

Solid Waste Disposal and Community Health Implications in Ghana: Evidence from Sawaba, Asokore Mampong Municipal Assembly

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Abstract

Many Ghanaian communities are faced with issues of solid waste disposal and health risks that undermine efforts towards ensuring a clean environment and good health for all. This research focuses on solid waste disposal and health issues among residents in the Sawaba community. Questionnaires, observation and unstructured interview guide were the methods employed for data collection using a sample size of 150 respondents. The systematic sampling technique was used to arrive at the sample size for the selected respondents. Percentages, frequency charts, photographs (Figures), cross tabulation and chi-square tests, with the aid of Statistical Product for Service Solution (SPSS) were the tools used to analyze the data. The shared experiences from residents showed that, issues of improper solid waste disposal have posed threat to health of residents. The cross tabulation and the chi-square tests on diseases contraction and distance of final disposal sites from the houses showed that, residents living closer to open dump sites have contracted related diseases such as malaria, skin infections among others as result of improper refuse disposal. The Environmental Health and Health department, and residents in the community are concerned and hoping a lasting strategy would be found to ensure a clean environment and good health for all. As result it was recommended that, there should be proper siting of final disposal sites to avoid pest and diseases proliferation, provision of more refuse containers and household waste bins for residents among others.

Keywords: Community; Disease; Health; Solid waste disposal

Introduction

The growth of the world's population, increasing urbanization, rising standards of living, and rapid developments in technology have all contributed to an increase in both the amount and the variety of solid wastes generated by industrial, domestic and other activities. Many industrialized European countries like Britain, France, Spain, Ireland and Italy were being classified by as constituting the nucleus of the "dirtiest" countries in Europe, "drowning in a sea of garbage" and with most of their "municipal rubbish dumped in landfill sites" [1]. A World Bank [2] report on the state of solid waste around the world estimates that, the amount of Municipal Solid Waste (MSW) will rise from the current 1.3 billion tonnes per year to 2.2 billion tonnes per year by 2025, with much of the increase coming from rapidly growing cities in developing countries. Low income countries are also expected to generate 213 million tonnes of solid waste a day with the population rising to 676 million by 2025. Lower Middle Income ones are also projected to generate 956 million tonnes of solid waste per day with a population of 2.08 billion. Waste generation will hit 360 million tonnes per day by 2025 in Upper Middle Income countries with expected population of 619 million. For High Income nations, waste generation a day by 2025 will reach 686 million tones and population at 912 million. The report further states that Municipal solid waste challenges are going to be enormous or even greater than the challenges we are facing with climate change [3]. Household waste in Africa contains food waste (biodegradable/compostable), sand, gravel, paper, plastic, metals (example aluminium) and glass (the last four components are recoverable, reusable and recyclable). Plastic is a major nuisance in municipal solid waste which degrades the environment, clogs drains and causes flooding in the rainy season. Waste is typically disposed of without consideration for environmental and human health impacts, leading to its accumulation in cities, towns and uncontrolled dumpsites [4]. Waste handlers and waste pickers are especially vulnerable and may also become vectors, contracting and transmitting diseases when human or animal excreta or medical wastes are in the waste stream. Improperly disposed solid waste left unattended to, can contaminate ground and surface water and also create greenhouse gas emissions and other air pollutants. Garbage is

often burned in residential areas to reduce volume and uncover metals. Burning creates thick smoke that contains carbon monoxide, soot and nitrogen oxides, all of which are hazardous to human health and degrade urban air quality [5]. Uncollected wastes often clog drains and cause the stagnation of water, the breeding of mosquitoes or the contamination of water bodies from which the population normally takes water for consumption, cooking and cleaning. In tropical countries, the high temperatures and humid conditions accelerate degradation, increase the amount of leachate and directly affect the surrounding ecosystems by penetrating the soil and contaminating groundwater [6]. The affluent lifestyle brought about by modernization and development aggravates the problem of improper solid waste disposal on health. While solid waste issues are not a novelty, uncoordinated disposal and its consequences if overlooked however can wreck the health and existence of any well-meaning people. Uncollected solid waste blocks drains, and causes flooding and subsequent spread of water-borne diseases. Solid waste that is not properly disposed of, especially excreta and other refuse from households and the community, are a serious health hazard and which can lead to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that in turn spread disease. This leads to unhygienic conditions and thereby leading to a rise in the health problems. Other high-risk group includes population living close to a waste dump and those whose water supply gets contaminated [7]. Begum [8] also argues that, uncollected solid waste also increases risk of injury and infection and that, annual floods in Eastern and Western parts of Africa, and Indian cities are

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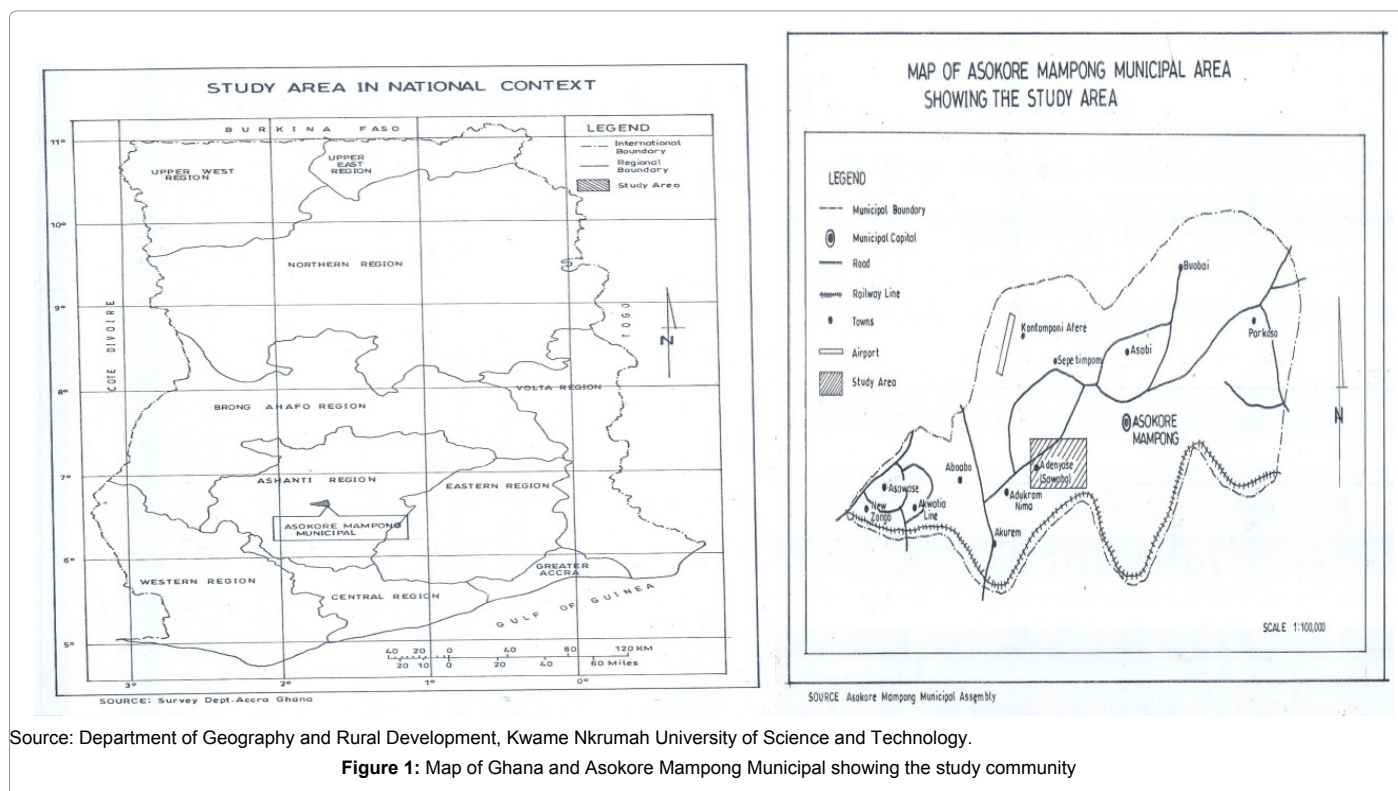
blamed, at least in part, on plastic bags blocking drains. UN-Habitat health data also show that diarrhea and acute respiratory infections are significantly higher for children living in households where solid waste is dumped, or burned in the yard, compared to households in the same cities that receive a regular waste collection service [6]. Improper solid waste disposal activities have diverse effects ranging from health, environment, and human life and property as different researchers espouse on the consequences of improper municipal solid waste disposal. Rotten organic materials pose great public health risks, including serving as breeding grounds for disease vectors. “Improper solid waste disposal leads to substantial negative environmental impacts (for example, pollution of air, soil and water, and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution)” [9]. Solid waste disposal in Kumasi is a complex issue that has been a major feature on the priority of successive municipal chief executives and waste management groups. Generally, existing facilities including sanitary facility are inadequate to serve the people, the ever increasing volumes of solid waste generated in the Kumasi municipality is overwhelming. Problems are encountered at all levels of waste management namely; poor network, different settlement structures making collection in some areas difficult, increasing waste quantities due to urbanization, inadequate and obsolete waste collection equipment. The situation creates a suitable environment for the breeding of disease vectors such as mosquitoes, flies, cockroaches and mice. In view of this, some of the inhabitants dispose of rubbish indiscriminately such as drainage channels, and the recent advent of polythene bags have even worsen the situation for waste management groups as they are seen everywhere in the city. Solid waste in the Sawaba community of Asokore Mampong Municipal, consist mainly of garbage generated from household food waste, plastics and containers. The community solid waste generated come in the forms of degradable and non-degradable and tends to be

improperly discarded in the environment. It is against this background that this study seeks to verify this challenge and its implication for the health of residents in Sawaba community of Asokore-Mampong Municipal assembly.

Data and Methods

Overview of study area

The Asokore-Mampong Municipal Assembly in which Sawaba community is located covers the north – eastern segment of Kumasi Metropolitan area in the Ashanti Region. Sawaba community located within the Asokore Mampong Municipal and is mainly a residential area which houses people from different religious backgrounds and ethnicity. The residences of this community are mostly migrants especially from the Northern sector of the country with few indigenous people [10] (Figure 1). The Ashanti Region, in which the Asokore-Mampong Municipal is found, is centrally located in the middle belt of Ghana. It lies between longitude 1°.15”W and 2°.25”W, and latitudes 6°.50”N and 7°.46”N, with a total land area of 24,389 km²; representing 10.2 percent of the total land area of Ghana. The Municipality falls within the South–West physical region of Ghana. Thus, it is within the range of 250-300 meters above sea level. The topography of the area is undulating. That is the area is characterised with lowland and highlands. Aboabo River is the main water body weaving through the Sawaba community. Like the other streams in the area, river Aboabo is choked with solid waste material. Thus, its extinction is eminent. The Dichem stream is endowed with man- made drainage system, however due to lack of maintenance and irresponsible human activities the drains are either collapsed or choked with refuse [10]. There are also water channels running across the Sawaba community and indiscriminate solid waste disposal along these water channels, gutters and drains poses a threat to health of residents in the Sawaba community, such as malaria, diarrhea and other infections [10]. Ensuring a



Source: Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology.

Figure 1: Map of Ghana and Asokore Mampong Municipal showing the study community

clean environment for many residents in the Sawaba community is synonymous to preventing environmental health related problems. On the contrary, poor solid waste disposal in the community is adversely contributing to the health problems in the Sawaba community. Some of these associated poor refuse disposal health problems include; malaria, typhoid fever, cholera, flies, bad odour, skin infections among others [10]. According to the Asokore Mampong Municipal Profile[10], directly related to good health, survival, growth and development are potable drinking water, improve sanitation and good hygiene. Delivery of these basic services of life has not been without challenges. Thus, access to these services has been a luxury in developing countries. With regard to sanitation, the major problem facing the municipality is poor communal refuse sites for managing solid waste materials, which is the area lack properly constructed communal refuse site. This development gap has resulted in indiscriminate disposal of refuse in the Sawaba community. Other residents patronize the house to house refuse collection system. Operation of this system has not been without dissatisfaction from the residents. Outstanding setback identified about this system of solid waste management is irregular emptying of household bins. Thus, these refuse bins will over flow and stay outside for many days before emptying it, this situation could lead to health problems such as mosquitoes, bad odour and other infections [10].

Research design, variables and settings

The study used cross sectional survey with both qualitative and quantitative approach covering Sawaba in the Kumasi Metropolis area. It is a cross sectional because it researched into waste disposal mechanism and its effects on health in an area at a point in time other than on long term interval. The demographic and socio-economic variables such as age, sex, marital status, education level, occupation and monthly income were collected to aid the study. Furthermore, study also collected data on effects of improper solid waste disposal on health in the study area. The study variables were measured based on the responses of the respondents. These were further coded so as to ensure accuracy in measurement.

Sampling and study participants

The study participants involved inhabitants in Sawaba and considered only residents who have attained 18 years and above. This age category was used because it is believed that at this age the individual is matured to give info on how solid waste disposal impact on his or her health. The systematic sampling technique was used to select individual respondents. The population of Asokore-Mampong Municipal as of 2010 was 209,479 of which that of Sawaba were 14,655 [10]. To arrive at a sample size that is representative enough for the total population of Sawaba, the study computed 20 percent (thus, 0.2) of 14655 the total population, which gave a sample size of 2931. However, due to the level of the study, time constraint and cost the sample size was further scaled down by 5 percent (0.05) of 2931 to arrive at an estimated sample size of 150 for individual residents and officials in the study area. Thus, 148 questionnaires were administered to the residents, two (2) were given to officials of both waste and health department; the heads of official for the two departments in the Asokore Mampong Municipal Assembly were purposely targeted to elicit relevant data on solid waste disposal and health in the Sawaba community.

Data collection method

The study employed various research instruments including administering of questionnaires and unstructured interviews to collect data for the study and also made some observations on the field to support the data. A set of questionnaire made up of close-ended and

open-ended questions were administered to individual respondents to collect basically primary data. Unstructured interviews were also administered to waste and health department to elicit information on the issue of solid waste disposal and health in the study area and how they intend to address the problem. Lastly, respondents were briefed on the objective of the study and they were assured of strict confidentiality of the response they gave.

Data analysis

Quantitative and qualitative methods of data analyses were employed to discuss the findings and to draw conclusions from the study. The qualitative data included data from the unstructured questions administered to the officials. Quantitative data also included data from administered questionnaires and these were analyzed with cross-tabulation and descriptive statistical tools such as frequency, percentage charts with the aid of the Statistical Product for Service Solution (SPSS) software. The study results were presented in the form of pie charts, tables, bar charts, and crosstabs with chi-square tests. Figures from the study area were also used to support the results and to give a visual presentation for clarity.

Results and Discussion

Characteristics of the study participants

Majority of the study participants (89%) were females showing a youthful age from 20 years to 40 years as indicated in Table 1. Most of the respondents (90%) were Northerners and this was attributed the nature of the study prefecture which is dominated by Northerners (Sissala, Wala, Dagomba, Frafra). Further, formal educations of residents play a significant role in enhancing their quality of life and reduction of related health problems from poor refuse disposal. Most of the respondents (41%) had no formal education. This is partly or wholly due to the fact that most of the residents in the area are settlers from different ethnic backgrounds seeking for greener pastures in other economic activities such as trading. Again, if the refuse generated as a result of the diverse occupational activities in the area is not properly disposed of it could lead to health problems. It was discovered that majority of the respondents (43%) were into petty trading. Moreover, it is normally underlined that high income earning residents have the possibility and the high propensity to afford the cost for proper disposal of solid waste generated than low income earners. In some cases, when the cost for disposing refuse is relatively low, some residents are still not able to afford that, and as such resort to dumping at open dump sites and unauthorized places. It was unearthed that about 51% of the respondents have their monthly earnings below GH¢ 200.00. This means that most of them will face the problem of disposal off their waste properly and can culminate into health predicaments in the area.

Current solid waste disposal situation

As regards respondents' assessment, it was discovered that the solid waste disposal situation in the area was very poor. This was confirmed by majority of the respondents (61%) following the study. Thus the poor solid waste disposal condition if not properly check can ruin the residents in Sawaba. Probably because of their low education level, most of them may not know that poor solid waste disposal have effect on their lives. The need for education is thus critical in the era of poor solid waste disposal in area (Figure 2).

Awareness of the effects of poor refuse disposal and diseases contracted

Awareness level of residents on the dangers of improper refuse disposal on their health is an important factor in considering issues

Variable	Category	Frequency	Percent
Sex	Male	16	11%
	Female	132	89%
Age	under 20yrs	6	4%
	20-29yrs	53	36%
	30-39yrs	55	37%
	40-49yrs	16	11%
	50yrs and above	18	12%
Ethnicity	Northerner	133	90%
	Akan	2	2%
	Ewe	5	3%
	Others	8	5%
Level of education	None	60	41%
	Primary	33	22%
	Middle level	10	7%
	Senior High School (SHS)	33	22%
	Tertiary	12	8%
Occupation	Petty trader	63	43%
	Food vendor	13	9%
	Service sector (sewing, hairdressing etc)	14	9%
	Civil servant	9	6%
	Student	14	9%
	Unemployed	35	24%
Monthly income	Below GH¢200	74	50%
	GH¢200-GH¢400	20	14%
	Above GH¢500	5	3%
	Not earning monthly income	49	33%
	TOTAL	148	100%

Table 1: Background characteristics of Study participants, Source: Field Survey, 2014.

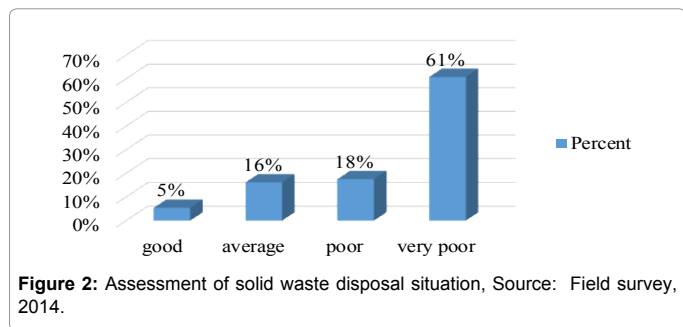


Figure 2: Assessment of solid waste disposal situation, Source: Field survey, 2014.

related to solid waste disposal and health. This is because in some cases it is argued that, residents engaged in indiscriminate dumping acts because they are not aware of the adverse effects on their health. For instance, the Municipal Health Director asserted in an interview on the 20th of February, 2014 that:

“Residents having no knowledge on the dangers associated with poor disposal of refuse as one of the constraints in tackling solid waste disposal and health problems in the community”. As a result, it was observed on the field that almost all the respondents in Sawaba community were aware of the dangers associated with improper refuse disposal on their health. Despite their awareness, it was found out that, 8 of the respondents had cholera cases before, 105 of the respondents complained of malaria cases; while 15 and 20 of the respondents had cases of typhoid fever and skin infections before respectively as indicated in Table 2. Observations from the results in Table 2 implies

that, majority of the respondents have contracted diseases associated with improper solid waste disposal, despite the fact that residents were aware of the dangers especially malaria.

Effects of the solid waste on health

Distance of final disposal sites and associated health risks

Hypothesis tested: H0: There is no relationship between distance of solid waste disposal site and contraction of related diseases H1: There is a relationship between distance of solid waste disposal sites and contraction of related diseases. The issue is that, improper siting of solid waste disposal sites within the community engenders health risks among residents. Unauthorized open dump sites are located near houses of residents in the Sawaba community; this has an adverse effect on health especially those staying closer to these sites. Whether people who stay closer to where refuse disposal sites are located are at high risk or not, the study sought to verify. As a result, it was found out that 67% of respondents whose house are less than 5 minutes from where the disposal sites are located had cholera cases before, while there were no cases of cholera for residents houses of 11 to 15 minutes away from the disposal sites as indicated in Table 3. Again, it was found out that for cases of malaria, 75% of respondents whose houses are less than 5 minutes from the disposal site had cases of malaria, while 2 % of respondents whose houses were 11 to 15 minutes away from the disposal sites had malaria cases. Also, it was realized that, 75% and 72% of the respondents whose houses are less than 5 minutes from the final disposal sites had cases of typhoid fever and skin infections respectively, while there were no cases for residents who are 11 to 15 minutes away from the disposal sites. Further, the chi-square test results from Table 4, the Pearson chi-square value of 0.017 with a degree of freedom of 2 and tested at 0.05 level of significance, implies that, there is a significant relationship between distance of final disposal sites and contraction of diseases. Hence, the rejection of the null hypothesis, there is no relationship between distance of solid waste disposal site and contraction of diseases. Zhu et al [7] noted that population living close to a waste dump have a higher risk of contracting diseases [7]. This finding has validated the research output of Zhu et al. Observation from the results in Table 3 implies that, respondents who stay closer to refuse dumping sites had cases of malaria, cholera, typhoid fever and skin infections and the farther away the lesser the risks. The implications for these outcomes are that, residents closer to these open dump sites are expose to health risks especially children who play around these sites and also defecating like the ones depicted by Figure 3 and Figure 4. UN-Habitat health data also show that diarrhea and acute respiratory infections are significantly higher for children living in households where solid waste is dumped, or burned in the yard, compared to households in the same cities that receive a regular waste collection service [6]. The groups at risk from the unscientific disposal of solid waste include the population in areas where there is no proper waste disposal method, especially the pre-school children and waste workers. A female 35 years old petty trader (charcoal seller), Sissala (Northerner), who stays closer to the dumping site in Figure 5 was asked, what is your experience with this disposal site closer to your house? She expressed to the researcher that: “I wish you could

Category	Frequency	Percent
Cholera	8	5%
Malaria	105	71%
Typhoid fever	15	10%
Skin infections	20	14%
Total	148	100%

Table 2: Some of the related diseases contracted, Source: Field survey, 2014.

			Distance of final disposal sites			Total
			less than 5 minutes	5-10 minutes	11-15 minutes	
Related diseases contracted	Cholera	Count	4	2	0	6
		Percent	67%	33%	0%	100%
	Malaria	Count	75	26	2	103
		Percent	73%	25%	2%	100%
	Typhoid fever	Count	9	3	0	12
		Percent	75%	25%	0%	100%
Skin infections	Count	13	5	0	18	
	Percent	72%	28%	0%	100%	
Total	Count	101	36	2	139	
	Percent	73%	25%	2%	100%	

Table 3: Related diseases contracted and distance of disposal sites, Source: Field survey, 2014.

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.129 ^a	2	0.017
Likelihood Ratio	8.719	2	0.013
Linear-by-Linear Association	5.684	1	0.017
N of Valid Cases	144		

Table 4: Chi-square test for distance of disposal sites and risk of contracting diseases, Source: Field survey, 2014.

Category	Frequency	Percent
Unpleasant odour	10	7%
Mosquitoes breeding grounds	130	88%
Pest and diseases proliferation	8	5%
Total	148	100%

Table 5: Health and environmental effects, Source: Field survey, 2014.

wait till evening time, to have a feel of the mosquitoes, flies and odour emanating from this site. It is worse when it rains but I look at this scene helplessly. I cannot control them especially that, residents do this at dawn and in the night". Again, the finding from the study supports the argument made by Zhu et al. [7] that, the group at risk from the poor disposal of solid waste include the population in areas where there is no proper waste disposal method, especially the pre-school children. A clear example is the dumpsite in Figure 3 closer to "God is Great International School" at the study area.

Effects of mode of solid waste disposal on health of residents

Considering that, most residents in the community were observed to be involved in the act of disposing solid waste at open dumpsites within the community such as building sites, along water channels and unauthorized places, have the tendency to engender health risks among not only residents but also the environment. Thus, the results indicated in Table 5 explain the health effects in relation to the modes of solid waste disposal among residents in the community. As regards the effects from Table 5, it was realized that, 7 percent of the respondents were concerned with the unpleasant odour, 88 percent were worried about mosquito's breeding grounds and 5 percent of the respondents said the tendency of causing pests and diseases proliferation in the community. Rotten organic materials pose great public health risks, including serving as breeding grounds for disease vectors. "Improper solid waste disposal leads to substantial negative environmental impacts (for example, pollution of air, soil and water, and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution)" [9].

This is clear evidence of what is happening in the study prefecture. Observation from results in Table 5 implies that, majority of the respondents were much concerned with the mosquitoes breeding grounds as a result of the open dump sites (building sites), along the banks of water channels and other unauthorized places within the community. Apparently, with scenes like the one depicted in Figure 5 found within the community would engender malaria cases, besides the unpleasant odour and proliferation of other pest and diseases. Even though there were some methodological limitations which could be sources of research bias were encountered in the research process. The application of the accidental sampling technique had its own limitation but did not affect the credibility of the results. It rather paved way for a thorough investigation into the problem for appropriate recommendations to address solid waste disposal situation and health risks not only among residents in the Sawaba community but Asokore-Mampong Municipal as a whole.

Conclusion

The shared experiences from residents showed that, issues of improper solid waste disposal have posed threat to health of residents. The Environmental Health and Health department, and residents in the community are concerned and hoping a lasting strategy would be found to ensure a clean environment and good health for all. The cross tabulation and the chi-square tests on diseases contraction and distance of final disposal sites from the houses showed that, residents living closer to open dump sites have contracted related diseases such as malaria,



Figure 3: A dumpsite closer to a primary school.



Figure 4: A dump site within residential area.



Figure 5: An unauthorised open dumpsite along railway line section Sawaba, Source: Field survey, 2014.

skin infections among others as result of improper refuse disposal. It is therefore recommended that final disposal sites for solid wastes should be sited outside residential area, especially the open dumpsites to avoid proliferation pest and diseases. It is further recommended that residents in the area should insist on using mosquito nets to avoid being biting by mosquitoes. In like manner, the district assembly in the study area should provide health education to the people on how to live in good health. Significantly, if the recommendations of this study are considered and implemented, there is a high tendency of improving the solid waste disposal situation and health risks among residents in the Sawaba community to have a clean environment.

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