International Research Journal of Public and Environmental Health Vol.1 (1), pp. 01-09, March 2014
Available online at http://www.journalissues.org/irjpeh/
© 2014 Journal Issues

Original Research Paper

Disposal of health facility waste in landfill sites and its effects on the people of Gbalahi community in the Tamale metropolis

Accepted 12 February, 2014

Hawawu Hussein[1], Baba A. N. Musah*[2], Emelia Guo[3]

[1]Tamale Teaching Hospital Tamale, Ghana.
[2]Ministry of Food and Agriculture, Tamale, Ghana.
[3]University for Development Studies, Tamale, Ghana.

*Corresponding Author
Email: putubabam@yahoo.com
Tel.: +233(244)738688

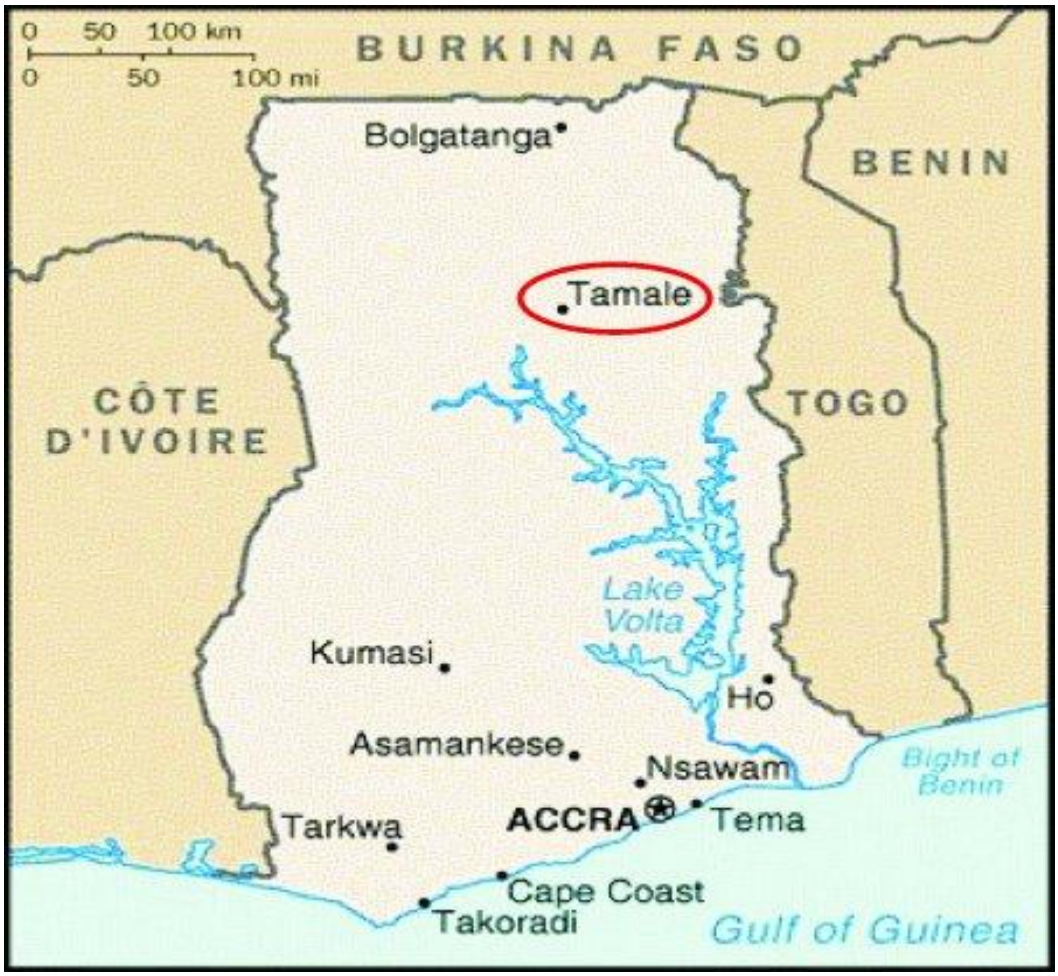
Waste management has become a thorny issue among many cities and towns managers. The use of landfills as refuse dumps is gradually extending the problems of health hazards even to the peri-urban. Most often than not children who scavenge and play with dangerous items such as used needles, infusion sets among others are invariably the victims of disease contaminations. Therefore, this study is premised on the researchers' personal observation that children who loiter around the landfill site are found playing with used needles, infusion sets and other waste products. In this light, the study sought to dig into the reasons that account for this by looking at the existing waste management practices used by some selected hospitals and the effects of landfill site on the Gbalahi community. Data from this research were collected using questionnaires and interview schedules to assess the perceptions of people of Gbalahi community about the effects the landfill site on them. Field observations were also used to obtain some of the necessary information. The field data was analyzed using Statistical Package for Social Science (SPSS) version 17. The study exposed the poor management state of medical waste of health facilities (hospitals) in the Tamale metropolis. The findings indicated that the systems put in place for waste management at the three health facilities were poorly executed and needs to be improved. The findings further indicated that the community found the land more useful (P<005) for their livelihood support (agriculture and hunting) before than after landfill construction.

Key words: Effects, landfill, health facility, waste, Gbalahi community, Tamale metropolis

INTRODUCTION

The generation of solid waste especially in urban areas has been increasing steadily. With an estimated population of about 20 million (projected population 2000) and an average daily waste production per capita of 0.45 kg, Ghana generates about 3.3 million tons of solid waste annually (EPA Ghana, 2002). Reasons accounting for the increased volumes of waste generated is attributable to population density, inadequate financing and lack of skilled human resource in waste management. Safe disposal of these wastes, though difficult, is absolutely necessary considering their environmental, economic, political and social impact. Indeed, various Metropolitan, Municipal and District Assemblies (MMDAs) are unable to cope with this challenging task of managing the quantities of waste generated daily.

In recent years, there has been an upsurge in waste generation coupled with inappropriate management of clinical waste in the Tamale metropolis. For instance, the health facility units generate an estimated total medical waste of 1.5kg/bed/day (EPA Guideline, 2002) which is far greater than the national per capita of 0.45kg of general waste (TMA, 2009). In 2002, WHO assessment conducted



Figures 1: A Sketch map of Ghana showing Tamale Metropolis

in 22 developing countries showed that 18% to 64% health-care facilities do not use proper waste disposal methods. The report has it that, most health facilities in developing countries either lack funding or the expertise to support them properly manage and dispose off health care waste (WHO, 2004). For instance, interaction with the Northern Regional Solid Waste Manager during information gathering revealed that of the three major hospitals under study, the Tamale Teaching Hospital incinerator is broken down. This was confirmed by the management of the hospital but indicated that a new one was under construction. Further observation and enquiries again showed that the incinerator for Tamale West Hospital has been closed down due to improper management, whiles that of the Tamale Central Hospital is operational (Figure 1).

Additionally, most hospitals in the Tamale metropolis lack the capacity to effectively manage their waste due to the absence of incinerators and other waste management resources. They openly burn the waste in the sites often located at the periphery of the city and those with on-site incinerators do not give attention to waste segregation before incineration. It must be mentioned that using incinerators is also not entirely the best alternative; according to Health Protection Scotland and Scottish Environmental Protection Agency that there is evidence of association between incineration and the incidence of some cancers were noted including: laryngeal, oesophageal, gastric, liver, colorectal, lung, childhood cancers in general and leukaemias in particular, non-Hodgkin's lymphoma, and soft tissue and visceral sarcomas (Health Protection Scotland, 2009). Again the Environmental Protection Agency of the United States of America in 1994 found that emissions from incinerators in health care facilities were responsible for high level of chemicals such as dioxin and furan in the atmosphere (Malkan, 2005).

In the face of the challenges mentioned above, cost effective management options must be exploited. The different forms of managing waste may include but not limited to source reduction, recycling and incineration. Woefully though, it is known that even after applying all these methods, there are usually still residues to be disposed off. Thus, the ultimate end of any used product is in the landfill site.

This implies that the construction and use of landfills is equally crucial in the management of solid waste and tantamount to careful choice in locating landfills. More often than not, the unavailability of appropriate lands for this purpose results in obnoxious disposal of these wastes that offensively affect the environment and communities where they are closely damped leading to public outcry.

A case in point is the Gbalahi Community where the Tamale landfill is sited, the inhabitants have complained of several discomforts, including smoke, odour, rodents and diseases such as malaria, typhoid, diarrhoea among others. This is happening because management of landfill after construction sometimes falls short of the required environmental standards which also defeat the purpose for which it was established.

For instance, treated health care waste may be land-filled with municipal waste with caution. A specially designed cell must be demarcated for the disposal of treated health care waste. The pit can be 2 m deep and filled to a depth of 1 m. Each load of waste should be covered with a soil layer 10-15 cm deep" (EPA Guide pp 24, 2002). However, it must be monitored closely so as to avoid scavenging. There have been cases where children were found playing with medical waste such as syringes and needles, for instance, Tygerberg Hospital treated 48 children with azidothymidine (AZT) after some were pricked with needles and others ate potentially lethal pills they found in a field in Elsie's Rive (Leonard, 2012).

The basis for this research is to look at the landfill site used as waste dump and its effects on the people of Gbalahi community in the Tamale Metropolis. At the same time, the study was to unearth the efficiency of the management systems put in place for waste disposal at the selected health facilities.

MATERIALS AND METHODS

Tamale Metropolis is located at the centre of Northern Region. It lies between latitude 9.16 ° and 9.34° North and longitudes 00.36° and 00.57. It shares common boundaries with Savelugu/Nanton District to the north, Tolon/ Kumbungu District to the west, Central Gonja District to the south-west, East Gonja District to the south and Yendi District to the east. It occupies approximately 750 km sq. which is 13% of the total area of the Northern Region. Source; (TMA, 2009).

Tamale is one of the reputed fastest growing cities in the West African sub-region which has three major hospitals, the Tamale Teaching Hospital, Tamale Central Hospital and Tamale West Hospital with about 30 Clinics complementing the works of the hospitals. Information obtained from the Waste Management Department of the Tamale Metropolitan Assembly suggests that, there is no structured health care waste disposal and management system as well as policies in place. Black bags are mostly used at the hospitals for all types of waste except for sharps and body parts. Solid waste especially is open burnt in most hospitals and clinics.

In this study, information was sought to describe how waste management practices affect the life of people where landfill site is situated. In addition, a study was conducted on the one Teaching Hospital and two district hospitals to classify and quantify Health Care Waste (HCW) in the Metropolis. The Tamale Teaching Hospital serves an average of 365 patients daily, whiles the two district hospitals serve about 180-250 daily.

METHODOLOGY

Data for this study were collected between August and October 2012. Systematic sampling was used to select a random start and then preceded with the selection of every Fth element from then onwards on the list of households based on the sample frame (Ghana Health Services Community Register). In this type of sampling technique, a required sample size is calculated; every Fth record is selected from a list of population members.

The sample size was calculated using the formula below

1. $F = N/n$, where 2. $n = N/F$, where n=sample size and N= Total number of households in the Gbalahi community. Thus $n = 150/5 = 30$, n=30, F=5 and N= 150 (Bethlehem, 2009 pp 75). This sampling method is as good as the simple random sampling method. Its advantage over the random sampling technique is simplicity. Samples were also taken from the three major hospitals, namely, Tamale Teaching Hospital, Tamale West Hospital and Tamale Central Hospital. Respondents were chosen by means of quota sampling. Thus the number from a particular hospital depended on the staff strength of the hospital. Respondents from various hospitals were chosen by stratified sampling. The Managers of the two other hospitals and the landfill site engineer of waste management department of Tamale.

Respondents were household heads from the Gbalahi community, where the landfill is sited, how waste especially health care waste being dumped at the landfill affects their life. Table 1 provides a detailed description of the sample frame.

Instruments that were use to collect data included questionnaires and interview schedules. The questionnaires were made up of both open and closed ended questions. The questionnaire focused on issues of waste disposal in the community and how it affects their livelihoods. The researcher wrote down the responses since most of the respondents could read and write.

Structured questionnaire was administered on the management personnel of the Waste Management Department (WMD) of the Metropolitan Assembly. This

Table 1. Population of selected health facilities and study community with their sample sizes

Name of Health Facility	Population Size	Sample Size
Tamale Teaching Hospital (TTH)	1300	30
Tamale Central Hospital (TCH)	245	20
Tamale West Hospital (TWH)	145	20
Gbalahi Community	150	30
Total	1840	100

Derived from TTH, TCH, TWH Human Resource Offices and from the community during field work

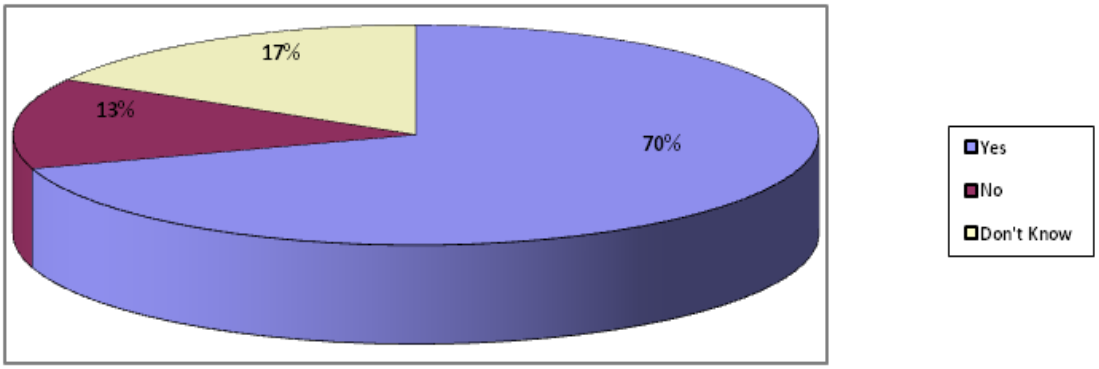


Figure 2: Awareness on hospital waste dumped at the landfill

was to assess the level of collaboration between the community and the Waste Management Department (WMD) of the metropolitan Assembly.

Data analysis

Data gathered through the use of interview schedules and questionnaires were edited to ensure consistency, sufficiency and relevance, summarised and coded for analysis. The software employed for the analysis was the Statistical Package for Social Science at 95% confidence level. Charts, Tables, Cross tabulations, frequency distributions, percentages and means were used to summarize the results for easy interpretation.

RESULTS AND DISCUSSION

Awareness on hospital waste dumped at the landfill

The awareness level of health facility waste dumps sited at Gbalahi community is indicated in Figure 2. The results revealed that majority (70%) of the respondents were aware of the use of landfills as health care waste dumps in the community. On the other hand, 30% did not know that there were such refuse dumps in the community. From the findings, it can be concluded that majority of the people were aware of the existence of constructed landfill used as waste dumps in the community. This finding is in consonance with the tenets of World Health Organisation (WHO) which require that all people who are involved in the management of waste must be trained or made aware of how hazardous waste could be (WHO, 2000). The findings further means that the people of Gbalahi community have informed mind about waste dumps and the precaution to take to avoid the associated angers. Again, it also means that little effort is required to create the awareness among the small percentage of the people who remained ignorant about the existence of dump sites in the community. This goes to say that with good health educative programmes, Gbalahi community could keep and maintain healthy lives styles devoid of any health problems especially emanating from waste dumps.

Land use in Gbalahi before the construction of landfills

The use of the Gbalahi community land before the construction of landfills is shown in Table 2. From the result, 36.7% of respondents said the land was used for farming, 30% said it was used for both farming and hunting whiles 33.3% said the land was left conserved and for hunting. This means that the people of Gbalahi depended on the land for agricultural production to meet their livelihood requirement. It is also obvious that they hunted wildlife for food. This means that using part of the

Table 2. Land use in Gbalahi before the construction of landfills

Land use	Frequency	Valid Percent
No Use	1	3.3
Farming	11	36.7
Hunting	5	16.7
Conserve	4	13.3
Hunting and farming	9	30.0
Total	30	100.0

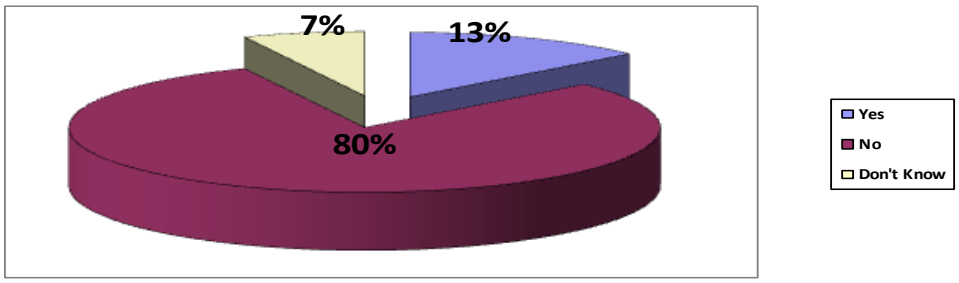


Figure 3: Compensation for land taken for landfill

land for landfills and for refuse dumps could reduce the land available for agriculture production and therefore deny some community members source of livelihood in the short term. On the other hand, the community could increase agriculture production, with time, by composting the waste and using it as manure. This however requires the expert advice of an agricultural officer or waste manger for the community to take advantage and convert the waste to improve upon their soils for increased agriculture production.

Compensation and the use of land as waste dump sites

Compensation to land owners for using their land as landfills is presented in Figure 3. From the result, a greater percentage of the respondent (above 86%) received no compensation for losing their lands to waste dump sites. The same result showed that only 13.3% received some compensation. It can be inferred from the above that many of the respondents were not compensated for relinquishing their lands to the construction of landfills and subsequent utilization as waste dumps. The smaller proportion of the respondents received compensation for the use of their lands as waste dump sites. This could mean that the compensating body satisfied most probably only the opinion leaders or those who have strong will pursuing their rights. It could also emanate from the fact that some land owners were made to believe that fertilizer processing plant was being built rather than landfills.

Health facilities and sorting requirements

Table 3 illustrates the provisions of facilities in comparison with sorting of waste. 74.6% of the respondents from the three health facilities know that waste was sorted prior to disposal. The knowledge of sorting was more popular with Tamale Teaching Hospital (90%) followed by Tamale Central Hospital (82.4%) with Tamale West Hospital (45%) being the least. This means that Tamale Teaching Hospital and Tamale Central Hospital more frequently sorted the waste before disposal and indicates the importance attached to sorting as a management practice in the two health facilities. It could mean that more sensitization is required in Tamale West Hospital where the waste was not frequently sorted.

The results also show that 52.8% did sorting in the ward and 32.1% did sorting in the laboratory whiles as low as 15.1% did the sorting at other places i.e. in the office or in the pharmacy. From the findings, high percentage sorting is done in the ward, followed by the laboratory. This implies that more health facility waste is generated in the wards and that more monitoring is carried out in the ward than in the laboratory and other places.

However, it is conclusive from this result that sorting is done at the various departments where the waste is generated for internal storage. One significant thing realized in all the hospitals was that staff were willing to practice this management option but the necessary and suitable containers with codes to aid sorting were not available (Table 6). High ignorant level of sorting waste in TWH implies that there is absolute need for more education and vigorous monitoring system.

Colour coding system used

Table 4 shows the colour coding systems used by selected

Table 3. Health facilities and sorting requirements

Sorting before disposal	Name of health facility							
	TTH		TWH		TCH		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	27	90	9	45.0	14	82.4	50	74.6
No	3	10	11	55.0	3	17.6	17	25.4
Total	30	100.0	20	100.0	17	100.0	67	100.0
Where is the sorting done								
Laboratory	9	30.0	4	44.4	4	28.6	17	32.1
Ward	15	50.0	5	55.6	8	57.1	28	52.8
Pharmacy	2	6.7	0	_	0	_	2	3.8
Office	1	3.3	0	_	0	_	1	1.9
Others	3	10.0	0	_	2	14.3	5	9.4
Total	30	100.0	9	100.0	14	100.0	53	100.0

health facilities. About 35.8% of the respondents know that colour coding system is used by the various hospitals. Comparatively, 64.2% of the respondents were not aware of colour coding in the waste system. This means that there is little awareness among the people about colour coding of waste containers in the health facilities. This is true since the highest percentage was only a little above 57% were aware the type of colours associated with the containers. This has serious implications on sorting and might mean that the practice of sorting by colour was not effective. Again, TTH showed higher awareness (50%) in sorting colour by colour code followed by TCH (35.3%) and the least was TWH (15%). It can be inferred from the above that the poor colour coding did not promote proper efficient segregation of waste products at all three health facilities contacted. This means that conscious efforts is required of the waste management departments of the three selected health facilities in the areas of awareness creation and monitoring to ensure efficient segregation of waste products.

Test statistics for the use of the land before and after landfill

Table 5 shows the chi square test performed on data collected on land use before and after the landfill site was constructed. From the results Gbalahi community used their land for farming or hunting before the construction of landfills. It also indicates that farming and hunting were the main sources of livelihood activities of the inhabitants of Gbalahi. The findings again indicate the need for the people of Gbalahi to learn compost production techniques to be able to convert the waste for their agriculture business. The conscious use of the waste as compost manure also suggests that health hazards and environmental pollution observed in the Gbalahi community (Table 5 and Figure 4) will be minimized or eliminated. Again, the use of the waste as source of manure will also go a long way to reduce the harmful effects often associated with a poorly managed waste.

Perceived harm of health facility waste

Perceived harm cause by health facility waste is shown in Table 6. From the table, it is obvious that a higher percentage (76.7%) of the respondents know that health facility waste is harmful, while only 16.7% thought it is not harmful. Very few respondents (3.3%) remain indifferent and did not know that health facility waste could be harmful or not. This research findings show that Gbalahi community is quite enlightened about health hazards association with improper disposal of health facility waste. This also implies that the community might have received some health education from the health sector directly or indirectly. This is so because most of them agreed that refuse damps such as landfills could be breeding ground for mosquitoes and other insects. These insects they further believe were causal agents to diseases such as malaria, typhoid and diarrhoea among others. They further pointed out that they are unable to dry their food items in the courtyards due to the proliferation of flies, dust and dirty items in the entire community (Figure 3). This dirt they observed was blown from the waste damps that got mixed with the food items especially on windy days. The above exposition re-emphasized the need for health facility waste to be disposed off properly.

Proportion of discomforts faced by the people of Gbalahi community

The bar chart (Figure 4) shows the discomfort facing the community as result of the health facility waste disposal in Gbalahi. The findings revealed that the landfill poses discomfort to the inhabitants of Gbalahi community. It shows that in a day, an average of 9-10 waste management vehicles ply the un-tarred road raising dust and which makes the community dusty. They also added that most of the waste vehicles do not have covers resulting in the scattering of waste on the road. Liquid faecal waste was also observed to be carried by old tankers that sometimes

Table 4. Colour coding system used

Any colour system used	Name of Facility							
	TTH		TWH		TCH		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	15	50.0	3	15.0	6	35.3	24	35.8
No	15	50.0	17	85.0	11	64.7	43	64.2
Total	30	100.0	20	100.0	17	100.0	67	100.0
If Yes, Please describe								
Plastic containers	1	6.2	0	_	3	60.0	4	15.4
Yellow containers with lid	10	62.5	3	60.0	2	40.0	15	57.7
Black plastic containers with lid	5	31.2	0	_	0	_	5	19.2
Brown plastic containers with lid	0	_	2	40	0	_	2	7.7
Total	16	100.0	5	100.0	5	100.0	26	100.0

Table 5. Test Statistics for the use of the Land before and after landfill site

	Use of Land before Landfill Site	Use of Land after Landfill Site
Chi-Square	17.574[a]	15.170[b]
Df	3	3
Asymp. Sig.	.001	.002

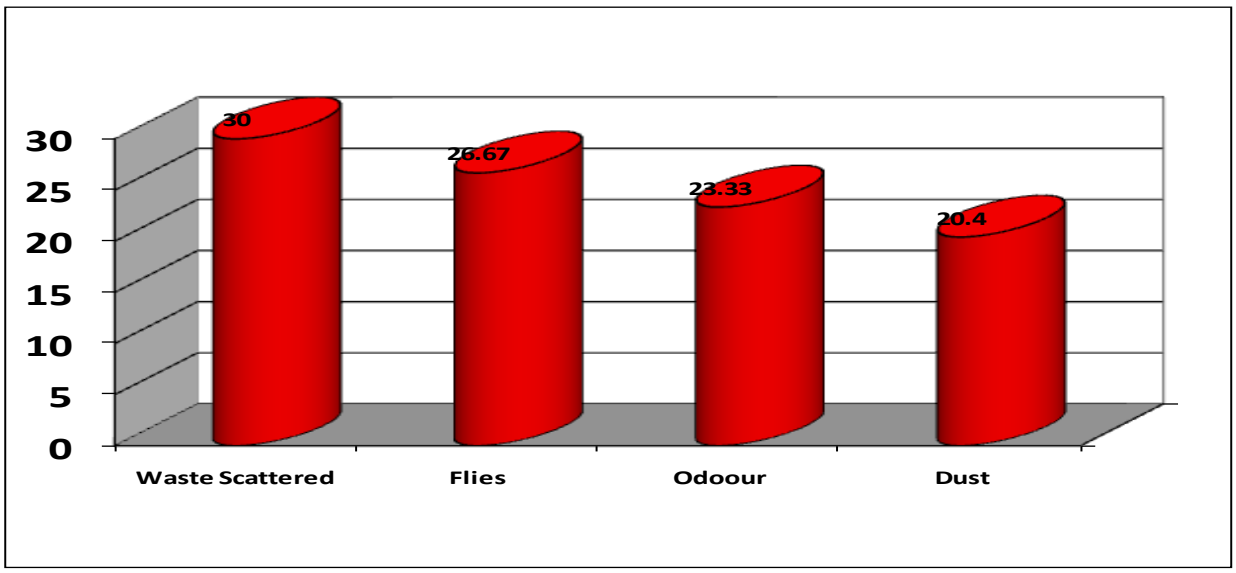


Figure 4: Proportion of discomforts faced by the people of Gbalahi community

led to spillage on the road creating a lot of nuisance and exposing the community to wide range of diseases. One disheartening findings observed during the field work was the presence in the waste of items such as expired drugs, syringe and needles, canulers among others (Figure 5). People especially children scavenge freely on the landfill for metals to sell as scraps. Some respondent complained that children play with used needles, expired drugs, while some even drink them and exposing them to dangers (Figure 6).

Conclusions

The study showed that most staff of the three hospitals do not have adequate information about the composition of

Figure 5: Special waste on the landfill

Figure 6: A child on the landfill scavenging

the waste they generate. It again portrayed that sorting procedures were also observed in all the hospitals. This suggested that some wastes were not properly segregated before dumping at the landfills in Gbalahi. Though the waste posed some threats to the Gbalahi community, it can be concluded that the inhabitants of the community could

eschew diseases incidence due to the high level of awareness among the people. The people of Gbalahi depended on the land for their livelihood. This conclusion was drawn from the fact that the land was significantly ($p<0.05$) used for agricultural and hunting expedition before than after landfill were constructed.

Children scavenged the waste dumps exposing themselves to the diseases and making it imperative to incinerate or neutralized the waste before dumping at the landfills. The presence of flies and mosquitoes in the community and the mixing of dirt with item dried is responsible for some the illnesses that occur in the community.

REFERENCE

Bethlehem J (2009). Applied Survey Methods: A statistical perspective, John Wiley & Sons, Inc, New Jersey.

Environmental Protection Agency(EPA) (2002). Guidelines for the Management of Health Care and Veterinary Waste in Ghana.

Ghana Statistical Services (2000). Population and Housing Census. GSS, Ghana.

Health Protection Scotland and SEPA. (2009). Incineration of Waste and Reported Human Health Effects. Health Protection Scotland, Glasgow.

Leonard L (xxxx).Health Care Waste in Southern Africa: A civil society perspective (unpublished). Retrieved August, 2012 from http:www.groundwork.org.za.

Malkan S (2005). Global Trends in responsible healthcare waste management- A perspective from health Care without harm. Waste Manag. 25: 567-572.

Ministry of Health (2006). MOH Policy and Guidelines for Health Institutions: Health Care Waste Management in Ghana.MOH, Ghana.

Tamale Metropolitan Assembly (2009). Profile and Overview of Waste Management Department, Tamale, (unpublished).

World Health Organisation (2004). Health care waste management: Policy paper, Department of protection of Human Environment water, sanitation and health. Geneva, Switzerland.

Cite this article as: Hussein H, Musah BAN, Guo E(2014).Disposal of health facility waste in landfill sites and its effects on the people of Gbalahi community in the Tamale metropolis. Int. Res. J. Public Environ. Health. 1(1):01-09.