and Electronic Waste Control and Management Act (Act 917)
vi. Ghana Public-Private Partnership Bill, 2013
vii. Public Health Act (Act 851), 2012
viii. Strategic Environmental Sanitation Investment Plan, 2011
ix. National PPP Policy, 2011
x. Environmental Sanitation Policy, 2010

xi. Environmental Assessment Regulations (LI 1652), 2009
xii. Manual for the Preparation of District Waste Management Plans in Ghana, 2002
xiii. Landfill Guidelines, 2002
xiv. National Building Regulation (LI 1630), 1996
xv. Water Resources Commission Act (Act 522), 1996
xvi. Environmental Protection Agency Act (Act 490), 1994
xvii. Control and Prevention of Bushfires Act (P.N.D.C.L. 229), 1990
xviii. Abandoned Property Disposal Act (N.R.C.D.308), 1974
xix. Criminal Code (Act 29), 1960

The legal regime in Ghana makes all MMDAs responsible for the collection, recycling and disposal of all solid waste generated in their jurisdictions (Kyere et al., 2019). The 2010 National Environmental Sanitation Policy working in tandem with the Local Government Act (Act 936, 2016), makes MMDAs legal entities with the power to promulgate bylaws to govern and regulate solid waste management, sanitation, cleansing, and nuisance within their jurisdictions. Waste Management Departments (WMDs) in the various MMDAs are responsible for waste collection and transport operations, management of disposal sites, and repair and maintenance of waste management vehicles and equipment. Regulation of the environment, including SWM in terms of the provision of standards, is vested in the Environmental Protection Authority (EPA), under the Ministry of Environment, Science, Technology, and Innovation. The EPA operates at the national, regional, and, to some extent, district levels. The Ministry of Local Government and Rural Development provides policy direction to MMDAs and has agencies, such as the District Assembly Common Fund Secretariat, who work with the Ministry of Finance to ensure funds are available to MMDAs to finance development, including waste collection. Various policies, regulations, and guidelines on solid waste management include:

Relevant legal provisions to guide the MMDAs in their solid waste management efforts are the following:

i. Procurement Act and Assembly Tender Board regulation;
ii. Bylaws of the MMDAs;
iii. Land Use and Spatial Planning Act 2016 (Act 925);
iv. Vaccination Ordinance Cap 76;
v. Food and Drugs Law 305b, 1992;
vi. Mortuaries, and Funeral Facilities Act 1998 (Act 563).

The institutions concerned with the implementation of environmental sanitation, and, for that matter, solid waste management have been grouped into "principal sector agencies" and "allied sector agencies" (see Environmental Sanitation Policy, 2010). The principal sector agencies are directly responsible for environmental sanitation, while the allied sector agencies have supporting roles. The allied sector institutions are 22 governmental agencies. Notable among these allied institutions are the Ministry of Health; Ministry of Education; Ministry of Environment, Science, and Technology; Ministry of Water Resources, Works and Housing (now Ministry of Sanitation and Water Resources, Ministry of Works and Housing); Ministry of Finance and Economic Planning; Environmental Protection Agency; and the Land Use and Spatial Planning Authority among others. The principal sector institutions include the Ministry of Local Government and Rural Development, Metropolitan, Municipal, and District Assemblies (MMDAs), the implementers at the local level, and the private sector. In addition, the private sector provides waste collection, transportation, and disposal services on behalf of the MMDAs under various public-private partnership arrangements. Oteng-Ababio (2012) described the decentralised local government system and SWM arrangements in Ghana, while Oduro-Kwarteng (2009, 2011) described the relationship between stakeholders in SWM in Ghana. Figure 1 presents a diagrammatic illustration of the key institutions and actors, and their roles at the various levels of governance in solid waste management.

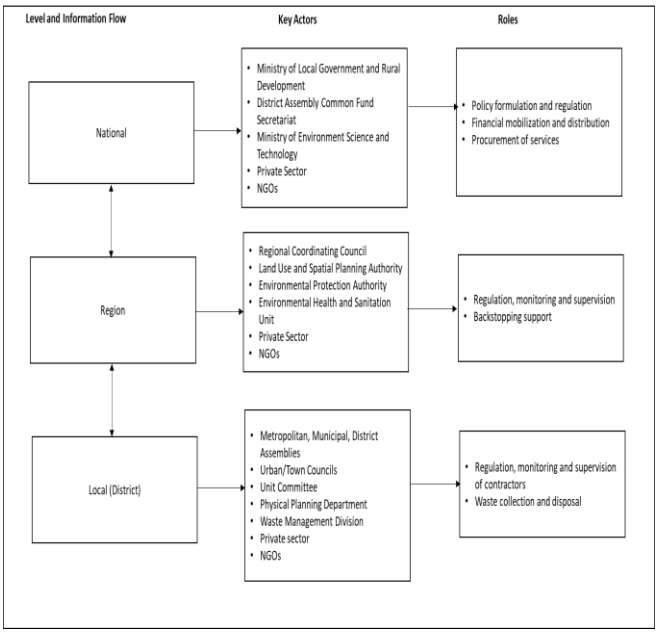

Figure 1: Institutions and their roles in waste collection
Source: Author's construct, 2021

3. Study area and methods

The Wa Municipality is the most urbanised district in the Upper West Region of Ghana. Wa is the capital of the Region, and lies within Latitudes 1º40' and 2º45'N and Longitudes 9º32' and 10º20'W. The Municipality covers an area of approximately 1,180 square kilometres, or about 32% and 2.56% of the region and nation's land area, respectively (Wa Municipal Assembly, 2012). The population of Wa as of 2021 is 200,672, of which females constitute 50.9%. The percentage change in population between 2010 and 2021 is 6% (Ghana Statistical Service, 2021).

Wa is one of the emerging secondary cities of Ghana. Wa was selected for the study because of its phenomenal urban growth in population and built-up area. Urban land in Wa grew by 5.73 times between 1986 and 2016 to 32.93 km2 in 2016 with an annual growth rate of 5.9% (Korah et al., 2018). The total

urbanised population of 71,051 in 2010 constituted 66.3% of the Municipality's total population, which is above the national urbanised share of 50.9% and the regional share of 16.3% (GSS, 2012). The total population of Wa Township was about 124,479 as of 2016 (Korah et al., 2018). The Municipality is also reported as having an urban population growth rate of 4% compared to the national urban growth rate of 3.4% (Ghana Statistical Service, 2005; Ghana Statistical Service, 2010). In addition, establishing the two public universities (SD Dombo University of Business and Integrated Development Studies, and Dr. Hila Liman Technical University) has added impetus to Wa's growth. Rapid growth in the population and size of a city has implications for waste generation and collection. Understanding waste collection in such a context is essential to crafting policies and strategies for managing waste in a growing context of urbanisation in the country and the developing world.

The case study design was used in the conduct of the study. The rationale for the adoption of the case study design was to enable the study to focus on a few participants to explore comprehensively, holistically, and deeply into the governance processes of the complexity of waste collection at the local level and from the perspective of the participants in the waste collection process (Creswell, 2014; Flyvbjerg, 2011; Harrison et al., 2017; Yin, 2014). The study was conducted between January and October 2021. Purposive sampling was employed to select key informants for in-depth interviews. Key informants included two staff members of the Wa Municipal Assembly Environmental Health and Sanitation Unit (WMEHSU), two staff members of the Regional Environmental Health and Sanitation Department, and four staff members of the two private solid waste management companies; Zoomlion Ghana Limited and Urban Waste Management Limited. Both quantitative and qualitative data were collected during the key informant interviews.

Observation was used to collect information on the sanitary conditions of areas where CCCs were located. Specific information solicited included the quantity of waste generated and collected, institutional and management arrangements for waste collection, perspectives on key areas related to solid waste collection services they provide, and the challenges that hinder their effectiveness. The qualitative data collected were analysed thematically in line with the major issues explored in the study. Descriptive statistics, such as percentages, were used to analyse the quantitative data. Tables, figures, and pictures, as well as detailed narrative descriptions, were used to present the data.

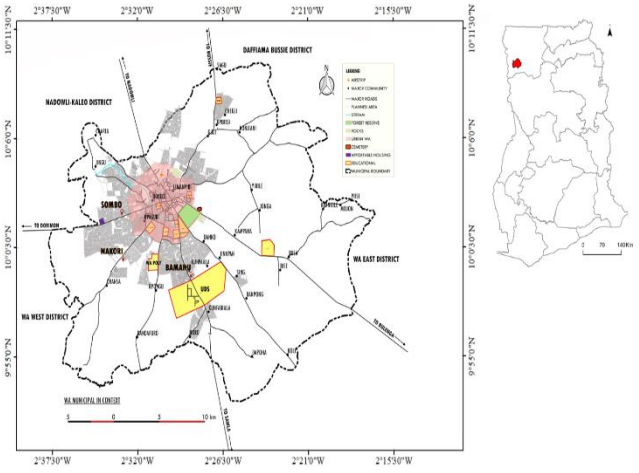

Figure 2: Map of Wa

4. Results and discussion

4.1 Quantity of solid waste generated and collected

Table 1 shows the estimated quantity of solid waste generated and actual waste collected in Wa. Between 2017 and 2020, waste generated grew by about 7%, while the amount of waste collected grew by 8.6%. The deficit in the amount of solid waste collected rose from 4,787 tonnes in 2017 to 5005.50 tonnes in 2020, an increase of 4.6%. Compared to solid waste quantification by Meizah et al. (2015), in which the average waste generated was 29 metric tonnes per day in 2014 in the Wa Municipality, the amount of waste generated in Wa has increased over the years from 32.8 metric tonnes per day in 2017 to 35.12 metric tonnes per day in 2020 as shown in Table 1.

Table 1: Estimated solid waste generated and actual waste collected in Wa

Year	Projected population (GSS)	Per capita generation (kg/person/day)	Metric Tonnes/day	Estimated annual solid waste generated	Actual annual solid waste collected
2017	82005	0.40	32.8	11,972.0	7,185
2018	83905	0.40	33.56	12,264.0	7,304
2019	85851	0.40	34.34	12,519.5	7,402
2020	87800	0.40	35.12	12,811.5	7,806

Source: Based on Meizah et al. (2015) for per capita waste generation, Ghana Statistical Service (2021) for population estimates, and Urban Waste Limited (2021) for actual waste collected.

On the quantity of waste collected, a key informant of the company involved in the collection of waste through communal containers had the following to say:

> *"Our Company has communal containers located across the township. Each of the communal containers is 12m^3. Averagely, eight communal containers are picked per day."* (Interview with Urban Waste Informant, Wa, 2021).

From Table 1, around 60% of waste generated is collected by waste collection companies. This shows a great backlog in waste collection in the town. Thus, much of the waste generated is indiscriminately dumped in open spaces and gutters, low-lying areas, and abandoned gravel pits, while lighter solid waste materials, especially plastic waste, are entrapped among bushes. The uncollected solid waste within the various residential areas finds its way into the unplanned solid waste dumping sites, thus aggravating the environmental sanitation situation caused by indiscriminate dumping by households without refuse receptacles.

4.2 Arrangements for solid waste collection

On arrangements for waste collection, a key respondent had this to say:

> *"The Municipal Assembly, as per the Local Government Act, Act 936, 2016, gives the Assembly the mandate for waste collection. However, due to logistical constraints, inadequate qualified personnel, and inadequate financial resources allocated to waste management (resulting from low levels of internally generated revenue), they are not able to perform their functions effectively."* (Key Informant interview, WMWMD, 2021).

From this statement, solid waste collection in the Wa Municipality is the mandate of the Wa Municipal Waste Management Department (WMWMD, also known as the Environmental Health and Sanitation Unit). However, the Assembly is not living up to its mandate as a planning authority, which includes providing various services, including waste collection. The WMWMD draws its powers from the Wa Municipal Assembly, which also derives its powers from the Local Government Act (Act 936, 2016) which is an amendment of Act 462, 1993, which also replaced the PNDC Law 207 of 1988.

One of the arrangements for solid waste collection in the Municipality is a public-private partnership. Under the initiative of the Ministry of Local Government and Rural Development (MLGRD), private waste companies have been contracted to assist in the collection of solid waste within the various Metropolitan, Municipal and District Assemblies (MMDAs). A key respondent said the following about public-private partnerships in solid waste collection:

> *"As a consequence of the functional challenges in waste collection by MMDAs, the MLRD contracted Zoomlion Ghana Limited and Urban Waste Company Limited to help the Municipality collect the waste generated. This partnership has been ongoing since it was signed"* (Interview with WMWMD, 2021).

According to Oduro-Kwarteng (2011), municipal solid waste collection is contracted to private service providers by the MMDAs under various forms of public-private partnership agreements. The MLGRD pays the contracted private waste company from the MMDA's Common Fund, which is deducted at source. The partnership arrangement involves the collection of solid waste at various levels, including household level, communal collection points, institutional collection points, and sometimes at unapproved and unorganised waste disposal sites. On the role of the various partners in the contract, the key informant at the Municipal Assembly captured succinctly the roles of the various stakeholders under the partnership as follows:

> *"The role of the MMDAs (through the Waste Management Department) in the contract with the private companies is monitoring the work of the solid waste contractors in their respective areas. The Planning Officers and Heads of Waste Management Departments of the MMDAs jointly perform this responsibility and recommend the payment of the contracted waste company at source (from the District Assembly Common Fund). Zoomlion Ghana Limited and Urban Waste, on the other hand, are expected to collect waste from households, institutions, organised communal dumps, and commercial places and dispose of it in a safe environment. On the communal container system operation, the containers are provided by Zoomlion Ghana Limited and the Municipal Waste Management Department (MWMD). The MWMD and the Environmental Health and Sanitation Unit of the Assembly monitor and supervise Zoomlion Ghana Limited as stipulated in the contract for CCC services. Among other things, the contract requires the private companies to furnish the Assembly on a regular basis with their performance targets, proceeds, conditions of their equipment and amount of waste collected, etc. The problem with this requirement is that the information needed from the private company does not come often and affects the activities and record-keeping plans of the Assembly."* (Key Informant WMAWMD, Wa, 2021).

The arrangement described is in tandem with what Kyere et al. (2019) found on arrangements between private waste management companies and the Berekum and Dormaa Municipalities of Ghana. An informant at the Municipal Assembly had this to say on the effectiveness of public-private partnerships in waste collection:

> *"This arrangement undermines the effectiveness of waste collection because the local authorities do not have much stake in the choice of the contractors. MMDAs should play a significant role in the selection of private partners to enable them to exercise the requisite oversight and control over*

them." (Interview with Key Informant, WMAWMD, 2021).

Even though private sector capacity in the Municipality to provide waste services is low, hence the current arrangement where contracting of companies is undertaken at the national level, MMDAs could still take charge of the process by being actively involved in the procurement process. This way, the companies will view them as their main clients and be more accountable to them than to the ministry of local government.

The study also found that two solid waste collection services approved by the Assembly are in place: the House-to-House (HtH) or Door-to-Door (DtD) and/or Central Communal Container (CCC) systems as a revealed by a key informant in the following:

> *"In addition to the services we have been contracted to render, that is, the DtD and CCC services, we sometimes are compelled to collect waste indiscriminately dumped in open spaces. Residents at the outskirts of the city also dig trenches and dump their solid waste in the trenches for the waste to be burnt at an appropriate time."* (Interview with Zoomlion Key Informant, 2021, Wa)

This finding is in line with existing studies (Sulemana et al., 2020; Owusu-Sekyere et al., 2015; Amoah & Kosoe, 2014; Oteng-Ababio et al., 2013;) in Ghana which show that solid waste collection services are mainly provided under the HtH and/or D to D collection and CCC systems. These services are provided by both Urban Waste Limited and Zoomlion Ghana Limited on behalf of the WMAWMD. Besides these two approved modes of waste collection, the study found indiscriminate dumping of solid waste at unauthorised sites (unplanned dumping sites), which the Zoomlion Ghana Limited occasionally collects, even though, collection of such waste is not part of the Company's contractual agreement with the Assembly. Another unapproved mode of waste collection identified is the collection of solid waste dumped in dugouts and burned in an organised manner. This mode of collecting waste is practiced mostly by hard-to-reach residents in the periphery of the city, where construction of residential and other properties is beginning to occur.

A key informant from the Municipal Waste Department had this to say about patrons of the CCC services:

> *"The CCC services are patronised largely by households and/or residents living in low-income residential areas. Also, the CCC services are provided at marketplaces and lorry stations as well as some institutions, such as basic and senior high schools within the city, by Zoomlion Ghana Limited."* (Interview with Urban Waste Informant, 2021, Wa).

On the performance of Zoomlion Ghana Limited under the partnership, a key informant had this to say:

> *"The contract the MLGRD signed with Zoomlion Ghana Limited on behalf of MMDAs requires them to provide 30 containers for Metropolitan Assemblies, 20 containers for Municipal Assemblies, and 11 containers for District Assemblies. However, we provided additional 10 containers (totalling 30 containers) to support solid waste collection within the Municipality."* (Interview with Zoomlion Ghana Limited, 2021, Wa).

The key informant stressed that the Assembly pays for only the 20 communal containers mandated in the contract. He also revealed that, Wa has about 10 localities, that are noted as areas in high demand for the use of communal containers (see Table 2), from which solid waste is collected frequently. It was also added that the Zoomlion Ghana Limited collects solid waste from five institutions within the city.

Table 2: Areas in high demand for CCC in Wa

S/N	Neighbourhoods (Location of CCCs)	Number of CCC
1	Fadama Market	2
2	Central Market	2
3	Tagrayiri	1
4	X-Y Wapaani	1
5	Wapaani Tuomuni	1
6	Limanyiri Vuori	1
7	Sopkeyire (Sokoto)	1
8	Zongo (Madam thousand)	1
9	Kabanye (Moleyiri)	1
10	Domoyiri	1
Total		12

Source: Zoomlion Ghana Limited, 2020

The communal containers (skip containers, roll-on/off containers) are placed at strategic points within the locality of low- and middle-income residential suburbs of Wa. Within these residential neighbourhoods, the communal containers are located within the premises of public toilet facilities and on plots of land either privately owned or acquired for sanitary purposes. The public toilet facilities within Wa have been constructed at vantage points within the business hub and the surrounding settlements where in-household toilet facilities are generally limited (Kosoe & Osumanu, 2018). There are about 41 public toilet facilities spatially distributed within Wa (see Figure 3).

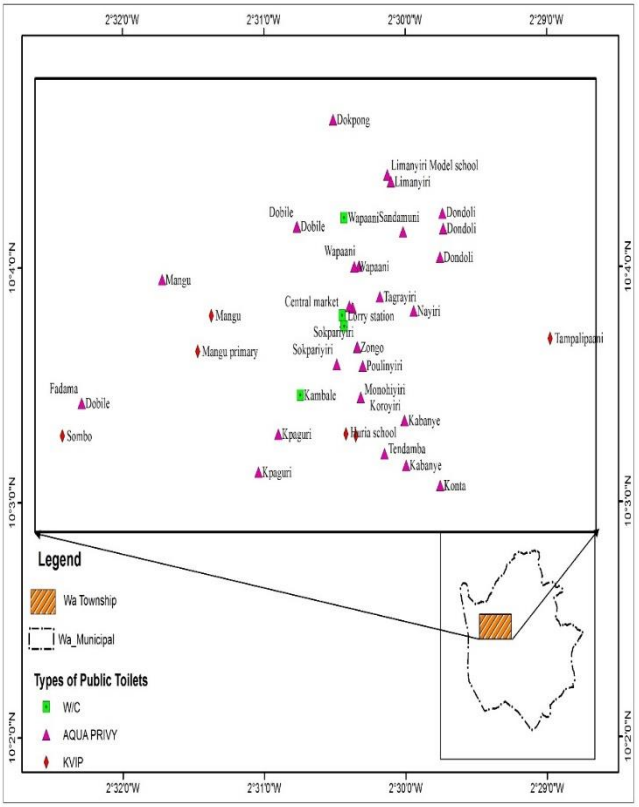

Figure 3: Spatial distribution of public toilets in Wa (places where centralised communal containers are stationed). Source: Kosoe & Osumanu, 2018

A key informant of the WMA had this to say on the rationale for the location of the CCC close to public toilets in the Municipality:

> *"The major reason for city authorities to strategically place the CCC closer to public toilet facilities is the proximity they offer households and residents within low- and middle-income residential suburbs without in-house toilet facilities to dispose of their solid waste early in the morning and/or late evening, or at any time of the day when attending to nature's call. It also maximises the use of space."* (Interview with Key Informant, WMAWMD, 2021).

The practice of using public toilet sites as sites for locating CCC presents challenges for the cleanliness of the environment of public toilets. The study found from key informants that the practice tends to aggravate the long existing problem of keeping the surroundings of public toilets clean. A conscious effort should be made to delink such sites from those of public toilets in order not to compound the already insanitary environment of public toilets in the Municipality. Major characteristics of the centralised communal containers (CCCs) identified by the study are that most of the containers do not have covers or staircases. The few that had staircase are not in-built but improvised wooden or metallic staircases. From the CCs serviced by Zoomlion Ghana Limited, the study identified that 4 out of the 29 containers currently in use have vents within them, while one is under repair and currently not at site and as well not replaced.

Plate 1: Centralised communal container

In the provision of the CCC services for clients within low- and middle-income residential areas, the clients do not pay in Wa unlike in some cities and/or towns in Ghana, where households and/or residents pay through the "pay-as-you-dump" solid waste collection system (Owusu-Sekyere et al., 2015). The pay-as-you-dump policy could be a reliable source of revenue to support the Waste Management Department of the Municipality to pay for the services of Janitors who manage the containers.

The Assembly's decision not to charge residents for the CCC services has its pros and cons. The study found from informants that a policy to charge dumpers would discourage them from using CCCs, thus exacerbating unauthorised dumping by residents who cannot afford to pay for the dumping of refuse. Laudable as this is, it continues to absolve residents of the responsibility for waste collection. Without households or residents becoming responsible for waste collection, solutions to the waste collection challenges of cities in Africa would continue to be a mirage.

Open dumping or dumping on undesignated sites are common features in Wa. The open dump sites serve as communal collection sites for households and residents within the low- and middle-income residential neighbourhoods.

With the HtH/DtD system of solid waste collection service, the study found that the system operates under a contract between the households and/or residents and the solid waste service providers. In the case of Wa, Urban Waste Limited provides the DtD services. The DtD services are largely patronised in high- and some middle-income residential areas. In the contractual arrangement, households and/or residents are to provide their own standardised plastic bins of between 120 and 240 litres capacities (see Plate 2) for temporary storage and also pay a monthly fee (GHC 30.00 or US$ 3.44 per month, which is subject to change). However, Urban Waste Limited, in many cases, makes these bins available to their clients and collects, transports, and disposes

of the solid waste. Also, under the contract agreement with clients, their solid waste is collected once a week for a monthly fee. A key informant from Urban Waste Limited revealed that the collection is done on average twice a week. "The waste company has two vehicles with 18 and 9 metric tonnes capacities that are used to pick up clients solid waste, and we try as much as possible to honour that".

Plate 2: Door-to-Door plastic waste bin

4.3 Challenges with solid waste collection

The study identified several challenges bedevilling the solid waste collection system in Wa. With respect to the contracted services, there is the challenge of irregular solid waste collection by the companies.

Another challenge is the funding and implementation arrangements for solid waste collection. There is an inherent contractual bridge and operational challenges with the funding and arrangements for solid waste collection. A key informant said the following in relation to the funding and operational challenges of the CCC and DtD services.

> *"One major challenge regarding the collection of waste from both the central containers and door-to-door is that of financial constraints. As a company, we have challenges with cash flow, which affects our ability to undertake routine maintenance of our equipment as well as procure new ones. Monies that are supposed to be paid to us by the Assemblies do not come on schedule. With the DtD services, some clients are owing payment yet complain that we do not come over to empty their waste bins."* (Key Informant, Zoomlion Ghana Limited, Wa, 2021).

This finding is in line with Amoah and Kosoe (2014), who also found that contractual and operational challenges hinder efficient service provision, which acts as a major disincentive for many households to patronise both DtD and CCC services despite their benefits. The central government maintains all the lucrative taxes and sources of revenue, while the difficult-to-collect taxes have been shifted to local authorities (Boamah et al., 2011). The human and logistical challenges of local authorities responding to the challenges of waste management are also the result of the centralisation of waste collection for decades, thus denying local authorities the opportunity to develop the capacity to handle waste collection challenges on their own. Again, constant changes in arrangements in the implementation of the functional elements in solid waste collection due to the firefighting approach to solid waste collection and low priority given to waste collection in general have exacerbated the solid waste collection conundrum.

A second challenge of the CCC and DtD services is poor or limited accessibility within residential areas. A key informant had this to say about the effect of accessibility on their operations:

> *"The layout of buildings in the Central Business District and other areas of Wa Township makes it difficult to move in and out. As a result, the solid waste collection vehicles are unable to collect and transport waste from some of the areas."* (Key Informant, Urban Waste, Wa, 2021).

This finding illuminates earlier observations by Ahmed et al. (2020), Osumanu and Akomgbangre (2020), and Kosoe and Osumanu (2018), that the Wa township is fast urbanising, and this has occasioned poor and uncoordinated residential developments with poor layouts and inadequate social and environmental amenities, compounding the accessibility problem. Aja et al. (2014) and Oteng-Ababio (2010) also found that the collection process of municipal solid waste management is faced with inadequate funding, low technical expertise, poor road network, and poor development planning, which have adverse environmental implications and affect the operational efficiencies of waste management service delivery. The mix-use of sanitary sites in Wa especially for public toilet facilities and communal container service delivery, is a critical challenge, as observed by a key informant in the following:

> *"Though the city authorities intended killing two birds with one stone by providing CCC dump sites close to public toilets so that households could while accessing the public toilets also dump refuse is good, it has not turned out well because households, especially children, openly defecate at the CCC sites thus making them unattractive to users."* (Interview with WMWM, 2021).

Another problem with waste management in Wa Municipality is the incessant occurrence of open dump sites. Open dump sites are communal collection sites used by several houses around the identified site. The phenomenon of open dump sites, as explained by a staff member of the Waste Management Department of the Assembly is the result of the long distance between CCC sites and the homes of residents.

> *"This problem of open dumping sites in the city is because there are few sites of the CCCs; thus, many residents must travel a few metres from their homes in order to locate a container."* (Interview with WMAWMD, 2021, Wa).

A key informant cited the high cost of the DtD services as a hindrance to many households patronising their services.

> *"Also, some residents are unwilling to pay for the house-to-house services stating the high cost (GHC 30.00 monthly)"* (Interview with WMWM, 2021).

Poor attitudes of residents towards environmental cleanliness were also cited as a challenge to the patronage of CCC services. An official of the WMWM had this to say about the attitudes of residents towards the patronage of CCC services:

> *"Though there are some residents who genuinely are unable to pay the monthly collection charges for the DtD services, they are equally unwilling to walk a few metres to the CCC service designated points." (Interview with WMWM, 2021).*

Political expediency also emerged as an issue affecting the effectiveness of waste collection by the Assembly. A key informant had this to say about the effect of political expediency on solid waste collection:

> *"The politicisation of the office of the Metropolitan Municipal District Chief Executives (MMDCEs) within the local governance system also affects its ability to take politically expensive decisions needed for the effectiveness of waste collection. Because of political expediency, that is, fear of incurring the wrath of voters, local authorities are unwilling to institute or mandate residents to patronise house-to-house waste collection services to make the practice sustainable and effective."* (Interview with Key informant, 2021).

5. Conclusion and recommendations

Solid waste collection is a major function of local authorities the world over. The study focused on solid waste collection and institutional arrangements for waste collection, as well as the mode of waste collection and challenges associated with solid waste collection. The study revealed that, after about 30 years of decentralisation, local authorities are still battling with solid waste collection. Significant gaps in the quantity of waste generated and waste collected continue to be a common phenomenon, resulting in backlogs in waste collection despite the involvement of the private sector in waste collection at the local level.

Consequently, unpleasant scenes in residential neighbourhoods characterise the environment of many neighbourhoods. Public-private arrangements in waste collection are plagued with many problems, including operational inefficiencies, poor capitalisation, and poor enabling environment to generate demand for the services of waste companies, among others. Poor attitudes towards solid waste collection continue to linger in the neighbourhoods in various forms, including dumping in unapproved areas such as undeveloped plots, along the shoulders of roads, and open defecation in approved centralised dumping sites as well as unapproved dumping sites. The study concludes that decentralised governance context factors underpin the challenges with solid waste collection at the local level. The weak financial base of MMDAs, coupled with the politicisation of the office of the MMDCE and limited skills and logistics, affect the operational efficiency and effectiveness of local authorities in waste collection.

To leverage on the potential of private sector involvement in waste collection at the local level for the creation and sustenance of a quality-built environment, the study proffers the following recommendations:

Enhancing the financial capacity of MMDAs for waste management – there is a need for policy decisions to reverse the current trend where the central government controls most of the sources of revenue and sends about 7.5% to local authorities for the prosecution of their service provision functions. Local authorities' functions must match their financial ability to enable them to perform their functions to gain the confidence and trust of their people. MMDAs must also aggressively pursue local fund mobilisation to augment the central government transfers they receive and enhance their waste collection functions.

De-politicisation of the assemblies, especially the office of the MMDCEs. While the arguments for the politicisation or non-politicisation of the MMDAs are ongoing, this paper supports the non-politicisation of the MMDAs and therefore advocates the elimination of all aspects of partisan politics from the local governance system to provide an enabling environment for bold and pragmatic decisions to be taken to curb the current waste menace from further deterioration.

Generating demand for waste collection by private companies – there is a huge mismatch between the quantities of waste generated and the quantities of waste collected, as revealed in the study. Private waste management companies have a role in generating demand, but their efforts need to be complimented by public sector agencies, in this case, MMDAs. The Assembly should levy residents for container repairs. When residents are levied, it would attract some of them to patronise the door-to-door services, thus increasing the number of customers who patronise them and ultimately reducing the unit cost of the service to customers. The resultant effect is an enhancement of the quality of service delivery and the environment.

Making effective house-to-house collections: With enhancement, the house-to-house waste collection could permit the sorting of waste into categories and thus allow for more efficient and sustainable waste management. It is the view of this study that, to enhance the efficient and effective operation of the door-to-door services, all households within planned areas without central communal containers should be made to patronise the service.

Attitudes towards waste management continue to be a bane for the sustainable and efficient management of waste in the developing world. Intense education, complimented with necessary bylaws, is needed to effect positive attitudes to solid waste collection in residents. The Assembly should be bold in enacting and enforcing bylaws on waste collection if the requisite attitude is to be attained for clean and inclusive cities to be created as envisaged by the SDGs.

To control the uncontrolled dumping in open spaces designed for public utilities as roads, drains, valleys, and sanitary areas, the study recommends the fencing of all public spaces within neighbourhoods to avoid encroachment on them as well as being used as dumping sites.

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