

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 BACKGROUND INFORMATION / PREAMBLE**

A study of the environment on the cusp of the twenty-first century is an exciting endeavour as we attempt to move from confrontation to co-operative problem-solving and place the study of the environment on a sound scientific basis. At the dawn of creation there was a perfect balance between man and his environment. Due to human activities on earth the stable equilibrium between man and his environment was broken and hence the resultant environmental problems. As humans we are part of the environment and the way we interact with the environment influences the quality of our lives.

The daily activities of humans in order to obtain their basic needs and nutritional requirements to sustain a healthy life generate a lot of unwanted materials. Solid wastes are defined as “the unwanted remains, residues, discarded materials or by-products which are no longer required by the initial user” (Nyang’echi, 1992). Solid wastes are the by-products of human activities which include the processes of preparation, manufacture, packing, repacking, unpacking, and construction and renovation of structures. Solid wastes fall under the following classes: domestic wastes, industrial wastes, street wastes, commercial wastes and hospital wastes.

Due to the rapid increase in population, movement of people to metropolitan areas and expansion in industries, much pressure has been placed on solid waste management and the task of solid waste management has become difficult. Volumes of solid waste in towns will run in millions of

tons and would accumulate if not collected. It is now an undebatable fact that for humans to safeguard, control and promote the environment there must be some appropriate facilities for solid waste management. In the absence of such facilities solid domestic waste will pose a significant health menace.

Environmental sanitation is of grave concern to governments and policy makers in a bid to prevent disease occurrence. It is incumbent upon us then to act now to manage waste matter properly to avoid the occurrence or incidence of communicable diseases. Waste matter at different stages of decomposition is allowed to grow in size developing into hills and becoming an eyesore in the community with its associated stench.

There are no proper solid domestic waste management practices in some districts including the Afigya Sekyere district. Most districts predominantly practice crude dumping. People deliberately ignore dump sites dotted in the communities and throw solid waste in the open spaces and gutters. Some people regrettably defecate into polyethylene bags and leave them as litter in the environment. Flies are attracted to them and may spread pathogens. Some influential people in the community attempt to liberate relatives and or acquaintances that have breached national sanitation laws from the grips of the law. Research indicates that pollution by man is increasing rapidly in many countries including Ghana (Freedman, 1995).

Health and social side effects are equally as important as environmental impacts when considering Municipal Solid Waste Management (Gladding, 2002). For people in developing countries including Ghana, bodily wellbeing is a far more pressing concern than the fact that

open burning of solid domestic waste contributes to acid rain or global warming. Outrage over health issues of poor solid waste management could therefore be a motivating factor towards more sustainable environmental practices, as suggested in Dryczek's discourse (Dryczek, 2001) on green rationalism. Waste management plays an integral role in human activity. Not only does it involve rationale decision making about whether to bury, burn, recycle, or produce less waste, it must also consider impacts to health, society, and the environment. Assessing the benefits and costs of various solid waste management policies and projects is complex because it involves numerous, interconnected economic, social, and biological components. The barriers to effective Municipal Solid Waste (MSW) management is not simply lack of policy but lack of infrastructure, education, social awareness of problems and solutions, and lack of institutions promoting sustainable actions. Barret and Sue (2001) assert that there is a pressing need to avoid or manage the damage that affects both people and natural ecosystems.

## **1.2 STATEMENT OF THE PROBLEM**

According to media reports and the District Health Management Team (Afigya Sekyere District 2007 Annual Health Report), improper environmental sanitation and solid waste management has been one of its major challenges over the years. The problem of domestic waste disposal such as broken ceramics, iced water sachets, plastics and the like has been of a major concern in the Afigya Sekyere District. Solid wastes such as iced water sachets, empty metallic tins or cans, plastics and the like are scattered here and there in the communities. Like most other communities in Ghana, surface dumps are located at the outskirts of most towns and villages in the Afigya Sekyere District and present unsightly scenes of heaped decomposed and semi-decomposed domestic wastes, pollute the environment and produce offensive odour. These heaps

attract flies and other disease-vector organisms most of which cause serious health hazards to the environs and the populace themselves. The stench emanating from these heaps becomes a nuisance to human habitation. Leachate from the dumps pollutes water bodies with poisons and pathogens. In the Ghanaian social settings, cleanliness is embraced as a virtue but most of the time the perception of cleanliness is restricted to one's immediate environs with little care for what happens outside their households. The belief is that the state will take care of things hence one should not be bothered.

Moreover, sanitation and its related issues were seen as the preserve of the colonial administration that usually employed sanitary officers to take care of the environs (Kendie, 1999). To the ordinary Ghanaian, waste management is simply a process of waste collection and disposal. Mothers mostly do the collection while disposal is the preserve of young girls in the household. This problem of poor environmental sanitation affects all community members especially children who suffer most in the event of disease outbreak. For example, the recent outbreak of cholera in the Bepoase community claimed the lives of three children according to the Assemblyman of the town. Children are found playing and defecating onto the rubbish dump bare-footed. This may cause disease infection in the children.

Solid waste is finally disposed of at a refuse dump at the outskirts of town or at a refuse dump somewhere in the community on the surface of the land. Water bodies get polluted giving rise to water-borne diseases like typhoid and cholera. Disease connected with poor sanitation, such as malaria, diarrhoea and intestinal worm infestations are very common. Flies, insects and some domestic animals are attracted to refuse dumps and bare decomposing bio-degradable solid waste

where they feed and or breed in large numbers. Because of inadequate resources – machinery or equipment and personnel, the problem of environmental sanitation persists. The District Health Administration (DHA) is conscious of and acknowledges the fact that the district has a major public health problem of solid domestic waste management that needs study and addressing.

### **1.3 RATIONALE FOR THE STUDY**

As a consequence of improper solid waste management in the Afigya Sekyere District, the inhabitants suffer from poor environmental sanitation related diseases such as malaria, diarrhoea, typhoid fever, worm infestation and others.

According to a media report (TV3 Ghana, September 18, 2008), 70 % of ailments or diseases in Ghana are sanitary related and diseases reported at the health facilities include diarrhoea, cholera, malaria, typhoid fever and buruli ulcer among others. Since most of the diseases reported at the health facilities are related to sanitation, it is appropriate for this study to be undertaken.

The study would present a comprehensive assessment of the methods of solid domestic waste management in the communities and appropriate recommendations for improving solid domestic waste management in the district could be made. The relevance of the appropriate recommendations and suggestions made in the research to the various officers of health and stakeholders will stimulate and encourage the policy makers at the District and Regional levels to formulate comprehensive strategies to improve upon the current improper solid domestic waste management in the district and beyond.

## **1.4 RESEARCH QUESTIONS**

- (1) What methods of solid domestic waste management are in practice within the Afigya Sekyere District?
- (2) What factors contribute to improper solid domestic waste management?
- (3) What are the consequences of improper solid domestic waste management?
- (4) What suggestions could be offered to improve upon solid domestic waste management within the Afigya Sekyere District?

## **1.5 OBJECTIVES**

### **1.5.1 General Objective**

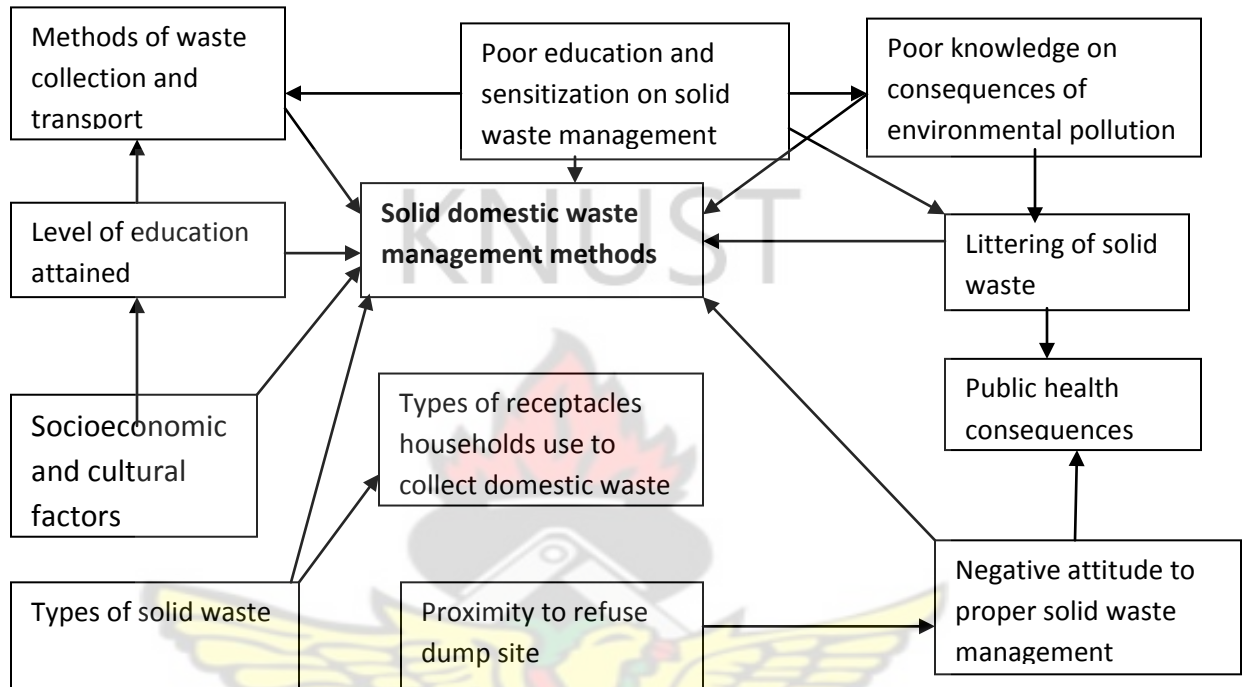
- (i) To assess the solid domestic waste methods in the Afigya Sekyere District.

### **1.5.2 Specific Objectives**

- (i) To outline the methods used to collect and transport solid domestic waste.
- (ii) To identify the factors contributing to improper solid domestic waste management.
- (iii) To elicit knowledge of respondents on the consequences of improper solid domestic waste management.
- (iv) To identify solid domestic waste disposal methods.
- (v) To bring out suggestions for improving solid domestic waste management.
- (vi) To make recommendations to all stakeholders as to how to improve upon solid domestic waste management.

## 1.6 CONCEPTUAL FRAMEWORK ON SOLID DOMESTIC WASTE MANAGEMENT METHODS

Figure 1.1 Conceptual framework on solid domestic waste management methods.



### EXPLANATION OF CONCEPTUAL FRAMEWORK

Poor education and sensitization on solid domestic waste management will lead to poor knowledge on consequences of environmental pollution which will in turn affect the solid domestic waste management methods. Poor education and sensitization on solid waste management may lead to littering of waste; littering of waste has public health consequences and at the same time may be a determinant of solid domestic waste management method. Poor education and sensitization on solid waste management directly impinges on solid domestic waste management methods and on methods of waste collection and transport. Methods of waste collection and transport affects waste management methods. Level of education attained is

affected by socioeconomic factors. Educational level attained may lead to choice of method of waste collection and transport; it also directly affects solid domestic waste management methods. Socioeconomic and cultural factors have a direct bearing on solid domestic waste management methods. Types of solid waste generated may determine solid domestic waste management methods and types of receptacles households may use to collect domestic waste which may in turn affect the choice of solid domestic waste management method. If houses of people are far away from refuse dumps, it may lead to negative attitude to proper solid waste management and this will have negative public health consequences. Negative attitude to proper solid waste management directly affects solid domestic waste management methods.

## **1.7 PROFILE OF THE STUDY AREA**

Afigya Sekyere District is one of the twenty-one districts of the Ashanti Region. The district shares boundaries with four others: in the south by Kwabre, north by Sekyere West, east by Sekyere East and west by Offinso districts respectively.

Agona, the district capital and also the seat of the district's administration, is twenty-seven kilometres from Kumasi on the Kumasi-Mampong trunk road. Agona also seats the shrine of the famous Okomfo Anokye (conjurer of the famous Ashanti Golden Stool – a symbol of Ashanti unity). The predominant tribe is Ashanti, with minors especially from northern Ghana.

The vegetation is partly forest and partly derived savannah. There are two forest reserves by the names Offin forest reserve and Gye Anoma forest reserve. The Offin river meanders across the length and breadth of the district.

### **1.7.1 Economic Activities**

Notably the district could boast of cocoa, timber and crops such as maize, cassava, plantain, oranges and vegetables. Unfortunately majority of the inhabitants were peasant farmers with very low income. Some of the inhabitants traded in general goods in most of the communities although the volume was much higher in the main towns. As regards commercial transport, vehicles involved were Nissan Urvan buses, Benz buses and taxis.

Some of the important tourist attractions in the district were the famous Okomfo Anokye shrine at Agona, the footprints of Okomfo Anokye on the trunk of a huge tree near Boamang and the 'kente' weaving and craft carvings at Kona, Jamasi, Denase and Bepoase. Some major endemic diseases were malaria, HIV/AIDS, buruli ulcer, yaws, onchocerciasis, intestinal worm infestation and schistosomiasis.

### **1.7.2 Population Distribution**

The district has a population of 145,549 as at year 2007 and a total land area of 714 square kilometres and hence a population density of 204 persons per square kilometre. There are 91 towns and villages in the district. The district has been divided into six sub districts namely Agona, Kona, Jamasi, Boamang-Kwaman-Ahenkro, Wiamoase and Kyekyewere.

### **1.7.3 Transport and Communications**

The general road network in the district is very poor. The only tarred road runs from Kona to Jamasi, which is part of the Kumasi-Mampong trunk road. All others are feeder roads making accessibility to the hinterland very difficult. However, the main road from Ahenkro to

Kyekyewere is currently under construction and due to the caving-in of the Jamasi-Mampong scarp, a diversion through Jamasi and Boanim to Mampong has improved the road network considerably. The main towns enjoy electricity from the national grid. Pipe borne water exists in the towns but it is not all that reliable. There are a lot of boreholes and hand dug wells in the district.

#### 1.7.4 Health Facilities

The district has three hospitals at Agona, Asamang and Wiamoase and eight health centres at Kona, Jamasi, Boamang, Kyekyewere, Ahenkro, Boanim, Tetrem and Domeabra. There are no private clinics and maternity homes in the district.

**Table 1.1 Health facilities in the Afigya Sekyere District**

| Type              | Hospitals                  | Government health centres                                                   | CHAG health centres                                       | Clinics | Total |
|-------------------|----------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------|---------|-------|
| <b>Government</b> | Agona                      | Kona, Jamasi, Tetrem<br>Boamang, Ahenkro,<br>Kyekyewere, Boanim<br>Domeabra |                                                           |         | 8     |
| <b>Mission</b>    | Asaman SDA<br>Wiamoase SDA |                                                                             | Salvation Army clinic, Wiamoase,<br>Sacred Heart, Bepoase |         | 4     |
| <b>Total</b>      | 3                          | 8                                                                           | 2                                                         |         | 13    |

**Table 1.2 Top ten diseases reported at the Agona District Hospital from January to December 2007**

| <b>Diseases</b>              | <b>Incidence %</b> | <b>Number of cases</b> |
|------------------------------|--------------------|------------------------|
| 1. Malaria                   | 68                 | 25039                  |
| 2. Cough                     | 9                  | 3377                   |
| 3. Hypertension              | 4.1                | 1525                   |
| 4. A.U.T. infection          | 3.4                | 1258                   |
| 5. Home/Occupation accidents | 3.3                | 1251                   |
| 6. Dermal diseases           | 3.0                | 1134                   |
| 7. Acute eye infection       | 3.0                | 1011                   |
| 8. Diarrhoea                 | 3.0                | 1027                   |
| 9. Intestinal worms          | 1.3                | 510                    |
| 10. Rheumatism               | 2.0                | 707                    |

*Source: Annual Report, Afigya Sekyere District, 2007*

### **1.7.5 Health Administration**

For the purposes of effective health administration, the district has been divided into 6 sub districts.

### **1.7.6 Health Staff**

The district is challenged with inadequate staffing. It has a doctor – patient ratio of 1:4,329 and one pharmacist was just recently posted to the Agona Government Hospital.

**Table 1.3 Health staff of Agona Government hospital**

| <b>Staff</b>              | <b>Number</b> | <b>Number Required<br/>(Additional)</b> |
|---------------------------|---------------|-----------------------------------------|
| Medical Doctor            | 2             | 2                                       |
| Medical Assistant         | 6             | 3                                       |
| General Nurses            | 35            | 4                                       |
| Health Aids               | 9             | 5                                       |
| Ward Assistant            | 9             | 5                                       |
| Hospital Orderly          | 39            | 0                                       |
| Pharmacist                | 1             | 2                                       |
| Dispensary Technician     | 3             | 6                                       |
| Dispensary Assistant      | 1             | 0                                       |
| Laboratory Assistant      | 1             | 8                                       |
| Disease Control/Nutrition | 6             | One on sick leave                       |
| Med.Rec.Assistant         | 10            | 2                                       |
| Watchman                  | 6             | 4                                       |
| Others                    | 15            | 0                                       |
| <b>Total</b>              | <b>142</b>    | <b>41</b>                               |

*Source: Afigya Sekyere District, 2007 Annual Report*

## **1.8 SCOPE OF THE STUDY**

The study focused on an assessment of the methods of solid domestic waste management in the district and was limited to the collection, storage, transport and final disposal of solid domestic waste.

## **1.9 ORGANIZATION OF THE REPORT**

Chapter one contains background information of the study, statement of the problem, rationale of study, research questions, objectives and conceptual framework. Chapter two offers literature

review. Chapter three contains information on study method and design, study population, sample size, study variables, sampling technique, profile of study area, data collection techniques and tools, data handling/analysis, pre-testing of questionnaire, ethical consideration, limitations of study and assumptions made. Chapter four presents the results, chapter five contains discussion of results whilst chapter six contains conclusions and recommendations.

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## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 METHODS USED TO COLLECT AND TRANSPORT SOLID DOMESTIC WASTE**

Disposal is broadly defined to include the collection, storage, treatment or processing, utilization, or final disposal of waste. It involves the process of getting rid of the waste materials that people generate (Mantell, 1972). According to the World Book Encyclopaedia (1994) edition W113, the chief methods used to dispose of domestic wastes include land disposal, incineration, recycling and waste reduction. Land disposal is where garbage is hauled to an area owned by a community or private firm. Such areas range from unsanitary open dump to properly operated sanitary landfills.

Open dumps are poor methods of waste disposal because of the environmental problems they cause. Incineration is the process of burning waste products. Burning in many of these incinerating plants releases gases and solid particles that may cause health hazards, damage property and kill plants. Recycling is the process of turning waste into something useful. That is, reusing materials instead of throwing them away. Recycling and waste reduction help lessen the amount of refuse that may be buried in land or burned in incinerators. The recycling process is the best method of solid waste management (Foess, 1969).

According to Barrow (1995), a wide range of agricultural and domestic wastes cause eutrophication when they are discharged into streams, rivers and lakes resulting in “Biological Oxygen Demand (BOD)” killing the aquatic flora and fauna.

Most cities in developing countries do not have adequate provisions for collection and disposal of domestic solid wastes, the accumulation of which represents a growing health hazard. Economically, domestic solid waste puts greater pressure on a nation’s financial status particularly in developing countries such as Ghana. According to Habitat News (1991), waste disposal may absorb 1% of the Gross National Product (GNP) of a country, 20% to 40% of municipal budget of cities in the developing world.

Disposal areas have become unavailable as cities’ suburbs have expanded beyond their former boundaries as places to put the wastes are filling up and a few new locations are made available (Mantell, 1972). Although the habit of the “throw away” culture of domestic waste dies hard especially when backed by ideological views opposing any form of regulation, regional planning is necessary for effective collection, processing and disposal of solid waste, but such planning is lacking in many communities (Mantell, 1972).

## **2.2 FACTORS CONTRIBUTING TO IMPROPER SOLID DOMESTIC WASTE MANAGEMENT**

A combination of poverty, population pressure and economic hardships are placing a considerable strain on household environments in Accra. In Accra, the municipal authorities have not been able to keep pace with the rapid accumulation of waste. This has resulted in waste

being found in gutters, drains, and in rivers. Some of the municipality's final garbage disposal sites are also located near the sea and is polluting the Korle lagoon. These practices have also created an unhealthy environment in Accra (Tsiboe and Marbell, 2004). As one report by the Environmental Protection Agency states, "municipal solid waste has been disposed of anywhere anyhow without regard to the nuisance and harm caused to the environment. All kinds of wastes, regardless of their nature, are being dumped indiscriminately into depressions, sand pits, old quarries, beaches, drains and even in certain areas, along streets." (EPA, 2004). Majority of the people in Ghana live below the internationally recognized poverty line of one dollar a day. In view of this, one can imagine the pressure that is put on the city's infrastructure in the course of day to day activities. Some say the problem of waste disposal in Accra is cultural, others say it is economic, yet others point in the direction of poor management (Tsiboe and Marbell, 2004). Kendie (1999) argues that the recent upsurge in waste disposal problems stems from the fact that, "attitudes and perceptions towards wastes and the rating of waste disposal issues in peoples' minds and in the scheme of official development plans have not been adequately considered. Kendie (1999) and Satterthwaite (1998) virtually agree in principle that the waste problem emanates from poverty and lack of funding as a result of low level of economic growth. Agbola (1993) traces the root cause of the problem to imbibed behavioural patterns and acquired values, which are given expression in the people's culture. Post and Obirih-Opare (2003) have pointed to performance and weakness in the waste management institutions as the bane of the waste problem.

## 2.3 TYPES OF SOLID WASTE MANAGEMENT

The four most common methods of municipal solid waste management are landfilling, incineration, composting and anaerobic digestion. Incineration, composting and anaerobic digestion are volume reducing technologies; ultimately, residues from these methods must be landfilled (Seo, 2004).

Landfilling is the only true “disposal” method of managing MSW. It is also the most economical, especially in developing countries where it typically involves pitching refuse into a depression or closed mining site (Daskalopoulos and Auschutz, 1998). Landfills produce landfill gases and Leachate which can harm human and natural systems. Landfill gases (LFGs), produced when methanogens decompose complex molecules, are primarily methane and carbon dioxide (up to 90%), but also include CO, nitrogen, alcohols, hydrocarbons, organosulphur compounds, and heavy metals (El-Fadel, 1997). Leachate forms as water percolates intermittently through the refuse pile, and can contain high levels of nutrients (nitrogen, phosphorous, potassium), heavy metals, toxins such as cyanide, and dissolved organics (El-Fadel, 1997).

Incineration is the high temperature combustion of wastes. Non-combustibles must be sorted out before incineration. Benefits of incineration include reduction of volume of waste and energy production in the form of electricity and heat (Seo, 2004). However, construction and start-up costs of incineration facilities can be prohibitively expensive for developing nations.

Composting and anaerobic digestion use natural microbial organisms to decompose the organic fraction of MSW (Seo, 2004). The non-organic fraction must be landfilled or incinerated. These methods reduce the volume of waste that must be landfilled, and end products can potentially be

used as agricultural fertilizers, or processed into fuels for motor vehicles (Sonesson, 2004). However, like incineration, project implementation can be too expensive for poor communities.

## **2.4 CONSEQUENCES OF IMPROPER SOLID WASTE MANAGEMENT**

Improper solid waste management activities can bring about the following:

- Increase disease transmission or otherwise threaten public health. Rotting organic materials pose great public health risks, including, as mentioned above, serving as breeding grounds for disease vectors. 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.
- Contaminate ground and surface water. Municipal Solid Waste (MSW) streams can bleed toxic materials and pathogenic organisms into an open refuse dump, and other ailments are also high. In downtown Segou, Mali, during the rainy season part of the dump is submerged in water, mixing with leachate, and threatening the health and water supply of the surrounding area. If the landfill is unlined, this runoff can contaminate ground or surface water, depending on the drainage system and the composition of the underlying soils. Many toxic materials, once placed in the general solid waste stream, can be treated or removed only with expensive advanced technologies. Currently, these are generally not feasible in Africa. Even after organic and biological elements are treated, the final product remains harmful.
- Create greenhouse gas emissions and other air pollutants. When organic wastes are disposed of in deep dumps or landfills, they undergo anaerobic degradation and become significant sources of methane, a gas with 21 times the effect of carbon dioxide in

trapping heat in the atmosphere. Garbage is often burned in residential areas and in landfills 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. Combustion of polyvinyl chlorides (PVCs) generates highly carcinogenic dioxins (Evan, 1994)

- Damage ecosystems. When solid waste is dumped into rivers or streams it can alter aquatic habitats and harm native flora and fauna. The high nutrient content in organic wastes can deplete dissolved oxygen in water bodies, denying oxygen to fish and other aquatic life form. Solids can cause sedimentation and change stream flow and bottom habitat. Siting dumps or landfills in sensitive ecosystems may destroy or significantly damage these valuable natural resources and the services they provide.
- Injure people and property. In locations where shantytowns or slums exist near open dumps or near badly designed or operated landfills, landslides or fires can destroy homes and injure or kill residents. The accumulation of waste along streets may present physical hazards, clog drains and cause localized flooding.
- Discourage tourism and other business. The unpleasant odour and unattractive appearance of piles of uncollected solid waste along streets and in fields, forests and other natural areas, can discourage tourism and the establishment and/or maintenance of businesses (Zeiss, 1998).

## 2.5 SUGGESTIONS FOR IMPROVING SOLID DOMESTIC WASTE MANAGEMENT

Municipal composting programmes exist in some South African cities. While solid waste collection is generally a municipal function, some countries and municipalities are now experimenting with limited privatization of these services, with some success. Because of the poor levels of collection, many residents – from impoverished to wealthy – pay for private collection of their wastes where these services are legalized. Some hospitals and municipalities have incinerators for medical waste, but these are often not operated correctly (WHO Newsletter on Environmental Health, 1993). The HIV/AIDS epidemic has raised concerns about reuse of syringes, and efforts are being made to construct low-cost, high-temperature two-chamber incinerators to destroy syringes. Recommending the means of handling waste disposal, Amuzu (1996) laid emphasis on the fact that the high proportion of domestic and human waste can easily be made into compost. This will form a valuable soil conditioner and a major source of plant nutrients. This in turn will lead to enriching the diet of the people as well as reducing the quantity of refuse for final disposal. When it comes to the collection, transportation and disposal of solid waste in Accra, one of the most noticeable changes that has occurred since the year 2000 has been a more dominant role being played by the private sector and other non-governmental agencies and community based organizations. From our interviews in Accra, one can conclude that, privatization of the waste handling in Accra is seen as a way to make waste management cheap, efficient, dynamic and free from political interference. Perhaps composting at home could be a way forward since a large portion of the solid waste emanating from the homes is biodegradable it can be used for compound gardening and help cut down on the waste being sent to the dump sites (Tsiboe and Marbell, 2004). The existing waste collection system should be

improved by providing adequate refuse containers in slum areas within easy reach of households, and frequent removal of containers to reduce indiscriminate disposal of solid waste. Attention should focus on demand oriented approaches to meeting the needs of consumers, by providing adequate facilities needed by the people, and requiring users to pay for the full cost of the facilities in order to enhance the efficient and sustainable use of facilities and services. This involves consultation with the people affected by environmental problems, and requires that people participate in the provision and maintenance of facilities (Boadi, 2004).

There is the need for environmental health education programmes to create awareness on the links between poor sanitation, hygiene, and physical wellbeing. People tend to change when they understand the nature of change, and view it as beneficial, so that they make an informed and conscious choice to include it in their list of priorities (UNCED 1992).

## **2.6 USES OF SOLID DOMESTIC WASTE**

Wastes become waste because we fail to use them for the purpose for which they could be used. Gourlay (1992) reported that environmentalists have joined hands with scientists and the more responsible sectors of industry and agriculture not merely to find better ways for disposing of wastes, but to seek its uses, reduction and eventual elimination. Before the advent of mineral fertilizers, manure and composts were the only source of nutrients for crop plants (F.A.O. and Environment, 1986).

Solid domestic waste can be used as organic fertilizer. The amount of organic residues used in developing countries in 1971 was eight times higher than mineral fertilizers and exceed the world supply of mineral fertilizer (F.A.O. and Environment, 1986).

There is a growing awareness of the usefulness of organic fertilizers as a means of maintaining and improving soil productivity when applied alone or in combination with mineral fertilizers. F.A.O. and the United Nations Development Programme (UNDP) is enhancing the long tradition in Asia of recycling. According to Kordyles (1990) vegetable waste and putrescible matter are very useful in the preparation of compost and natural organic fertilizers. A research conducted by Chowder and Salaam (1995) indicated that nearly 2,364 tonnes of solid domestic waste are produced annually in a village with a population of 510 people. About 77% of the wastes was used as domestic fuel, animal fodder and organic fertilizer for crop production. Food residues, cereal straw, legumes, tuber crop peels and others have been generally utilized as animal feed. For instance, waste from plantain, cassava, yam and potatoes are processed into animal feed for which there is a large market.

Domestic wastes (garbage, cassava peels and others) covered with a layer of sand or clay media increase plant height, leaf area, plant dry weight, induce early flowering, enhance early yield and increase total yield (Salaam, 1996).

Gourlay (1992) reported that workers at the United States Department of Agriculture (USDA) conceived the idea of producing true high quality protein by using poultry manure. He further noted that cocoa seed coat is rich in digestible protein and minerals can be milled and

incorporated into animal feed in small quantities. Fresh coconuts are used in making a reddish dye and used to dye fishing net. Mantell (1972) also confirmed that cocoa pods are dried and used as fuel. Brewer (1996) has reported that various agricultural wastes provided satisfactory substrates for vegetable growth and increased yield.

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## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 STUDY DESIGN AND TYPE**

A descriptive cross-sectional study was used to gather data on the methods used to collect and transport solid domestic waste, factors contributing to improper solid domestic waste management and solid domestic waste disposal methods. Focus Group Discussions were organized to elicit information on consequences of improper solid domestic waste management and suggestions offered to improve solid domestic waste management.

#### **3.2 STUDY POPULATION**

The study population involved households in the Agona, Wiemoase and Kona communities with specific reference to household heads or substitutes who usually supervise or direct the daily handling of sanitation in the home and twenty (20) key informants.

#### **3.3 SAMPLING TECHNIQUE AND SAMPLE SIZE**

##### **SAMPLING TECHNIQUE**

Multistage, purposive and simple random sampling techniques were used. Multistage sampling technique was chosen because the study involved a large scale survey and purposive sampling technique was also chosen because the investigator believed that the study subjects had in-depth information which will give optimal insight into the issue under investigation. A random sample of three sub districts out of the six in the district was selected. These constituted the first stage sampling units. The communities in the three sub districts were listed. According to the number of sampling units in the communities, 140 households were selected from the Agona community, 167 households from the Wiemoase community and 100 from the Kona community by simple

random probability sampling. These 407 households became the second stage sampling units of the multistage technique. Twenty (20) key informants including teachers, community health nurses, environmental health workers, dispensing chemists and the Assemblymen of the communities were selected by the purposive sampling technique. Simple random technique ensures that each member of the population is chosen at random in the study area, with no subjective or bias on the part of the researcher. Community Health Nurses and the District Environmental Health Officer were chosen from the key informants for two Focus Group Discussions. Four hundred and twenty-seven (427) respondents became the actual study units.

### **SAMPLE SIZE**

A sample size of four hundred and twenty-seven (427) was used in the study. The following statistical formula was used based on the fact that the study population was more than 10,000:

$$n = \frac{z^2 p q}{d^2}$$

where n = the desired sample size (when population is greater than 10,000)

z = the reliability coefficient for 95% confidence level usually set at 1.96

p = the proportion in the target population estimated to have a particular characteristic.

50% was used because there was no reasonable estimate. (i.e. 0.50)

$$q = 1.0 - p$$

d = degree of accuracy desired, usually set at 0.05

$$n = \frac{(1.96)^2 (1.96)^2 (0.50)(0.50)}{(0.05)^2}$$

$$n = 427.$$

The total sample size came up to four hundred and twenty-seven (427).

### 3.4 STUDY VARIABLES

The study variables included types of receptacles for waste, frequency of disposal, distance of refuse dump, type of refuse dump, availability of community storage receptacles, disposal methods and methods of waste transport, attitude and behaviour towards sanitation and land for dump site as the independent variables and methods of solid domestic waste management as the dependent variable.

**Table 3.1 Table of variables**

| Type of variable            | Variable                                  | Operational Definition/Indicator      | Scale of measurement                                                           | Data collection tool | Data collection technique |
|-----------------------------|-------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------|----------------------|---------------------------|
| <b>Dependent variable</b>   | Method of domestic solid waste management | Type of waste manag't in action       | Nominal<br>1.proper<br>2.improper                                              | Questionnaire        | Interview                 |
| <b>Independent variable</b> | Level of education                        | Last level attained                   | Ordinal<br>1.Primary<br>2.Middle/JSS                                           | Questionnaire        | Interview                 |
|                             | Type of receptacle for refuse             | Type of receptacle used by respondent | Nominal<br>1.old basket<br>2.plastic bin with lid<br>3.plastic bin without lid | Questionnaire        | Interview<br>Observation  |
|                             | Community storage receptacle              | Present/Absent                        | Binary<br>1.Yes<br>2.No                                                        | Questionnaire        | Interview                 |
|                             | Method of waste collection                | Type of method used for collection    | Nominal<br>1.door to door<br>2.communal                                        | Questionnaire        | Interview                 |

|  |                                    |                                 |                                                                                                                            |               |                          |
|--|------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|
|  |                                    |                                 | 3.other                                                                                                                    |               |                          |
|  | Method of waste transport          | Method used to transport waste  | Nominal<br>1.carried on the head<br>2.by wheelbarrow<br>3.other                                                            | Questionnaire | Interview<br>Observation |
|  | Place of waste disposal            | Site where waste is disposed of | Nominal<br>1.at the refuse dump<br>2.on the road to refuse dump<br>3.on the road to farm<br>4.into nearby bush             | Questionnaire | Interview                |
|  | Refuse dump                        | Type of refuse dump used        | Nominal<br>1.isolated spots within community<br>2.dump at town outskirts<br>3.dug trench                                   | Questionnaire | Interview<br>Observation |
|  | Proximity to dump site             | Distance to dump site           | Ordinal<br>1.too far(250+m)<br>2.far(200-250m)<br>3.quite far(150-200m)<br>4.close(100-150)<br>5.too close(less than 100m) | Questionnaire | Interview                |
|  | Availability of land for dump site | Present/Absent                  | Binary<br>1.yes                                                                                                            | Questionnaire | Interview                |

|  |                              |                |                         |               |                          |
|--|------------------------------|----------------|-------------------------|---------------|--------------------------|
|  |                              |                | 2.no                    |               |                          |
|  | Community storage receptacle | Present/Absent | Binary<br>1.yes<br>2.no | Questionnaire | Interview<br>Observation |

### 3.5 DATA COLLECTION TECHNIQUES AND TOOLS

The main data collection tool was a structured questionnaire backed by interview. The main issues that were addressed in the design of the questionnaire included the respondents' educational background, socioeconomic and cultural backgrounds, knowledge level on solid waste management, attitude and behaviour towards sanitation programmes, types of receptacles used to collect solid domestic waste, frequency of emptying storage receptacles, methods of transport of solid waste, method of refuse disposal, proximity to dump site and availability of community storage receptacles. Focus Group Discussions were conducted to elicit suggestions from respondents for improving solid domestic waste management and consequences of improper solid domestic waste management.

The questions were both closed and open-ended. Interviews and observation as regards how the respondents collect, store, transport and finally dispose of their solid domestic refuse were employed to find out more relevant facts about how solid domestic refuse is being managed in the study area.

Collection of data was done from July to October 2008. Since most of the respondents were illiterate, their responses were recorded in English after the questions had been interpreted in the

local language to them. However, for the few literate ones, the questionnaire was handed over to them and they were requested to use four days to complete the items. The response rate for the self-administered questionnaire was 100%. The data collected by the questionnaire were recorded in tables expressed as frequencies and percentages.

### **3.6 DATA HANDLING / ANALYSIS**

After the data for each community had been checked for accuracy and completeness, they were then kept safely in a large brown envelope for analysis. Data were entered into a computer and analyzed with Statistical Package for the Social Sciences (SPSS) version 14 and Microsoft Excel 2007. The relevant information was retrieved in a standard form using tables, figures, frequencies and percentages for analysis and interpretation of the information.

### **3.7 PRE-TESTING**

It was necessary for the study to be conducted in a similar area with similar characteristics to enable the instruments to be redesigned if need be. The pre-testing was therefore done in a sub district with similar environmental features. The sub district which was identified to be close and share similar characteristics is the Kyekyewere sub district which shares boarder with Wiamoase sub district to the west. After the pre-testing some of the questions were modified and added. The respondents had the questions in a logical sequence and the questionnaire was made as short as possible. The questionnaire thus became ready for administration in the next stage of the research.

### **3.8 ETHICAL CONSIDERATION**

Ethical clearance for the study was obtained from the School of Medical Sciences, Kwame Nkrumah University of Science and Technology (KNUST) and the District Director of Ghana Health Service of Afigya Sekyere District.

The nature, purpose and procedure of the study were explained to each participant and they were made aware that they were free to refuse to answer any questions or drop out of the study at any time and will not affect them. Consent was then obtained from each participant in the study where participants either appended their signatures or thumbprints. Participants were assured of the confidentiality of personal information and written materials. There are no known risks to who take part in this study. Participants will rather benefit from the study since they have an opportunity to express their views and experiences with regards to solid domestic waste management.

### **3.9 ASSUMPTIONS**

All responses and information provided by the respondents were assumed to be accurate and a true representation of the study area.

#### **3.1.0 LIMITATIONS OF STUDY**

The study did not cover the entire communities in the district due to lack of resources such as financial support, time and personnel. The depth of the study was not reached accordingly.

## **CHAPTER FOUR**

### **4.0 RESULTS AND ANALYSIS**

#### **4.1 INTRODUCTION**

This chapter presents details of the findings of 427 household heads or substitutes, key informants and a focus group. The presentations are made in the form of tables with frequencies and percentages for ease of comprehension.

#### **4.2 SOCIAL CHARACTERISTICS OF RESPONDENTS**

The average age of the respondents was 49.5 years with a standard deviation (SD) of 14.5. The minimum age was 22 years and the maximum 90 years. Eight percent (8%) of the respondents had no formal schooling at all and 10% had Primary education. Middle school Form 4 and Junior High School had the highest percentage of 37%. Thirty-one (31%) went through Secondary/ Vocational/ Technical institutions with 14% having had tertiary education. Forty-eight percent (48%) were government employees, 35% had private employment and 17% were unemployed. Majority had average income (63%) and 37% had low income. None of them recorded receiving high income. Seventy-seven percent (77%) of the respondents were married and 17% single. Four percent (4%) and 2% were divorced and separated respectively. Christians formed the majority of respondents (72%) and 28% being Muslims.

**Table 4.1 Social characteristics of respondents**

| <b>Variables</b>             |                              | <b>Frequency N = 427</b> | <b>Percentages (%)</b> |
|------------------------------|------------------------------|--------------------------|------------------------|
| <b>Sex</b>                   | Male                         | 312                      | 73                     |
|                              | Female                       | 115                      | 27                     |
| <b>Type of occupation</b>    |                              |                          |                        |
|                              | Government                   | 205                      | 48                     |
|                              | Private                      | 149                      | 35                     |
|                              | Unemployed                   | 73                       | 17                     |
| <b>Educational level</b>     |                              |                          |                        |
|                              | No schooling                 | 34                       | 8                      |
|                              | Primary                      | 43                       | 10                     |
|                              | JHS / Middle Form 4          | 158                      | 37                     |
|                              | SHS/Vocational/Technical     | 132                      | 31                     |
|                              | Tertiary                     | 60                       | 14                     |
| <b>Income level</b>          |                              |                          |                        |
|                              | High (GH 400and above)       | 0                        | 0                      |
|                              | Average(GH 200-400)          | 269                      | 63                     |
|                              | Low(below GH200) /Unemployed | 158                      | 37                     |
| <b>Marital status</b>        |                              |                          |                        |
|                              | Married                      | 329                      | 77                     |
|                              | Single                       | 73                       | 17                     |
|                              | Divorced                     | 17                       | 4                      |
|                              | Separated                    | 8                        | 2                      |
| <b>Number of children</b>    |                              |                          |                        |
|                              | 1 – 3                        | 201                      | 47                     |
|                              | 4 – 6                        | 112                      | 28                     |
|                              | 7+                           | 77                       | 18                     |
|                              | Other                        | 37                       | 7                      |
| <b>Religious affiliation</b> |                              |                          |                        |
|                              | Christian                    | 300                      | 72                     |
|                              | Muslim                       | 127                      | 28                     |

*Source: Field Survey, 2008*

#### 4.3 METHODS USED TO COLLECT AND TRANSPORT SOLID DOMESTIC WASTE

With the door to door method (136), bigger containers for refuse are placed by certain selected houses and refuse from individual houses in the catchment area are sent into those containers. Paid staff (Zoomlion employees) transport and dispose of the waste at the refuse dump. With the communal method (145), individual household wastes are carried directly to larger community storage receptacles for onward transmission to the dump site by paid workers. Seventy-three (73) respondents used the wheelbarrow to transport their waste to the dump site and 73 used other methods such as sending their waste to a nearby bush or the farm.

**Table 4.2 Methods of waste collection and transport**

| Method             | Frequency  | Percentage(%) |
|--------------------|------------|---------------|
| Door to door       | 136        | 32            |
| Communal           | 145        | 34            |
| Wheelbarrow system | 73         | 17            |
| Others             | 73         | 17            |
| <b>Total</b>       | <b>427</b> | <b>100</b>    |

*Source: Field Survey, 2008*

#### 4.4 FACTORS CONTRIBUTING TO IMPROPER SOLID DOMESTIC WASTE MANAGEMENT

The factors identified were low level of education of respondents, low incomes and unemployment, lack of proper storage receptacles, lack of community storage receptacles,

distance to the dump site, types of refuse dumps used, method of disposal of waste and unavailability of land for dump site.

Source: Field Survey, 2008

#### 4.4.1 Income level of respondents

Two hundred and ninety-seven (297) respondents had average incomes and 130 comprised of low income earners and the unemployed. With respect to income level, no significance was seen between income level and the kind of solid domestic waste management practiced ( $p = 3.841$ )

**Table 4.3 Income level of respondents**

|                           | <b>Average</b> | <b>Low</b> | <b>Total</b> |
|---------------------------|----------------|------------|--------------|
| Proper waste management   | 270            | 30         | 300          |
| Improper waste management | 27             | 100        | 127          |
| <b>Total</b>              | 297            | 130        | 427          |

Chi square value = 19.9;  $p$  – value = 3.841

#### 4.4.3 Availability of community storage receptacles

Eighty percent (80%) of the respondents had no storage receptacles in their communities while 20% had community storage receptacles.

**Table 4.4 Availability of community storage receptacles**

| Storage receptacle | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| Available          | 85        | 20             |
| Unavailable        | 342       | 80             |
| <b>Total</b>       | 427       | 100            |

*Source: Field Survey, 2008*

#### **4.4.4 Distance to dump site**

Fifty-nine percent (59%) of the respondents lived far away from the dump site (26% were too far away and 33% were far away from the dump site). Significantly, there was no difference between distance to dump site and the type of dumping practiced either proper or otherwise ( $p = 0.6299$ ).

**Table 4.5 Cross tabulation table showing distance to dump site among respondents**

|                  | Close       | Far         | Total |
|------------------|-------------|-------------|-------|
| Proper dumping   | 150 (62.7%) | 106 (57.6%) | 256   |
| Improper dumping | 89 (37.3%)  | 82 (42.3%)  | 171   |
| <b>Total</b>     | 239 (100%)  | 188 (100%)  | 427   |

Odds = 1.19;  $p$  – value = 0.6299

#### **4.4.5 Types of refuse dumps used in the communities**

Sixty-nine percent (69%) of the respondents used a surface dump at the outskirts of town. This type of dump is not recommended so far as public health is concerned. Twenty percent of

respondents (20%) used isolated spots within the community as dump sites, another unwelcoming situation. Dug trench was used by 6% and 5% used other methods.

**Table 4.6 Types of refuse dumps used in the communities**

| Type of dump                        | Frequency  | Percentage (%) |
|-------------------------------------|------------|----------------|
| Isolated spots within the community | 85         | 20             |
| Surface dumps at outskirts of town  | 295        | 69             |
| Dug trench                          | 26         | 6              |
| Others                              | 21         | 5              |
| <b>Total</b>                        | <b>427</b> | <b>100</b>     |

*Source: Field Survey, 2008*

#### 4.4.6 Storage receptacles

The main type of receptacle used was an old basket without cover (37%), 11% used old baskets with covers and 12% used plastic bins without lids. Use of all the three types of receptacle contributes to improper solid domestic waste management.

**Table 4.7 Type of receptacle used by respondents**

| Type of receptacle       | Frequency  | Percentage (%) |
|--------------------------|------------|----------------|
| Plastic bin with lid     | 149        | 35             |
| Plastic bin without lid  | 51         | 12             |
| Old basket with cover    | 47         | 11             |
| Old basket without cover | 158        | 37             |
| Other                    | 22         | 5              |
| <b>Total</b>             | <b>427</b> | <b>100</b>     |

*Source: Field Survey, 2008*

#### 4.4.7 Solid domestic waste disposal method

Three hundred and sixty-three (363) respondents corresponding to 85% disposed of their refuse at an open surface dump and fifty-one (51) corresponding to 12% into the nearby bush. This situation remarkably contributes to improper solid domestic waste management.

**Table 4.8 Solid domestic waste disposal method**

| Method of disposal       | Frequency  | Percentage (%) |
|--------------------------|------------|----------------|
| On the road to dump site | 13         | 3              |
| At the refuse dump       | 363        | 85             |
| Into the nearby bush     | 51         | 12             |
| <b>Total</b>             | <b>427</b> | <b>100</b>     |

Source: Field Survey, 2008

#### 4.4.8 Availability of land for dump site

Seventy-three percent (73%) of the respondents recorded non-availability of land for dump site. The remaining 27% had land for dump site.

**Table 4.9 Availability of land for dump site**

| Available    | Frequency  | Percentage (%) |
|--------------|------------|----------------|
| Yes          | 115        | 27             |
| No           | 312        | 73             |
| <b>Total</b> | <b>427</b> | <b>100</b>     |

Source: Field Survey, 2008

## **CHAPTER FIVE**

### **5.0 DISCUSSION**

#### **5.1 INTRODUCTION**

This chapter considers the findings gathered on the sample from the study population and discusses it in line with the objectives, literature review, and the key variables of the research.

#### **5.2 DEMOGRAPHIC CHARACTERISTICS**

The average age of the respondents was 49.5 years; the oldest was 90 and the youngest 22 years. The males were more than the females. A few of them had tertiary education, primary education and no schooling at all with the majority having had secondary education. All respondents either had average or low income with a few unemployed. On the religious front, respondents were either Christians or Muslims with Christians forming the dominant group. Most of them were married with a few either, single, divorced or separated.

#### **5.3 METHODS OF WASTE COLLECTION AND TRANSPORT**

A third (32%) of the respondents in the study collected and transported their waste by the door to door method (from individual households to containers placed in front of selected houses) and 34% by the communal method (from individual households to community storage receptacles for onward transmission to dump site), 17% used the wheelbarrow system and 17% used other methods. Basically, solid waste collection is the process of transferring solid wastes from storage receptacles into vehicles and then transporting it to the disposal sites (Nyang'echi, 1992). In this study, no vehicles were involved in waste collection but rather people carried waste from the storage sites to the dump site. Some of the receptacles leaked and dropped some of the waste on

the ground and may spread pathogens. Bad odour is also released polluting the air. Water bodies get polluted giving rise to water-borne diseases such as cholera and diarrhoea. Tsiboe and Marbell, (2004) add weight to this fact by stating that in Accra disposal sites are located near the sea and are polluting the Korle lagoon creating an unhealthy environment.

## **5.4 FACTORS CONTRIBUTING TO IMPROPER SOLID DOMESTIC WASTE MANAGEMENT**

### **5.4.1 Income level of respondents**

A remarkable number of the respondents had average and low incomes. There was also the problem of unemployment. There was no significant difference between income level and the type of solid domestic waste management practiced ( $p = 3.841$ ). Tsiboe and Marbell (2004) stated in their study that “a combination of poverty, population pressure, and economic hardships is placing a considerable strain on household environments in Accra. Majority of the people in Ghana live below the internationally recognized poverty line of one dollar a day. Satterthwaite (1998) virtually agrees in principle that the waste problem emanates from poverty and lack of funding as a result of low level of economic growth. Financial constraints undoubtedly are a factor that contributes to improper solid domestic waste management.

### **5.4.2 Type of storage receptacle used**

Sixty percent (60%) of the respondents used receptacles without covers. Thus, they lacked proper storage receptacles. These attract flies; serve as a breeding place for many insects and vermin which transmit disease. The stench emanating from these open receptacles become a nuisance to people. A study conducted by Benneh et al in 1993 showed that the problem of solid

waste in Accra begins at the home. According to Benneh et al (1993), open storage of solid waste was practiced by some 42% of households in Accra and some of the problems associated with this system of waste disposal have been the prevalence of rodents and flies around the home.

#### **5.4.3 Availability of community storage receptacle**

Eighty percent (80%) of the respondents had no community storage receptacles while 20% had them. The presence or otherwise of community storage receptacles may influence the kind of solid domestic waste management practiced.

#### **5.4.4 Distance to dump site**

Majority of the respondents were far away from the dump site (26% were too far away and 33% were far away from the dump site. Significantly, there was no difference between distance to dump site and the kind of dumping practiced ( $p = 0.6299$ ). The possibility is that indiscriminate dumping which promotes infection and creates an unsightly scene could be practiced. Gourlay (1992) stated that, “ Environmentalists should not only join scientists and other responsible sectors of industry and agriculture to find better ways for disposing of wastes, but to locate convenient places for their disposal.

Location of the dumping sites too can be discouraging, considering the fact that children who are assigned to carry wastes to the dumps may find it inconvenient to walk long distances and out of frustration may dump them anyhow and anywhere.

Fasida (1996) also stressed that the paramount consideration in the management decisions involving waste disposal is site location. To eliminate the problem involved in indiscriminate disposal of waste, sites located for waste disposal be “paramount” as quoted by Fasida. The results therefore suggest that the communities have not taken the pains to identify suitable sites to enable them manage wastes well.

#### **5.4.5 Type of refuse dump used in the communities**

Sixty-nine percent (69%) of the respondents used a surface dump at the outskirts of town. This type of dump is not recommended as far as public health is concerned. 20% of them used isolated spots within the communities as dump sites, another adverse state of affairs. Dug trench was used by 6% and 5% used other methods. Surface dumps at the outskirts of towns have serious negative public health implications. Goldsmith (1988) emphasized that improper refuse dump, apart from ruining an area’s appearance, also provide a comfortable breeding place for animals and other organisms that spread diseases.

These wastes, according to him, drain into water bodies to contaminate the water sources, the result of which is the rampant outbreak of typhoid fever in the area. Since mosquitoes also breed at unhygienic places, the improper dump in the area gives the mosquitoes an opportunity to lay their eggs which are hatched and increase the quantum of mosquitoes and hence a high incidence of malaria. The virus which causes cholera arrests the opportunity of the unhygienic environment to cause infection.

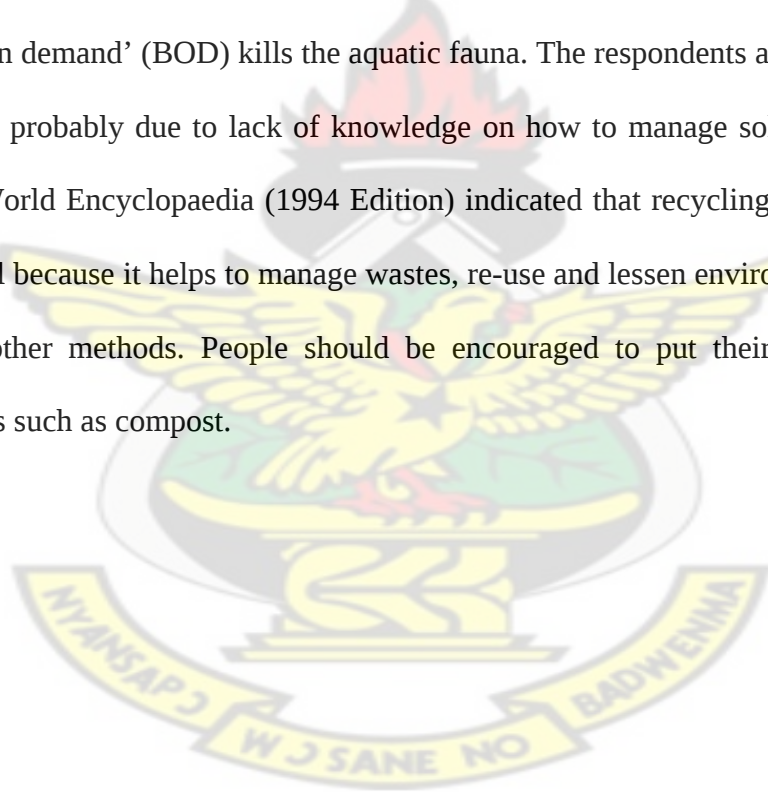
The communities therefore must be taught and sensitized to live in a clean environment. But this would be possible if people would change their negative attitude about waste disposal to help reduce the outbreak of diseases. Open dumps are poor methods of disposing of waste because of the environmental problems they cause. Refuse dumps are located on the edges of cities, towns, and villages, sometimes in ecologically sensitive areas, or areas where groundwater supplies are threatened. They serve as breeding grounds for rats, flies, birds and other organisms that function as disease vectors. In poorer areas, uncollected wastes accumulate at roadsides, are burnt by residents, or are disposed of in illegal or inappropriate dumps which blight neighbourhoods and harm public health (Medina, 1997). The sheer volume of domestic solid wastes is already causing serious disposal problems because most of the methods used to dispose them result in some kind of damage to the environment. When these solid domestic wastes are placed into open dumps, they ruin the attractiveness of the surrounding area. Dumps also provide habitats for disease carrying organisms (Barrow, 1995).

#### **5.4.6 Availability of land for dump site**

A greater percentage of respondents mentioned unavailability of land for dump site (73%). Without doubt, this situation would promote indiscriminate or crude dumping with its attendant negative public health effects. Fasida (1996) also emphasized that the paramount consideration in the management decisions involving waste disposal is site location. Much attention is not given to the location of sites for waste disposal the result of which is the prevalence of disease outbreak.

## 5.5 WASTE DISPOSAL METHOD

More than three out of four (85%) of the respondents disposed of their refuse at the refuse dump sites which are mostly surface dumps. This is reiterated by Asomani-Boateng and Haight (1998) who also had 79% of their respondents using the same method. This method of waste disposal according to Mantell (1972) causes environmental problems. They can destroy an area's appearance and provide a home for animals and insects that spread diseases. Barrow (1995) strongly disagrees with this method of disposal practiced by the people by pointing out that when wastes (agricultural wastes) are drawn into streams by run-off water, eutrophication, resulting in 'biological oxygen demand' (BOD) kills the aquatic fauna. The respondents adopted this practice of waste disposal probably due to lack of knowledge on how to manage solid domestic waste. Reports by the World Encyclopaedia (1994 Edition) indicated that recycling is the best method of wastes disposal because it helps to manage wastes, re-use and lessen environmental hazards as compared with other methods. People should be encouraged to put their waste into useful agricultural inputs such as compost.



## CHAPTER SIX

### 6.0 CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 CONCLUSIONS

Four hundred and twenty-seven (427) respondents were interviewed on the assessment of the methods solid domestic waste management in the Afigya Sekyere District through multistage, purposive and simple random sampling. Majority of the respondents had average education (72%). The communal method of waste collection was used by 34% of the respondents followed by the door to door method of 32%. Waste was mainly carried on the head to the dump site by collectors and a few used the wheelbarrow. Thirty-five percent (35%) used plastic bins with lids as the type of receptacle used by the respondents. Eighty percent (80%) had no community storage receptacles and 56% of respondents emptied their storage receptacles once daily. Majority of the respondents disposed of their waste at the refuse dump (85%) and 69% used surface dump at the outskirts of town as the main method of waste disposal. The dump site was far away from 59% of the respondents. Seventy-three percent (73%) of respondents recorded unavailability of land for dump site. Respondents stated breeding of vectors of disease and disease outbreak as the major consequence of improper solid waste management (60%). Cholera was listed as the commonest disease caused by improper solid waste management (38%) followed by malaria (37%). Supply of household bins and community storage receptacles (29%) was the most popular suggestion by respondents for improving solid waste management with intensification of health education as the runner-up (17%).

## **6.2 RECOMMENDATIONS**

This study has revealed that solid domestic waste management is not proper and healthy in the Afigya Sekyere district and the following measures are recommended for action by all stakeholders.

### **Educational Institutions**

More students of public health are to undertake further research into solid domestic waste management as the study was not in-depth enough due to certain limitations. Solid domestic waste management with more emphasis on recycling of domestic waste and transforming domestic waste into manure and compost should be included in the school curriculum right from the basic to the tertiary levels.

### **The District Health Management Team**

The DHMT should organize periodic environmental health education at social gatherings, on market days and in places of worship on the need to live in a healthy environment and proper methods of waste disposal.

### **The District Assembly**

In collaboration with the people, the District Assembly should supply hygienic bins or storage receptacles to community members. The District Assembly should provide waste collection vehicles and come out with a programme that should completely involve the communities (community participation) in managing solid domestic waste in the district.

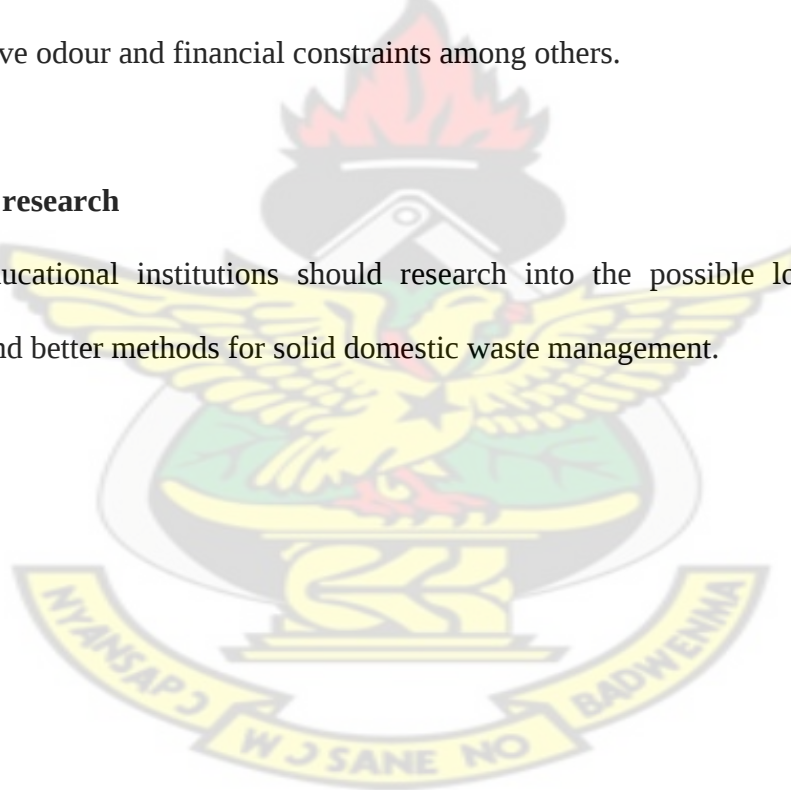
The Assembly should ensure that recommended dump sites are properly located in the communities and regulations governing environmental health are enforced in the communities. Dumping solid domestic waste into landfills and dug trenches should be encouraged by the Environmental Health Unit of the District Assembly.

### **Government, Non-Governmental Organizations and Research Institutions**

Government, non-governmental organizations (NGOs) and research establishments should encourage research into problems concerned with solid domestic waste management such as bulkiness, offensive odour and financial constraints among others.

### **Areas for future research**

Research and educational institutions should research into the possible local use of solid domestic waste and better methods for solid domestic waste management.



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## APPENDICES

### APPENDIX 1

#### KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, SCHOOL OF MEDICAL SCIENCES, DEPARTMENT OF COMMUNITY HEALTH

#### QUESTIONNAIRE

This questionnaire seeks to elicit information on the assessment of solid domestic waste methods in the Afigya Sekyere District of the Ashanti Region of Ghana. It is for an academic exercise purposely. Please you are respectfully requested to complete the items as dispassionately as you can. The confidentiality of your responses are assured.

Name of respondent.....

House number.....

Age.....

#### DEMOGRAPHIC AND SOCIOECONOMIC FEATURES

1. Sex  
Male ☐ ☐  
Female ☐ ☐
2. Number of children  
(i) 1-3 ☐ ☐  
(ii) 4-6 ☐ ☐  
(iii) 7+ ☐ ☐
3. Type of occupation  
(i) Private ☐ ☐  
(ii) Government ☐ ☐  
(iii) Unemployed ☐ ☐

4. Income level
- (i) High (400 Cedis or more) [ ]
  - (ii) Average(200-400 Cedis) [ ]
  - (iii) Low (200 Cedis and below) [ ]
5. Level of education
- (i) Primary [ ]
  - (ii) JHS/Middle Form 4 [ ]
  - (iii) SHS/'O' Level [ ]
  - (iv) Tertiary [ ]
  - (v) None [ ]
  - (vi) Others (specify).....
6. Marital status
- (i) Married [ ]
  - (ii) Single [ ]
  - (iii) Divorced [ ]
  - (iv) Separated [ ]
7. Place of residence
- (i) With spouse [ ]
  - (ii) With children [ ]
  - (iii) With spouse and children [ ]
  - (iv) Alone [ ]
8. Religious affiliation
- (i) Christian [ ]
  - (ii) Muslim [ ]
  - (iii) Pagan [ ]
  - (iv) Buddhist [ ]
  - (v) Others (specify).....

### Sources of information and knowledge on solid waste management

9. Availability of sources of information on solid waste management
- (i) Yes [ ]
  - (ii) No [ ]
10. Information source on proper solid waste treatment
- (i) Parent/Relatives [ ]
  - (ii) School [ ]
  - (iii) Mass media [ ]
  - (iv) Health workers (specify) [ ]
  - (v) Others (specify).....
11. Awareness of consequences of bad solid waste disposal
- (i) Yes [ ]
  - (ii) No [ ]
12. Meaning of proper solid waste treatment to you
- (i) Sweeping the house and throwing refuse away [ ]
  - (ii) Keeping the house neat or clean [ ]
  - (iii) Storing, transporting and disposing of refuse hygienically [ ]
  - (iv) Others (specify).....

### Attitude and behaviour

13. Reaction towards sanitation programmes
- (i) Get close [ ]
  - (ii) Stay away [ ]

14. No. of times present at sanitation programmes
- (i) Once [ ]
  - (ii) Twice [ ]
  - (iii) None [ ]
  - (iv) Other [ ]
15. Methods of waste collection
- (i) Door to door [ ]
  - (ii) Communal [ ]
  - (iii) Others (specify).....

**Types of receptacles used**

16. In what do you store your refuse?
- (i) Heap at a corner in the house [ ]
  - (ii) Heap outside near the house [ ]
  - (iii) Old basket without cover [ ]
  - (iv) Old basket with cover [ ]
  - (v) Plastic bin without lid [ ]
  - (vi) Plastic bin with lid [ ]
  - (vii) Others (specify).....
17. Presence of community storage receptacle
- (i) Yes [ ]
  - (ii) No [ ]

**Methods of transport of solid waste**

19. What method do you use to transport your refuse to the dump site?
- (i) Door to door method [ ]
  - (ii) Communal method [ ]
  - (iii) Wheelbarrow system [ ]
  - (iv) Others (specify).....

- 20 Who transports your refuse to the dump site?
- (i) Myself [ ]
  - (ii) My child [ ]
  - (iii) Paid worker [ ]
  - (iv) Others (specify).....
21. Where do you dispose of your refuse?
- (i) On the road to farm [ ]
  - (ii) On the road to dump site [ ]
  - (iii) Into a river/stream/pond/gutter (underline that which applies) [ ]
  - (iv) At the refuse dump [ ]
  - (v) Into the nearby bush [ ]
  - (vi) Onto a weedy house plot nearby [ ]
22. How many dump sites are in your community?
- (i) One [ ]
  - (ii) Two [ ]
  - (iii) Three [ ]
  - (iv) None [ ]
  - (v) Others (specify).....
23. Type of refuse dump in your community
- (i) Isolated spots within the community [ ]
  - (ii) Surface dump at the outskirts of town [ ]
  - (iii) Dug trench [ ]
  - (iv) Others (specify).....

24. What do you have to say on the distance to the dump site?

- (i) Too far (250m or more) [ ]
- (ii) Far (200-250m) [ ]
- (iii) Quite far (150-200m) [ ]
- (iv) Close (100-150m) [ ]
- (v) Too close (less than 100m) [ ]

**Availability of land for dump site**

25. Is land available for proper refuse dump site?

- (i) Yes [ ]
- (ii) No [ ]

26. Are community leaders willing to release land for dump sites?

- (i) Yes [ ]
- (ii) No [ ]

27. If no why not?

- (i) Fear of polluting communities [ ]
- (ii) Fear of disease outbreak [ ]
- (iii) Others (specify).....

**Consequences of improper refuse management and suggestions for improvement**

28. Are you aware of some of the common problems associated with improper refuse management within the community? Write down the problem.....

.....

.....

.....

.....

29. How often do people within the community report sick and where do they seek help?

.....

.....

.....

30. List some of the common diseases that affect the community members (specify)

.....

.....

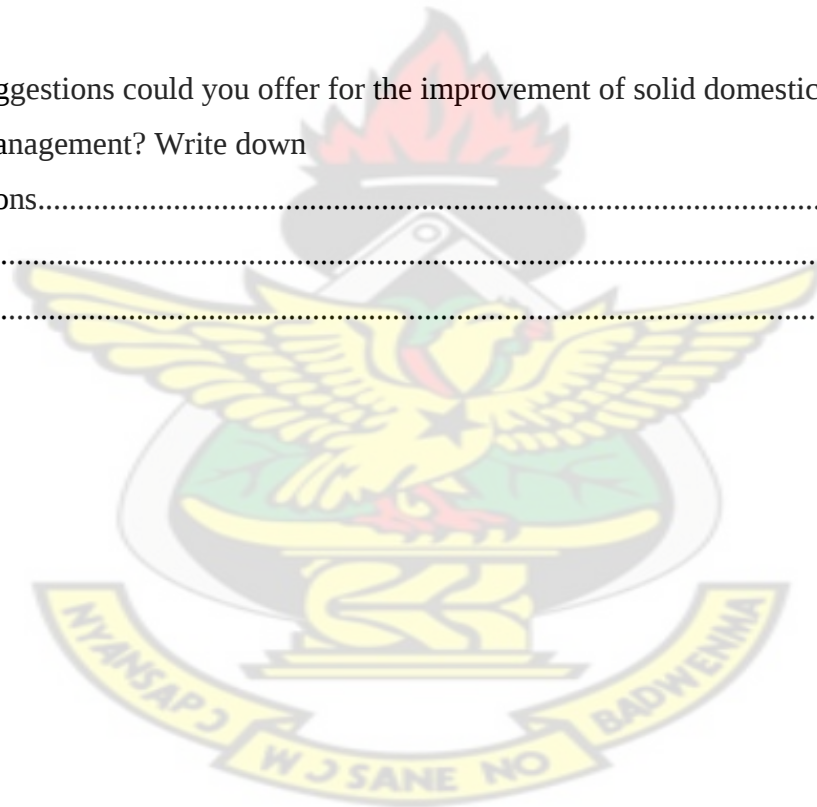
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31. What suggestions could you offer for the improvement of solid domestic/public solid waste management? Write down suggestions.....

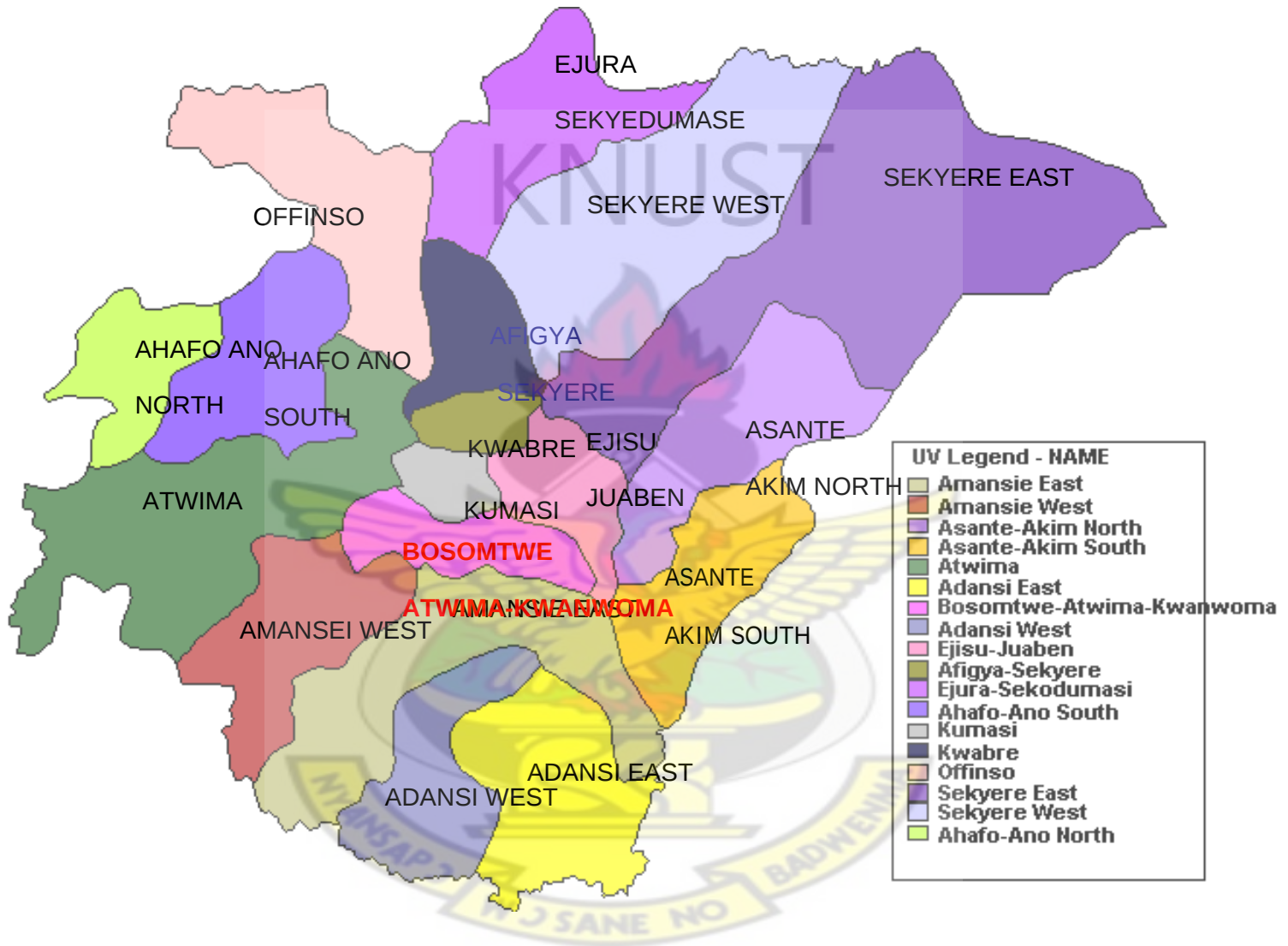
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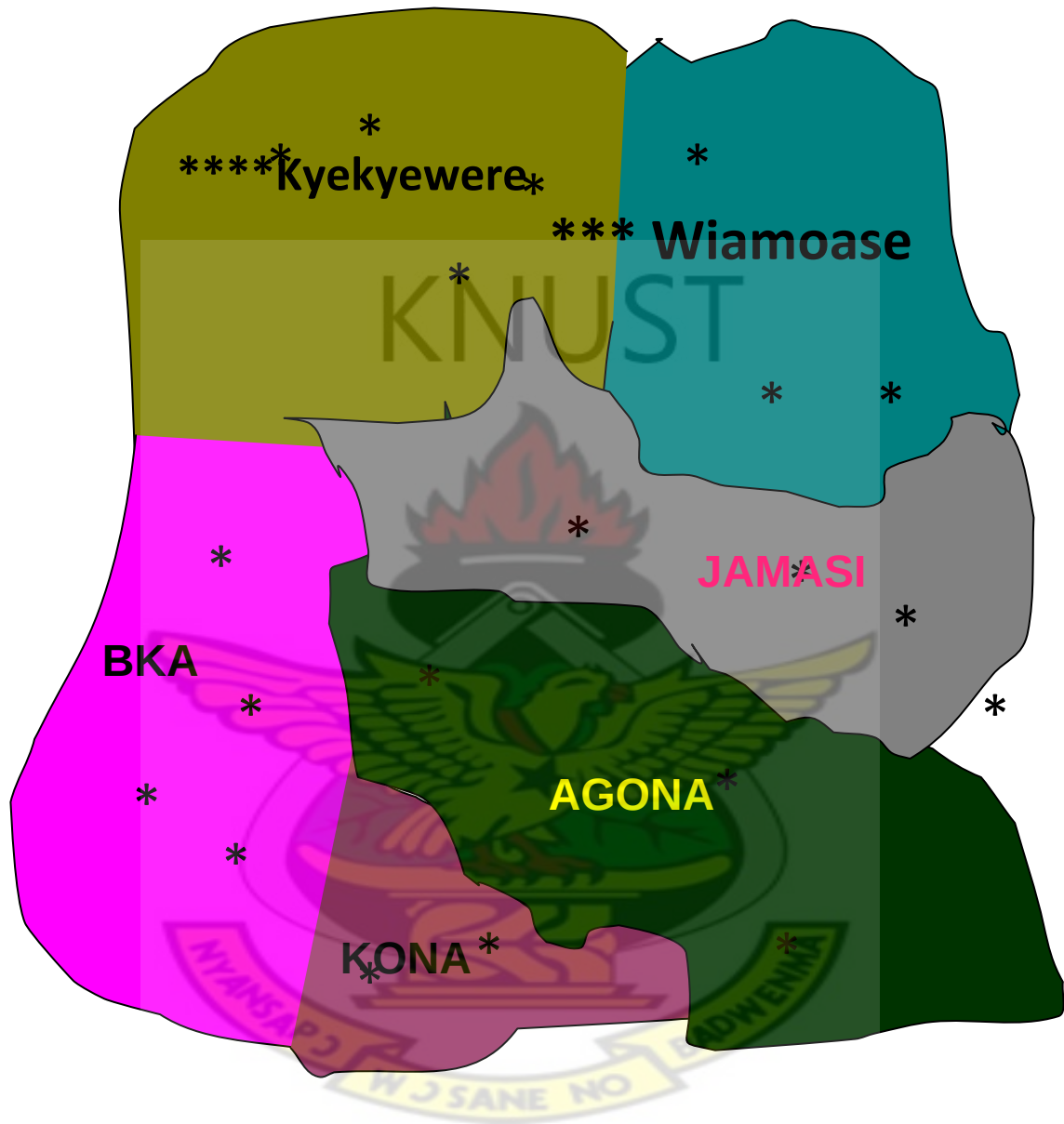


## APPENDIX 2

### MAP OF ASHANTI REGION OF GHANA INCLUDING THE STUDY DISTRICT

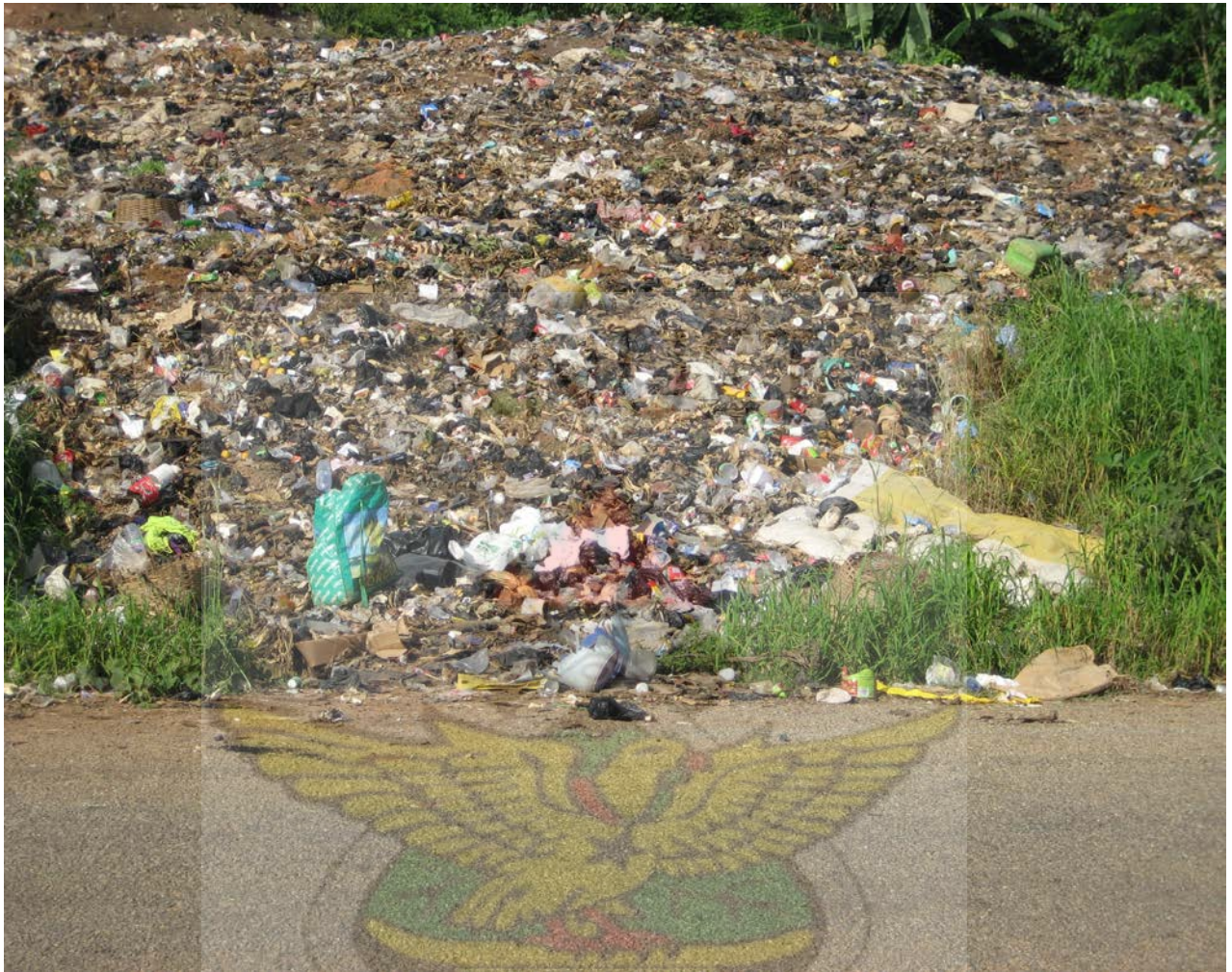


DISTRICT MAP SHOWING THE 6 SUB-DISTRICTS



### APPENDIX 3

Figure 1.2 Surface dump at the outskirts of the Agona community



Solid domestic waste has almost invaded the road and presents an unsightly scene and stench to passers-by. After rains, run-off water from the dump site pollutes water bodies with the potential of causing disease outbreaks

Figure 1.3 Children defecating on a refuse dump in the Wiamoase community



These children are defecating bare-footed on the dump with the possibility of getting infected.

## APPENDIX 4

### FIRST FOCUS GROUP DISCUSSION

**FACILITATOR:** KWAME ADU-KYEI

**NOTE TAKER:** T. ADJEI BENEFO

**PARTICIPANTS:** COMMUNITY HEALTH WORKERS

### INTRODUCTION

This is a research work by Kwame Adu-Kyei on assessment of solid domestic waste methods among COMMUNITY HEALTH WORKERS in the Afigya Sekyere District of Ashanti Region – FOCUS GROUP DISCUSSION (FGD) on 10/9/2008 at 9.30 am with 6 participants for AGONA Area: - Agona Sub-district.

**Facilitator:** Since almost all of us know and have heard of solid waste management, I would like to know what it means. Please mention identity number before you answer the question.

**Respondent 6:** It means keeping the environment clean of any filth including clearing of bushes around our communities.

**Respondent 4:** In my opinion, it means not allowing unwanted materials to be scattered in our environment; on the streets, around our houses and getting gutters desilted to facilitate drainage.

**Facilitator:** RESPONDENT 3, what about you?

**Respondent 3:** It means storing our wastes properly and disposing of them at a refuse dump.

**Facilitator:** Any more to say on that, respondent 2? I think my colleagues have said much about it. I have nothing more to say.

**Facilitator:** Because of improper solid waste management, our environment is polluted with garbage. What is your impression about it?

**Respondent 1:** (angry) This problem has to do with the attitude of people. Most of them know that throwing things around is not healthy and yet they continue to do it. They just don't care.

**Facilitator:** Can you tell me more about it, RESPONDENT 5?

**Respondent 5:** I think it is shameful for us as community members to be engulfed by garbage and people don't seem to be worried about it.

**Respondent 2:** (an elderly nurse who has not yet spoken) We have been complaining about this for a long time. There is lack of waste collection bins and no waste collection vehicle.

**Respondent 6 and 1** (Together): We agree with 2.

**Facilitator:** Do you have proper waste disposal sites in the community, RESPONDENT 3?

**Respondent 3:** No.

**Respondent 4:** There are few surface dumps dotted in the community. What is serious about it is that filth is almost invading peoples' houses.

**Respondent 5:** There are two main open dumps located at the outskirts of town along the road.

**Facilitator:** Tell me, do you have a problem of indiscriminate dumping, RESPONDENT 2?

**Respondent 2:** Oh yes, very rampant.

**Facilitator:** Why is that so?

**Respondent 1:** The mindset of most of the people is bad, I think. They need a positive attitude. You can't understand what is wrong with people. Again, most of the people have very low incomes and some are unemployed hence they can't afford to buy waste bins.

**Respondent 6:** I support RESPONDENT 1.

**Facilitator:** What are some of the adverse effects of improper solid waste management?

**Respondent 4:** The most glaring effect is the marring of environmental beauty and pollution of the environment.

**Facilitator:** What about you, RESPONDENT 3?

**Respondent 3:** I think pollution of the land, water bodies and ground water are paramount.

**Facilitator:** Do you have something different RESPONDENT 5?

**Respondent 5:** Improper solid waste management presents a lot of health problems in the community. There is breeding of vectors and outbreak of disease especially on open or surface refuse dumps.

**Respondent 3:** I would like to share the opinion of RESPONDENT 2. Let me add that stagnant waters and water collected in empty cans breed mosquitoes increasing the burden of malaria.

**Respondent 2:** Offensive odour emanating from decomposing refuse make inhabitants uncomfortable.

**Facilitator:** Would RESPONDENT 6 tell us more?

**Respondent 6:** There is creation of unsightly scenes especially at town outskirts along the road where wastes are disposed of in open dumps. Honestly, this issue under discussion must be taken seriously by all stakeholders.

**Respondent 1:** Refuse chokes gutters and cause poor drainage when it rains.

**Facilitator:** Mention any disease you know is associated with improper solid waste management.

**Respondent: (ALL RESPONDENTS SIMULTANEOUSLY)** Malaria, Cholera, Diarrhoea and Typhoid fever.

**Facilitator:** What are some of the suggestions you can offer to improve upon solid domestic waste management in the communities?

**Respondent 4:** I think the most important suggestion should be the supply of household bins and community receptacles.

**Respondent 5 and 1:** (Together) We support 4.

**Facilitator:** Why do you think so?

**Respondent 3:** Because most of the people are poor and cannot afford to buy them.

**Respondent 6:** Another reason is that most of the inhabitants stay far away from the refuse dumps.

**Facilitator:** RESPONDENT 2 what do you have on that?

**Respondent 2:** Environmental health education about proper solid domestic waste management should be intensified.

**Respondent 5:** I share the opinion of RESPONDENT 2 and I add that there should be regular clean up exercises in the communities.

**Facilitator:** RESPONDENT 1, what is your single most important suggestion?

**Respondent 1:** I think the District Assembly should team up with the communities to tackle the problem head-on.

**Respondent 6:** I would suggest that there should be daily collection of waste which should be disposed of in dug trenches instead of the surface dumps.

**Facilitator:** RESPONDENT 3, tell us what you have to say.

**Respondent 3:** Proper disposal sites conveniently located should be made available.

**Facilitator:** Any final suggestions?

**Respondent 5:** Most of the wastes generated are of organic origin and farmers who are the dominant inhabitants should be taught how to convert organic waste into manure.

**Facilitator:** Any question? Thanks for your co-operation.

## **SECOND FOCUS GROUP DISCUSSION**

**FACILITATOR:** KWAME ADU-KYEI

**NOTE TAKER:** T. ADJEI BENEFO

**PARTICIPANTS:** COMMUNITY HEALTH WORKERS

### **INTRODUCTION**

This is a research work by K A-K on the assessment of solid domestic waste methods among COMMUNITY HEALTH WORKERS in the Afigya Sekyere District – FOCUS GROUP DISCUSSION (FGD) on 10/9/2008 at 9.00am with 7 participants for WIAMOASE Area.

**Facilitator:** As all of you are aware, solid waste management vis-a-vis environmental health is now a global menace. What does solid waste management mean to you? Please mention your identity number before answering the question.

**Respondent 7:** It means how solid waste is collected and sent to refuse dumps.

**Facilitator:** What about you RESPONDENT 1?

**Respondent 1:** It means what happens to the waste from where it originates to its final disposal site.

**Facilitator:** Is there any other answer?

**Respondent 2:** I agree with RESPONDENT 1.

**Facilitator:** Are you comfortable with the way solid waste is treated in the community?

**Respondent 4:** No, not at all.

**Facilitator:** Why?

**Respondent 4:** Solid waste is scattered around wherever you pass. This is not an acceptable situation.

**Respondent 6:** I do agree with RESPONDENT 4.

**Respondent 4:** People just turn deaf ears to the environmental health education being giving on the air and by the community health workers.

**Facilitator:** What do you think should be done about this?

**Respondent 3:** Since people are not prepared to change, sanitary inspectors must bring perpetrators to book.

**Respondent 2:** Threats from sanitary inspectors has not been working. We need to let people understand the individual and corporate benefits they will gain from good environmental sanitation.

**Respondent 7 and 5:** The whole community must be involved in a programme to maintain proper environmental sanitation. In addition, a task force should be set up to ensure that the programme is sustainable.

**Facilitator:** What are some of the things improper solid waste management can do?

**Respondent 7:** The major result will be increase in vectors of disease and outbreak of sanitation related diseases. Then “I AM THE SAME AS YOU”, said RESPONDENT 1; that will be the ultimate outcome.

**Facilitator:** Come in, RESPONDENT 6.

**Respondent 6:** The whole environment will be polluted with attendant disease outbreaks.

**Respondent 1:** Gutters and drains get choked and unsightly scenes cannot be left out.

**Facilitator:** RESPONDENT 1, can you tell us more?

**Respondent 1:** Those uncontrolled decomposing refuse dumps give out offensive odour.

**Facilitator:** Any initiative taken by you to help address the situation?

**Respondent: (2, 3 and 6 simultaneously)** Yes.

**Facilitator:** What kind of initiative?

**Respondent 2 and 3:** By summoning breakers of sanitary laws and imposing fines on them.

**Respondent 6:** By organizing community clean up campaigns.

**Facilitator:** Let's talk about suggestions that could be offered to improve solid domestic waste management in our communities. RESPONDENT 5, set the ball rolling.

**Respondent 5:** First, there must be supply of household bins and receptacles and then environmental health education must be intensified on the importance of living in a clean environment.

**Respondent 4:** Daily waste collection should be encouraged adding up regular clean up exercises in the communities.

**Facilitator:** Your contribution, RESPONDENT 7.

**Respondent 7:** Refuse dumps in the communities should be landfills or dug trenches which should be properly controlled.

**Facilitator:** RESPONDENT 3 Do you agree with the suggestions offered?

**Respondent 3:** Sure, I do agree with all of them. Let me add that the District Assembly should play a complementary role by at least getting one waste collection vehicle.

**Facilitator:** Do you have any questions to ask? Thank you so much for your time.

**SUMMARY OF FINDINGS OF FOCUS GROUP DISCUSSIONS ON THE RESEARCH TOPIC:** Assessment of solid domestic waste methods among COMMUNITY HEALTH WORKERS in the Afigya Sekyere District of Ashanti Region: Ghana.

### **Knowledge**

On knowledge, it was found that all the participants know something about solid domestic waste management. RESPONDENT 1: FGD 2 said. "It means what happens to the waste from where it originates to its final disposal site." RESPONDENT 4: FGD 1 said "In my opinion, it means not allowing unwanted materials to be scattered in our environment; on the streets, around our houses and getting gutters desilted to facilitate drainage" and

RESPONDENT 3: FGD 1 added, “ storing our wastes properly and disposing of them at a refuse dump.”

### **Attitude and Behaviour**

With respect to attitude and behaviour towards solid domestic waste management, people were conscious of the fact that indiscriminate dumping was wrong and yet it was being done. RESPONDENT 1 FGD 1 said:” The mindset of most of the people is bad, I think. They need a positive attitude. You can’t understand what is wrong with people.” And RESPONDENT 4: FGD 2 said this to buttress the point, “ People just turn deaf ears to the environmental health education being giving on the air and by the community health workers.”

### **Socio – Economic Factors**

Most of the people had average and very low incomes and some had no employment at all. On the inability to afford household waste collection bins, RESPONDENT 1 FGD 1 said “Again, most of the people have very low incomes and some are unemployed hence they can’t afford to buy waste bins.” RESPONDENT 3 FGD 1 added this: “Because most of the people are poor and cannot afford to buy them.”

### **Consequences of Improper Solid Domestic Waste Management**

The most popular consequence of improper solid domestic waste management was breeding of disease vectors and outbreak of diseases. RESPONDENT 7 and RESPONDENT 1, FGD 2 said “The main result will be increase in vectors of disease and outbreak of sanitation related diseases. Then “I AM THE SAME AS YOU”, said RESPONDENT 1; that will be the ultimate outcome.” RESPONDENT 5 FGD 1 was of the same opinion. This is what she said: “Improper solid waste management presents a lot of health problems in the community.

There is breeding of vectors and outbreak of disease especially on open or surface refuse dumps.” The next popular adverse effect of improper solid waste management given was environmental pollution. RESPONDENT 6 and 2 FGD 2 respectively said” The whole environment will be polluted with attendant disease outbreaks.” and “Solid waste is scattered around wherever you pass. This is not an acceptable situation.” In agreement with the previous two respondents, RESPONDENT 3 FGD 1 had this to say: “ I think pollution of land, water bodies and ground water are paramount followed by RESPONDENT 4 FGD 1: “ The most glaring effect is the marring of environmental beauty and pollution of the environment.” Generation of offensive odour was given to crown it all when RESPONDENT 2: FGD 1 said “Offensive odour emanating from decomposing refuse make inhabitants uncomfortable.”

### **Suggestions for improving solid domestic waste management**

The predominant suggestion was supply of household bins and community receptacles. RESPONDENT 5 FGD 2 gave this suggestion in support of the point made “First, there must be supply of household bins and receptacles and then environmental health education must be intensified on the importance of living in a clean environment.” “I think the most important suggestion should be the supply of household bins and community receptacles, said RESPONDENT 4 FGD 1. This view was shared by RESPONDENT 5 and 1 FGD 1 by saying this: (Together) “We support 4”. The runner up suggestion was intensifying environmental health education. RESPONDENT 2 FGD 1 said “ Environmental health education about proper solid domestic waste management should be intensified” and RESPONDENT 5 FGD 1 shared RESPONDENT 2’s suggestion by saying, “ I share the opinion of RESPONDENT 2 and I add that there should be regular clean up exercises in the communities.” Daily waste collection and use of dug trenches as waste disposal sites were

cited by RESPONDENT 6 in FGD 1. Among the suggestions were the involvement of the District Assembly in provision of waste collection vehicles and playing an active role in managing solid waste.

# KNUST

