

**DOMESTIC WASTE MANAGEMENT: PERCEPTION,  
KNOWLEDGE AND PRACTICES IN ELELENWO  
COMMUNITY IN OBIO-AKPOR L.G.A, RIVERS STATE,  
NIGERIA.**

**BY**

**IKEKWEM PRINCESS CHINYERE**

**REG NO: 20134873848**

**A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL,  
FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI, IMO  
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**JUNE, 2016**

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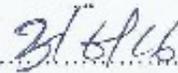


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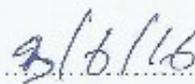
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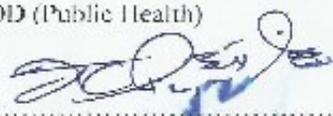
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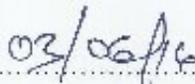
  
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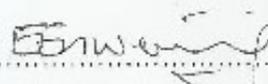
  
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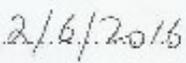
  
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## DEDICATION

This thesis is dedicated to Jehovah the Eternal Rock of ages and His beloved son, Jesus Christ for Their unfailing love, protection and guidance showered on me in the course of running this program. I also dedicate this work to the memory of my two fallen buddies; my late kid brother and pal **Freedom Chinedu Ikekwem** and my late ally, **Solomon Ottah**, who missed out on this great and noble stride in my life.

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## ABSTRACT

The sanitary state of an area is largely influenced by the domestic waste handling practices of the residents and the measures in place for safe waste evacuation and disposal. This study was aimed at examining the perception and knowledge towards waste handling and disposal practices, among households in Elelenwo community. A descriptive cross-sectional study design using a multistage sampling technique, where the community was divided into the three main villages in Elelenwo community, to get the sample size of 500 respondents was adopted for this study. A structured questionnaire written in English language which included respondent's socio-economic status, their consumption patterns, perception and knowledge, regarding waste and its management was used to conduct the survey. The result of the study revealed that female respondents 308(61.6%) were more than their male 192(38.4%) counterparts. Respondents from the Christian sect 474(94.8%) outweighed the Muslims 26 (5.2%). Precisely 264 9(52.8%) of the respondents are civil servants, with 252(50.4%) of the study population attaining the tertiary level of education. About 286 (57.2%) were very aware of the health impact of improper waste management with educational qualification as a contributory factor. About 236.5(47.3%) of the participants reported that they burn their waste, 202.5 (40.5%) practiced the open dump method and 12 (2.40%) patronized the services of private collectors who convey such wastes to the final disposal sites. From the study, burning garbage is a health risk as positively depicted by the respondents. There is a positive relationship between improper storage and disposal of domestic waste and the spread of diseases such as malaria, leptospirosis. In conclusion, the study showed that a large proportion of respondents positively asserted that public education about proper domestic waste management will help to curb waste problem. But many of the respondents were not willing to take their domestic waste to allocated dump sites. The study population had poor attitudes and perceptions toward solid (domestic) waste handling. They stored their household refuse in substandard refuse containers with no coverings which is a wrong domestic waste practice. Therefore, it is recommended that Government and other stake holders provide the necessary facilities needed for domestic waste management, adequate funding of the various agencies in charge of waste management, community mobilization should be enhanced and awareness created about better approaches to waste management to ensure compliance by individuals in order to promote public health.

**Keywords: Domestic waste management, perception, knowledge, practices.**

## **CHAPTER ONE**

### **INTRODUCTION**

#### **Background to the Study**

Household solid waste is one of the most difficult sources of solid waste to manage because of its diverse range of composite materials (Huntley, 2010). A substantial portion is made up of garbage, a term for the waste matter that arises from the preparation, and consumption of food and consists of waste food, vegetable peelings and other organic matter (Slack, Gronow & Voulvoulis, 2005). Other components of household solid waste include plastics, paper, glass, textiles, cellophane, metals and some hazardous waste from household products such as paint, garden pesticides, pharmaceuticals, fluorescent tubes, personal care products, batteries containing heavy metals and discarded wood treated with dangerous substances such as anti-fungal and anti-termite chemicals.

Domestic waste also known as "municipal solid waste" is waste that is generated as a result of the ordinary day-to-day use of a domestic premise. It is either taken from the premises by or on behalf of the person who generated the waste; or collected by or on behalf of a local government as part of a waste collection and disposal system.

The wastes could be both solid and liquid types; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu, Asnani, Zurbrügg, Anapolsky, & Mani, 2008). Globally, millions of tons of municipal solid waste are generated every day. Urban waste management is drawing increasing attention, as it can easily be observed that too much garbage is lying uncollected in the streets, causing inconvenience, environmental pollution, and posing a public health risk (Zia, & Devadas, 2008).

Rouse (2008) defined Solid waste as “material which no longer has any value to its original owner, and which is discarded”. The main constituents of solid waste in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics. Ash, dust and street sweepings can also form a significant portion of the waste.

Rouse (2008), opined that; Solid waste management (SWM) involves the collection, storage, transportation, processing, treatment, recycling and final disposal of waste. Systems need to be simple, affordable, and sustainable (financially, environmentally and socially) and should be equitable, providing collection services to poor as well as wealthy households.

To achieve the above stated means of management, household members of a given geographical territory, as one of the stakeholders, have their own responsibility. But the extent of their responsibility varies depending on the approach that the town follows: either conventional based approach or community based approach. The collection of wastes on temporary storage at the source and dump it on the given municipality material (conventional approach) or handover to the waste collectors (community based approach) is the responsibility of the households of a given area (World Bank, 2000; Rahman, Salequzzaman, Bahar, Uddin, & Islam, 2005).

Hence, these Solid waste management (SWM) approaches have an advantage to protect the environment from the risk of ineffective disposal system of solid wastes. Moreover, the primary objective of solid waste management activity is to make the environment sound and safe in human health via disposed off wastes in a well organized manner.

Waste is more easily recognized than defined. Something can become waste when it is no longer useful to the owner or it is used and fails to fulfill its purpose (Gourlay, 1992). A great mixture of substances including fine dust, cinder, metal, glass, paper and cardboard, textiles, putrescible vegetable materials and plastics characterize solid waste. As time passes accumulation of waste outstrip its control. Waste management process is usually framed in term of generation, storage, treatment and disposal, with transportation inserted between stages. Hence, a combination of source reduction, recycling, incineration and burying in landfills and conversion is currently the optimal way to manage domestic waste (George, 2008).

Domestic waste is the waste generated as consequence of household activities such as the cleaning, cooking, repairing empty container, packaging, huge use of plastic carry bags. Humans has always produced waste that included not only the discarded bones of animals slaughtered for food, hundreds of stone axes found in Olduvia, or the stinking cesspits and hidden heaps of Medieval Europe but the momentous increase in waste that characterizes contemporary society, dating from the industrial revolution (George, 2008).

Despite the present concern of individual and the government about waste management in Nigeria, Elelenwo one of the communities in Port Harcourt City, is still faced with serious domestic waste management problem. Asamoah, 1998 observed that many waste generated from cooking and human activities were found disposed in places like gutters and on the streets and even when it is being packed and taken to the dump site by the waste managers, it is not properly managed. They are left in pile for weeks and later set on fire which in turns

generates toxic gases that could be dangerous to the inhabitants of the locality and to the environment itself.

### **Statement of the Problem**

Hundreds and thousands of years ago, the solid waste management system was not a big deal globally. One of the studies related to this stated that “The first humans did not worry much about waste management; rather they simply left their garbage where it dropped”(Net Industries,2010).This implies that solid waste management task is becoming a serious concern due to the alarmingly increasing rate of population growth and the development of urbanization in the world. According to Smith (2003), “as far as humans have been living in settled communities, solid waste has become an issue and modern people generate by far more wastes than early humans ever did”.

The problem of solid, liquid, and toxic-waste management in Africa has come with urbanization in the developing world. An important feature of the urbanization of the developing world is the rapid growth of cities and metropolitan areas. The high rate of urbanization in African countries implies a rapid accumulation of refuse. Social and economic changes that most African countries have witnessed since the 1960s have also contributed to an increase in the waste generated per capita (Ahmed &Ali, 2011). As a result, municipal waste management constitutes one of the most crucial health and environmental issues facing managers of African cities. Proper waste management is a public benefit and obligation. Improper waste disposal by one individual affects the entire citizenry, so, as a policy, countries have tasked every individual, establishment or institution to contribute significantly to the process of keeping their communities and environment clean (Onibokun & Kumuyi, 1999).

Like other major towns and cities of Nigeria, Elemenwo community is engulfed in filth in both conspicuous and inconspicuous places, because it has serious problems with its waste management from generation, through storage, treatment, to disposal. It is not clearly known if it is due to residents' wrong perceptions and unconcerned attitudes towards waste management.

Poor waste handling practices and inadequate provision of solid waste management facilities in cities of developing countries results in indiscriminate disposal and unsanitary environments that pose a threat to the health of urban residents. Improper handling, storage and disposal of wastes are major causes of environmental pollution, which provides breeding grounds for pathogenic organisms and encourages the spread of infectious diseases (Owaduge, 2010).

In order to provide solution to these problems, it is therefore imperative for this study to examine the perception and attitudes of the inhabitants of Elemenwo community and proffer solution on how these domestic wastes can be managed in Elemenwo community. This research is therefore intended to provide insight to citizens, government officials and nongovernmental organizations who might want to help resolve the domestic waste management crisis in Elemenwo community.

## **Main Research Objective**

To assess the relationship between perceptions, knowledge and domestic wastes practices among residents in Elemenwo community.

## **Specific Research Objectives**

The specific objective of this study is:

1. To assess the community's general perception on the different aspects of domestic waste management.
2. To assess the level of knowledge on domestic waste and its effect on health and environment among residents.
3. To identify the current household practices for domestic waste management.

## **Research Questions**

1. What is the community's perception about the different aspects of waste management?
2. How does knowledge factor affect domestic waste management?
3. What is the current domestic waste management practice of the community?

## **Significance of the Study**

This study will aim at assessing the different aspects of waste management, and to evaluate the health risks associated with poor waste management practices. This study will also identify the effects people's perception and knowledge will have on current waste management practices. Finally, the result of this thesis will add something new to existing body of knowledge on the subject on current literature.

## **Scope/ Delimitation of the Study**

This study covers domestic waste management practices, perception and attitudes in Eelenwo Community in Obio-Akpor L.G.A, Rivers State. There are different factors that determine management of waste at the household level, but this thesis is delimited to factors such as perception and attitude of the people of Eelenwo.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

The management of solid wastes has increasingly become a difficult task locally and globally with increase in population and high consumption patterns among urban dwellers in Nigeria. In most urban cities, solid wastes are thrown away indiscriminately in any available space and this poses serious threat to human health and the environment. Improper management of solid wastes defaces the environment, spreads disease, and contaminates ground water, air and land quality. Glenn (2009), observed that improper solid waste disposal of household solid wastes is a source of air, land and water pollution and creates hazards to humans and the environment. It is a major environmental concern to many nations especially the developing countries.

Ayotamuno & Gabo (2004), observed that: indiscriminate dumping of wastes from industrial, commercial and households such as food wastes, paper, polythene, textiles, scrap metals, glass, wood, and plastic at street corners and gutters is very common in Port Harcourt city. Another observation made by the authors is that the residents of the city do not segregate their wastes into different categories of wastes before disposal. These wastes are usually mixed together and dumped indiscriminately in the environment and as a result, poses a lot of problems for effective management of wastes. It will be interesting to note that this phenomenon occurs in all the states of the federation including the Federal Capital Territory.

## **Concept of Municipal Solid Wastes**

Babayemi & Dauda (2009) define solid waste as “non-liquid and non-gaseous products of human activities, regarded as being useless”. Solid wastes could take the form of refuse, garbage and sludge. United Nations (2009) considers solid wastes as “all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris and in some countries, human wastes”. Solid wastes arise from human activities. They could be regarded as refuse or garbage which is discarded by the owner as something which is of no use to the owner. However, some materials that are regarded as wastes can be reprocessed into valuable products or given away, thus rendering them useful to those who may need them. This could be achieved through proper management of solid wastes.

Solid waste also called domestic waste or residential waste are waste comprising of garbage and rubbish (such as bottles, cans, clothing, compost, disposables, food packaging, food scraps, newspapers and magazines, and yard trimmings) that originates from private homes or apartments. It may also contain household hazardous waste (Business Dictionary, 2015).

## **Types and Sources of Solid Wastes**

Solid waste is classified based on its origin, risk potential, or characteristics. Based on origin, solid waste can be classified into food waste, rubbish, ashes and residues, agricultural waste, municipal service, industrial process waste, and demolition and construction wastes. With regards to characteristics, it also classified as biodegradable and non – biodegradable. In addition, based on its risk

potential, again it can be categorized into hazardous and non-hazardous wastes (Committee for Economic Development (CED), 2003).

However, solid wastes are usually classified based on their sources (from which they emanate). Based on this bench mark, it can be categorized into domestic or household, commercial, institutional, industrial, municipal services, construction and demolition, agricultural wastes.

### **Solid Waste Management Components/ Disposal Methods**

Solid waste management is the collection, storage, transportation, treatment and disposal of wastes in such a way as to render them innocuous to human and animal life, ecology and the environment (Oreyomi, 1998). In other words, waste management could be regarded as a process of treating, handling of refuse, sewage and other wastes that arise from human activities without endangering human health and the environment. According to Wikipedia (2013), the municipal solid waste has four components: recycling, composting, land filling, and waste-to-energy via incineration.

It is represented by the waste management hierarchy designed by Waste Aware Business (2009) as shown in the figure below:

Figure 1: Waste Management Hierarchy



The hierarchy of waste management - defined by the 3Rs - reduce, reuse and recycle- stratifies options of waste management and focuses on maximum utilization of resources with minimum generation of resultant waste (UNEP, 2005b). The 3Rs refer to the reduction in the amount of waste being generated, the reuse of items prior to their being commissioned as waste, and the recycling of items once they become waste. An expounded version of this in the waste management hierarchy includes- waste prevention/reduction, reuse, recycling & composting, energy recovery, and finally land filling.

The hierarchy's function is to aid in the management of waste whilst ensuring little impact on the environment; as such, it is employed in the development of policies for resource management, for handling challenges of landfill scarcity, pollution control (of water and air), and to safeguard public health (UNEP, 2005a). In most nations, prioritization of components in the hierarchy is like giving preference first to waste prevention, then reuse, recycling (including composting and material recovery), energy recovery and reduction of waste via methods such as incineration and finally land filling.

### **Waste Prevention and Reduction**

Waste Prevention occupies the highest step in the waste management hierarchy. It refers to the activities undergone with an item prior to being perceived as waste.

These involve:

- decrease in the amount of waste produced via prolonging of such item's life span and its re-use.
- decrease in associated environmental and public health impacts from waste produced

- decrease in quantity of noxious substances contained in products (European Commission, 2010).

The concept of waste prevention cuts across the entire process that product undergoes, right from its raw form, its manufacture, distribution, to its utilization and end of its useful life. While prevention or minimization may not be isolated to a certain stage in any product's life time, the more efforts are directed at waste prevention in the earlier stages of a product's lifetime, the less impact they have on the latter stages. In essence, effective waste prevention at source is based on factors which include adoption of suitable practices, adjustments in the usage of raw materials, as well as in technology and production processes.

At the domestic level, such would include making suitable decisions in the management of the household (Williams, 2005). Much focus has been given to food waste which is a major component of household waste. Such waste may be esculent (for example, potato peels, food that may have lost freshness) or non-consumable (for example, fruit peels) in nature. Some waste generated in the former group could also be prevented from occurring (avoidable waste); this however does not extend to those which may only be consumed following strict preparation methods (European Commission, 2011). Generation of non-consumable wastes may not be prevented based on their nature and these include calciferous parts of animal products such as shells or bones (unavoidable waste). Still pertaining more to food waste, prevention translates basically to purchasing only what is required to meet one's needs at any given time and maximizing the usefulness of what is purchased.

## **Reuse**

Following the hierarchy, the next best option for SWM is re-use and this encompasses the utilization of an item after its initial use, either for a purpose similar to that which it was intended or for an entirely new one. This is exemplified in the reutilization of bottles (of beverages) or plastic bags from stores (Williams, 2005). According to the European Commission (2010), reuse refers to "... any operation by which a product or its components, having reached the end of their first use, are used for the same purpose for which they were conceived, including the continued use of a product which is returned to a collection point, distributor, recycler or manufacturer, as well as reuse of a product following refurbishment."

As such, the reduction of solid waste extends to reuse as the latter slows down the entrance of an item into the waste stream, as well as prevents the amount of items that eventually become waste (European Commission, 2010).

## **Recycling**

Municipal Solid Waste (MSW) materials which arise following consumption may be recovered and processed into useful items, bearing in mind the cost effectiveness, marketability and environmental impact it may have (Williams, 2005). The recycling process includes collection, segregation and processing of waste with productive value (Pattnik et al, 2009). This option's suitability depends on inherent conditions of the environment under consideration. Hence, energy resources utilized during the process of recycling as well as the resultant pollution should be minimal in comparison with the utilization of fresh production material. The effectiveness of cost and marketability of products from such activity should also be ascertained. Recovery of inorganic materials from Municipal Solid Waste

(MSW) has been identified as a key component in the management of waste (Sharholy, Ahmed, & Vashya, 2007).

## **Composting**

Organic components in Municipal Solid Waste (MSW) (i.e. waste of food and garden origin) are considered useful composting material (Williams, 2005). Composting is a process which could decrease MSW by an average of almost 68 % of its original volume (Sharholy et al, 2007). The process has been defined as the: “... biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture” (UNEP, 2005a).

The end product, compost, may be utilized in the conditioning of soils meant for agricultural purposes; its use in this manner gives the soil a stable nutrient source (nitrogen, potassium and phosphorus) that is gradually tapped from, and aids its water retention capacity. The usefulness of compost also extends to coverage material for landfill sites as well as material for land reclamation from mining activities and incidents of erosion (Ali, 2004; UNEP, 2005b).

With regard to reducing the amount of waste that ends up in solid waste disposal sites, composting is considered a more viable and sustainable option for developing countries due to the high organic fraction of waste generated (Troschinetz & Mihelcic, 2008) and resource constraints in such countries (UNEP, 2005a). However, the success of composting for environmental benefits (reduction of organics in the MSW stream) and economic benefits (such as: from sales of recycled organic waste to compost- for agricultural soil improvement) rests

mainly on segregation of waste at source, in which case households have important roles to play as they are major producers of organic waste (Ali, 2004).

### **Energy Recovery (Incineration)**

Municipal Solid Waste (MSW) contains organic components which are combustible. Thus, energy could be gained from incineration of waste or landfill gas combustion, which may be used to generate electric power (from steam under high thermal conditions) or produce heat for buildings (through boilers) (Williams, 2005). As such, the process of converting solid waste of organic nature into other useful forms such as gas, heat, steam and ash residues via combustion is referred to as incineration and such process is carried out in places often referred to as Waste-to-Energy (WtE) plants (Magutu & Onsongo, 2011).

In the reduction of solid waste volume by 70 to 80% lies also a main advantage of this method of waste disposal, as this minimizes the quantity of waste that is eventually sent to the land fill. Consequently, for nations where land space challenges exist for example, Japan and Singapore, incineration is a popular waste disposal option (Magutu et al, 2011). Further, following the introduction of bans and taxation on landfills with regard to biodegradables, countries such as Sweden and Denmark in the European Union (EU) have been reported to be the most active in the use of incineration for disposal of MSW (EEA, 2007).

According to Williams (2005), simultaneous production of heat and power (combined heat and powers) from landfill gas and incineration makes optimum energy recovery from (organic) waste achievable. However, in comparison with their initial forms, new products that arise from incineration of waste (liquid and air discharge inclusive) pose more difficult management and environmental

challenges- a development which has increasingly seen many countries banning this option for waste management (Narayana, 2009).

### **Land Filling**

Land filling is the deposition of waste either in a specific land area with the goal of preventing such waste from impacting negatively on the environment (Narayana, 2009). The landfill directive has its roots in the hierarchical prioritization of waste management options- giving maximum preference to prevention of waste, with reuse, recycling, recovery options following and land filling having the least priority. Realizing how land filling could be impactful on the environment through greenhouse gas (GHG) emissions and other forms of pollution (through soil, surface and ground water) and how inadequate space could be a challenge, the landfill directive discourages heavy reliance on this option by setting goals which gradually reduce the quantity of municipal waste that is relegated to the landfill until the year 2016 (EEA, 2009).

Despite being widely considered as the least desirable option, the most prevalent approach to the disposal of waste globally has been the utilization of landfills. This remains an important aspect of the Solid Waste Management (SWM) plan of most countries and varies in structure; ranging from sanitary landfills, to semi-controlled landfills and uncontrolled (or open) dumpsites (Remigios, 2010).

Sanitary landfills are designed according to specifications which help to ensure minimal impact of the disposed waste on the environment. As such, they are structured for leachate containment and treatment, as well as management of greenhouse gases (carbon dioxide and methane) which are produced in the event of waste decomposition. Such well-structured landfills exist in nations with developed economies. Generally in North America and other countries such as,

Australia and New Zealand, the most utilized option for waste disposal on a large scale remains land filling. However, such is highly controlled and goes with adherence to corresponding legislative land filling and air quality requirements.

For highly industrialized Asian countries such as Singapore where space for perpetual land filling is a challenge, this option is only utilized when other means for waste disposal are not feasible (Zhang, Keat, & Gersberg, 2009). In the global South, partly operated waste disposal sites, referred to as semi-controlled landfills and uncontrolled dumps exist. For the former, compaction of waste and subsequent covering with topsoil is carried out. However, structures for leachate and greenhouse gas containment as well as restriction on the type of waste being deposited are absent. Uncontrolled dumping is the main and favored means of solid waste disposal in a majority of nations on the African continent. This involves disposal of waste on open, non-structured area of land without considerations for environmental impact (Remigios, 2010).

In conclusion, the most favoured option being waste reduction (waste prevention and minimization) and the least favoured option is sending wastes to landfills. Solid wastes segregation technique which enables individuals to segregate wastes at the source of generation is also an important technique that should be developed in individuals in order to attain effective management of wastes in Nigeria.

Solid waste disposal methods which are mostly preferred and considered as environmentally friendly in waste management business are: incineration, composting, dumping in approved dumpsites and land filling. However, littering, open burning and open dumping of solid wastes which are practiced by many individuals are not environmentally friendly because they aid in the spreading of diseases and the pollution of the environment.

The primary objectives of effective solid waste management as highlighted by Oreyomi (1998) are:

- a. To eliminate health hazards in the community by removing all the physical, biological and chemical agents like bottles, vectors or diseases and toxic substances that are harmful to man in his environment.
- b. To protect the natural environment being polluted or damaged. This is achieved by discouragement of wastes being dumped indiscriminately on either land or river.
- c. To provide gainful employment for many young men who would have been jobless.
- d. To enhance regular supply of raw materials to industries through salvaging and recycling of materials of economic value from wastes.

Effective solid waste management by adult citizens will entail reduction of wastes, segregation of wastes into degradable and non- degradable materials, reuse, composting and recycling of wastes. The dumping of wastes in the designated collection centers is equally needed in order to main clean and healthy environment (Oreyomi, 1998).

### **Elements of Solid Waste Management System**

The main elements of solid waste management system comprises of: waste generation, waste composition, waste collection and transportation, waste treatment and disposal (Asase, Yanful, Mensah, Stanford, & Amponsah, 2009).

## **Waste Generation**

Waste generation encompasses activities in which materials are identified as no longer being of value (in their present form) and are either thrown away or gathered together for disposal. Waste generation is, at present, an activity that is not very controllable (Vergara & Tchobanoglous, 2012). In the future, however, more control is likely to be exercised over the generation of wastes. Reduction of waste at source, although not controlled by solid waste managers, is now included in system evaluations as a method of limiting the quantity of waste generated (Vergara et al, 2012).

Municipal Solid Waste (MSW) generation rates are influenced by economic development, the degree of industrialization, public habits, and local climate. Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced. Income level and urbanization are highly correlated. Waste generation varies as a function of affluence, however, regional and country variations can be significant, as can generation rates within the same city. Waste generation in sub-Saharan Africa is approximately 62 million tonnes per year (Stanford, 2000).

## **Waste Handling, Sorting, Storage, and Processing at Source**

The second of the six functional elements in the solid waste management system is waste handling, sorting, storage, and processing at the source. Waste handling and sorting involves the activities associated with management of wastes until they are placed in storage containers for collection (Stanford, 2000). Handling also encompasses the movement of loaded containers to the point of collection. Sorting of waste components is an important step in the handling and storage of solid waste at the source. For example, the best place to separate waste materials for

reuse and recycling is at the source of generation. Households are becoming more aware of the importance of separating newspaper and cardboard, bottles/glass, kitchen wastes and ferrous and non-ferrous materials (Steblyn & Stanford, 2008). Labspace, (2013) agreed that onsite means solid waste at the place where the waste is generated and residential waste means waste at home within the household. 'Handling' means the separation of wastes into their different types so they can be dealt with in the most appropriate way. The benefits of appropriate onsite handling include reducing the volume of waste for final disposal and recovering usable materials (Labspace, 2013).

Onsite storage means the temporary collection of waste at the household level. It is important that waste is stored in proper containers. These could be baskets, preferably made from locally available materials, plastic buckets or metal containers. Larger containers or dustbins, especially those used for food waste, should be leak proof, have tight lids and be long-lasting, having onsite storage facilities with greater capacity (Labspace, 2013). The cost of providing storage for solid wastes at the source is normally borne by the household in the case of individuals, or by the management of commercial and industrial properties.

Processing at the source involves activities such as backyard waste composting (McDougall, White, Franke, & Hindle, 2001).

## **Collection**

The functional element of collection includes not only the gathering of solid wastes and recyclable materials, but also the transport of these materials, after collection, to the location where the collection vehicle is emptied. This location may be a material processing facility, a transfer station, or a landfill disposal site (McDougall & Hruska, 2000). Labspace (2013), indicated that in urban centres,

collection is a function that has its own process and services. Waste is collected and held at central transfer stations where waste is stored before it is transported to a final disposal site.

### **Transfer and Transport**

The functional element of transfer and transport involves two steps:

1. The transfer of wastes from the smaller collection vehicle to the larger transport equipment.
2. The subsequent transport of the wastes, usually over long distances, to a processing or disposal site. The transfer usually takes place at a transfer station (Vergara et al, 2012).

### **Disposal**

The final functional element in the solid waste management system is disposal. Today the disposal of wastes by land filling or uncontrolled dumping is the ultimate fate of all solid wastes, whether they are residential wastes collected and transported directly to a landfill site, residual materials from Materials Recovery Facilities (MRFs) residue from the combustion of solid waste, rejects of composting, or other substances from various solid waste-processing facilities (McDougall et.al, 2001). A municipal solid waste landfill plant is an engineered facility used for disposing of solid wastes on land or within the earth's mantle without creating nuisance or hazard to public health or safety, such as breeding of rodents and insects and contamination of groundwater (Vergara et al, 2012).

## **Energy Generation**

Municipal solid waste can be used to generate energy. Several technologies have been developed that make the processing of MSW for energy generation cleaner and more economical than ever before, including landfill gas capture, combustion, pyrolysis, gasification, and plasma arc gasification (Vergara et al, 2012). While older waste incineration plants emitted high levels of pollutants, recent regulatory changes and new technologies have significantly reduced this concern. United States Environmental Protection Agency (EPA) regulations in 1995 and 2000 under the Clean Air Act have succeeded in reducing emissions of dioxins from waste-to-energy facilities by more than 99 percent below 1990 levels, while mercury emissions have been by over 90 percent. The EPA noted these improvements in 2003, citing waste-to-energy as a power source “with less environmental impact than almost any other source of electricity” (Wikipedia, 2013).

## **Constraints / Challenges of Solid Waste Management**

Researchers have identified several factors that militate against solid waste management efforts in poor countries. These are:

- Inappropriate technologies/processes
- Enforcement inefficiencies/non-existent
- Illegal dumping
- Lack of finance
- Lack of training/human resource
- Lack of political support
- Lack of legislation
- Policy conflict among levels of government /overlapping responsibilities

- Rapid increase in waste generation and limited data
- Lack of awareness among the populace
- Limited land areas and land tenure issues.

These have posed serious constraints to the waste sector and dampened efforts towards waste management in the city. Many other writers have elaborated on how the factors cited above (plus others) interact to aggravate the solid waste problem in poor country cities. What follows from here is a detailed examination of the factors responsible for the abysmal waste situation in poor country cities (Babayemi & Dauda, 2009).

### **Problems of Waste Disposal**

The deterioration of the Nigerian urban environment in terms of irresponsible dumping and accumulated solid waste is most apparent in our growing cities today. The dehumanizing effects of these circumstances in our urban lives and blighted environment have often been cited and noted as contributing causes of the Nigerian urban decay, (Asuquo, 1979).

As population increases, as more people move to this few primate cities in search of better life, the generation and disposal of waste becomes a major public issue effecting both health and the aesthetic value of urban centre. Oldnira (1995), argued that one of the major environmental health problems facing Nigerian especially in the major cities is poor waste management. Edu (2003), stated that waste is the greatest physical problem that persistently poses a grave challenge to man on earth. The indiscriminate dumping of waste along streets, market places, residential axis in Port-Harcourt constitutes nuisance which causes serious health hazard, as dumping leads to percolation to pollute ground water supplies, breeding

ground for such annoying and disease bearing organisms, such as rats, cockroaches, flies, etc.

Uchegbu (1998), in his words said man's unguided development and ineffective solid waste management in urban centers of Nigeria has resulted to urban degradation and outbreak of diseases like cholera, malaria, typhoid, bronchial disorders. Udo (2003), has observed that decomposed waste emits carbondioxide (CO<sub>2</sub>) methane gas (CH<sub>4</sub>), which enhances global warming. White nitrite and nitrate emission causes health hazard such as carcinogenic and mutagenic nitrosamines.

### **Effects of Solid Waste**

It is the fact that, if solid wastes are not managed properly there are many negative impacts on aesthetic, human health and ecology (water and air pollution). Therefore, in order to control the management activity in a good manner and have a proactive measure for such negative impact, one must have a good understanding about the effects and risks that may arise from improperly managed solid wastes. According to Melaku (2008), the following are some of the most important effects because of uncontrolled solid waste disposal systems.

- Uncollected wastes cause blockage of drains, which result in flooding and unsanitary conditions.
- Flies and Mosquitoes breed in some constituents of solid wastes, and flies are very effective vectors that spread disease.
- Waste dumps are good shelter for rats. Rats consume and spoil food, spread disease, damage electrical cables and other materials.
- Uncollected wastes degrade the urban environment, discouraging efforts to keep the streets and open places in a clean and attractive conditions.

- Dangerous items (such as broken glass, razor blades, needles and other healthcare wastes, aerosol cans and potentially explosive containers) may pose risks of injury or poisoning, particularly to children and people, who sort through waste.
- Waste items that are recycled without being cleaned effectively or sterilized can transmit infection to later users.
- Polluted water (leachate) flowing from waste dumps and disposal sites can cause serious pollution of water supplies.
- Waste that is treated or disposed of in unsatisfactory ways can cause a severe aesthetic nuisance in terms of smell and appearance.
- Fires on disposal sites can cause major air pollution, causing illness and reducing visibility, making disposal sites dangerously unstable, causing explosions of cans, and possibly spreading to adjacent property.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **Area of Study**

Elelenwo falls under Obio-Akpor Local Government Area, one of the twenty-three Local Government Areas (LGAs) in Rivers State. Obio – Akpor L.G.A covers 260 km<sup>2</sup> and has a population of 462,350 (Male, 238,951 and Female, 223,399) as at the 2006 Population Census. Elelenwo is primarily a residential neighborhood and former village with minor commercial hubs located within the Obio-Akpor Local Government Area in the metropolis of Port-Harcourt. It is made up of three main villages namely: Rumuodani, Rumuodunwere and Rumueheleze. The neighborhood is home to a number of State owned media establishments including, Rivers State Television (RSTV) and Radio Rivers. It is bounded on the south by Eleme beyond which is Okirika Island, on the west by Oginigba and Woji beyond which is Trans Amadi; on the north by Oil Mil Market, beyond which is Rumukurushe, and on the east by Iriebe, beyond which lies the Oyigbo Local Governmental Area. The neighborhood consists largely of mixed-income apartment buildings, public and privately owned estates, along with single-family homes of varying styles. Its only accessible police station is the Elelenwo Police Station.



## **Research / Study Design**

A descriptive cross-sectional study design was employed in this study which involved a survey on the perception, attitudes and practices of domestic waste in Elelenwo community in Obio-Akpor L.G.A.

## **Population of Study**

The study population for this work includes all residents of Elelenwo Community aged between eighteen (18) years and above.

## **Sample Size and Sampling Techniques**

### ***Sample size calculation for a population of more than 10,000***

Minimum sample size was calculated using the formula.

$$ME = z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

n = Desired sample size

ME = Desired margin of error

z = Standard normal deviate, usually set at 1.96 (more simply 2.0) which corresponds to the 95% confidence level.

$\hat{p}$  = Population in the target population estimated to have a particular characteristic, which was taken as 50% in this study.

$$\text{Sample size} = \frac{(1.96)^2 (0.50) (0.50)}{(0.05)^2}$$

$$n = 0.9605 / 0.0025;$$

n=384

If you do an iteration of non-respond of up to 20 percent, then we have 20% of 384= 76.8

Adding 76.8 to 384= 460.8 samples

Approximated to the nearest hundreds, a sample size of 500 was used.

Using multistage sampling techniques, the community was divided into the three main villages in Elelenwo community. Proportional to the relative size of the community (Rumuodani is the largest village, closely followed by Rumuodunwere and Rumueheleze), since the absolute size could not be reached as of the time of this study due to lack of data, 500 samples were randomly selected from the community. Systematically, respondents were selected until the assigned number was exhausted. That is, 250 samples were collected in the largest village whereas 150 and 100 samples each were collected from the other two villages.

### **Instrument for Data Collection**

For collection of relevant data for this study, a structured questionnaire written in English language was used. The questions bordered on variables such as household and demographic characteristics, current practices for domestic waste management, perception and attitudes associated with domestic waste management. The questionnaire was administered by the researcher until the specific sample number was gotten.

## **Data Collection Method**

A questionnaire was adopted for data collection using the systematic random sampling technique on the selected houses. Informed consent was gotten from each respondent with a promise to maintain confidentiality with the information obtained from them.

## **Data Analysis**

The data collected was sorted out manually, edited and coded before inputting for analysis using the Statistical Package for Social Sciences (SPSS) version 16.0 statistical package.

The researcher employed simple descriptive statistical and analytical tools such as frequency distribution for evaluation of domestic waste, charts and percentages in the analysis of the data obtained from the instrument (questionnaire) used. A statistical significance for association was tested using the Chi-square with p-value less than 0.05 considered significant statistically.

Likert Scale and Weighted Mean Score formulae

$$\bar{X} = \frac{\sum WF}{N}$$

Where:

W = Weighted Mean Scale

F = Number in the category

N = Total Population

SA - Strongly Agree = 5

A - Agree = 4

U - Undecided = 3

SD - Strongly Disagree = 2

D - Disagree = 1

**Summation  $15 \div 5 = 3$**

**Therefore 3 and above is positive, below 3 is negative.**

## **CHAPTER FOUR**

### **RESULTS**

#### **Socio-demographic Characteristics**

From the socio demographic characteristics of the respondents, 230(46%) were aged 25-34 years old and least age of the respondents had 12 (2.4%) at 55+ years. Female respondents 308(61.6%) were more than the male 292(58.4%) respondents. About 474(94.8%) surveyed were Christians while 26(5.2%) were Muslims. Civil servants 264(52.8%) were seen to have large response when compared to traders 123(24.6%), farmers 21(4.2%) and students 92(18.4%).

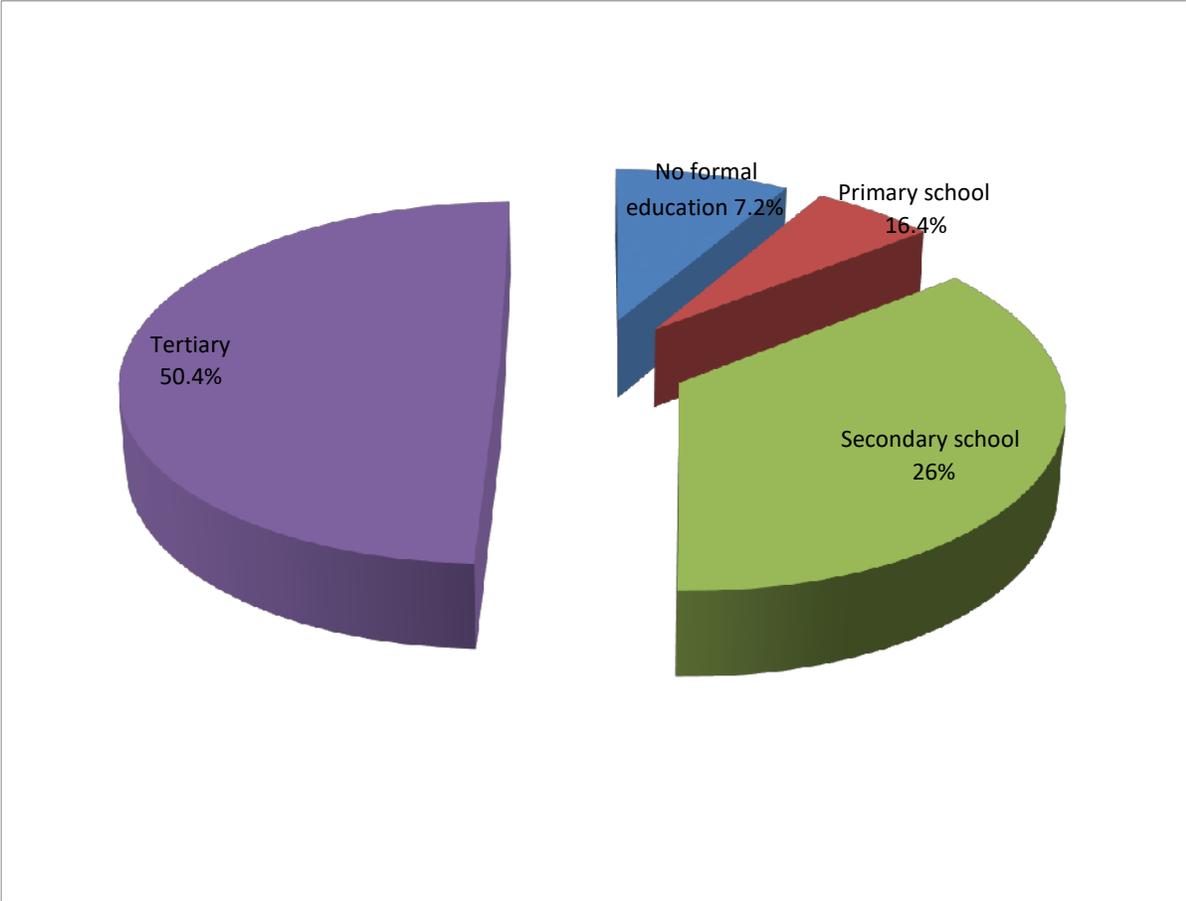
**Table 1: Socio-demographic and Personal Data**

<b>Variables</b>	<b>Frequency (N=500)</b>	<b>Percentage (%)</b>
<b>Age of respondents</b>		
18-24	109	21.8
25-34	230	46.0
35-44	113	22.6
45-55	36	7.2
55+	12	2.4
Total	500	100.0
<b>Gender of respondents</b>		
Male	192	38.4
Female	308	61.6
Total	500	100.0
<b>Religion of respondents</b>		
Christianity	474	94.8
Islam	26	5.2
Total	500	100.0
<b>Occupation of respondents</b>		
Trader	123	24.6
Civil servant	264	52.8
Farmer	21	4.2
Student	92	18.4
Total	500	100.0

## **Educational Qualification of the Respondents**

Information on educational qualification of respondents is shown in figure 3. Precisely 252(50.4%) attained the tertiary level, 130(26%) attained secondary education, Primary education was 82(16.4%), whereas 36(7.2%) had no formal education.

**Figure 3: Educational Qualification of the Respondents.**



## **General Awareness of Waste Management**

Table 3 shows the general awareness of the respondents on waste management. Majority 286(57.2%) were very aware of the health impact of improper waste management, 174(34.8%) were aware, 38(7.6%) were slightly aware and least 2(0.4%) were not aware. From the same table, educational qualification has significant effect on awareness of the respondents on the health impact of improper waste management.

About the environmental impact of improper waste management; 256(51.2%) were very aware, 198(39.6%) were aware, 38(7.6%) were slightly aware while 8(1.6%) unaware. The awareness of the respondents on the environmental impact of improper waste management was significant with educational qualification.

Concerning the economic impact of improper waste management, 240(48%) were very aware while the least 14(2.8%) were unaware. Educational qualification has significant effect on awareness of the respondents on the economic impact of improper waste management.

Aware of the legislation/regulations regarding waste management; the highest number 207(41.4%) of the participants were aware followed by 119(23.8%) that were slightly aware, 100(20%) were very aware and only 74(14.8%) were not aware.

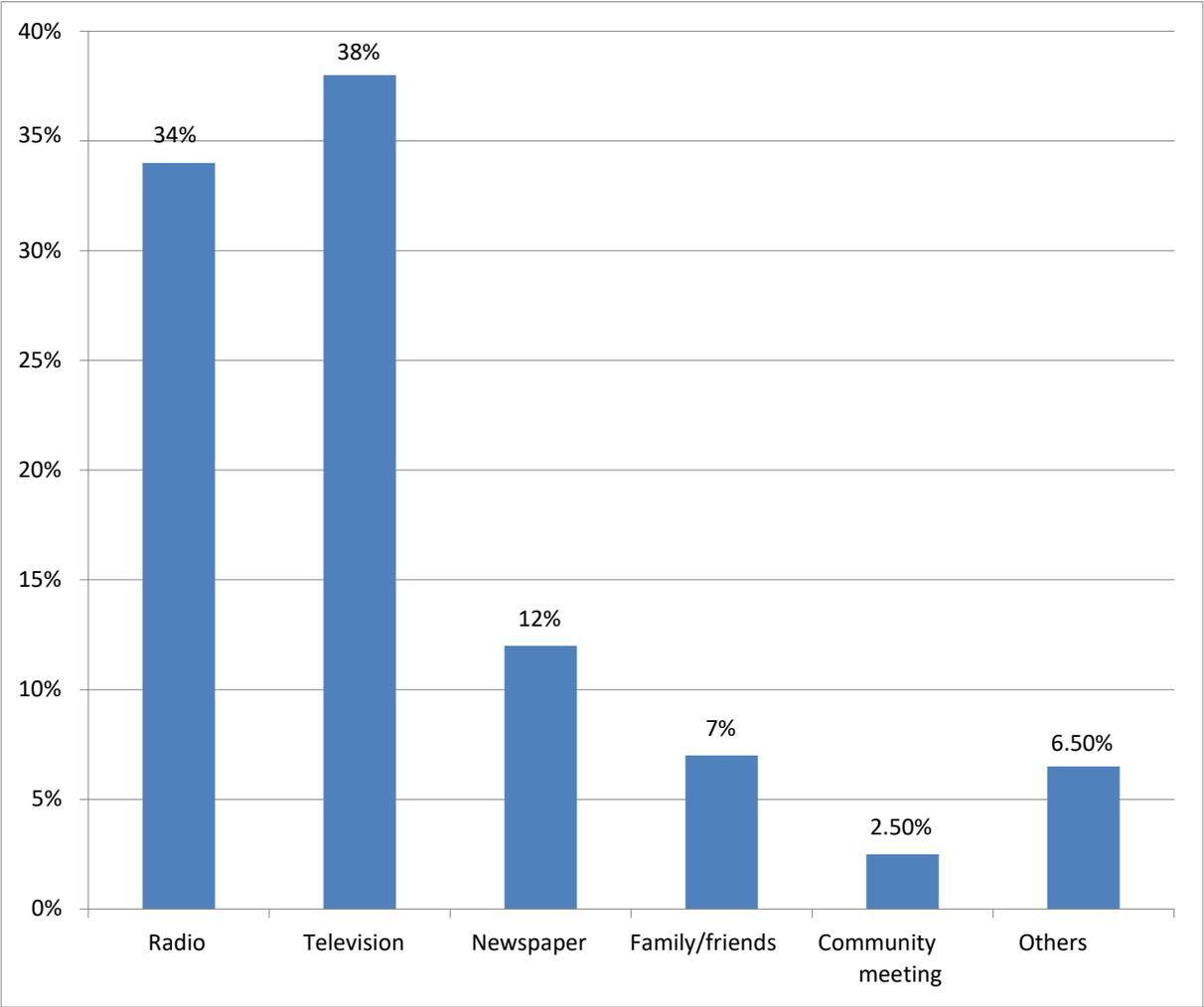
**Table 2: General Awareness of Waste Management**

<b>Variables</b>	<b>Very aware</b>	<b>Aware</b>	<b>Slightly aware</b>	<b>Unaware</b>	<b>Total</b>	<b>X<sub>2</sub></b>	<b>P- value</b>
Aware of the health impact of improper waste management	286(57.2%)	174 (34.8%)	38 (7.6%)	2(0.4%)	500	<b>141.8</b>	<b>0.000</b>
Aware of the environmental impact of improper waste management	256(51.2%)	198(39.6%)	38(7.6%)	8(1.6%)	500	<b>192.2</b>	<b>0.000</b>
Aware of the economic impact of improper waste management	240(48%)	190(38%)	56(11.2%)	14(2.8%)	500	<b>178.8</b>	<b>0.000</b>
Aware of the legislation/regulations regarding waste management	100(20%)	207(41.4%)	119(23.8%)	74(14.8)%	500		

## **Medium of Information Transmission**

The source of information about waste management or any associated problems as presented in figure 4, shows that about 190(38%) reported getting the information via television, 170(34%) got through radio, 60(12%) said through newspapers, 35(7%) reported from family/friends, 12.5(2.5%) was through community meeting.

**Figure 4: Medium of Information Transmission**



## **Domestic Waste Management Practices**

The current practice of household solid waste management in Elemenwo community is shown in Table 4 below. About 456(92%) agreed that they have a temporary solid waste storage in the house while 44(8.8%) disagreed with that view. Waste basket 299 (59.8%) was the common kind of storage material used in Elemenwo community followed by sack bag 113(22.6%) and other methods had the least 3(0.6%). About 172 (34.4%) agreed that solid waste disposing container was available in their neighbourhood, while majority 328(65.6%) disagreed. A large number of the respondents prefer to dispose their waste at night 180(36%), 177(35.4%) preferred early morning, 141(28.2%) opted for any time of the day and 2(0.4%) agreed that noon time was more ideal. Majority 258 (51.6%) agreed on the presence of micro and small enterprises that collect solid wastes via door to door system in communities while 242(48.4%) did not agree.

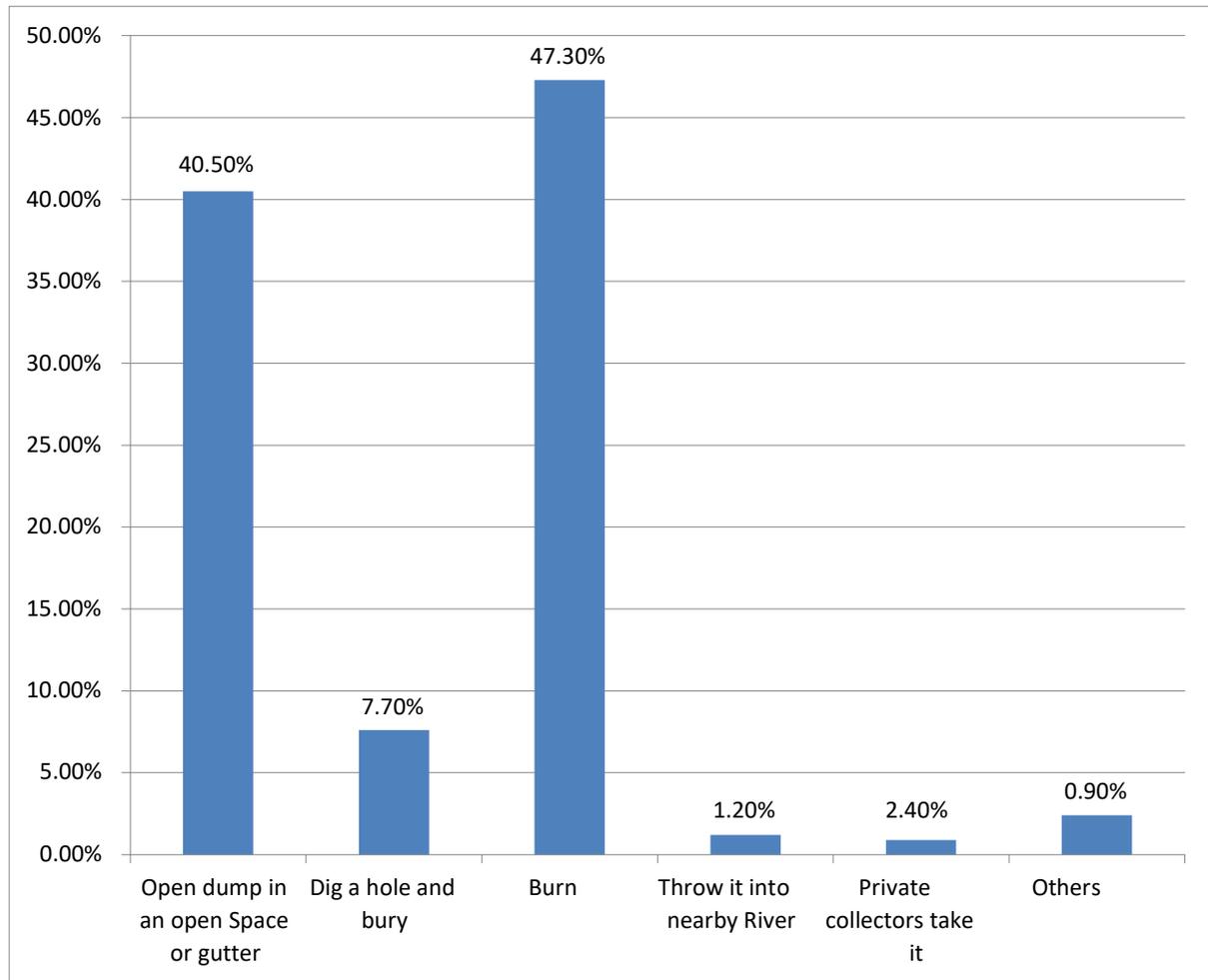
**Table 3: Domestic Waste Management Practices**

<b>Variable</b>	<b>Frequency (N=500)</b>	<b>Percentage (%)</b>
<b>Have a temporary solid waste storage in the house</b>		
Yes	456	92.0
No	44	8.8
Total	500	100.0
<b>Kind of waste collection container used for disposal</b>		
Plastic bag	6	1.2
Sack bag	113	22.6
Waste basket	299	59.8
Open container	22	4.4
Closed container	50	10.0
Pile in the yard	7	1.4
Others	3	0.6
Total	500	100.0
<b>Solid waste disposing container available in neighbourhood</b>		
Yes	172	34.4
No	328	65.6
Total	500	100.0
<b>Time preferred for disposal household waste</b>		
Early morning	177	35.4
Noon	2	0.4
Night	180	36.0
Any time	141	28.2
Total	500	100.0
<b>Presence of micro and small enterprises that collect solid wastes via door to door system in communities</b>		
Yes	242	48.4
No	258	51.6
Total	500	100.0

### **Means of Disposing Solid Wastes in the Household**

The means of disposing solid wastes in various households in Elemenwo community depicts that 236.5(47.3%) of the participants practiced burning method, 202.5 (40.5%) practiced the open dump method, 38.5(7.7%) dug holes and buried their wastes, and 12(2.40%) patronize the services of private collectors to take it to final disposal site whereas the least percentage 4.5(0.9%) represents other methods not mentioned.

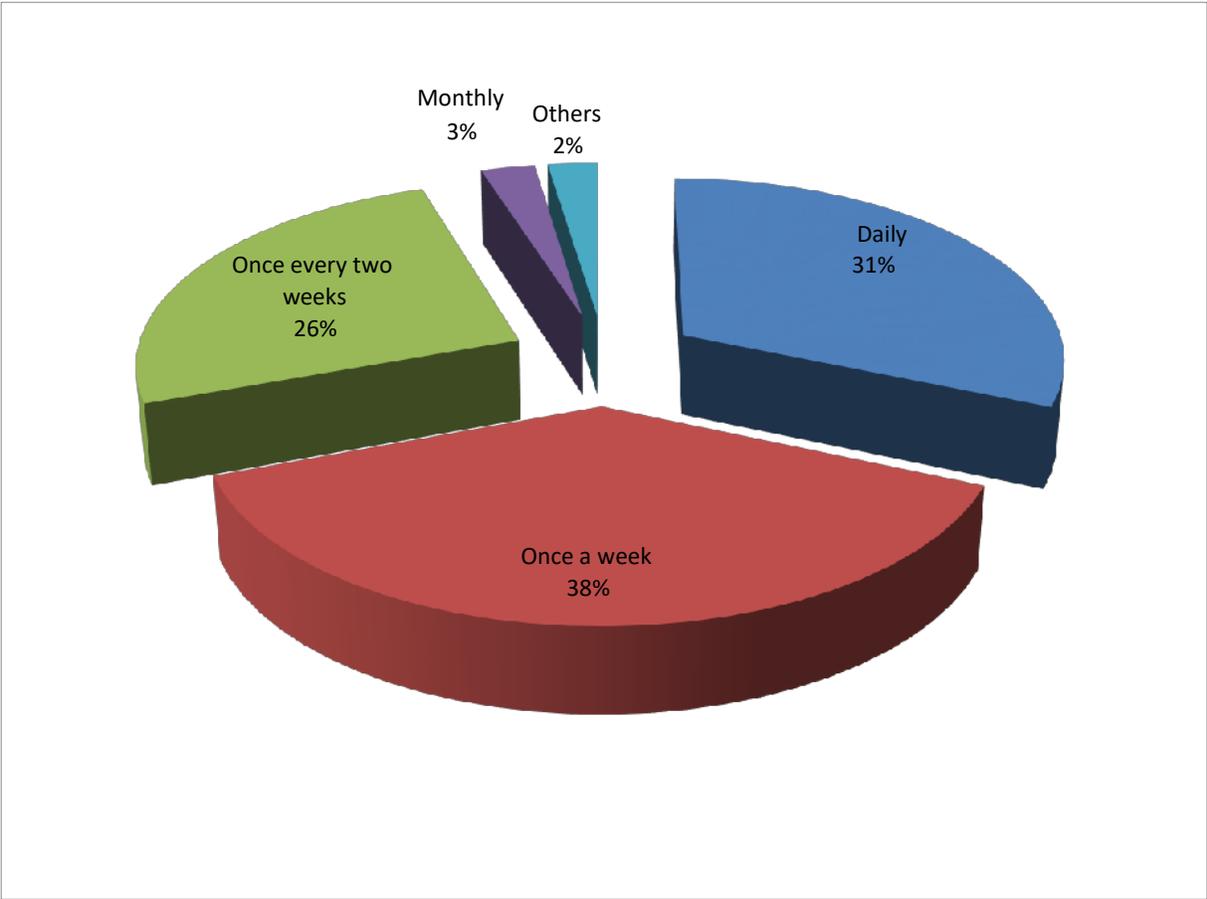
**Figure 5: Means of Disposing Solid Wastes in the Household**



### **Frequency of Waste Disposal**

Majority of the respondents 190 (38%) disposed their wastes once a week, 155 (31%) disposed it on a daily basis, 130 (26%) of the respondents disposed theirs once in every two weeks, 15(3%) practiced monthly disposal frequency while 10(2%) represents others who had no definite disposal frequency.

**Figure 6: Frequency of Waste Disposal**



## **Perception about Domestic Waste Management**

On perception of residents on domestic waste management; most of the respondents agreed that burning garbage is a health risk as positively depicted in the table below. As regards illegal burning in the area as a means of domestic waste disposal, respondents positively asserted that it has an influence on human health. Respondents agreed that there is a positive relationship improper storage/ disposal of domestic waste and the spread of diseases. The results in the study showed that flooding can be caused by blocked drains and gullies as positively shown in the table below. There is a positive relationship between the spread of parasitic and zoonotic diseases and littering of domestic waste.

**Table 4: Perception about Domestic Waste Management**

Perception about Domestic Waste Management	Options	Frequency	Weighted Mean Score (WMS)	Decision
Burning garbage has associated health risks.	SA	300	3.81	POSITIVE
	A	24		
	U	56		
	SD	20		
	D	100		
Illegal dumping in the area is a health risk.	SA	310	3.88	POSITIVE
	A	26		
	U	50		
	SD	24		
	D	90		
Improper storage and disposal methods can cause diseases.	SA	299	4.0	POSITIVE
	A	65		
	U	46		
	SD	21		
	D	69		
Blocked drains and gullies as a result of domestic waste can cause flood.	SA	52	3.58	POSITIVE
	A	306		
	U	67		
	SD	33		
	D	42		
Littering of garbage serves as breeding grounds for rodents and insects that could increase the risk of the spread of parasitic and zoonotic diseases.	SA	37	3.36	POSITIVE
	A	281		
	U	84		
	SD	22		
	D	176		

## **Knowledge on Domestic Waste Management**

Respondents negatively showed that they didn't have enough information on domestic waste management methods such as composting and recycling. Concerning respondents' willingness to take their garbage to dump sites if situated in the community, a negative response was gotten. From the results, it can be negatively deduced that the respondents do not see domestic waste management as their responsibility. Respondents positively asserted that the Local Government is not doing enough to handle and fix the domestic waste issues. As positively depicted in the results below, public education is one of the ways to fix the domestic waste crisis.

**Table 5: Knowledge on Domestic Waste Management**

Knowledge on Domestic Waste Management	Options	Frequency	Weighted Mean Score (WMS)	Decision
I have enough information about composting	SA	29	2.34	NEGATIVE
	A	66		
	U	54		
	SD	249		
	D	102		
I have enough information about recycling	SA	12	2.37	NEGATIVE
	A	74		
	U	84		
	SD	250		
	D	80		
I will be willing to carry garbage to a dump site if it was located in the community	SA	45	2.34	NEGATIVE
	A	228		
	U	240		
	SD	610		
	D	49		
People throw garbage on the streets and in the drains and gullies because they have no other means of getting rid of (Disposing of) their garbage	SA	45	2.93	NEGATIVE
	A	119		
	U	124		
	SD	180		
	D	32		
The Local Government is not doing enough to fix the garbage problem	SA	302	4.0	POSITIVE
	A	65		
	U	20		
	SD	86		
	D	27		
Public education about proper garbage management is one way to fix the garbage crisis	SA	127	3.70	POSITIVE
	A	209		
	U	124		
	SD	6		
	D	34		

## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATION

#### Discussion

The management of domestic solid waste in Eelenwo as observed from this study shows some major problems. Wastes are indiscriminately dumped on the streets, drainages, backyards. This becomes a major problem as the aesthetic nature of the environment is reduced. From the study, respondents are aware of the health, environmental and economic impact of improper domestic waste management.

Most often, waste is burnt in the open air at the source of generation and final disposal sites. Burning of wastes especially plastics will add to the toxic gaseous emissions in the atmosphere, polluting the air and destroying the ozone layer and its protective properties, thereby increasing the risk of health hazards, including cancers. This is consistent with a study by Azeez (2006), that the increased use of plastics is due to changes in life style and industrialization in which plastic packages replace other forms of packaging. He supported that the large quantity of plastic waste that is generated could create financial and socio-economic losses for governments at large when they try to manage it. In addition, plastic wastes seem to be part of almost all the waste generated at home.

The use of covered plastic bins protects the waste from direct exposure to flies, vermin, and scavengers, and they also prevent odour nuisances and unsightliness. Unfortunately, indiscriminate open dumping of wastes poses significant threats to public health and the environment if they are not stored, collected and disposed of properly. This is in line with the work by Abel (2007), which shows that increased

domestic and household activities in urban environments are linked to the generation of high volumes of domestic wastes.

It is also evident that some of this waste is dumped on the streets, gutters, holes and in nearby bushes. Unfortunately, indiscriminate open dumping of wastes poses significant threats to public health and the environment if they are not stored, collected and disposed of properly. The best practice is still to store domestic waste in covered plastic bins (Damghani ,Savarypour, Zard & Deihimfard, 2007).

On perception of residents towards domestic waste management; most of the respondents positively agreed that illegal dumping as a means of domestic waste disposal, has an effect on human health. Respondents agreed that there is a positive relationship improper storage/ disposal of domestic waste and the spread of diseases. The study also showed that flooding can be caused by blocked drains and gullies and that there is a positive relationship between the spread of parasitic and zoonotic diseases and littering of domestic waste. This is in agreement with the study by Abeyewickreme et al, (2012), who stated that littering of domestic waste has the potential of serving as breeding grounds for rodents and insects. This increases the risk of the spread of zoonotic and parasitic diseases such as malaria, Lassa fever. Indiscriminate dumping of domestic waste leads to flooding during the wet season, spread of diseases as well as property loss. Food debris disposed off indiscriminately could give rise to choked drains and blocked waterways which aid the breeding of flies and mosquitoes especially during the wet season.

The respondents lacked enough information about current waste practices like composting, recycling, waste separation techniques. However, they were aware that improper waste management can lead to morbidity. In addition, the findings in the study indicated lack of willingness to take domestic wastes to allocated

dumpsites. This high level of knowledge on the effects of waste management does not correspond with their observed practices as respondents rather prefer to dump them in gutters and drains. This is confirmed by a previous work done by Onibokun et al, (1999), who asserted that the increasing rural-urban migration compounds the problem of waste management, as citizens do not take responsibility for adequate waste disposal but rather, rely on government to dispose of waste.

Inadequate funding is another important factor militating against domestic waste management. The cost of labour, purchase and maintenances of vehicles involved in the collection and disposal of waste has risen so high that many sanitation agencies are already finding it difficult to collect and properly dispose all the collected wastes. This is similar with findings from many studies (Uchegbu,1998; Agunwanba, 2001; Mosler et al, 2006 ) . They attributed the problem to the above mentioned factors and others like poor attitudes, lack of knowledge and concern about environmental issues, high levels of poverty and misguided waste disposal practices, poor institution framework for waste management by the government, inherent rural attitude of most urban dwellers, poor state of public infrastructure.

To ensure a lasting solution to domestic waste management problems, regular collection of waste and public education as deduced from this study, can help curb the garbage crisis. Because the problem of waste disposal in our cities has gone beyond individuals and communal effect, therefore the government needs to be more committed in making our cities safe and habitable for all.

## **Conclusion**

In conclusion, this study found out that domestic waste problem in emerging urban cities in Nigeria is a consequence of drastic change occurring from rural habits, norms and values of the people to those of urban civilization. Since most people residing in the cities still patronize their bad habit of backyard dumping. Domestic waste issues are related to perception, attitudes and lack of public awareness and enlightenments (Mabogunje 1974).

Like other cities in Rivers State, Elelenwo is engulfed in filth of both conspicuous and inconspicuous places because it has serious problems with its waste management from generation, through storage, treatment, to disposal. Residents' wrong perceptions and unconcerned attitudes towards waste management might also be the cause of this problem. Teo et al. (2001), found that attitudes toward waste reduction are one of the reasons for difficulties in waste management.

Major underlying factors contributing to poor waste management include a high rate in population growth and consumption patterns, poor management by local authorities in provision of waste management facilities, inadequate law enforcement by the government, lack of community participation due to lack of awareness, and increase in urbanization and industrialization

Based on the findings, it is believed that the involvement of both government and private agencies and even individuals in waste sorting at the source will go a long way in helping the recovery of reusable materials from domestic waste in the study area. Often, previous unguided development and ineffective solid waste management programme had resulted in environmental degradation, with serious health implications. This means that greater investment should be made in the area

of refuse storage, sorting, collection and disposal. Greater awareness of the need for cleaner environment is needed among the urban population since it will reduce indiscriminate disposal.

With a little push, support, and education to improve people's perceptions, attitudes and practices, regarding waste management, some of the challenges confronting municipalities in the area of waste management can be minimized.

For the successful implementation of waste management measures, a collective effort from all involved parties is important (Kulatunga et al, 2006). Human factors in the minimization of waste are of great importance and domestic waste management can be prevented by changing attitudes.

## **Recommendations**

From the study carried out, I found out that domestic waste management still has a long way to go. Individuals cannot carry out this arduous task alone. I hereby recommend the following:

- Solid Waste Management in Nigeria should become the concern of everybody –the landlords, tenants, school children, traders, business people, civil servants, the privileged, the politicians etc. One single governmental agency cannot alone effectively cope with the volume of solid waste generated in Nigerian settlements.
- Agencies charged with the responsibility of solid waste management must be sufficiently supported by way of adequate funding and circulatory infrastructural improvements to enable the agency perform successfully.

- Government should also provide friendly enabling legislations and edicts that will establish waste management agencies as Independent Waste Management Authorities which will function like a private business corporations. This will enhance its efficiency because it will aspire to break even and at the same time try to live up to expectations.
- Efforts should be geared towards the use of scientific techniques to develop appropriate technologies for dealing with solid waste management such as encouraging the emergence and development of industrial ecology where wastes from one activity are input of raw materials for another activity. Landfill sites should be designed and operated in accordance with W.H.O standards.
- The community should adopt a self-help approach to solve the problem. Much can be achieved when the various communities mobilize themselves and organize periodic clean up exercises and by contributing financially to support the exercise, the residents can also act as watch dogs and make sure that they themselves adhere to proper waste disposal practices.
- The chiefs and other opinion leaders must be given additional roles to play in ensuring environmental cleanliness. This can be done by authorizing the chiefs in each area or community to take up the additional job of ensuring clean environmental practices with the youths playing an important role.
- The women should be made to play an important role as it has been realized that women play a greater role of domestic waste handling and disposal in the community.

It is hoped that these recommendations, when considered for action by the government, local authorities, and the people themselves would help address the domestic waste management problems and its related issues in Elemenwo community.

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**APPENDIX 1**  
**QUESTIONNAIRE**

**DEPARTMENT OF PUBLIC HEALTH**  
**SCHOOL OF POST GRADUATE STUDIES**  
**FEDERAL UNIVERSITY OF TECHNOLOGY,**  
**OWERRI P.M.B 1526**  
**IMO STATE**

**QUESTIONNAIRE PREPARED FOR SAMPLE HOUSEHOLDS**

Dear Respondent,

I am Ikekwem, Princess Chinyere. I am conducting a research, on “**Domestic Waste Management Perception, Knowledge And Practices In Elelenwo Community In Obio-Akpor L.G.A, Rivers State**” for the fulfillment of the award of Master of Public Health (MPH) in Public Health in the Federal University Of Technology, Owerri. I would like to inform you that this questionnaire is prepared for academic purposes only. Besides, the outcomes of this research will help the efforts made by the responsible bodies or individuals to resolve or mitigate the problems of solid waste management. I hereby solicit your co-operation and I am assuring you that all information provided shall be treated with utmost confidentiality.

Thanks for your co-operation.

## **PART I. SOCIODEMOGRAPHIC CHARACTERISTICS**

### **PERSONAL INFORMATION**

#### **1. Age**

18-24       25- 34       35 -44       45-55       55+

#### **2. Gender**

Male                   Female

#### **3. Educational Qualification**

No schooling       Primary School       Secondary school       Tertiary

#### **4. Religion**

Christianity       Islam       others: Specify

#### **5. Occupation (Please indicate) .....**

## **PART 2: DOMESTIC WASTE MANAGEMENT PRACTICES**

6. Which of the following is the medium of information transmission about domestic waste?

Radio                       Television                       Newspaper  
 Family/ friends               community meeting       others: specify

7. Do you have a temporary solid waste storage in your house?

Yes                       No

8. What kind of storage do you use?

plastic bag       sack       Basket       open container       closed container  
 pile in the yard       others: specify

9. Is solid waste disposing container available in your neighborhood?

Yes                       No

10.If your answer for question No. 9 above is "NO", what other means do you use to dispose the solid wastes of your household?

open dump in an open space or gutter       dig a hole and bury       burn

- Throw it in to the nearby rivers       Private collectors take it  
 others: specify.

11. How frequently do you usually dispose your wastes to either of your choice dumping place?

- daily     once a week     once every two weeks     monthly  
 others: specify

12. What time do you prefer to dispose your household wastes?

- early morning     noon     night     any time

13. Is there any micro and small enterprises that collect solid wastes via door to door system in your community?

- Yes       No

### **PART 3: PERCEPTION ABOUT DOMESTIC WASTE MANAGEMENT**

14. Burning garbage has associated health risks.

- (a) Strongly agree       (b) Agree       (C) Undecided   
(d) Strongly Disagree       (e) Disagree

15. Illegal dumping in the area is a health risk.

- (a) Strongly agree       (b) Agree       (C) Undecided   
(d) Strongly Disagree       (e) Disagree

16. Improper storage and disposal methods can cause diseases such as malaria and leptospirosis

- (a) Strongly agree       (b) Agree       (C) Undecided   
(d) Strongly Disagree       (e) Disagree

17. Blocked drains and gullies as a result of domestic waste can cause flood.

- (a) Strongly agree  (b) Agree  (C) Undecided   
(d) Strongly Disagree  (e) Disagree

18. Littering of garbage serves as breeding grounds for rodents and insects that could increase the risk of the spread of parasitic and zoonotic diseases

- (a) Strongly agree  (b) Agree  (C) Undecided   
(d) Strongly Disagree  (e) Disagree

#### **PART 4: KNOWLEDGE ON DOMESTIC WASTE MANAGEMENT**

19. I have enough information about composting.

- (a) Strongly agree  (b) Agree  (C) Undecided   
(d) Strongly Disagree  (e) Disagree

20. I have enough information about recycling.

- (a) Strongly agree  (b) Agree  (C) Undecided   
(d) Strongly Disagree  (e) Disagree

21. I will be willing to carry garbage to a dump site if it was located in the community

- (a) Strongly agree  (b) Agree  (C) Undecided   
(d) Strongly Disagree  (e) Disagree

22. People throw garbage on the streets and in the drains and gullies because they have no other means of getting rid of their garbage

(a) Strongly agree  (b) Agree  (C) Undecided

(d) Strongly Disagree  (e) Disagree

23. The Local Government is not doing enough to fix the garbage problem.

a) Strongly agree (b) Agree  (C) Undecided

(d) Strongly Disagree (e) Disagree

24. Public education about proper garbage management is one way to fix the garbage crisis.

a) Strongly agree (b) Agree  (C) Undecided

(d) Strongly Disagree (e) Disagree

25. Are you aware of the impacts of improper waste management on the following listed below:

	Very aware	Aware	Slightly aware	Unaware	
Health Impact		[ ]	[ ]	[ ]	[ ]
Environmental Impact		[ ]	[ ]	[ ]	[ ]
Economic Impact		[ ]	[ ]	[ ]	[ ]

26. Do you know about the legislation/ regulations regarding waste management?

[ ] know a lot [ ] know some [ ] know a little  
[ ] don't know any

**APPENDIX II**  
**PICTURES**

**A dump site on one of the streets of Elelenwo**



## Picture of refuse covering roads and blocked drainages



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