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Governance Crisis or Attitudinal Challenges? Generation, Collection, Storage and Transportation of Solid Waste in Ghana

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1. Introduction

Waste is a continually growing problem at global, regional and local levels and one of the most intractable problems for local authorities in urban centers. With continuous economic development and an increase in living standards, the demand for goods and services is increasing quickly, resulting in a commensurate increase in per capita waste generation (Narayana, 2008). In most developing countries, the problem is compounded by rapid urbanization, the introduction of environmentally unfriendly materials, changing consumer consumption patterns, lack of political commitment, insufficient budgetary allocations and ill motivated (undedicated) workforce.

In Ghana, deficiencies in solid waste management (SWM) are most visible in and around urban areas such as Accra, Tema and Kumasi where equally important competing needs and financial constraints have placed an inordinate strain on the ability of the authorities to implement a proper SWM strategy in tandem with the rapid population growth. Consequently, most of the urban landscape is characterized by open spaces and roadsides littered with refuse; drainage channels and gutters choked with waste; open reservoirs that appear to be little more than toxic pools of liquid waste; and beaches strewn with plastic garbage. The insidious social and health impact of this neglect is greatest among the poor, particularly those living in the low-income settlements (UN-Habitat, 2010).

The provision of such environmental services had typically been viewed as the responsibility of the central government. However, the costs involved, coupled with the increasing rate of waste generation due to high urban population growth rates, have made it difficult for collection to keep pace with generation, thus posing serious environmental hazards. Apart from the unsightliness of waste, the public health implications have been daunting, accounting for about 4.9% of GDP (MLGRD, 2010a). Data from the Ghana Health Service indicate that six (6) out of the top ten (10) diseases in Ghana are related to poor environmental sanitation, with malaria, diarrhea and typhoid fever jointly constituting 70%-85% of out-patient cases at health facilities (MLGRD, 2010a).

Launching a National Campaign against Malaria in 2005, a Deputy Minister of Health noted that "malaria remains the number one killer in the country, accounting for 17,000 deaths, including 2,000 pregnant women and 15,000 children below the age of five", a quarter of all

child mortality cases and 36% of all hospital admissions over the past 10 years" (Daily Graphic, November 3, 2005: 11). The Ghana Medical Association also stipulates that about five million children die annually from illnesses caused by the environment in which they live (World Bank, 2007). In Kumasi, a DHMT Annual Report (2006) states that, "out of the cholera cases reported to health facilities, 50% came from Aboabo and its environs (Subin Sub-Metro) where solid waste management is perceived to be the worst".

Poor waste management practice also places a heavy burden on the economy of the country. In Accra, solid waste haulage alone costs the assembly GH¢ 450,000 (US$307,340) a month, with an extra GH¢ 240,000 (US$163,910) spent to maintain dump sites (Oteng-Ababio, 2010a), while in Kumasi, an average of GH¢720,000 (US$491,730) a month is spent on waste collection and disposal (KMA, 2010). The negative practice is also partly responsible for the perennial flooding and the associated severe consequences in most urban areas. The June 2010 flooding in Accra and Tema for example claimed 14 lives and destroyed properties worth millions of cedis (NADMO, 2011).

Admittedly, these tendencies are not exclusive to Ghanaian cities. Most urban centers in the developing world are united by such undesirable environmental characteristics. In Africa, it is anticipated that the worst (in terms of increasing waste generation and poor management practices) is yet to be experienced in view of the high rate of urbanization on the continent. By 2030, Africa is expected to have an urban population of over 50%, with an urban growth rate of 3.4% (UNFPA, 2009). The fear has been heightened by the changing dynamics of waste composition due partly to globalization and the peoples' changing consumption pattern. The increasing presence of non-biodegradable and hazardous waste types means that safe collection, transportation and disposal are absolutely crucial for public health sustainability.

The study examines how Accra, Tema and Kumasi, the most urbanized centers in Ghana, are grappling with SWM challenges in the wake of the glaring need to improve urban waste collection systems. It contributes to the menu from which practitioners can identify appropriate, cost effective and sustainable strategies for efficient solid waste collection, handling and disposal systems. Ultimately, the lessons learned from these experiences are useful not only for future policy formulation and implementation but more importantly, for other cities that are experimenting with private sector participation. Fobil et al (2008) intimated that, "the key observable feature is that the collection, transportation, and disposal of solid waste have moved from the control of local government authorities to the increased involvement of the private sector." It would be an understatement to say that understanding both the successes and failures of a city that has shifted most of the responsibility for SWM to the private sector is important for those planning to chart a similar course.

2. Study methodology

A variety of research methods were employed to achieve the objectives set. These included primary data collected using structured questionnaires, which covered the consumers, private providers of solid waste services, and local authorities in the three selected cities. The study also included a detailed investigation and survey of several collection points within each city. A detailed survey and investigation were performed to assess the current situation of the solid waste collection system in each of the cities. Also, selected focus group discussions were conducted with the executives of service providers, landlord associations as well as the rank and file of service beneficiaries, especially in the low-income areas. Other

secondary data sources were contacted, including some from the metropolitan assemblies, private organizations, and other community-based organizations.

To analyze the waste composition within each city, the entire area was examined based on their socio-economic characteristics (low, middle and high-income). A total of 25 houses in each city were randomly selected based on the population in each segment. Each selected house was provided with a 240-liter plastic waste bin, lined with a plastic bag. Residents were then required to dump their waste into the bin. Refuse from each house was collected twice a week, on Tuesdays and Thursdays, for eight weeks. The bags from each house were given special identification numbers and then transported to a designated site for segregation. A large clean plastic sheet was spread on the floor at the sorting site, and the contents were manually separated and the waste stream analyzed. Each category of waste for each house was weighed on a manual spring scale and recorded on a spreadsheet. The component materials in the waste stream were classified as follows:

- Organic (putrescible);
- Plastics (rubber);
- Textiles;
- Paper (cardboard);
- Metals and cans Glass.

The data was analyzed using a variety of tools and methods. Data collected from the interviews, investigations, surveys, and field work were processed, reviewed, and edited. The quantitative data were tabulated and relevant statistical tools and computer software were employed for analyzing and interpreting the results. Personal judgments, expert comments, and the results from the interviews and public survey were used as a basis for the analysis and interpretation of the qualitative data. In general, the results from the three locations— Accra, Tema and Kumasi— were virtually identical, therefore the analyses and subsequent discussions were organized and restricted around the main themes for the study area as a whole, with occasional references to a few exceptions for purposes of emphasis.

3. Result and data analysis

3.1 Waste generation

For the purpose of establishing the optimum collection systems, it is imperative to know the quantities and densities of the waste and where it is coming from. Generally, it is established that population growth greatly contributes to an increase in waste production. It has also been empirically established that waste generation has increased rapidly over the years. In Accra, for example, the amount of solid waste generated per day was 750-800 tonnes in 1994 (Asomani-Boateng, 2007); 1,800 tons per day in 2004 (Anomanyo, 2004); 2000 tons per day in 2007 (AMA, 2010; Oteng-Ababio, 2010a) and in 2010, it is estimated to be 2,200 tons (personal interview).

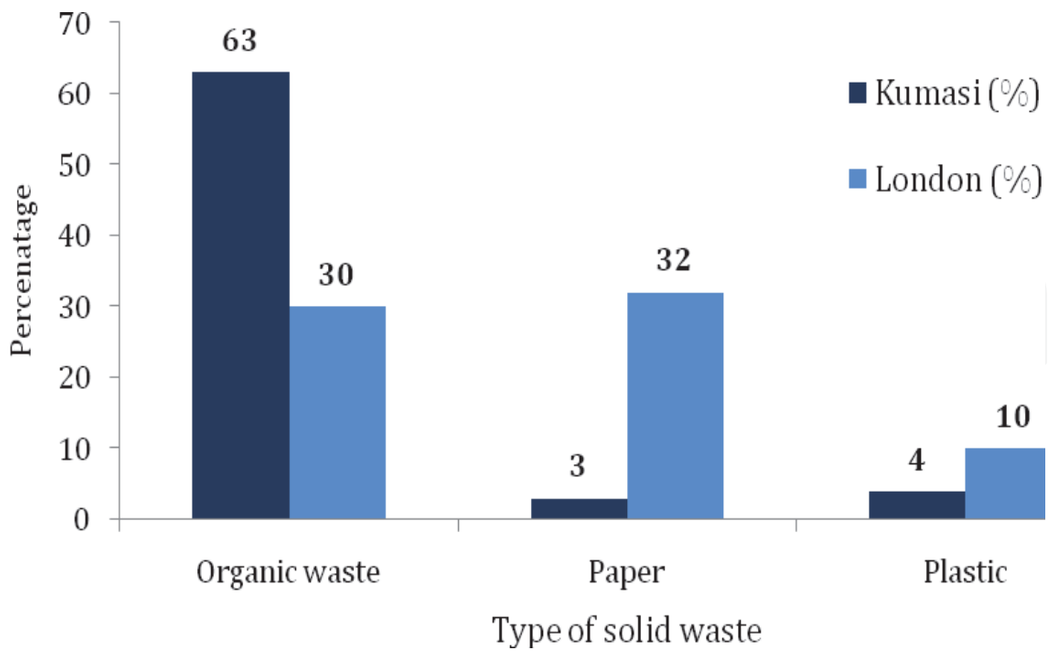
A dilemma relates to the amount of waste generated per person, which varies greatly with income (Houber, 2010). According to Blight and Mbande (1998), an affluent community may generate about 3 to 5 times as much waste per capita as a poor one. Boadi and Knitunen (2003) estimate that residents in low, middle and high income areas generate 0.40, 0.68 and 0.62 kilograms per day, respectively. They however noted that the density of waste is higher in low-income areas (0.50 per kilo liter) because their waste typically has a greater portion of organic and inert (sand and dust) matter, while packed products and cans form a significant

part of waste in high-income areas. Density of waste in high-income areas is estimated at 0.2 kilo per kilo liter while middle-income areas have 0.24 kilos per liter.

To date, there has not been any comprehensive empirical study on per capita waste generation in Ghana as a whole. All figures currently in use are crude estimates given by various authorities. Whilst the MLGRD, for example, gives the average daily waste generation as 0.51kg per person, the Water Research Institute (WRI) puts it at 0.41kg (WRI, 2000). Be that as it may, both have ramifications for planning purposes. Using these figures and the official as well as unofficial population of Accra for 2000, (i.e. 1.65 and 3 million, respectively), for example, in calculating daily waste generation, different figures are generated (i.e., between 841.5 and 1,530 tonnes based on MLGRD figures, and between 676.5 and 1,230 tonnes using the WRI figures). The disparities between these figures in a single year are just too great for any meaningful comparisons, analysis and proper planning, as a good statistical data is the link between good planning and good results. Despite the discrepancy, the low-income areas, home to about 80% of the population undoubtedly generate the bulk of solid waste in the study area.

3.2 Waste composition

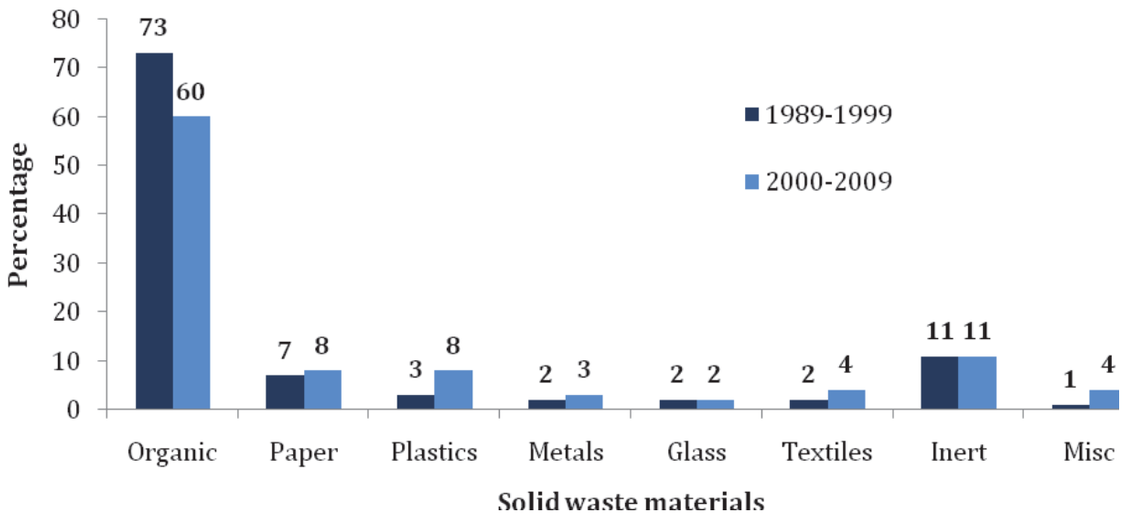
One significant aspect of solid waste in the study area is the changing complexity in the waste stream. Compared to the developed countries, wastes generated in the study area (and in developing countries for that matter) contain large volumes of organic matter. Table 1 presents a comparative study by Asase et al (2009) on the waste stream in Kumasi, Ghana and that in London in Ontario, Canada. The data show the clear difference between the composition of waste in the two cities, with organic materials accounting for 63% of waste in Kumasi but only 30% in London.



Source: Asase *et al*, 2009

Fig. 1. Comparison of waste streams in Kumasi (Ghana) and London (Canada)

According to Blight and Mbande (1998), the rapidly changing composition of waste stream in developing countries is a reflection of the dynamics of their culture, the per capita income of the community and the developmental changes in consumption patterns (Doan, 1998). Most residents have begun to make extensive use of both polythene bags and other plastic packaging, which creates an entirely new category of waste. Commenting on the menace of plastic waste in 2005, an Accra Mayor described it as "a social menace of a dinosaur, constituting over 60% of the 1,800 tons of waste generated within the Metropolis daily" (Daily Graphic, 2005: 28). Figure 2 compares the waste composition in Accra and Tema from 1989-1999 and from 2000-2009. Figure 2 shows a reduction of organic waste content from 73% in 1989-1999 to 60% in 2000-2009 while plastic surged from 3% to 8% within the same period. Also significant is the increasing miscellaneous category (which contains e-waste) from 1% in the 1990's to 4% in the 2010's. The emergence of e-waste in the waste stream is seen as an emerging challenge to waste management in Ghana (Oteng-Ababio, 2010b).



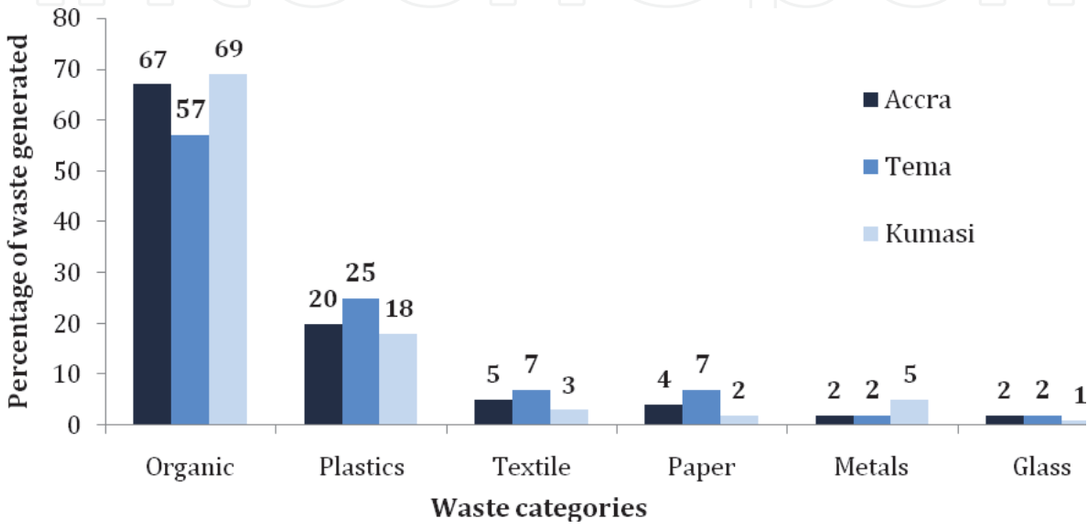
Source: Varying Composition of Solid Waste Stream, Greater Accra Metropolitan Area, Accra Metropolitan Assembly (AMA) (2004) and Baseline Survey, MMDAs (2008) in the National Environmental Sanitation Strategy and Action Plan (NESSAP), Ministry of Local Government and Rural Development (MLGRD), 2010. Note that there is a discrepancy in the above figures. The data from the period 1989-1999 adds up to 101% and not 100%. This data was taken directly from the source without changing this figure.

Fig. 2. Dynamics of Waste Composition-Accra/Tema (1989-1999 and 2000-2009).

Results of waste composition analysis conducted during the study were also consistent with the literature, with organic material (such as food, yard trimmings) being the most prevalent, comprising about 67% of the waste generated in all the three research localities (see Figure 3). Plastic material (such as plastic bottles and sachet bags) accounted for about 20%, while textiles accounted for about 5%. Figure 3 presents the percentage fractions of each category of the waste stream in the study areas.

From figure 3, it is clear that organic waste dominates the sampled waste stream while paper and plastic are the two other important constituents. The rest include glass, rubber, leather, inert materials (dirt, bricks, stones, etc.), wood, cloth, and other materials. It is estimated that the percentage contribution of most waste constituents will remain close to

those of present years; however, there will be a dramatic change in plastic waste production due to the increased use of plastic products among the Ghanaian populace, especially people in the major cities. From the foregoing urban waste classifications, it is evident that different categories of waste may require different handling, collection and disposal strategies. The successful implementation of any SWM system is partly dependent on the synergy between waste storage, loading and transportation. The compatibility between these three elements of SWM systems ensures efficient and sustainable operations. Generally, an appropriate waste storage facility must satisfy many requirements, including convenience, size and durability.



Source: Field Survey, 2010.

Fig. 3. Percentage fractions of each category of the waste stream in the study areas

3.3 Waste storage practices

The research identified two major modes of storage for household solid waste in the study area. The first involves the use of polythene bags, card board boxes, and old buckets, which was quite prevalent in both the low and middle-income areas, and the standard plastic containers in the high-income neighborhoods. It further revealed that the more improvised (unorthodox) systems are used for waste storage, the more likely the area suffers poor SWM practices. A critical analysis of the mode of solid waste storage in the various residential areas within the study area buttresses this. The situation in Accra is presented in Table 1.

Table 1 shows the various waste storage facilities used in residential areas in Accra. Seventy-four (82.2%) respondents in the high-income areas, where the house-to-house (HH) system is prevalent, use the standard plastic containers. Only 16 (17.78%) of them used unorthodox methods (polythene bags, old buckets, etc.). This is perhaps because waste in the high-income areas is collected once or twice a week and therefore needs to be properly stored. Alternatively, in the low-income areas where the communal container collection (CCC) operates, 155 (73.81%) respondents used impoverished storage facilities. Indeed, waste in such areas is stored for a very short period and residents can visit the container sites more than once a day. A chi-square test, conducted on the mode of waste storage and the residential location, gave a value of 105.579 at 6 degree of freedom (df). By inference, there is

a highly significant relationship between the mode of waste storage and residential areas, and by extension, the wealth of the area, and this is consistent with the literature (UN-Habitat, 2010). This is also a function of the mode of waste disposal.

Classification	Std. Containers		Polythene Bags		Pile outside		Others		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Low Class	44	20.95	155	73.81	10	4.76	1	0.48	210	100
Medium Class	91	45.5	93	46.5	13	6.5	3	1.5	200	100
High Class	74	82.22	16	17.78	0	0	0	0	90	100
Total	209	41.8	264	52	23	4.6	1	0.2	500	100

Source: Field Survey, 2010
Note: Chi-square value 105.579. Asyump. Sig. (2-Sided) 0.000 a. 4 cells (33.3%) were expected count less than 5. The minimum expected count is 0.72.

Table 1. Mode of Solid Waste Storage by Residential Areas in AMA

Similar observations were made in Tema and Kumasi. However, unlike Accra and Kumasi, 100% and 65% of respondents in the high and middle-income areas of Tema, respectively, used the standard plastic containers. This is primarily due to the planned nature of Tema. Additionally, the authorities in Tema, through the Waste Management Department (WMD), have been supplying plastic containers to residents at a fee, thus providing motivation and impetus for the use of the standard containers. Consequently, littering in these areas is relatively minimal and thus the city has a relatively clean environment.

It can also be inferred from the study that most residents in the low-income areas generally lack the economic capabilities and will typically not willingly spend much money on waste storage containers. This situation is more likely to occur under the container system where children can send waste to the container site at least twice in a day. Indeed, because children are mostly involved in waste disposal, residents are compelled to use lighter containers like polythene bags, instead of the costly but 'heavy' standard containers, which are somewhat incompatible with the prevailing institutional arrangement. Another observation, especially in Kumasi, was that although some middle-income residents claim to be using standard containers, practical observation revealed the use of improvised galvanized containers (see Figure 4), possibly due to the higher cost of the former. A market survey of the prices of the standard containers revealed that a 120-liter container (see Figure 4) which was GH ¢3.3 in 1995, cost GH ¢150 in 2010, an increase of about 4,445%, while a galvanized container was selling at only GH ¢ 15.

The use of unapproved storage facilities and children in waste disposal, especially in the low-income areas, presents its own problems, which the authorities seem to have glossed over. For example, in most cases, children find it difficult to properly access the containers because of their height. It thus becomes more convenient to throw waste on the ground instead of dumping it in the refuse container. The situation is even worse in areas where they are supposed to be assisted by caretakers for a fee, which is reminiscent of the "Pay-As-You-Dump" (PAYD) system. Additionally, these unorthodox containers are constantly subjected to ransacking by domestic animals to the detriment of the environment. This

ultimately results in indiscriminate littering at the sites, with its attendant poor hygienic conditions (see Figure 5). It is therefore not uncommon to see scattered waste bags being loaded into the collection trucks with the help of shovels and rakes. This is a slow, laborious and unhygienic system that results in poor vehicle utilization and low labour productivity.

Source: Field Survey, 2010

Fig. 4. Samples of standard and improvised waste receptacles.

Source: Field Survey, 2010.

Fig. 5. Indiscriminate dumping at a container site. (Note the high presence of plastics)

It was further observed that in the middle-income areas of Accra and Kumasi, some residents in the informal sector, including mechanics, sawmill operators, car washing bays and chop bar operators are virtually compelled to use unofficial dumping practices because of the nature and volume of the waste they generate vis-à-vis the cost of disposing such waste. In other words, the socio-economic characteristics in those neighborhoods make the official services virtually inaccessible (cost prohibitive) to these residents, thus buttressing

the argument that social propinquity may be different from social accessibility (Phillips, 1981; 1984).

3.4 Waste collection

For any sustainable waste management system, the collection system must be designed and operated in an integrated way. In particular, the method of loading a collection truck must suit the mode of storing waste. If the waste is destined for recycling, then it should be designed to ensure minimum contamination. It is also important to ensure that, if waste is to be deposited in a landfill, then the trucks in operation should be appropriate for landfill manoeuvring. Generally, the waste collection rate in most African cities has been typically low (see Table 2), ranging from 40-50% (Mwesigye et al, 2009). However, available data in the study area indicate that there has been a significant increase in total waste collection with the introduction of the private sector. Accra, for example, is currently said to have attained a collection rate of 70% (AMA, 2009; Oteng- Ababio, 2010a) or 80% (Huober, 2010). The remaining 20-30% uncollected waste is either burned or buried or dumped indiscriminately (MLGRD, 2010b).

	Population	Growth (%)	% of solid waste collected
Abidjan (Cote D'Ivore)	2,777,000	3.98	30-40
Dakar (Senegal)	1,708,000	3.93	30-40
Ndjamena (Chad)	800,000	5.00	15-20
Nairobi (Kenya)	2,312,000	4.14	30-45
Nouakchott (Mauritania)	611,883	3.75	20-30
Lome (Togo)	1,000,000	6.50	42.1
Yaoundé (Cameroon)	1,720,000	6.80	43
De res Salam (Tanzania)	2,500,000	4.30	48

Source: Sotamenou 2005 for Yaoundé; Rotich et al 2006 for Nairobi; Benrabia 2003 and Bernard 2002 for Dakar and Abidjan; EAMAU 2002 for Lomé; Doublier 2003 for Ndjamena; Ould Tourad et al 2003 and Pizzorno Environnement for Nouakchott; and Kassim 2006 and the International Development Research Centre for Dar es Salaam in Parrot et al 2009 (cited in Houber, 2010).

Table 2. Cross-country analysis of population, growth and solid waste collected

Table 3 presents the trend of total volume of waste collected between 2002 and 2008 in Accra. The data indicate an overall progressive improvement in the collection rate from 476,281.92 in 2002 to 658,044.06 in 2008, an increase of about 38%. What remains debatable is whether such increase has translated into quality service delivery. One would have expected much improved sanitation, especially in low-income areas, yet ironically, the opposite pertains. Those areas continue to be engulfed in filth and this seems to give credence to the perception that some WMD officials collaborate with some private service providers to cheat the assemblies. The data however shows a steady decline in the volume of waste collected between 2002 and 2004. The situation could be attributed to the tardy payments

from the authorities, which was worsened by the sharp increase in fuel prices and other operational costs at the time.

Year	Waste Generated	Waste collected	Waste uncontrolled	% collected	Private contractors shares
2002	675,000.00	476,281.92	198,718.08	70.56	N/A*
2003	657,000.00	419,671.30	237,328.70	63.88	N/A*
2004	657,000.00	424,802.42	232,197.58	64.66	96.28
2005	657,000.00	512,030.95	144,964.05	77.93	98.46
2006	657,000.00	639,854.69	17,145.31	97.39	98.06
2007	730,000.00	604,756.43	125,243.57	82.84	99.73
2008	730,000.00	658,044.06	71,955.94	90.14	99.94

Source: AMA/WMD, 2009. * N/A means data was not available at the time of the study.

Table 3. Waste Generation and Collection in Accra (2002-2008)

The study reveals that waste collection services within the study areas are provided by one of two means: the house-to house (HH) and the communal container collection (CCC) systems. The HH system is designed to serve low-density, medium and high-income areas that have easy access and identifiable houses. With this system, private waste collectors are expected to pick up waste from private homes, expectedly with compact trucks, for dumping. The CCC, on the other hand, is designed to serve high-density, low and middle-income areas that are more difficult to access by road. Under this system, residents are expected to carry their waste free of charge to a communal container that is later emptied by a collection truck. The assembly is expected to pay the private waste collector GH ¢10 per every ton of waste sent to the dump site. Table 4 presents a brief discussion on the characteristics of the two institutional arrangements.

The study revealed that because the low-income areas offer fewer opportunities for profit (due partly to the tardy payment of the assemblies) compared to the high-income areas where service providers have the privilege of negotiating directly with service beneficiaries, the former generally receive the lowest priority from the service providers. There is also enough evidence to suggest that the communal containers provided by the authorities are frequently inadequate in terms of their volumes and the population threshold they are expected to serve. This happens in situations where un-emptied or overflowing communal containers have become common sights in such areas, constituting both a nuisance and health hazards. The situation has worsened due to the high organic and moisture content of the waste as well as the generally high temperatures which facilitate rapid decomposition, coupled with the fact that waste in those areas is often mixed with human waste due to inadequate sanitation facilities. The problem of inadequate facilities does not only lead to indiscriminate dumping of waste, but also to strong foul smells emanating from the waste, both of which compromise the health needs of residents.

The limited refuse containers compel residents to travel long distances to access the few in circulation. During the study, only 10% and 8% of respondents from the low-income areas in Accra and Tema, respectively, indicated they traveled within a 50 meter radius to waste container sites to dispose of their waste. The rest have to travel beyond the 50 meter mark up to over 200 meters to assess a container. The situation appears worse in Kumasi where about 50% of residents in Aboabo (low-income area) had to travel over 150 meters to the nearest refuse receptacle. This has a negative impact on solid waste disposal as most residents have the tendency of finding other convenient places to dispose of their waste, places which are normally very close to where they live.

Variables	**House-to-house collection**	**Collective container collection**
Standard collection frequency	At least Weekly	Daily
Dominant waste storage container	Standard Plastic bins	Old buckets Polythene bags
Mode of transporting solid waste	Multi-lift truck Open truck Three-wheeled tractor Pushcart	Skip-loader
Mode of lifting waste bins/containers	Multi-lift trucks	Skip-loader
Main areas of operation	High income Middle income	Low income Middle income
Characteristics of areas	Good road-network Excellent accessibility to houses	Poor road network Poor accessibility to houses
User fees	Yes	No
Service provided by	Private sector	Local authority/Private sector
Private contractor pay dumping fees to AMA	Yes	No

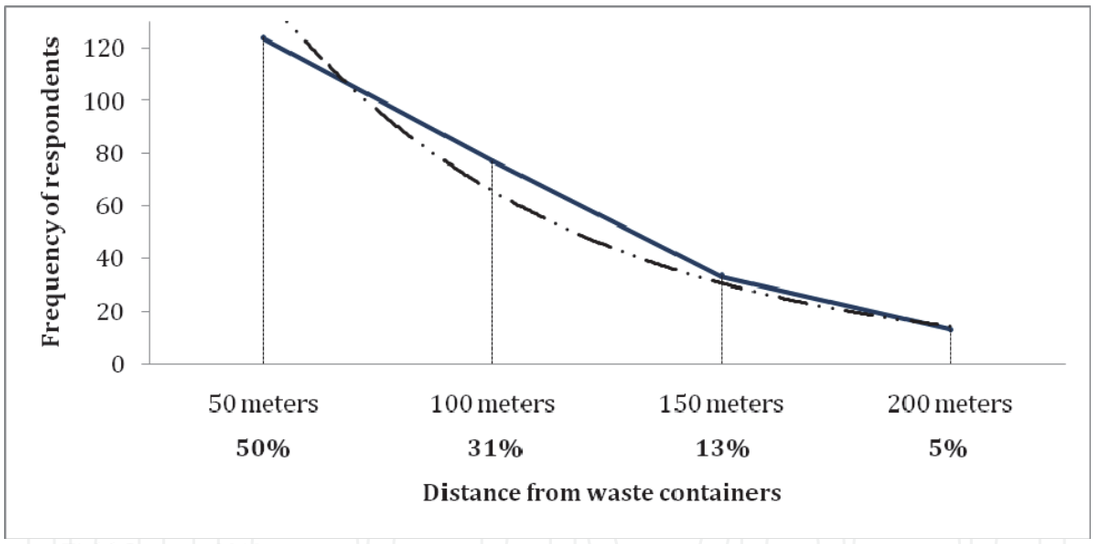
Source: Field Survey, 2010

Table 4. Major Characteristics of the Institutional Arrangements in the study area

Many reasons might have accounted for this development. For example, it was established that some residents have encroached on the container sites, while the inability of the authorities to regularly pay the collection companies adversely affects the rate at which the containers are emptied. Consequently, some residents who cannot stand the filth and the attendant stench vehemently protest and resist the continuous location of the containers at those sites. During the survey period, there were instances where some residents of Abossey Okai, for example, physically attacked the workers of Golden Falcon Company (a private waste collection company) for attempting to place a container at a particular spot.

3.4.1 Distance-decay and the use of refuse containers

Attempts were also made to ascertain how far residents are prepared to travel to access a refuse container. In Accra, 124 (50%) respondents in low-incomes areas indicated their willingness to access communal containers within a 50 meter radius while only 13 (5%) are prepared to travel about 200 meters for the same purpose (see Figure 6). The situation was not different from the responses from Kumasi, though fewer people (only 3.7%) were prepared to travel beyond the 50 meter radius. This is due to the drudgery and opportunity cost associated with commuting long distances daily to the container site. By inference, the longer the distance, the more people are likely to abuse the system, thereby legitimizing the principles enshrined in the distance-decay theory. The long distances and the fact that in most instances the containers will be over-flowing on arrival, serve as deterrents to residents who then use any available open space as an alternative dumping site. From the foregoing, it can be deduced that, there is a maximum travel threshold within which residents will voluntarily access the communal container. Once this is exceeded, utilization tends to fall considerably. This negative relationship observed is reinforced empirically by the very little littering in areas serviced by HH operators, where wastes are virtually collected at the doorsteps of residents, as against the container system where residents have to travel long distances and unsightly scenes have become the bane of the society, as is the case in Nima in Accra, Ashaiman in Tema and Aboabo in Kumasi.



Source: Field Survey, 2010

Fig. 6. Distance-Decay in residents' willingness to access the nearest refuse container

3.4.2 The role of the informal sector in waste collection

The study revealed the use of the services of Kaya Bola[1] in the waste collection system, especially in Accra and Tema. In Accra, such activities are confined to the middle and high-income areas while in Tema, it is predominantly in the low-income areas. The fact is that in Tema, the middle and high-income areas are well planned and therefore facilitate the HH operation, which is generally seen as quite efficient and acceptable. On the other hand, the

[1] Kaya Bolas or Truck Boys are porters who carry solid waste from residences, markets and offices in sacks, baskets, on trucks, etc to a container or dumping sites for a fee.

middle-income areas in Accra and Kumasi did not have that advantage. Some residents are thus compelled to complement their official "unsatisfactory" services with those of Kaya bola.

The middle-income areas of Abossey Okai, Adabraka and Kaneshie in Accra, for example, are officially supposed to be serviced under the container system. However, the study revealed about 25% of respondents in each of these neighborhoods use the services of Kaya Bola. This has been necessitated by the fact that these areas have essentially become part of the commercial hub of Accra and presumably, contain some modestly rich residents. Consequently, because of their commercial interests and wealth, they can afford the services of Kaya Bola as a trade-off for the apparent inefficiency of the formal institutional arrangements. The service was quite noticeable in the low-income areas where, due to its peculiar infrastructural challenges, the official HH system is rendered technically impossible. In such circumstances, the few affluent people rely on the services of the Kaya bola to meet their environmental needs.

Be that as it may, the activities of the Kaya Bola cannot be a panacea to the solid waste menace confronting the city authorities. Indeed, their present modus operandi actually contribute to the creation of filth, especially around the container sites, the reason being that their activities are unofficial and therefore are not properly integrated into the overall SWM system.

They also do not have the mechanism to off-load their collected waste into the already over-flowing containers. In the process, they litter the sites or find other means to dispose of the collected refuse which, in most cases, is inimical to environmental and societal health. The city authorities should therefore make attempts to incorporate these activities into other CBO operations or harness them to formally provide HH services to the official operators of the CCC. The idea should not be to roll them into the tax bracket but to structure their activities and let them provide checks on their colleagues.

3.5 Technology for solid waste collection

All things being equal, the mode of waste storage and disposal influences the technology used for collection (Obiri-Opareh, 2003). Generally, the result of this study confirms this observation, though it also reveals that some service providers in all the cities use unorthodox technology to execute their contracts. Among the reasons assigned for this development is the authorities' inability to adequately resource them (private contractors) or make prompt payments for services provided. Under the current HH system, contractors use multi-lift trucks, open trucks, three-wheeled tractors and power tillers. In the CCC system, however, skip-loaders were very predominant because of the use of central containers.

By inference, there is a correlation between the type of technology used and the material wealth as well as the layout of an area. It was however observed that most of the available trucks often showed signs of heavy wear with a limited useful economic life. Even the number of these trucks in circulation vis-à-vis the job at hand was very limited. Most of the trucks had also broken down and were stripped of spare parts due to the difficulty and cost in buying new parts (see Figure 7).

Interactions with some private contractors, including Golden Falcon and ABC Waste, revealed that most of the supposed faulty trucks only needed a part to be operational. However, because of the irregular payment from the authorities and the fact that many of the parts are not locally accessible, many of the companies overlooked them and put in

circulation the few for which they could provide fuel and other lubricants. The same reason also explains why some contractors are compelled to use rickety vehicles, especially in the less-privileged suburbs, as captured in Figure 8. In terms of equipment holdings, Accra is the worst off among all the cities. The assembly has no road-worthy vehicle for waste collection, apparently because it has fully privatized its solid waste collection services.

Source: Field Survey, 2010

Fig. 7. Some disused trucks for some private solid waste companies in Accra

(Note the plastic waste which has started accumulating around the truck).
Source: Field Survey, 2010

Fig. 8. A broken down refuse collection Bedford truck (GR5308B) in Accra.

3.6 Area of coverage of waste collection

One cardinal objective for introducing private sector participation in SWM was to help improve the aerial extent of efficient service provision. However, empirical data from the

survey could not wholly support this. For instance, over 30% of residents in Kumasi still had no official institutional arrangements for waste collection and therefore continue to practice crude dumping. In Accra, the current total waste collection coverage is about 70%. The remaining 30% is collected either irregularly or not at all (Oteng-Ababio, 2010a). About 10% of Tema is still rural and services, where they existed, were poor. Even the appropriateness of these figures is in doubt, in view of the increasing number of households over the past years, a situation which has led to the rapid deterioration of waste management facilities that are not replaced and to the increasing amount of waste generated by street sweepers, industrial areas and the central business district (CBD).

The conventional municipal SWM approach based on collection and disposal has failed to provide the anticipated efficient and effective services to all residents. In Tema, the collection coverage is estimated to be 65% while the rest are dumped indiscriminately into drains and gutters (Post, 1999; Oteng-Ababio, 2007). Probably, the un-serviced neighbourhoods are not experiencing the kind of filthy environment that pertains in Nima (Accra), Ashaiman (Tema) and Aboabo (Kumasi) because the nature and volume of waste in the fringe communities are more biodegradable and can be handled by the eco-system. However, the recent increasing use of plastics is gradually posing serious health and environmental threats to the otherwise uninterrupted natural way of managing the fringe environment.

3.7 Waste transportation

The main objective of any waste collection system is to collect and transport waste from specific locations at regular intervals to a disposal site at a minimum cost. In this regard, many technical factors have a direct bearing on the selection of a collection system and vehicles for any particular situation. In other words, the choice of vehicle and storage system are closely related. Among the factors influencing the choice of a possible transportation (vehicle) include the rate of waste generation; density; volume per capita; constituents; transport distance and road conditions. Others include traffic conditions, the level of service, and beneficiaries' willingness to pay. The study revealed that among the commonest means of transportation used in the study area are handcarts, pushcarts and wheelbarrows. These are used to carry waste over short distances. In addition, carts drawn by bullocks, horses or donkeys have been used to pull relatively larger loads. These appear appropriate especially in the densely populated, inaccessible low-income areas with serious traffic congestion. Unfortunately, the study reveals that city authorities and most residents currently perceive this system as primitive and therefore abhor it.

The exclusive use of "sophisticated" vehicles, ranging from tractors to specifically designed trucks, normally at the behest of donor agencies or "corrupt" city authorities, have become the order of the day, notwithstanding the obvious institutional, financial and infrastructural challenges and the varying areal differentiation. For example, in 1997, AMA entered into a financial agreement with the Ministry of Finance for a line of credit for US$14,630,998 from Canada's EDC to purchase waste collection vehicles. Most of the said vehicles had been parked by 2000 due to lack of spare parts and maintenance know-how (Oteng-Ababio, 2007). Thus, technically, the low technology options such as donkey carts, pushcarts are deemed appropriate and convenient for deployment in densely populated, inaccessible neighbourhoods while the high technology ones like skip-loaders and compaction trucks can operate in more accessible areas.

Besides, it is relatively easy to acquire and maintain the low technology options, though they have the tendency of compromising environmental sustainability if they are not properly integrated into the overall SWM programme. By inference, it can be concluded that to ensure any sustainable efficient waste collection system the transportation mechanism and equipment must meet the varying needs of the urban space. It must also be affordable and easy to operate and maintain, with ready availability of spare parts on the local market. Sophisticated imported equipment, mostly procured through donor support, has often not lasted long, quickly becoming moribund and creating equipment graveyards at the local authority depots (see figure 9).

Source: Field Survey, 2010

Fig. 9. Some disused trucks of AMA at the Assembly's depot.

4. Some problems affecting SWM in GAMA

The study has identified a clear relation between the SWM practices and cleanliness. It also demonstrated that although a greater part of the study area is fairly clean, especially the high income and some middle-income areas, the low-income areas are filthy due to poor SWM practices, occasioned by the high population growth (Obiri-Opareh, 2003; Awortwi, 2001) and the changing nature and composition of waste (Doan, 1998). Additionally, most high-density, low-income areas where about 60% of the city's waste is generated are poorly accessible by road. This makes the removal of accumulated waste using motorized vehicles difficult, hence the use of the container system, which is also fraught with many problems. For example, the fact that some residents have to travel long distances to access waste receptacles encourages indiscriminate littering. Furthermore, inadequate funding and poor cost recovery capabilities have resulted in acute financial problems for the authorities. The situation has been aggravated in Accra and Kumasi where the container system, which caters for almost 60% of total waste collection, is fee free, thus putting severe financial constraints on the authorities which invariably affects service delivery.

The inability of the assemblies to enforce their own by-laws also impacts negatively on SWM. For example, a key statutory document required for the proper development of any city environment is a building permit. This is to ensure decent and safe buildings in an orderly manner across urban space. However, for many developers, obtaining this license has been a nightmare. Accordingly, most developers aware of the inconveniences

deliberately flout the rules, at times with the connivance of some officials. Hence, the many unplanned, haphazard neighborhoods which hinder proper waste collection. An equally important observation is the authorities' inability to involve all stakeholders in the decision making process and build on consensus. Apart from autocratically deciding which institutional arrangement operates in which neighborhoods, decisions regarding the waste collection vehicles that are supplied are often made by the authorities who have very little understanding of technical issues and are therefore devoid of operation and performance competence. Donor agencies are sometimes also guilty of providing vehicles with inappropriate design and from a manufacturer almost unknown to the region where the vehicle is expected to be maintained. In such situations, sustainability of the vehicles and service delivery is compromised.

Certain lax attitudes of some residents and officials have also contributed to poor SWM practices. For instance, although most residents yearn for refuse containers to dispose of their waste, they simultaneously object to the location of such containers near their houses, under the pretence that the sites are not properly maintained and/or the containers are not emptied on time, creating spillage and foul stench. The attitude of some officials also indirectly helps perpetuate the problem. For example, a key attitudinal factor that has engendered the growth of undesirable settlements like Sodom and Gomorrah, Ashaiman, and Aboabo is the quick provision of state-sponsored utility services and infrastructural facilities like water, electricity and telephone. Additionally, the massive encroachment on public lands constrains the authorites' ability to find an appropriate place to locate refuse containers. The Ghanaian media are replete with news about such abuses.

5. Waste collection dilemma in Ghana: a governance crisis or attitudinal challenge?

The study provides an overview of solid waste storage, collection and transportation in three Ghanaian cities. The result clearly shows that the present situation leaves much to be desired. Faced with rapid population growth and changing production and consumption patterns, the authorities, like those in many cities in Sub-Saharan Africa, are seriously challenged to implement the infrastructure necessary to keep pace with the ever increasing amount of waste and the changing waste types. Although the waste collection rate has improved over the past decade due to greater private sector participation, waste services in low-income areas are still inadequate. Admittedly, many factors jointly account for this: institutional weakness, inadequate financing, poor cost recovery, the lack of clearly-defined roles of stakeholders and the lax attitude of officials and residents.

However, a critical analysis of these challenges reveals a fundamental cause which is skewed towards a governance crisis rather than attitudinal challenges. For example, policies relating to the adaptation of institutional arrangements and the purchasing of transportation equipment are developed in the absence of both the private sector and public participations. Such unilateral decisions ignore the realities of local conditions, as in the case of the failure to acknowledge the operations of the Kaya bola. The authorities have also failed to implement the necessary by-laws to make compliance with policies enforceable. For example, citizens in poor neighborhoods may simply refuse to pay for waste services and begin to dump waste indiscriminately, creating financial challenges for service providers who will then be compelled to downgrade the quality of service. This will in turn possibly

frustrate the fee paying residents in the middle and high-income areas. Such policy inconsistencies have created deep fissures in the relationship between the authorities and a large segment of the citizenry, culminating in loss of trust and confidence as well as some lax attitudes and behaviour as are being exhibited in some neighborhoods.

Revising this trend will be a daunting task. The authorities need to change from these current out-oriented, foreign-inspired policies. They need to look inward and adopt an all-inclusive, creative and experimental approach that takes into consideration local conditions and engages the public in a democratic manner. Moving towards a genuine participatory approach to waste management will not come on a silver platter. It calls for a paradigm shift on the part of the authorities and it will take time to win public interest, acceptability and participation. Probably as a first step, the authorities need to formalize and integrate the operations of the hitherto neglected informal sector into the overall SWM system. The sector does not only provide services for the almost neglected low-income neighbourhoods (home to about 70% of the urban population) but also serves as a source of livelihood for thousands of urban poor. Streamlining such operations will therefore create public confidence and also avert any environmental repercussions of their operations. At the end of the day, it is the poor management of waste, not the waste per se, that makes the cities filthy.

6. References

Accra Metropolitan Assembly (2009). *Integrated Solid Waste Management Strategy*. Hifab SIPU-Colan Consultants. Urban Environmental Sanitation Project, Accra, Ghana.

Accra Metropolitan Assembly (2010). *Accra, the Millennium City: A New Accra for a Better Ghana*. Urban Planning Department Lecture, Spring 2010. Columbia University, New York, NY.

AMA/WMD (Accra Metropolitan Assembly), (2009). *Annual Report from the Waste Management Department (WMD), Accra*. Unpublished Data from Various Internal Reports.

Anomanyo, E. D. (2004) *Integration of Municipal Solid Waste Management in Accra (Ghana): Bioreactor Treatment Technology as an Integral Part of the Management Process.* Dissertation. Lund University, Sweden. 03.04.2010, Available from www.lumes.lu.se/database/alumni/03.04/theses/anomanyo_edward.pdf>.

Asase, M.; Yanful, E. K.; Mensah, M.; Sanford, J.; & Amponsah, S. (2009). Comparison of Municipal Solid Waste Management Systems in Canada and Ghana: A Case Study of the Cities of London, Ontario and Kumasi, Ghana. *Waste Management,* Vol. 29, No. 2, pp. 779-786.

Asomani-Boateng, R. (2007). Closing the Loop: Community-Based Organic Solid Waste Recycling, Urban Gardening, and Land Use Planning in Ghana, West Africa. *Journal of Planning Education and Research,* Vol 27, No. 2, pp. 132-145.

Awortwi, N., (2001). Beyond the Model Contract: Analysis of Contracted and Collaborative Arrangements between Local Governments and Private Operators of Solid Waste Collection; *Paper presented to CERES summer school*, University of Wageningen, 04.07.2001.

Blight, G. & Mbande, C. (1998). *Waste Management Problems in Developing Countries. Solid Waste Management: Critical Issues for Developing Countries*. Kingston: Canoe, pp. 11-26.

Boadi, K. O. & Kuitunen, M. (2003). Municipal Solid Waste Management in the Accra Metropolitan Area, Ghana. *The Environmentalist*, Vol. 23, No. 3, pp. 211–218.

Daily Graphic (2005). *Daily Graphic*, Saturday 26 April, 2005, Accra, Ghana, pp. 21–28. Daily Graphic, (2005). Daily Graphic, 3th November, 2005, Accra, Ghana, pp 14.

Doan, P.L. (1998). Institutionalizing Household Waste Collection: The Urban Environmental Management Project in Cote d'Ivoire. *Habitat International*, Vol. 22, No. 1, pp. 27-39.

Fobil, J.; Armah, N.; Hogarh, J.; &. Carboo, D. (2008). The Influence of Institutions Organizations on Urban Waste Collection Systems: An Analysis of Waste Collection System in Accra, Ghana (1985–2000). *Journal of Environmental Management,* Vol. 86, No. 1 pp. 262-271.

Houber, A. L. (2010). Moving Towards Sustainable Solid Waste Management in Accra: Bridging the Formal-Informal Divide. Dissertation, Amherst College,

Ministry of Local Government and Rural Development (MLGRD) (2010a). *Environmental Health and Sanitation Directorate. National Environmental Sanitation Strategy and Action Plan (NESSAP) 2010-2015,* Government of Ghana.

Ministry of Local Government and Rural Development (MLGRD) (2010b). *Environmental Sanitation Policy 2009 (Revised 2010)*. Government of Ghana.

Mwesigye, P.; Mbogoma, J.; Nyakang'o, J.; Afari, I.; Kapindula, D.; Hassan, S. & Van Berkel, R. (2009). Africa Review Report on Waste Management - Main Report - Integrated Assessment of Present Status of Environmentally-Sound Management of Wastes in Africa. *Proceedings of United Nations Economic and Social Council (Economic Commission for Africa), Sixth Session of the Committee on Food Security and Sustainable Development*, Addis Adaba, Ethiopia.

Narayana, T. (2008). Municipal Solid Waste Management in India: From Waste Disposal to Recovery of Resources. *Waste Management* Vol. 29, No.3, pp. 1163 – 1166. Available from www.elsevier.com/locate/wasman.

Obirih-Opareh, N. (2003). Solid Waste Collection in Accra: The Impact of Decentralization and Privatization on the Practice and Performance of Service Delivery*, A study conducted at the Amsterdam Research Institute for Global Issues and Development Studies (AGIDS),* University of Amsterdam, The Netherlands.

Oteng-Ababio, M. (2007). Private-Public Partnership in Solid Waste Management in the Greater Accra Metropolitan Area. PhD Dissertation, University of Ghana, Legon.

Oteng-Ababio, M. (2010a). Private Sector Involvement in Solid Waste Management in the Greater Accra Metropolitan Area. *Waste Management & Research,* Vol. 28, No. 4, pp. 322-329.

Oteng-Ababio, M. (2010b). E-waste: An Emerging Challenge for Solid Waste Management in Ghana; *International Development Planning Review, Vol.* 32, No. 2 pp. 191-206.

Phillip, D. R. (1984). *Health Care in the Third World*, Longman, Scientific and Technical. pp. 183-184.

Phillip, D. R. (1981). *Contemporary Issues in the Geography of Health Care*, Northwich, Norfork, Geography Books.

Post, J. (1999). The Problems and Potentials of Privatizing Solid Waste Management in Kumasi, Ghana. *Habitat International*, Vol. 23, No. 2, pp. 201-216.

United Nations Centre for Human Settlements (UN-HABITAT), (2010). Collection of Municipal Solid Waste in Developing Countries. *UN-HABITAT*.

United Nation Population Fund (UNFPA) (2009). *State of World Population 2009*, 26.03.2010, Available from http://www.unfpa.org/swp/2009/en

Water Research Institute (WRI) (2000). *Facts and Figures, Environmental Dal Tables*, 04.03.2000.

World Bank (2007). *Ghana Country Environmental Analysis*, Report No. 36985 – GH, 2. 11.2007.

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