The Negative Impacts of Poor Municipal Solid Waste Management on Livelihoods in Walewale Township, West Mamprusi District, Ghana: A Social Survey and Assessment

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Abstract

In much of the developing world, district and municipal authorities have struggled to manage the waste generated in their area of jurisdiction due to a plethora of factors ranging from inability to enforce a comprehensive set of laws pertaining to the sector, through the dearth of technical capacity to the financial limitations imposed by budgetary constraints. The study considered the case of waste management by selecting five communities within the Walewale Township in the West Mamprusi District, Ghana. This social assessment of the impact of poor waste management employs interviews, personal observation and site visits, literature review and secondary data to identify the problems, examine its level and relationship with other variables. The prevailing system of solid waste management was found to be overly inclined to early approaches of collection, transportation, transfer but with little attention to disposal and final landfill site (reduction, reuse, recycle). The waste management in the District was frought with many challenges such as irregular collection of waste, proliferation of illegal dumping sites, overflowing of waste receptacles and partial involvement of stakeholders such as residents. The research sheds light on the many areas of poor waste management, particularly on disposal, since such poor practices are not only common to the other towns in the district but also with many of the towns in the country as a whole.The paper proposes as solutions to the above, the expanded involvement of private sector actors, communities and the empowerment of the District Waste Management Departmnet to enforce its bye-laws on sanitation and waste.
Keywords: Solid waste, Segregation, Waste collection, Waste receptacles, sanitary site, Walewale, West Mamprusi

1.0 Introduction
1.1 Background of the Study
Solid waste management (SWM) is one of the major problems facing Ghana's towns and cities and the problem is increasing with rapid urbanisation, increasing population, industries and increased use of non-biodegradable plastics and bottles (Kaseke, 2005). The problems associated with SWM are complex because of the quantity and diversity of the nature of waste and financial limitations on public services in towns and cities (Ampofo et al., 2015). For instance solid waste generations in major cities and towns have been very high for cities like Kumasi (0.60 kg/per capita/day) and Accra (0.40/per capita/day) and is similar to other developing countries (like Pakistan) which ranges between 0.283 to 0.612 kg/per capita/day and the waste generation growth rate are 2.4% per year (Dix, 1981). SWM can be seen as activities to handle, process, transport and dispose of waste to reduce or avoid the human health and environmental negative impacts of uncorrect solid waste disposal (Devi, 2007). SWM has emerged as a dominant urban environmental issue that has attracted academic, economic and media debates, and has over the years developed into an independent discipline (Manyanhaire et al., 2009).

According to Ogawa (2005), management and disposal of waste refers to the integrated control of unwanted materials, which would otherwise have been harmful to the environment. This entails storage, collection, treatment and disposal of solid waste. Ogawa stressed that the collection and disposal of solid waste is an important facet of environmental hygiene and needs to be included in any environmental planning. The continuing concern by various governments on SWM and disposal problem is attempting to make the general public more aware of the seriousness of solid waste disposal on the environment. The issue of waste management is of greater concern in Ghana as in many other nations as it is one of the basic public services essential in improving public health irrespective of its rising cost (Asamaa, 2007). The Ghanaian experience shows that within the existing socio-economic context, manual systems are appropriate. The challenge therefore is to develop and promote disposal systems that require a minimum level of mechanical equipment (Mensah and Larbi, 2005).

In Ghana, the severity of the problem has compelled the Ministry of Local Government and Rural Development to attempt to develop policies in controlling the effects of wastes and health related issues. This includes the institution of the monthly sanitation days for communities to clean their localities (Mensah and Larbi, 2005). Solid waste management in Ghana is at present delivered in an unsustainable manner and so impact negatively on livelihoods (Boadu and Kuitumen, 2003). Municipal budgetary allocations for operation and maintenance are inadequate. The result is substandard and unsafe facilities which pose public health risks and

aesthetic burdens to the citizens they are meant to serve (Landfill Guidelines, 2000). It is estimated that throughout the country only about 10% of solid wastes generated are properly disposed off. Again, the rate of collection is not in pace with the rate of generation, therefore much garbage is dumped in open heaps which remain uncollected for a long period or in drainage channels which become blocked thereby serving as a breeding place for mosquitoes. The uncollected refuse also attracts disease vectors and pest that eventually contaminate food thereby resulting in health hazards (Mensah and Larbi, 2005). Poor environmental conditions are quite common in the study area and these are particularly associated with solid waste collection and disposal. General sanitation conditions in several communities in the town are poor. The practice of indiscriminate dumping of refuse in both large and small quantities still persist in the study area. This has impacted negatively on the environment and the people's livelihoods. Given these adverse consequences of poor solid waste management, sustainable solid waste management is of great importance (Turan et al., 2009).

According to the District Waste Management Report (2009), health problems in Walewale are compounded by a combination of overcrowding, uncollected accumulated solid waste from the main market, residential areas and local industrial sites. The SWM system used in the area is failing to address the challenges of accumulated solid waste in the Township (District Waste Management Report, 2009). The main goal of the study is to identify the impacts of SWM on the livelihoods of people of Walewale and to make recommendations to the District Assembly to help improve SWM in the area. The objectives are to: (i) identify the nature and type of solid waste generated in Walewale, (ii) determine the effects of solid waste on the environment and people's lives and (iii) conduct an assessment of SWM at both household and community levels. The accomplishment of the above goals would afford local governments authorities the understanding to address the problems in managing their waste by involving not only private sector operators but also inviduals and communities that are affected.

1.2 The conceptual framework of the study

Figure 1 shows a framework that summarizes the impact of SWM on livelihoods, with much emphasis on the negative impacts. The livelihoods of people can be realized through various socio-economic activities in the fields of domestic, industry, commerce, agriculture, etc. which eventually becomes major sources of solid waste. High growth rate of population means increase in socio-economic activities causing heaps of uncollected refuse in many areas of towns and cities. Poor SWM is attributable to low revenue for Metropolitan, Municipal and District Asembly (MMDA's), high expenditure for waste management, inadequate logistics, lack of public education, and poor attitude of people towards waste handling, weak sanitation laws and policies, among others (Mensah and Larbi, 2005).
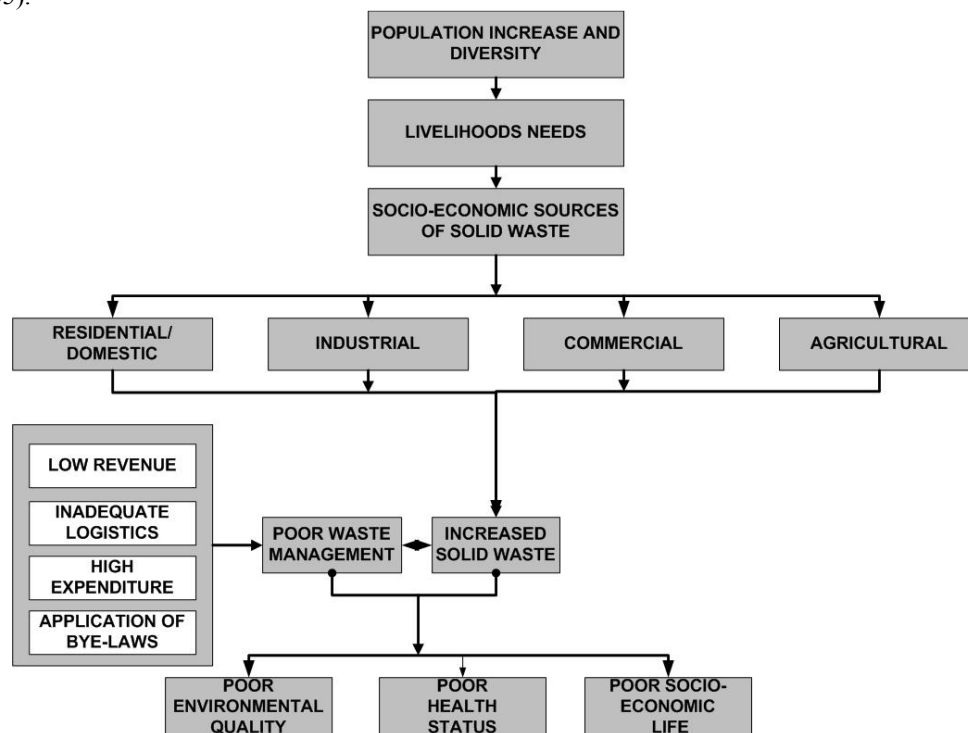

Figure 1: Conceptual frame work of impact of SWM on livelihoods.

As a result, the seriousness that developing countries attach to SWM leaves much to be desired. This has caused poor environmental quality, poor health, and poor socio-economic life of the people especially the vulnerable. In the end there is prevalence of diseases, joblessness, poverty, food insecurity, hunger and lowering

of standard of living (Yin, 1994).The unsatisfactory quality of the residential and working environments, and associated health problems, of poor urban people is now generally recognised. The urban poor, living in inadequate overcrowded shelters, suffer from diseases and injuries resulting from proximity to toxic and hazardous wastes, lack of clean water and sanitation (Songsore, 2004). They are particularly vulnerable to typhoid, diahorreal diseases, cholera and intestinal worms from contaminated water and food, as well as diseases associated with poor drainage and garbage collection such as malaria (Yedla, 2005). The poor in society do make a trade-off between the quality and the location of their living spaces – living in areas with poor, insanitary environments in order that they can be in a preferred location with access to livelihood generating assets (Tsiboe, 2004).

2.0 Research method
2.1 The study area
The population in the district is concentrated in and around Walewale, the District capital, which is the major settlement in the district. Walewale, alone accounts for 12% of the district's population of 121,117 (Ghana Statistical Service, 2014).
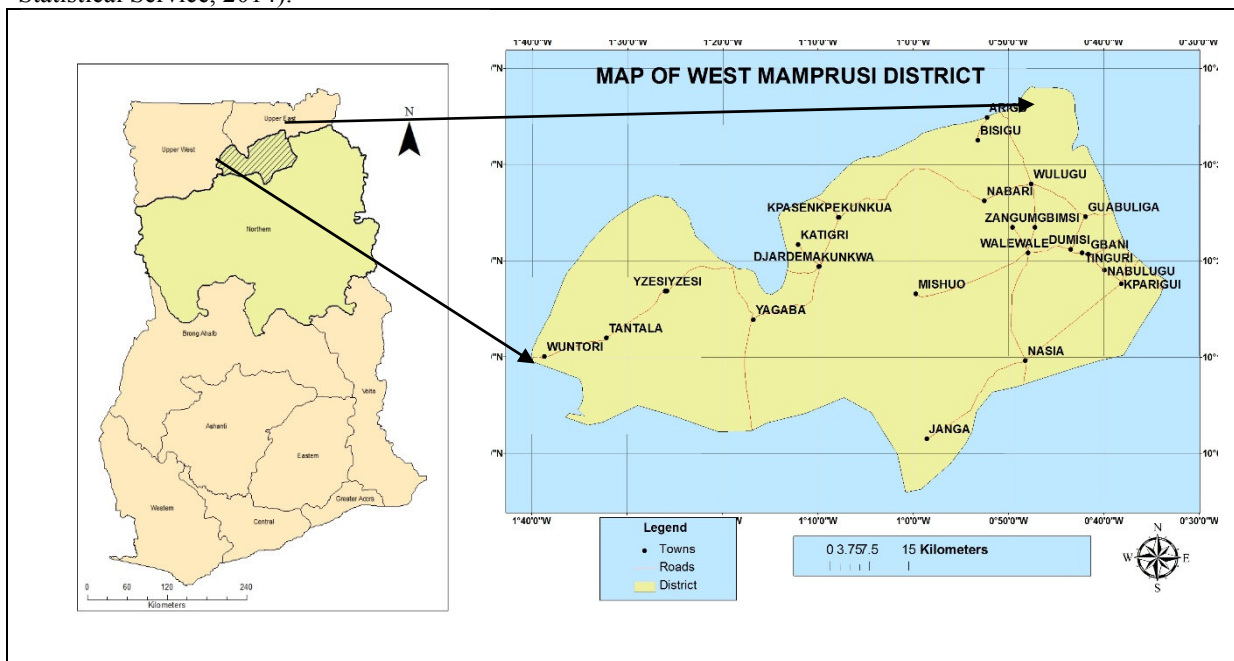

Figure 2: Map of the study area

2.2 Data sources
Both quantitative and qualitative approaches were combined to collect the data. There were interviews, questionnaires, field observation and documentary analysis. The choice of the mixed methods approach was informed by a number of reasons. First, it was meant to achieve the 'logic of triangulation' (Denzin, 1989) since no single method (such as questionnaire, interviewing and documentary analysis) could completely capture all the relevant features of the study. Furthermore, the combination of qualitative and quantitative methods enabled the researcher to crosscheck the data gathered by different methods, thereby, making the results of the study valid and credible (Bryman, 2004). The sample was drawn from some actors and stakeholders of waste management in Walewale; the District Assembly, Zoomlion Ghana Limited, owners/operators of businesses and residents of communities residing around disposal facilities. The structured questions used for both the interviews and questionnaire were open and closed-ended. The questionnaires were administered in five communities in Walewale namely: Naayirifong, Kperiga, Mossifong, Kukuazugu and Tampulugu. Furthermore, aspects of the data were physically observable and had to be gathered through direct field inspection or observation.

2.3 Sampling and data analysis
Since all residents of Walewale are involved in some aspect of SWM (they generate waste or require waste disposal services or are affected by waste disposal), the entire population of the township was regarded as the study population for this research and this was evaluated at the household level. For the purpose of this study, key stakeholders identified included waste disposal service providers and their clients, public institutions whose functions affect waste management and communities affected by solid waste disposal facilities.There are 14,432 households in the district with an average household size of about 8.4 persons which is higher than both the regional (7.8) and the national (4.5) average (Ghana Statistical Service, 2014). Household heads were the main

respondents for the research so as to obtain information from small unit in various communities. The Sample size for the study was obtained from Ebuzoeme (2015) and Ampofo et al. (2015) as follows:

$$S= \frac{N}{1+N(e)^2}$$

Where S = Sample size (?)
N= Household Number
e= Assumed margin of error
1= Theoretical constant

$$S= \frac{14,432}{1+14,432(0.10)^2}$$

$$S= 99$$

Other Categories of stakeholders selected for the study were waste disposal service providers, District waste management department, private sector waste companies, public institutions with functions affecting solid waste management, households (within in the following communities: Naayirifong, Kperiga, Mossifong, Kukuazugu and Tampulungu), businesses, institutions, and communities near solid waste disposal facilities.The questions from the questionnaires and interviews were coded based on responses, and the responses were captured in the Statistical Package for Social Sciences (SPSS) version 17.0 database, which was created for the study. The data was processed to produce statistical charts for interpretation and discussions.

3.0 Results
3.1 The background information of respondents
Out of the hundred questionnaires administered in the study area, 50 of the respondents were males and 50 were females, giving a gender balance. The high percentage of illiteracy of respondents revealed low level of awareness and capacity to manage waste at household level since attitudinal change is a major key to growth and this can be possible through education. A low level of education by the majority of the citizens negatively affected their waste handling and led to poor sanitary conditions which have had negative impact on their livelihoods. With an average number of two rooms per household identified from the survey, it was realized that 46% of respondents live in households ranging from 6 to 10 people. 38% live in households ranging from 1 to 5 members. 10% and 6% of the respondents have household size between the ranges of 11 to 15 and 16 to 20 respectively. The average household size is eight suggesting that there was overcrowding in most households as the national average household number in Ghana is five (Ghana Statistical Service, 2002).This indicates that more waste is generated, coupled with low level of education among the people and worsening poor living conditions.

3. 2 Waste generation, disposal and volumes
The researchers wanted to find out the major constituents of household solid waste generated by respondents. Figure 3 reveals the composition of household solid waste; foods constituted 40%, followed by 27% for rubbish (i.e. things that are thrown away because they are no longer useful, e.g. food left-over, paper, plastic used for wrapping things, and empty containers), plastics 22% and 11% comprising paper and metals. A lot of agricultural waste is generated in the study area. This organic waste can be used as compost, which can generate income for the people, and furthermore increase in agricultural yields. Agricultural waste such as plant stock can also be used to feed ruminants that are reared at home and also as fuelwood in cooking.

According to the respondents, foodstuffs, the largest constituent of garbage generates much waste during its preparation, packaging, use and sale. Polythene bags are used for the packaging of almost everything here in Walawale, and indiscriminately dumped into the environment. This causes insanitary scenes and blocking of gutters, which in turn results in flooding and erosion especially during rainy season. This affects the environment, land value, production, health of people, and thus impact negatively on livelihoods. 43% of households filled their waste receptacles by the close of each day, 28% generated more than half of volume of receptacle and 29% from quarter to half the volume of receptacles. Volumes of waste receptacles were not standardized. Average volume and size of receptacle was found to be 90 litres and 60cm x 55cm respectively. Failure to empty these receptacles any time they got filled up, compelled people to empty their waste into any available open space, gutter, or either burn the waste or feel reluctant to pay service providers. This in turn caused the sanitation conditions around these receptacles to be poor.
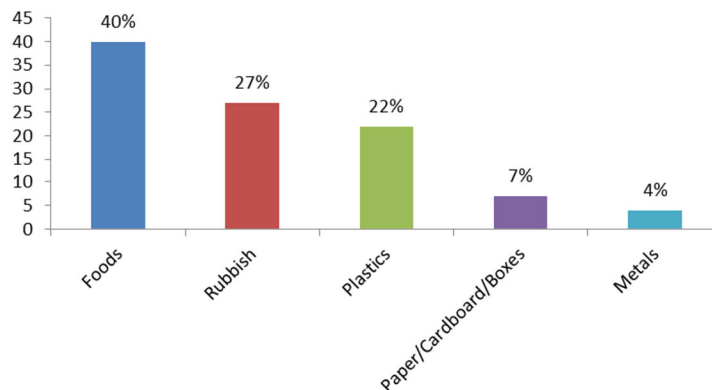
Major Constituents of Household Solid Waste

Figure 3: Major constituents of household solid waste.

3. 3 Solid waste handling and collection

The District Assembly is the major waste management institution, followed by Zoomlion Ghana Limited, a private company, and Volunteers with a 5% patronage. 95% of the population responded that the District Assembly and Zoomlion Ghana Limited are solely responsible for ensuring clean surroundings. Iit is likely that the people do not support clean up campaigns meant for making the surroundings clean, which could stemm up from high illiteracy rates and large household sizes. Solid waste handling is a key process within the solid waste management system. Only 1% of people do waste segregation as part of their solid waste handling, 4% do compaction of waste while 49% and 46% of them wrap food in plastics/paper and mix various waste types respectively (Figure 4). Most respondents see waste handling as a dirty and time-consuming exercise and are not aware of the benefits of recovery, reuse and recycling of waste because of low levels of education on issues of waste handling.
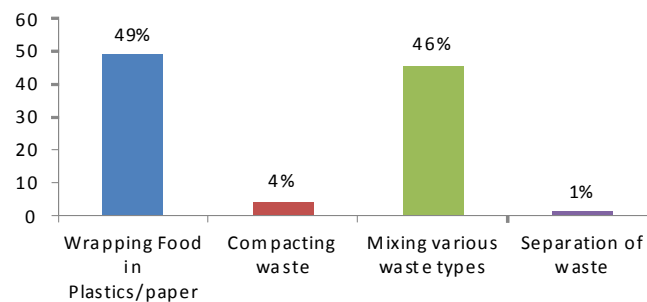

Figure 4: Waste handling types.

3. 4 Receptacles and method of solid waste disposal in Walewale

Waste after its generation is stored in receptacles before it is finally disposed. The study revealed that the receptacles for waste storage include plastic containers, metal containers, polythene bags and baskets. The study indicated that 47% of people store their waste in plastic containers. This was due to the influx of plastic wares in the country as well as its portability. Metal containers were the next with 12%, and 43% and 7% use baskets and polythene bags respectively. Other informal receptacles used include meal bags, cardboard boxes and sacks. Households with largesizes have their waste receptacles being filled up within a short period of time, and at a rate faster than the rate service providers do the collection. This results in waste overflows at the household level. Waste overflows are also due in part, to the fact that the receptacles mostly have no coverings posing serious health challenges. The Assembly must subsidise the prices of standard dustbins and offer education to residents on the need to store refuse in dustbin. This can help change the current situation. The commonest method of waste disposal is burning with 27%, followed by 21% who dump waste either on roadsides or open spaces, 20% for agricultural reuse, 6% sell the solid waste they generate and 5% bury their waste. It is a worry that 42% of people dump their solid waste in the open. This poses a threat to the environment; agriculture and health of people and thereby affects livelihoods.

3. 5 Waste collection system in Walewale

61% of the respondents use communal/public receptacles whilst 39% resorte to house-to-house collection system. This disparity according to respondents is as a result of the distance to public receptacle, lack of adequate receptacles, failure on the part of the District Assembly to empty receptacles promptly, and lack of financial means to embrace the house-to-house system. Those who patronize the house-to-house collection system indicate that people are willing and able to pay for the collection of their solid waste because of its convenience. Private Service companies like the Zoomlion Ghana Limited use tri-cycles and pushcarts to collect waste for a fee. This practice according to the people is the best, however, these collectors charge exorbitant prices. According to them, they pay at least GHC 7.00 (equivalent of $ 2) every month for the collection of their waste. The charge seems to be on a high side for residents in a low income area like Walewale. Inability on the part of residents to pay for their service providers also meant unsatisfactory service.

Out of 39 people who preferred house-to-house collection of solid waste, only ten of them could afford the charges while 29 people said they could not afford. The Environmental Protection Agency embraces the polluter-pay principle but the problem is that there are no mechanisms or provisions obliging the assembly to plough back funds collected for waste collection into the actual waste collection itself, leaving residents less willing to pay for refuse collection services that are irregular. With regards to whether the work done was commensurate with the payment, 10 out of the 39 responded in affirmative and said the operation must be intensified. Respondents were dissatisfied with service provider's ability to keep to agreed schedule for waste collection hence indiscriminate littering of refuse.

3. 6 Perception on the house-to-house and communal waste collection system

11% people who patronised the door-to-door waste collection system are satisfied with the house-to house system of collection. This poses a threat to the environment in that people whose receptacles were full and un-emptied resort to dumping their waste in the open resulting in all the negative consequences that poor solid waste management brings. High illiteracy rates, unemployment, low income and high population growth among the people renders the house-to-house waste collection unworkable. 7% of respondents report that common public receptacles were emptied on daily basis, 9% said they were emptied fortnightly, 57% indicated they were emptied weekly and 27% responded they were emptied monthly or after. The above diverse responses indicate that waste collection was irregular. This is a worrisome situation as the irregular rates of collection poses serious environmental and health hazards.The period for the collection of waste using the communal system depends on the population and the volume of waste generated in the area. However, this is not always the case as sometimes these receptacles are left un-emptied even when they get full causing unsanitary conditions.

During visits to the sanitary sites where the communal receptacles are kept, one can observe that, most of the skip bins are overflowing with solid waste. There is as a result, a litter of waste around the overflowing skip bins (Figure 5). It is obvious that more skip bins must be provided, and situated well within the communities. These conditions may account for the indiscriminate littering of the environment due to the large tonnes of waste generated on daily basis.

Figure 5: An overflowing communal skip bin with unsorted waste.

The distance between the households to the sanitary sites within the community also affects the willingness of some community members in carrying waste to the sites. Normally with the communal system of waste collection, the residents walk for a distance to empty their refuse into the public receptacles. The location of these receptacles differs from one household to the other. 40% of the people live at a distance of more than 300

meters from these sanitary sites and they represent the group that is most dissatisfied with the use the facility. More than 4% of the people live within a 100 metre radius from the receptacles, 27% indicate that the distance to collection site was between 1-200 meters, 33% answered 201-300 meters. In general, the distance to the collection site is a factor causing the people to litter the environment. This is because those people who live far away from the collection site find it difficult walking for such distances to empty their bins. If distance to the collection site is far, residents are reluctant to carry their solid waste there and this caused dumping in the open to increase. Respondents indicate that the sanitation around these waste containers is bad and could easily lead to out-break of diseases like cholera, malaria, diarrhoea, etc. They further aver that Municipal Assembly and Zoomlion Ghana Limited need to recruit/train more waste management personnel provide more/modern waste management equipment, and intensify regular waste collection; all these have the potential of ensuring proper SWM in Walewale and averting the negative impact of solid waste on the environment and the lives of people. Reacting to the consequences of heaps of uncollected waste in Walewale, all respondents affirm that heaps of uncollected wastes can the spread of diseases, environmental hazards, and socio-economic problems.

3. 7 Waste separation
From the study, 10% do separation of waste before disposal and 90% do not separate the waste before disposal. Most of the times waste is mixed and this makes any recovery, reuse and recycling difficult. Respondents to the household survey who separate their waste note that they mainly separate paper/cardboard/boxes to generate fire for cooking; plastics, cans, bottles and plastic containers for reuse in the household or sold to informal waste collectors who sold these to traders to package food stuffs like shea butter, groundnut paste and oil, and vegetables in these containers and plastics. This may have positive impact on the people's livelihoods since this enables them to make some savings and gain some income from the reuse and sale of the waste they separate. In finding out the views of respondents whether waste separation before disposal has positive impact on livelihoods, they all strongly agree to the assertion. This gives the rsidents the opportunity to use the items again since they lacked adequate income and jobs to continuously buy items they could easily separate from their waste and use such items again. This practice may help improve the financial status of people.

3. 8 Waste treatment and utilisation
Waste treatment in Walawale involves burying, burning, composting/ agricultural resue and when neither of the aforementioned has been done then disposal at the community sanitary sites. Burying and burning of waste is the most predominant practices and these two occurr mostly simultaneouslyResidents are compelled to burn their waste due to irregular collection of waste, inadequate number of dustbins/receptacles, and inability to pay for service charge on refuse collection. Residents suffer nuisance from burying and burning of waste, such as the odour and pollution and the inhalation of offensive gasses and soot that come with burning and its iffects on breathing and sight problems. These activities however help to reduce waste significantly and this together with agricultural reuse (which was not widely practiced) is the only means to waste reduction. Composting is a low income technology approach which is sustainable and suited to low income areas, as composts do not require expensive engineering and are easy and cheap to maintain. However, this study reveals that 26 % of households engage in composting. Given that about 29% of solid waste generated in Walewale is agricultural waste, there is hope for composting as a good strategy to reduce waste considerably.

3. 9 Challenges faced by the District authorities in SWM
The town has an estimated population of 121,117 (Ghana Statistical Service, 2010).The Waste Management Department Report (2009) revealed that, the town's per capita waste generation is 0.9 kg per day. The projected waste generation in the area is approximately 300,000 tonnes annually while estimated collected waste is 150,000 tonnes per year. These figures correspond with figures elsewhere in other cities in developing countries (Ampofo et. al., 2015). For instance the waste collection efficiency of 45% agrees with the findings of UNEP (2009) which show that 30-60% of solid waste in developing countries is uncollected. This quantity of solid waste generated per day in tonnes is on a high side and can have negative impact on the environment and livelihoods of peopleThe study revealed the following as estimates of the solid waste composition of Walewale: 15.5% rubbish, 6.5% food waste, paper 20%, plastics 20%, glass 5%, agriculture 15%, construction 8%, metals 5%, textiles 2% and others 3%.

High composition of organic material in solid waste justifies the use of composting as a sustainable method of managing organic waste and can generate income, manure for farming (food security) and impact positively on livelihoods. The net effects of poor SWM are the clogging of streets, drains and open spaces with waste. The study ranked the challenges to waste management based on responses obtained as (Figure 6);
1) Inadequate number of dustbins
2) Poor attitude to waste management by residents
3) Lack of logistics (equipments and tools)

4) Limited number of personnel
5) Lack of contemporary waste collection equipments

In finding solutions to the challenges faced by the district authorities in SWM in the study area, respondents mentioned public education, recruitment of more waste management personnel, acquisition of enough/ modern waste management equipment, adherence to polluter pay policy and enforcement of sanitation laws/policies.
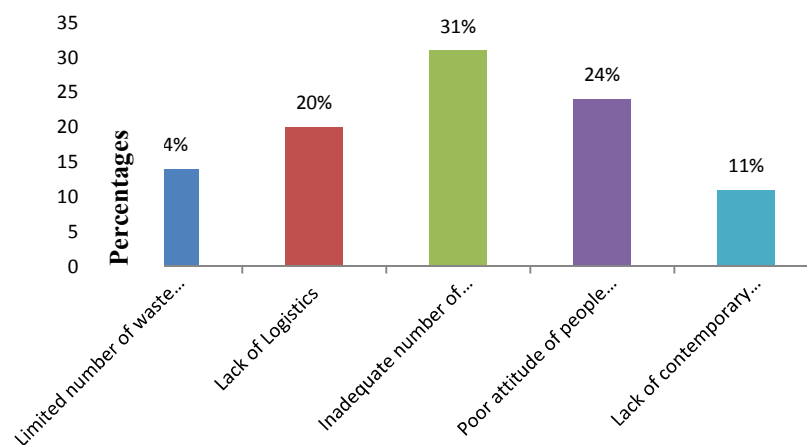

Figure 6: Ranking of challenges faced by District Assembly

Policy and legal frameworks are key aspects in a SWM system which can impact positively on livelihoods. Residents' awareness of policies and laws governing waste management is paramount in ensuring that residents are conscious of their roles and responsibilities in waste management in their areas. Most of the citizens are ill-informed on prevailing policy and statutes on waste management except on knowledge of the role of the District Authority.Very little awareness of policies and laws governing waste management among residents may be an indication that there is poor communication of national policies on waste management to local authorities and also communities. Hence, there is a lack of programmes of action aimed at raising public awareness among residents on the existence of these policies/laws. Respondents who expressed knowledge of existing policies/laws are of the view that problems with the policies/laws was implementation due to its complexity, lack of technical capacity, inadequate allocation of resources for environmental sanitation and ineffective waste management policy. These factors responsible for indiscriminate littering of refuse, according to respondents, can be curbed by behavioural change, and both human and material development. The reasons assigned for the indiscriminate waste disposal are as listed below;

1) Inadequate dustbins
2) Indiscriminate disposal
3) Lack of education
4) Delay in waste collection
5) Inability to pay for waste collection

An examination of the cross relationships between the educational level and marital status with waste composition and disposal method confirms some natural expectations.Since the educational level of majority of the people is low, their methods of refuse disposal is poor; they burn their waste within the households or very near, and dump them on roadsides, drainage channels and in open spaces. The reverse is the case for those who have higher education, which is defined as those who have secondary and tertiary levels of education, and these practice some form of reuse, recycle and reducing, albeit very low.It was obseved that married couples living together generate more waste resulting from household chores and other activities since there seems to be more members in households of married people than in single, divorced and widowed households. The people, no matter their marital status, generate waste in whatever form of activities they find themselves in. However, they do not separate the waste they generate and so are denied of the economic value it may bring to their lives through composting, recycling, reusing and reducing.

4.0 Discussions

Rapid urbanisation over the past decades has resulted in population concentration and high densities in Walewale, thereby increasing pressure on urban infrastructure and services. Thus, the demand for environmental services

such as water, sanitation and waste disposal has increased tremendously. Against this background, the District Assembly has not been able to keep pace with the growing waste disposal needs of the population. Inadequate waste disposal services and resources, political commitment for SWM, high illiteracy rates, lack of enforcement of waste disposal by-laws/policies among others, has resulted in waste accumulation and unsanitary environmental conditions in the area. The study showed that the waste management approach in Walewale can be described as a mix of the early SWM approach which focuses on the limited scope of storage, collection and disposal (Gotoh, 1989) and contemporary approaches that included sanitary landfills, composting and separation (Denison and Ruston, 1990), done at a neglegible scale.

Recycling and large-scale incineration plants are completely absent in Walawale. The solid waste generated by households is temporarily collected into receptaclesskip bins or dumped on the roadside and occasionally refuse trucks to collect the waste for final disposal at Gbimsi, a community about 2 kilometers north of Walewale. Waste disposal at this site is just haphazard dumping. Solid waste is seen as a problem to deal with through disposal however inappropriate while little attention is given to preventive strategies to reduce waste. Waste recovery and stakeholder participation is not given the needed attention and the authorities still view waste as an engineering challenge requiring technologically heavy solutions (Mader, 2011). From the study findings Walewale's SWM system has the legal and the illegal streams as revealed by Manyanhaire et al. (2009). In the legal stream, waste is stored in receptacles and then transferred and transported to legal dump sites by service providers. The legal stream also includes activities by private players like clean up campaigns by NGOs, schools and volunteers and collection of waste by private companies.The illegal stream on the other hand is mainly caused by the inadequacy of services provided which results in huge waste accumulations in residential areas and open spaces. The illegal stream accounts for all the waste that is not collected by the service providers. All these practices have negative impact on the environment and health of people.

Challenges facing SWM in Walewale includ lack of funds, inadequate refuse receptacles, poor attitude of people towards waste handling, lack of logistics, limited number of waste management personnel, lack of community awareness on reducing, recycling and separation of waste, lack of contemporary waste management equipment, lack of public education on issues of SWM, delay in waste collection, inability of people to pay for waste collection charges and ineffective waste management policies/laws. These challenges according to Manyanhaire et al. (2009) are consistent with waste management challenges confronting developing countries. When asked what they thought are the effects of poor SWM in Walewale, respondents mentioned diseases like malaria, diarrhoea, cholera, increase in disease vectors, ugly scenery, rodents and mice as evidence of the poor SWM and resultant poor environmental quality. Figure 7 shows an insanitary environment as a result of indiscriminate dumping and poor management of solid waste.

Figure 7: A gutter engulfed with solid waste.

5.0 Conclusion and recommendations
5.1 Conclusions
The two systems of waste collection in the study area are the house-to-house and the communal container type or the public receptacle. The communal container type is gradually dominating due to the inability of residents to pay for the house-to-house collection system which is done by private waste service providers contracted by central government. The compositions of wastes generated in the area are predominantly organic wastes. The District Assembly spends about 40% of its annual budget on waste management. However, the revenue generated in this regard does not match up to the expenditure on it. The Assembly therefore sees waste management as an activity that is continuously draining the assembly's funds. The laws governing sanitation are not strictly enforced which

encourages the indiscriminate disposal of refuse, non-payment of refuse, etc.thereby affecting efficient SWM in Walewale. The District Assembly is unable to regularly carry out inspection to find out the state of cleanliness or otherwise due to the lack of adequate personnel, vehicles, logistics, etc. The Assembly does not have enough dustbins and this encourages the indiscriminate throwing of waste at open places and in drains. Again the few dustbins are not well placed at vantage points for the public.

Communal containers are placed in specific locations for households to store their waste. However, these containers are inadequate, which creates a situation that encourages open dumping in unauthorized places. Households pay informal collectors to transport garbage to the skip which Assembly truck would take to the official dump site. Informal collectors are needed because the distance to the skips is quite far but informal collectors may also dump in unauthorized places as long as their activities are not regulated. The private waste management company, Zoomlion Ghana Limited operates on low technology of using pushcarts, tricycles and other locally made equipment. Most residents are unable to pay for these services. Most people of Walewale live in areas which have been provided with minimal waste management services. 60% of the solid waste generated inWalewale is left uncollected and the people are forced to live in this unsanitary condition thus impacting negatively on the environment, their health and livelihoods. Several policy interventions such as public education and enforcement of sanitation laws have been applied to get around with this problem but the problem prevails.

5.2 Recommendations

A healthy society is not the one which produces no waste but the one which recognizes its duty to manage its waste properly and not to ignore it. Waste is not itself a bad thing, rather it is poor waste management that is wasteful and sometimes dangerous. The following recommendations are provided to help improve upon the prevailing system;

1) Utilising waste as a resource through reuse, recycle and energy recovery
2) Promoting household/communal composting
3) Regular collection of waste from household
4) Improvement to waste disposal site at Gbimsi
5) More involvement of the private sector
6) Greater involvement of community
7) Public campaigns and education
8) Develop a long term integrated solid waste management plan
9) Review existing sanitation laws and policies

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