ASSESSMENT OF SOLID WASTE DISPOSAL PATTERN OF SELLERS IN MILE ONE MARKET, PORT HARCOURT CITY RIVERS STATE

BY

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TITLE PAGE

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RIVERS STATE

CERTIFICATION

This is to certify that this project work on Assessment of Solid Waste Disposal Pattern of Sellers in Mile One Market Port Harcourt, Rivers State was done by **DAVIDS, BOMA GLORIA (PG/MSc/12/62744)** under the supervision of DR. M.C. Okeji in fulfilment for award of Master of Science (M.Sc.) degree in Centre for Environmental Management and Control, University of Nigeria, Enugu State.

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DEDICATION

This Project isdedicated to God Almighty the Source of Life,
Health and Wisdom.

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My unreserved gratitude goes to my supervisor Dr. M.C. Okeji for his directives and corrections during the period and process of writing this research work. I am also thankful to all my lecturers for impacting knowledge to me during the course of my study.

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Tables of Abbreviation

ANOVA   Analysis of Variance

Ed.   Edition

EPA   Environmental Protection Agency

Fig   Figure

FMHE   Federal Ministry of Housing and Environment

GIS   Geographical Information System.

Http   Hyper Text Transfer Protocol

IJBAIR   International journal of basic, Applied and Innovative research.

ISWM   Integrated Solid Waste management.

Ltd.Limited

M.Sc   Masters of Science

No.   Number

Org.Organization

P.   Page

Pvt.Private

RIWAMA   Rivers State Waste Management Agency

RISEPA   Rivers state Environmental Sanitation Authority.

UN   United Nations

UNEP   United Nations Environmental Programme

US   United State

USEPA   United State Environmental Protection Agency.

Vol.Volume

WEDEC   Water, Engineering and Development Centre.

W.H.O   World Health Organization

www.   World Wide Web

ABSTRACT

The study sought to assess the solid waste disposal pattern of sellers in Mile One Market Port Harcourt in order to: identify the solid waste disposal habits of sellers, determine the frequency of clearing dumpsters from the market, determine accessibilityof waste dumpsters to market sellers and ascertain if the pattern of waste disposal significantly vary from different section of the markets.Data wereobtained throughinterviews, questionnaires and on the spot observation. A total of 290 questionnaires weredistributed tothe market sellers and 256 were properly filled and returned giving a return rate of 88.3%.Thirty questionnaires were issued to the Rivers State Waste Management Authority (RIWAMA) staff; and 30questionnaires were properly filled and returned giving a return rate of 100%. Data obtained were subjected to descriptive statistics andanalysed using the analysis of variance (ANOVA).Findings revealed thatwaste disposal pattern of sellers significantly vary with sellersø accessibility to waste dumpsters at the Mile One Market at $p < 0.05$; Again, the results showed that the pattern of waste disposal does not significantly vary among the different sections of the market at $p > 0.05$.Findings revealed that 11% of the sellers dump their refuse at the dumpster while 89% dump their refuse at open spaces, by roadside and drainages.Thirty eight percentages (38%) of sellers evacuate their waste daily andabout 62% evacuate their waste twice a week and weekly. Only 22% of market sellers have easy access to waste dumpster.The study recommended provision of more waste disposal facilities, improved sellers-agency cooperation and adoption of integrated approach that recognizes the various stakeholders and elements necessary for a sustainable waste disposal practices in the market.

CHAPTER ONE.

1.0   INTRODUCTION.

1.1 Background of Study.

The importance of a market in any city or community cannot be relegated to the background as market providesa physical surrounding and an arena for purchase, exchange of goods for goods, goods for money and vice versa. It has been observed that there is scarcely a city or community without a market location. One basicchallenge in a market is that unwanted materials generatedby the market traders may not be adequately disposed.These unwanted materials aretermed ÷Wasteø

The World Health Organization (2008) defines waste as õsomething, which the owner no longer wants at a given time and space and which has no current or perceived market valueö. According to EPA (2007)waste could be in a liquid, gaseous or solid form and may constitute both biodegradable and non-biodegradable materials.The solid form ofwaste is composed ofcombustibles and non-combustible materials,the combustible materials include papers,plastics, debris, food waste, wood, textiles, and other organics while non-combustibles include glass, metal, bones, leather and aluminium product (Zerbock, 2003). Waste is generated by activities in all economic sectors and can be regarded as an unavoidable by-product of economic activity (Goran, 2005).

One major challenge in a large market is that the generation of waste may outweigh the evacuation pattern and thus increase public health risks.The study area which is

Mile one market is one of the largest markets in the city of Port Harcourt. The market usually attracts large gathering of buyers and seller, goods are exchanged for money on daily bases in the market. Categories of unwanted items in the market rangesfrom combustible materials like papers, plastics, food waste to non-combustible materials like glassesand metals.

According to Meidina and Gamse (2010), markets contribute about 20% of waste generation; they are the second largest generator of municipal solid waste after households. Waste generation encompasses those activities in which materials are identified as no longerof value and are either discarded or gathered together for disposal (Momoh andOladebeye, 2010).

In developing countries like Nigeria, proper waste disposal in markets isasource of concern as markets spring up with less attention to provision of proper refusedumps; According to Ololade*et al.,*(2009) man has carelessly polluted the environmentin an attempt to dispose waste materials.

Wastes that contain high concentration of toxic substance when carelessly disposed can pollute underground wateras liquid seep through waste, this leachate negatively change the chemical composition of the underground water. Improper waste disposal practices may also result in land pollution and couldcause other adverse health effects.Thus the researcher aims at assessing the solid waste disposal pattern of sellers in Mile One market Port Harcourt.To the best of the researcherøs knowledge, there is no documented studyon the assessment of the solid waste disposal pattern of sellers inmile one market Port Harcourt.

1.2 Statement of Research Problem.

Mile One market is a central market in the city of Port Harcourt and should be a place for healthy transaction of business activities however; piles of wasteslitter the market. During periods of heavy downpour of rain, these piles of waste are channelled into drainages and causes obstruction of the free flow of water; theyalso provides excellent breeding ground for vector of communicable disease which are detrimental to the health of the buyers, sellers that visits the market and most especially harmful to household dwellers residing close to the market.More so, some sellers in the market lack waste storage containers and are left with no option than to dispose their waste in places suitable to them.Despite the growing concern of waste management in many market in the city Mile One market inclusive,the assessmentofsolid waste disposal habits of sellers in Mile one marketas well as the evacuation practise ofRivers State waste management agencyhas not been studied to the best of the researcherøs knowledge.

1.3Aim and Objectives of Study

1.3.1 Aimof theStudy

The aim of this study is to assess solid waste disposal patternsof sellers in Mile One market, Port Harcourt.

1.3.2 Objectives of the Study

The aim of the study will be achieved through the following objectives:

1. To identify the solid waste disposal habits of the sellers at mile one market Port Harcourt.

2. To determine the frequency of clearing the dumpsters around the markets.

3. To determinethe accessibility of waste dumpsters to market sellers and to ascertain whether the waste disposal pattern of sellers in the market differ with the accessibilityto waste dumpster.

4. To determine if the pattern of waste disposal vary from the different sections of the market.

1.4 Research Questions:

From the above objectives, the following research questions are hereby formulated to guide the study:

1. What are the waste disposal habits of the sellers at mile one market in Port Harcourt?

2. What is the frequency of emptying the dumpsters at Mile One Market Port Harcourt?

3. Does waste disposal pattern of sellers significantly vary with sellersø accessibility towaste dumpstersat theMile One Market?

4.Does the pattern of waste disposal significantly vary from a section of the market to another?

1.5 Research Hypotheses

In accordance with the research objectives, the followinghypotheses are formulated for testing in this study. Objectives one and two are presented usingdescriptive statistics while objective three and four arepresented using inferential statistic.

i.H_1: Waste disposal pattern of sellers does not significantly vary with sellersø accessibility to waste dumpsters at the Mile One Market.

ii. H_2: The pattern of waste disposal does not significantly vary from the different sections of market.

1.6 Scope of the Study.

The study is limited to the research assessment on waste disposalpatternof sellers in Mile One market and primary data wascollected only from the sampled market. Data collection were on waste generation, storage, collection and disposal by owners of stalls, shop stands, booths, kiosks, and counters among the various sections of the market. It was assumed that the above mentioned sellers registered with the market authorities and are recognised as sellers in the market. Data collected from the sellers provided the bases for identifying the current pattern of waste disposal in the market.

1.7 Limitation of the Study

The sellers were reluctant to give relevant information, extraction of this information was made possible by persuasion, politeness and perseverance. So much effort was made to see that the questionnaire for this research was answered as accurate as possible.

Members of staff of Rivers State Waste Management Agency were reluctant in providing comprehensive information.Also, there was a difficulty in penetrating the swampy areas of the market to obtain necessary data.

1.8 Significance of the Study

This study defined the waste disposal pattern operational at mile one market in Port Harcourt, Rivers State. It also define whether dumpsters are accessible for proper waste disposal in the market and how often the dumpsters are evacuated from the market. More so, itprovides the basic information necessary for government to formulate policies for proper waste management. Finally, this study serves as a baseline study forfuture research.

CHAPTER TWO

2.0   CONCEPTUAL FRAMEWORK

In this section, the study tries to explain some of the basic concepts and theories used. These include the environment,environmental sustainability, waste, solid

waste disposal,integrated Solidwaste managementetc. To begin with, theenvironment refers to all of the external factors affecting an organism. It could also mean all the circumstances, people, things, and events around an organism, a person, a community that influence an organismøs life (Phillip, 2004).

Section 38 of the Federal Environmental Protection Agency Act defines the environmentto include water, air, land and all plants and human beings or animals living therein and the inter-relationships that exist between and among them.

2.1 Concept of Environmental Sustainability.

The word 'sustain' comes from the Latin wordsustenare meaning "to hold up" i.e. to support; it evolved long ago to mean to keep something going or extend its duration, for commonest non-specialised use of the word the closest synonym is 'maintain' (Phillip, 2004).

This paper defines environmental sustainability:as a condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs while neither exceeding the capacity of its supporting ecosystems to continue to regenerate the services necessary to meet those needs; nor by our actions diminishing biological diversity.More specifically, Environmental Sustainability is defined as meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them (Greenwood*et al.,* 2010),

Environmental sustainability seeks to sustain global life support system indefinitely (This refers principally to those systems maintaining human life).Source capacity of the global ecosystem provides raw material inputs ó Food, water, air, sink

capacities and waste assimilation, these source and sink capacity are large but finite. Sustainability requires that they be maintained rather than run down(John 2011). For example, accumulation of CFCs (chlorofluorocarbons), damages the capacity of the atmosphere to protect humans and other biota from harmful UV radiation. Protecting human life is the main reason human seeks environmental sustainability.

According to Robert, (2005) humanlife depends on species of food, Shelter, breathable air, plants pollination, waste assimilation and other life support services.The physical environment is powerfully affected by and is made up of evolving systems - ecological systems, societies and economies. These evolving systems will create changes in some aspects of the physical environment and will prevent or resist changes in other aspects.

Robinson, (2011) says environmental sustainability involves the sustenance of the environment, society and economy (Figure 2.1);Whether one considers sustainability to exist as a three-legged table consisting of the environment, the economy, and society, or as a dualistic relationship between human beings and the ecosystem theyinhabit,there should at least be agreement that ensures the provision of clean air, clean water and productive land as foundational to a responsible socioeconomic system(Robinson,2011)

Ecological System   Economy
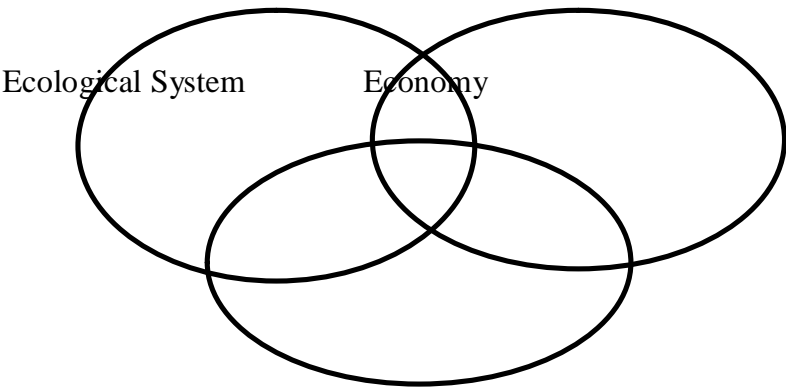
Society

Environmental Sustainability.

Figure 2.1 Dimensions of Environmental sustainability
Source: Robinson 2011

Since humans depend in countless ways on the physical environment (both natural and human constructed) sustaining desired environmental conditions directly contributes to the sustaining of people and human societies, that is, to social sustainability. The viability of the economy clearly depends on environmental resources and service flows so economic sustainability depends onenvironmental sustainability(Phillip 2004).

Some of the issues that pose major environmental sustainability problems include: destruction of the living environments (habitats) of native species, emission of greenhouses gases into the atmosphere that can cause climate change, depletion of low cost oil and other fossil fuels and discharge of polluting chemicals and waste materials into the environment.

2.2 The Concept and Classification of Waste

Waste management is one of the important services provided by most urban authorities. Wastes need to be characterized by sources, generation rates, types of wastes produced, and composition in order to monitor and control prevailing waste management systems while improving the existing system.

Waste can be any substancebe it solid, liquid or gaseous, that remains a residue or an incidental by-product of a substance for which no use can be found by the organism or system that produces it (Allaby, 2008).Wastes may be categorized into gaseous, solid and liquid waste.

Davies (2008) notes that ꞊what people consider being a waste material or substances are considered a source of value by othersø According to Ibrahim (2002) wastes are categorized based on the composition. These are: Biodegradable (These are waste that are capable of changing to harmless natural state by action of bacteria) mainly composed of garbage; Non-biodegradable waste comprises of scraps of metals and plastics.

Table 2.1.shows the criteria for waste classification. A number of criteria are employed to classify waste into types including their source, physical state, material composition and the level of risk associated with waste substance. Such classification of waste provides a basis for the development of appropriate waste management practice.

Table 2.1 Classification of waste
Criteria for waste classification; Examples of waste types.

Criteria for Waste Classification	Examples of Waste Classification.
Sources or premises of generation	Residential, commercial, industrial, municipal services, building and construction, agricultural.
Physical state of waste material	Liquid, gaseous, solid and radioactive.
Material composition of waste	Organic food waste, paper and card, plastic, inert, metal, glass, textile.
Level of risk.	Hazardous and non- hazardous.

Source: World Bank, 1999

The source classification of waste is based on the fact that waste emanates from different sectors of the society such as residential, commercial and industrial sources. A good example of the source classification of waste was provided by the world bank (1999) in a study in Asia which identified waste as residential, commercial, industrial, municipal services, construction and demolition, processing and agricultural source.Classification of waste by their sources is a useful way of determining the relative contributions of the different sectors to the waste stream and how to plan for their collection and disposal.

Classification of waste by the useof physical state of waste substances; the materials in the waste stream can be categorizes into liquid, solid, gaseous and radioactive waste. Examples of these types are shown in table 2.2 below.

Table 2.2 Classification of Waste Based on Physical State of Waste Substances

Waste Types	Examples
Liquid Waste	Sewage sludge, waste water from bath house and kitchen
Solid Waste	Food waste, paper, plastics, and metals
Gaseous Waste	Factory smoke, vehicle exhaust smoke, fumes from burning waste dumps.
Radioactive Waste	Radiation and excess energy

Source: World Bank 1999

Frequently, the material composition of the waste stream is also used to classify waste into such types as organic waste, paper and cardboard, plastic, glass, ceramics, textiles and metals (Table 2.3) An analysis of household waste stream in the Surrey county identified nine main types of materials: paper/card, plastic film, dense plastic, textiles, combustibles, glass, ferrous metals, garden waste and food waste (Surrey waste. 2000)

Table 2.3 Material Classification of Waste

Waste Type	Examples
Paper	Newspapers, cardboards, office waste papers and magazines
Plastics	Bottles, expanded polystyrene, film plastics, other rigid plastics.
Glass	Clear glass, green glass, amber glass, non-recyclable glass.
Metals	Steel cans, aluminium cans, other ferrous metals.
Organics	Yard waste-grass, wood, textile, diapers, other organics.
Inorganic	Electronics, carpets, construction and demolition, other inorganic.

Source: Surrey waste classification (2000)

Classification of waste materials into hazardous waste and non-hazardous waste is useful when determining the potential health risk of waste material. Hazardous waste refers to waste with properties that make them potentially harmful to human health or the environment (USEPA, 2008). According to the United State Environmental Protection Agency(2008), hazardous waste can be liquids, solids or contained gases and can be by-products of manufacturing processes or simply discarded commercial products like cleaning fluids or pesticides. Hazardous waste

materials requires rigorous and cautions means of disposal because of their potential pollution danger (Delm, 1993). In the EPA's hazardous waste listings the categories of hazardous waste include ignitable waste, corrosive waste, reactive waste and toxic waste.

The classification of waste intotypes, as discussed above, is very important for waste management planning. Among other things, it provides useful information that enable municipal authorities to organize waste management operations including the frequency, means of collection, and appropriate disposal methods. The developed countries have made great advances in waste data generation and analysis which have enabled them to improve waste management over the years.In most developing countries however, even the most basic data on waste such as the quantities generated and composition of the waste stream are lacking, making it difficult to organize waste management effectively (Tribe 2001).

2.3Market Waste and Its Constituents.

Amarket is any arrangementwherebysellers of a particular good or service can meet with the buyers of that goods and service where there is a potential for a transaction to take place. The buyers must have something they can offer in exchange for there to be a potential transaction(Mike, 2014).

In terms of physical impact on the environment, markets in Nigeria may be classified as small, medium or large. Small markets usually serve local communities and may consist of just a few stalls. Small markets are usually easy to keep clean at the end of the day's transactions (Abejegah*et al*., 2013). Medium

markets serve a number of neighbouring communities while large markets are usually central, contain many stalls and promote inter-township trade (Bala, 2004). Market wastes constitute both inorganic and organic solid waste. Organic solid waste is a type of biodegradable solid waste that is gotten from plants or animals. Markets that sell organic produce usually generate a high volume of waste from spoiled fruits and vegetables, while inorganic waste may include items like metal scraps and glasses. Inorganic waste may take hundreds of years to decompose or may not decompose at all. However, inorganic waste can often be recycled.

Table 2.4 Types of solid waste and time needed to degenerate if untreated

Type of waste	Time needed to degenerate, if left untreated
Organic wastes (vegetable fruit food etc.)	7-15 days
Paper	10-30 days
Cotton cloth	2-5 months
Woolen cloth	12 months
Wood	10-15 years
Tin, Aluminum and other metal cans	200-500 years
Plastic	100 – 1000+ years
Glass	Not determined.

Source: Idoce (2002)

Table 2.4 shows different types of waste material that can be seen in a market, it also show the time needed for the wastes to degenerate if left untreated. Okecha, (2000) stated that market wastes include animal wastes, human wastes, equipment wastes and wastes from several food products sold in the markets. Solid wastes comprise all the wastes arising from human activities that are normally solid,

discarded as useless or unwanted. Also included are by- products of process lines or materials that may be required for disposal.

2.4 Generation of Market Waste

Wastes are complex in nature depending on sources of generation. Market waste are generated as different categories of item that are not useful to the producers of the waste. Waste generation encompasses those activities in which materials are identified as no longerbeing of value and are either thrown away or gathered together for disposal.

2.5 Waste Storage and Disposal

Kreith, (1994) waste storage is of primary importance because of the aesthetic consideration;according to him, waste generated should bestored in waste storage containers or bags and not thrown away indiscriminately. Stored waste should be collected,the element of collection includes not only the gathering of solid waste, but also the hauling of waste after collection to the location where the collection vehicle is emptied.

The word disposal means to destroy, discard, or hide embarrassing or incriminating material or to get rid of anything undesirable (Peter *et al.,* 1996).Uncontrolled solid waste disposal can cause environmental problems like traffic congestion on streets and roads and can also cause municipal floods when dumped on waterways.

According to Bichi et al., (2013)the problem of refuse disposal is basically location problem, most of the collection centres that are not well planned may lead to introduction of illegal collection points. Incomplete and abandoned structures and

vehicles serving as refuse centres apart from being a hide out for culprits can be a threatto the life and environment of the general public.

Improper handling and disposal of solid waste has multi-dimensional impact on human and the environment wellbeing. Improper dumping can lead to

1. Pollution of air, soil and water.

2.Clogging of drains.

3.Floods in the plains and landslide in the hilly areas during rainy seasons.

4. Creation of stagnant water for insect breeding.

5.Contamination of surface and underground water supplies.

Improper incineration and burning of waste could lead to urban air pollution. Again, it can lead to greenhouse gases emission (Palmer 1999).

2.6 Concept of Refuse Disposal Pattern

A pattern is a regular and repeated way in which something happens or is done. The pattern of waste disposal in a market illustrates the way, means, method by which disposal of waste is practised in a market. A good study of market waste disposal requires the assessment of the factors that influence the disposal of wastes generated in the market, which encompasses a full range of activities from generation to final disposal at dumpsters. This means that the factors influencing the activities in the flow stream have to be investigated which may include amount of waste generated, waste storage medium(bags, waste containers, baskets etc.), frequency of collection and evacuation of waste to dumpster and frequency of evacuation of waste from dumpsters to permanent dumpsite. The worry by environmentalists is the quantity and toxic level posed by the wastes produced as

these waste are mainly by product of consumer-based items (Daniel andPerinaz, 2012).

2.7 Network and Team Work Flow Technology for Waste Management Agencies

Organizational capabilities are required for the effectiveness of agencies and this depends on the emergence of network of actors involved in performing a task. Nnunduma (2003) cites that individuals engaged in the activities of a network establish common aims and interests. However, these networks should have resources, skills, legitimacy and means of coordination and this can be applicable to waste management agencies. According to Wasserman & Faust(1999) there is need for waste management agencies to understand their roles and network of dutiesin performing their task.

The figure2.2 illustrates the team work flow technology in waste management. It illicit the allocation of scheduled task to process managers and technical staff that monitors waste management activities from the point of waste generation to final disposal.
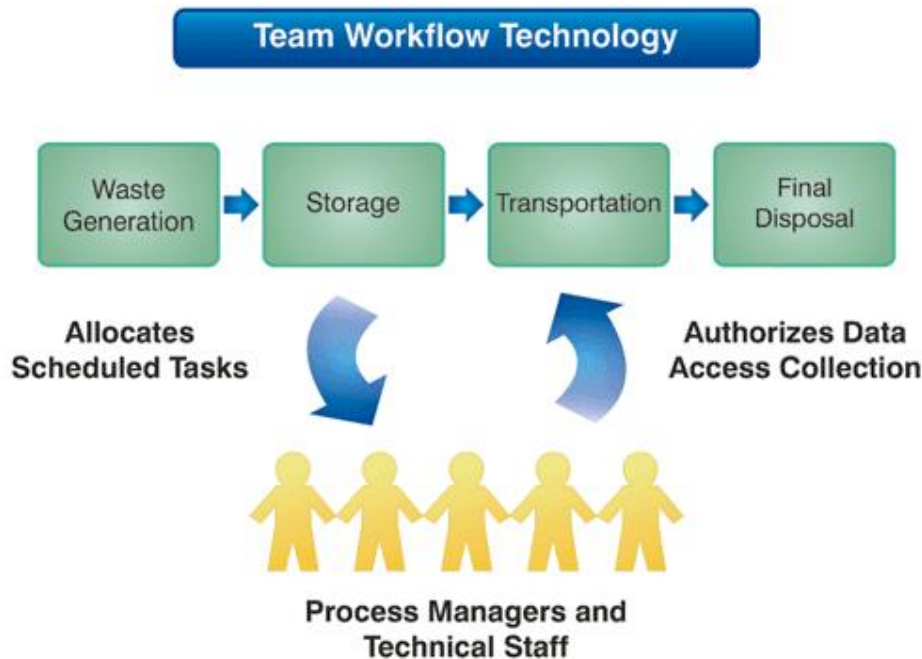
Figure 2.2 Team Work flow Technology
Source:Wasserman (1999)

Kalu*et al.*, (2009) also mentioned that waste collected should be well evacuated at recognised dumpsite this is because uncontrolled waste disposal not only creates serious environmental problems and affects human and animal health, but also causes serious financial and socio-economic losses.

Although most changes in solid waste composition occur seasonally as a result of seasonal changes in food consumption, changes in lifestyle and increasing dependence on processed food and associated packaging may continuously alter waste composition (Environmental Quality International, 2005).

2.8 The Goals of Waste Management.

The Ghana EnvironmentalProtection Agency (2002) notes that waste management is essential in the present day context for the following reasons:

- To protect human health against waste-related hazard and risk.

- To prevent pollution of the environment and its natural resources like air water and land.

- To produce energy which can be an alternative for the fast depleting fossil fuels and other conventional sources of energy.

- To make optimum use of waste generated.

- For a better and sustainable future.

In conclusion, the main objective of waste management is to protect public health against waste-related hazards and risks, and to maintain ecosystem services by preventing the pollution of the natural environment and its resources such as land, water and air as well as the aesthetic quality of the environment.

To achieve the goals of municipal solid waste management, it is necessary to establish sustainable systems of solid waste management which will meet the needs of the entire urban population including the poor. The systems put in place for solid waste management must be appropriate to the particular circumstances of the city and its various locations.

2.9 International Best Practice in Solid Waste Management Using the Integrated Sustainable Waste Management Concept.

Integrated solid waste management refers to the strategic approach to sustainable management of solid wastes covering all sources and all aspects, covering generation, segregation, transfer, sorting, treatment, recovery and disposal in an integrated manner, with an emphasis on maximizing resource use efficiency(UNEP 2012).

Arnold and Justine (2001) ISWM is particularly useful when the goal is:

- To prepare and formulate a waste management strategy

- To design a system for an area that does not yet have waste management

- To improve existing collection or disposal systems

- To extend the waste collection service to low-income areas or neighbourhoods with difficult access (narrow streets, steep streets, etc.)

ISWM is useful to evaluate existing waste management systems, whether the goal is upgrading or installing something new. The goal of the assessment is to develop an overview of how materials flow in the city: a kind of input-output analysis. Ideally, waste materials are tracked from their sources (imported or domestic) to manufacturer, distributor, retail dealer and ultimately to consumers. The physical infrastructure in the city and neighbourhoods should be taken into consideration when selecting systems and technologies for waste management. Examples are: Road and traffic conditions (wide, narrow, winding, paved, one or two-way traffic, traffic jams); Space for transfer or temporary storage of waste,space for separation at source bins, gardens generating organic waste and the presence of markets (UNEP 2012).

According to Peter et al., (1996) best waste management practise can be achieved by applying combination of necessary measures for sustainable and effective waste management. These involvedifferent stakeholders, elements and aspectsas seen in figure 2.3
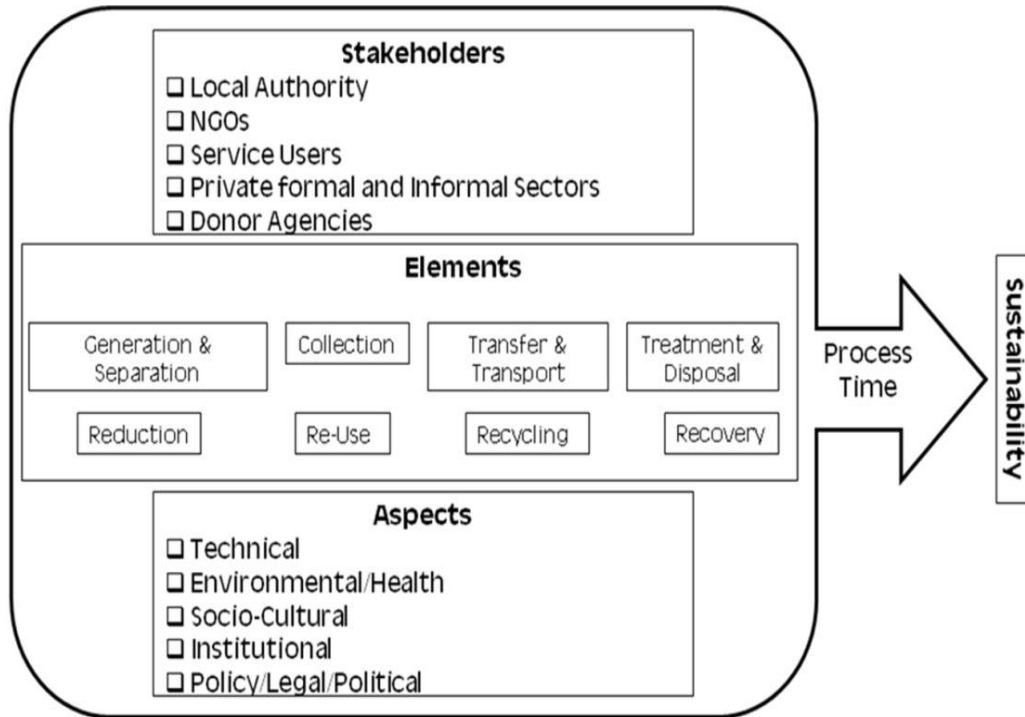
Figure 2.3:Integrated Sustainable Solid Waste Management (ISWM) Concept.
Source: Peter *et al.,* (1996)

- Institutional Aspect:(Make a clear definition of jurisdiction and roles of government authorities in waste management);

- Social Aspect: (Social and cultural performance) This aspect take into cognisance the stakeholders in waste management in the city, type of activities these stakeholders carry out, who has an interest in waste management or is affected by it, co-operation between stakeholders and municipalities, mode of communication, gender and sex roles relating to management of waste.

- Financial Aspect : (Financial-economic performance)This aspect assesses if the municipality have the authority to raise its own funds for waste management (through fees or taxes) andwaste management budget

- Economical Aspect (Consider costs of facilities and equipment and the long-term economic impact of services provided);

- Technical Aspect: (Design of transfer facilities and equipment which must match the characteristics of local collection systems and the capacity of existing disposal facilities), waste quantities, waste composition, Capacity of collection or treatment technology,Physical infrastructure, Sturdiness of equipment/technology and Local availability of spare parts.

Technical performance can be measured through: Collection rate ,Collection coverage , areas not served by regular collection (which and how many), number of litter bins in commercial areas, vehicle productivity, duration and volume of one collection round trip (collection, transfer to disposal site and back)

- Policy and legal Aspect: This include national frameworkfor waste management law, jurisdiction and authority to plan, waste management rules /laws, (do they cover all necessary issues, are sanctions severe enough)? and howwell do enforcement of these regulations function?

Stakeholders Participation in sustainable waste management practices include the activities and involvement of Non-Governmental Organizations (NGOs), Local authorities, private formal and informal sectors and community leaders.

The ISWM insight is that most waste management problems have to do with something other ó or more ó than money and equipment. Some problems have to do with the attitude and behaviour of citizens, waste management staff, private enterprises and waste pickers. Other problems are caused or made more serious by factors that are not technical or financial, but relate to managerial (in)capacities, the

institutional framework, the environment, or the social or cultural context. In these cases, it is not money or equipment that provide solutions, but rather changing social, institutional, legal or political conditions (Palmares 2000).

CHAPTER THREE

3.0   LITERATURE REVIEW.

In early times in Nigeria (pre-colonial days up till 1970s), disposal of refuse and other wastes did not pose any significant problem, the population was small and enough land was available for assimilation of wastes, waste problem started with urban growth which resulted partly from national increase in population and more importantly from immigration (Egunlobi, 1996). Various researchers have carried out both local and foreign studieson solid waste generation, management and disposal.The review of related literature istherefore a source of secondary information to support this study.

3.1 WasteGeneration in Urban Cities:

According to NEST, (1991) one of the problem facing Nigerian urban centres is the issue of waste management which has always been created by mankind since the prehistoric times, NEST stated that the big challenge with waste management in major Nigerian cities is not only the volume of the wastes, but also the composition of the wastes. Modern civilization and the associated increase in population worldwide contribute significantly to the increase in the quantity and variety of waste generated (Anikwe and Nwobodo 2002).

Afon, (2006) discovered a wide gap between the rate of waste generation and the rate at which it is evacuated in Oyo town resulting from high rate of urbanization, In his study, he discovered that the rate of generation supersedes the rate of evacuation. This is consistent with the findings of Abejegah*etal.(*2013)on a case

study of Oregbenimarket Benin City Edo State which shows that the rate of evacuation of waste lag behind rate of generationwaste.

Nabegu, (2006) shows that only 20% of the estimated waste generated in Kano metropolis is being evacuated by the public waste collection agency in the city.Although hewent further to identify access ways, insufficient funds, inadequate manpower and poor sanitation habits as the major factors that hamper the smooth operation of the public waste collection agency in the city.The fact that the rate of collection and evacuation perpetually lag behind the rate of generation makes solid waste accumulation a major source of environmental nuisance in Nigerian cities (Uwadiegwu, 2013).

World Bank,(2013) Studynotes that urbanizationandincomelevel are highly correlated. As disposable incomes and living standards increase, consumption of goods and services also increase, as does the amount of waste generated.In recent times, there has been an increase in the volume of waste generation;thisis partly due to the increasing rate of population, urbanization, industrialization and general economic growth (Inyang, 2012).

Uwadiegwu and Chukwu, (2013)states that the amounts of waste being generated are increasing, in developing countries.Much of the waste are poorly managed, as in cases where wastes are not collected; disposal sites are inadequate; or wastes are contaminated with hazardous materials.

3.2 Waste Storage, Collection and Disposal

According to Uchegbu, (2002) waste generated should be well stored for easy collection and disposal by the appropriate authority. Onsite storage is of primary importance because of public health concerns and aesthetic consideration.Poorly managed waste has an enormous impact on health, local and global environment, and economy; improperly managed waste usually results in down-stream costs higher than what it would have cost to manage the waste properly in the first place(Daniel *et al.,* 2012).

Ndinwa*et al.,* (2012) shows that manyparts of urban cities and towns do not benefit from any organised waste management services and therefore wastes are unattended to, buried, burnt or disposed haphazardly.This is consistent with the findings of Adewole, (2009) whoidentified unhealthy waste disposal habits of the residents,continual increase in the state's population, corrupt practices and lack of proper role definition among related agencies as some of the problems encountered in the management of solid waste in the city of Lagos.

Zakariyau, (2006) reported that small children were solely responsible for the collection and disposal of the waste in Funtua market in Kasitna States. He concluded that the public waste collection agency in the study area was virtually doing nothing;unsightly makeshift containers and even open ground storage, both of which are undesirable are often seen at many residential and commercial sites.

Furthermore, publication from The Nigerian Times (2014) report shows that sellers at Utako ultramodern market Abuja dispose waste indiscriminately as a result of inaccessibility to waste disposal facilities in the market.

In a survey of waste management policies and practices in 20 cities in different parts of the world,done for UN-Habitat, a team of waste management professionals (researchers, consultants, practitioners, advocacy NGOs) from over 30 countries;concluded that data is a priority in efforts to improve waste management which is needed to know how much waste is generated, how much is collected (by formal and informal sectors), recovered , how much is disposed of and how much is accounted for(Wilson*et al.,* 2012).Financially, waste generator should share a part of theburden of managing the waste from collection to disposal (Ossai2006).

3.3 Human Behaviour and Its Effect on the Environment

A study conducted by Nshimirimana, (2004) on the attitudes and behaviour of low income households towards the management of domestic solid waste in Tafelsig, South Africa concluded that poverty causes a lack of focus on the environment and the livelihood activities in low-income areas contribute to littering.

NEST, (1991) adds that there is lack of interest by people towards the management of the refuse they generate. According to the Publication on Nigeriaøs threatened environment by NEST it noted that although waste is generated by people, they show no concern towards its final disposal. Many studies carried out in some urban centres confirmed the influence of the people on the maintenance and conservation of the environment. Everybody wants their refuse to be taken away, nobody wants to take part in its disposal and management (Simon, 1994).

According to Afangideh*et al*., (2012) in his work on attitude of urban dwellers to waste disposal and management in Calabar, he noted thatpoor attitude to waste disposal may be ascribed to the inefficiencies of the environmental protection

agencies.Most times people pack their wastes in wastebins for weeks without the agencies coming to evacuate them to the final point of disposal.

3.4 Brief Review on the Effect of Rural Urban Migration on Waste Generation

Human population and rural-urban migration is on an increase yet the service rendered is not sizeable to control the high level of waste generated in urban areas and these has contributed to a large extent, the nuisance and the damaging effect of the urban environment (Sule, 2004). The deterioration of the Nigerian urban environment in term of irresponsible dumping and accumulated solid waste is most apparent in our growing cities today, Rapid population growth has not been accompanied by a corresponding increase in the delivery of essential urban services such as solid waste facilities capable of enhancing environmental sanitation practices in Nigerian cities(Edu, 2003).

3.5 The Importance of Urban Design and Planning in Waste Management.

Fadamiro (2010) in his inaugural lecture on dynamics of city developmentdelivered at the Federal University of TechnologyAkure, Ondo State,notesthat cities are supposed to be centres of innovation, industrialization and modernization, where they are neglected, unplanned and underdeveloped, the city can become a place of despair rather than a habitat of hope and better life. The most important of these are the encroachment of open spaces by poor disposal of Waste. Shonibare, (1996)confirmes the encroachment of the open spaces by waste as one of the greatest problems facing Nigerian urban centres he went further to explain the need for proper planning of markets and environs by positioning waste

dumpster at strategic locations to create a better environment for business transaction in markets.

3.6 Review on Environmental Education, Awareness and Public Participation in Waste Management.

Environmental education is necessary for improving environmental quality (Emeribe, 2000). Foday *et al*., (2013) discovers that it was obvious from the disposal methods used by residents in Granville brook Freetown city market, sierra Leone that most of the people who throw refuse on open land and drains are uneducated. Those who keep waste in bins or burn it are most likely those with higher education, the preference of educated people to adopt better methods of waste disposal was seen to be higher than illiterates. In general, majority of the respondents either threw their waste on land or drains or streets. Equally, only a small proportion (21%) of the respondents out of 398 respondent deposits their waste in bins and bags from where they can be transferred to the designated points for ultimate disposal. Experiences in many countries demonstrate that even the best run water, sanitation or solid waste schemes cannot successfully be implemented, operated and maintained without full involvement and commitment of the users (Narayan, 1995).

Tajuddeen (2003) observes a resultant effect of inadequate enlightenment campaign on the dangers posed by indiscriminate waste disposal by the authorities to the city dwellers, he noted that poor knowledge of waste management can result in careless disposal of waste and thus lead to outbreak of epidemics. Although people are capable of influencing their environment in both constructive and destructive ways,

yet, much of the influence has been in the service of making the environment less attractive (Emma *et al*., 2012).

Environmental education and awareness among decision makers will according toEmeribe, (2000) considerably help in a better integration of environmental issues into development planning, budgeting and policy formulations, this is consistent with Minghua*et al.*, (2009) study which emphasises on legislation, environmental management strategies, economic and technological capabilities as well as environmental awareness and education of citizens as key to successful implementation of solid waste management.

The need for environmental education is a weapon that could be used by all nations to arouse peopleøs consciousness, positively change their attitudes and instill in them those values and skills that can promote effective environmental management (UNESCO, 1992).

3.7 Health And Environmental Risks Of Poor Waste Disposal Practice.

Kofoworola, (2007) in his journal notes that one of the greatest challenges facing developing countriesis the unhealthy disposal of waste.As cities grow economically, business activities and consumption patterns increases waste generation especially solid waste quantities.

Waste that containheavy metals are known to be non-biodegradable; they rather accumulate along the food chain as domestic and wild animals commonly forage on abandoned wastes. A study on waste management in Pudong New Area in China, recommended source separation as a key priority to reduce the amount of waste requiring disposal.In time past, men thought the environment had an infinite

capacity to devour his waste without any ill effects, but recently however, man's health and welfare are being affected by environmental pollution resulting from careless waste disposal (Ololade, 2009).

Poor waste disposal presents a potential health problem not only to waste workers, but also to scavengers, other users of the same municipal drop-off point, and even small children who like to play in or around waste containers (Zerbock, 2003).Sha'Ato*et al.,* (2007) adds that surface and groundwater can be contaminated by leachatedue to inadequate waste disposal. The inabilities of societies to manage waste generation effectively play no small role in increasing environmental pressures as poorly managed wastes are perceived as environmental hazards of high significance, (Alam *et al.,* 2008).

(Anoliefo*et al.,*2001) Shows that leachates from waste dump makes the soil within and around the dump to become toxic. Other studies revealed that wastes from waste dump site in Nigeria have contaminated groundwater and other drinking water sources.According to UNEP (2005), decomposition of freshly disposed or old organic content in municipal solid waste results in the generation of unpleasant odour. The overall objective of waste management may include minimization of adverse environmental effects caused by indiscriminate disposal of wastes (Kaseva*et al*., 2003).

3.8PrivatePublic Partnership in Waste Disposal.

Stare (2009) study notes thatthe entire waste collection and disposal in Zaria city Nigeria is being carried out by informal sector with near complete absence of both

public and private sector. She concluded that the provision of waste management services in the city is far from being adequate.

Christopher (2008) posits thatmunicipal solid waste collection and disposal in Nigeria often involves informal sector; unregistered businesses, socially disadvantaged people, poor individuals and squatters or migrants from rural areas who are outside the social safety net. This is consistent with the findings of Adekiya (2005) that socially disadvantaged people are actively involved in the collection and disposal of market solid waste.

The use of private firms through public-private partnership (PPP) contracts (especially developing countries), is difficult due to the limited capacity of governments to manage PPP and the incapacity of governments to fulfil their financial obligations towards the private partner, nevertheless the private sector is a critical player in any successful national strategy on waste management (Awortwi, 2004).

3.9 Solid Waste Disposal and Management in Developing Countries

Rogdgers, (2011) defines waste management as a systematic control of generation, storage, collection, transportation, separation, processing, recovery and disposal of waste. Ankit*et al*.,(2012)cited that proper management of waste has been a critical aspect in urban areas, especially in mega cities which are major centres of waste generation. Irregular collection or non-collection and environmentally unsafe methods of waste disposal are common features of a large number of urban areas.

Nabegu, (2010) in his journal, statesthat changesin consumption patterns with alterations results in a quantum jump in solid waste generation, this may result from an increase in demand of goods which increases waste generation.

The unhealthy disposal of wastes is one of the greatest challenge facing developing countries (Kofoworola, 2007).Dumping of solid waste in highly inappropriate places like middle of roads and unauthorized disposal sites are common practices in developing countries (Igbinomwanhia, 2011)

According to World Health Organization Regional Office for Africa 2009, a significant proportion of urban population of Africa has poor access to refuse collection for proper solid waste management, this poorly managed waste presents a health risk to communities (WHO, 2008). Ideally, waste management should go beyond pollution prevention and disease prevention for humans and should benefit society by providing economic gain for families and communities,Implement procedures, where applicable, to collect, transport, and dispose of solid waste at appropriate disposal facilities in accordance with applicable federal, state, and local laws and regulations(Labspace, 2014) .

From the review of related literature, it is observed that several work have been studied on waste management in several cities in Nigeria and beyond.

The researcher identified some **research gaps** in this area of study.

Waste management studies have so far concentrated generally on municipal solid waste with more focus on household waste and industrial waste as observed by Afangideh*et al.* (2012);Foday*et al.* (2013); Emma *et al.* (2012) among other

researchers. In this area of study, the most available environmental journals on market focus mainly on land use, architectural technology and physical planning as studied by Daniel and Perinaz,(2012); Fadamiro (2010); Kent and Kawke,(2003) Nevertheless, there is paucity of information on market waste disposal practices. This study therefore assesses the solid waste disposal pattern of sellers in mile one market Port Harcourt.

Despite the growing concern of waste disposal practices in many market in the city of Port Harcourt Rivers State, to the best of the researcher's knowledge there is no documented study on the assessment of the solid waste disposal pattern of sellers in mile one market Port Harcourt.

CHAPTER FOUR

STUDY AREA

4.1 Geographical Location of Port Harcourt, Rivers State.

Port Harcourt is the major city in Rivers State. Rivers state is bounded on the South by the Atlantic Ocean, to the North by the Anambra, Imo and Abia States, to the East by AkwaIbom State and to the West by the Bayelsa and Delta States.

Port Harcourt, the State Capital of Rivers State has the GPS coordination (Lat4.78^{o}N - Long 7.01^{o}E and Elevation 468m) Being the capital of Rivers State, it is situated at the southern tip of Nigeria, a littoral state covering about 11,077sq kilometres bordering the Atlantic Ocean(WFI 2013).

Figure 4.1 Shows the geographical location of Port Harcourt City in Rivers State, the co-ordinates, other Local Government Areas present in the state and locations of rivers across the state. The area coloured red in the map of Nigeria shows where Rivers State is located and the shaded portion in the map of the Rivers State is thePort Harcourt City.
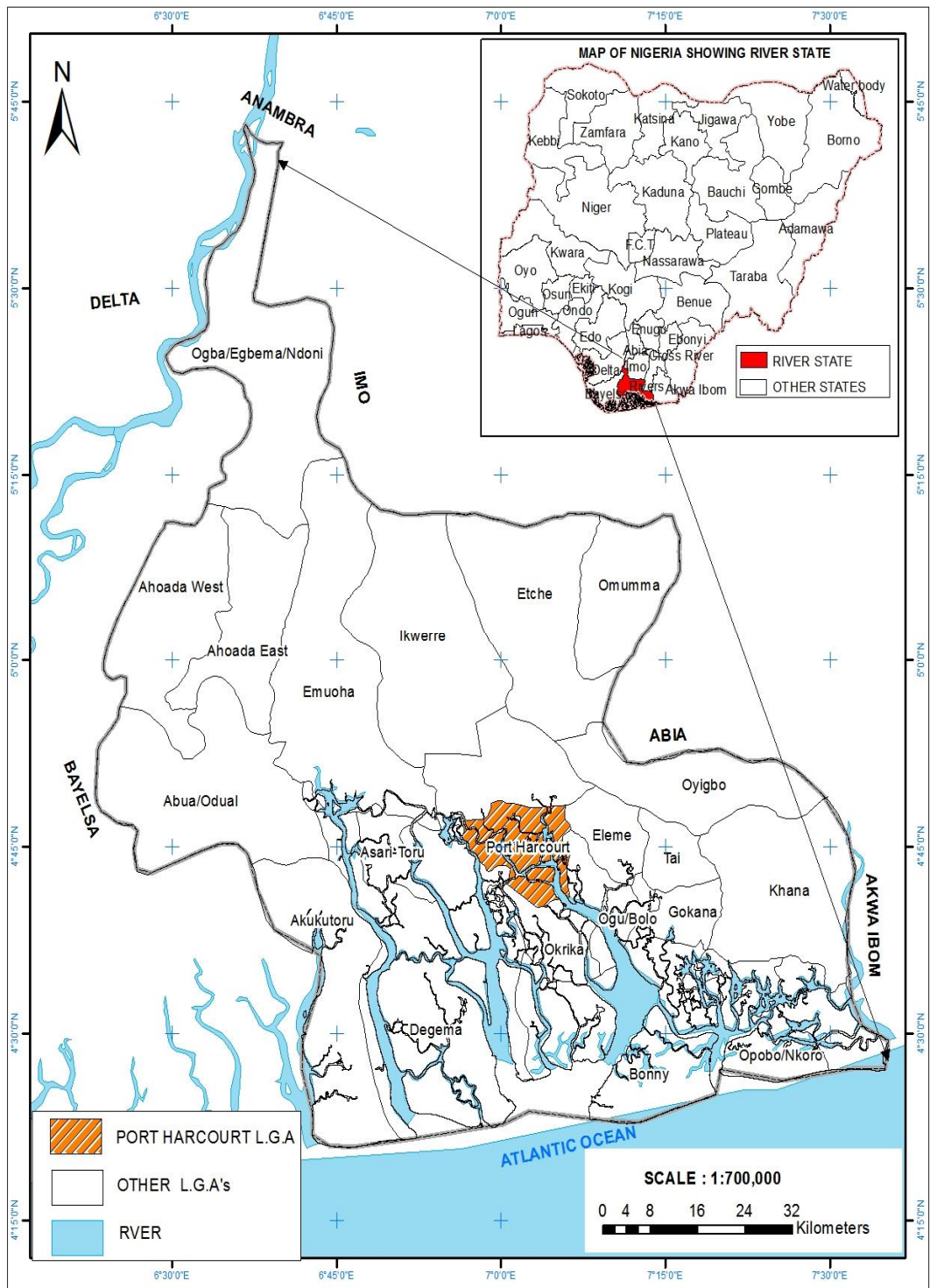
Figure 4.1: Map showing geographic location of Port Harcourt in River State.
Source : Extracted from Administrative map of Nigeria (INEC GIS shapefile Database 2011).

4.2 Brief Description of Mile One Market, Port Harcourt.

Mile one market is located in Rumuwoji community, Diobu along Ikwere road Port Harcourt. It is one of the largest markets in the city of Port Harcourt. The market is surrounded by residential buildings,banks,a police Station, a recreational park commonly known as Isaac Boro Parkand car parks. There are different segment of the mile one markets which are: the new Ultra-modern building with more than eighty stalls, road side market along Afikpo Street, disperse stalls at Sangana Street and railway market; a regular market that is situated beside a rail track and dotted in a filthy and swampy environment. Mile one market is a central market with buyers and sellers coming from different area in Port Harcourt for the purpose of business transaction,despite the nature of the market, traders and customers alike converge on a daily basis to transact their business. Item sold in the market include non-perishable and perishable goods like fruits and vegetables.

Figure 4.2 shows the map of Port Harcourt, The red coloured portion of the map is the study area which is the Mile One market in Port Harcourt, Rivers State.

Figure 4.2 Map of Port Harcourt Showing the Mile One Market.

Source: Extracted from Quickbird satellite imagery 2011 of Port Harcourt using GIS technology.
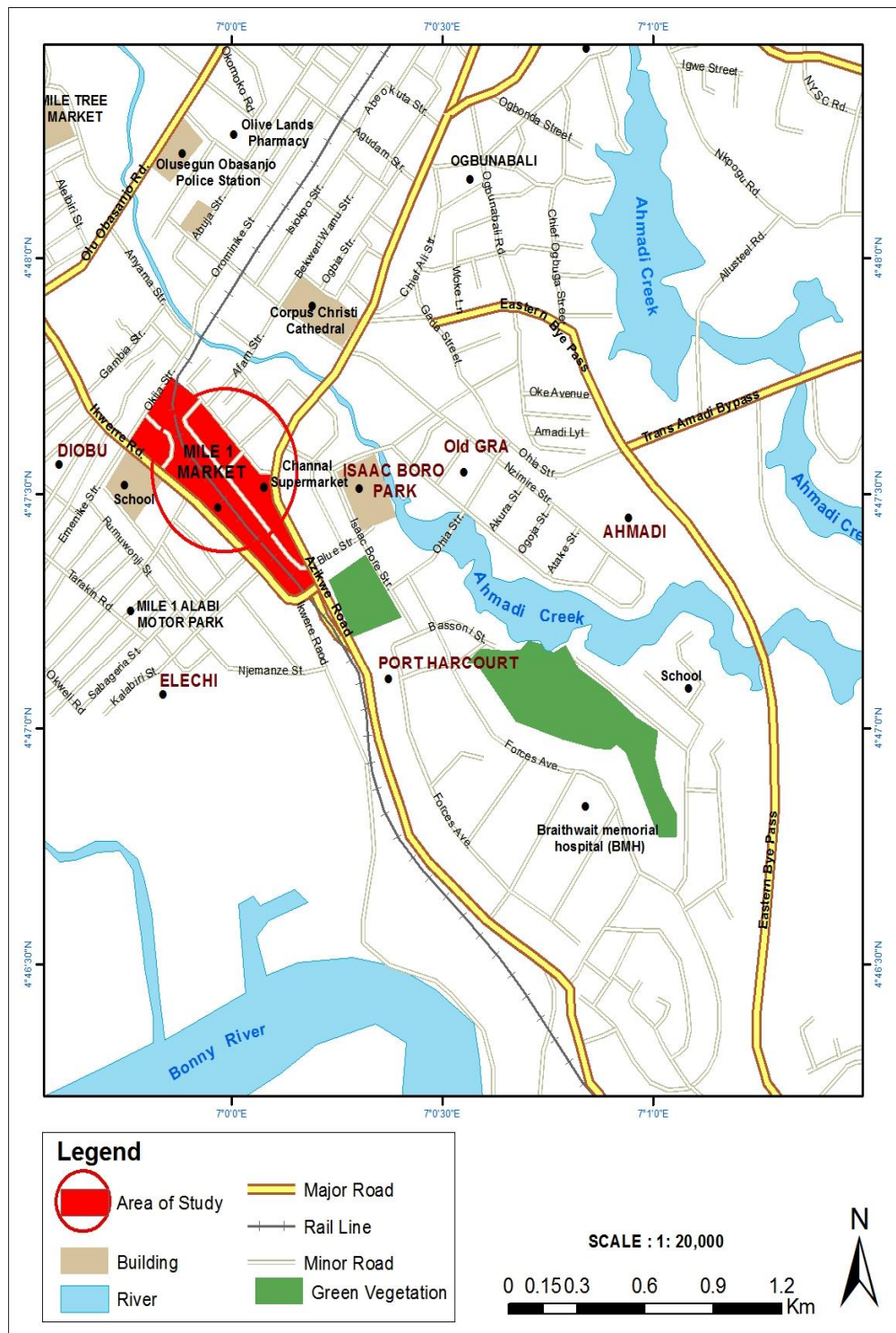
4.3 Population

Rivers state has a population of over 5,198,716 people (2006 population census)Using the projector mode fomula, the population of Rivers State projected to 2015 is 8,588,289,810. The dominant ethnic groups are Ijaw, Ikwere, Etche, Ogoni, and Ogba/Egbema. Ijaw and Ikwerre are the most spoken languages.Rivers state is currently made up of 23 local government areas, these are Abua/ Odual, Ahoada East, Ahoada West, Andoni, Asari /Toru, Akuku/Toru, Bonny, Degema, Eleme, Emohua, Etche, Gokana, Ikwerre, Khana, Obio /Akpor, Ogba/Egbema/Ndoni, Ogu/Bolo, Okrika, Omuma, Opobo/Nkoro,Oyigbo, Tai and Port Harcourt, (Rima2012)

The population of Port Harcourt city in Rivers State (within its municipal boundaries) has risen from 7,000 residents in 1921 to more than 800,000 in 2006. Port Harcourt is a densely populated area with a lot of economic activities. In this study, the target population is sellers (owners of stalls, stands, booths, kiosks and counters) at Mile One market located in the Port Harcourt urban area of Rivers state.

4.3 Climate

Port-Harcourt features a tropical heavy rainfall climate with lengthy and heavy rainfall seasons, and very short dry season. It is assumed that, only the months of December and January are truly qualified as dry season months in the city. The harmattan, which climatically influences many cities in West Africa, is less

pronounced, and temperatures throughout the year in the city are relatively constant showing little variation throughout the course of the year.

4.5 Social Economic Activities in Port Harcourt.

Historically, the surrounding areas of port-Harcourt city were inhabited by the indigenous Ikwerre and Okrika people before, 1913. Then, the natives were rural and their major socio-economic occupation was farming and fishing. The city of Port Harcourt is now synonymous with commerce and industry.

Port-Harcourt is the heart of Nigeria's oil industry with virtually all major multi-national oil companies being represented there.The economic activities of Port-Harcourt include, manufacturing such as food producing, car assembly at Ikoku area, manufacture of paper products, paints, petroleum products, refinery, road construction, metal works and furniture. Services include legal services, medical, educational and engineering services, extractive industries, also exist such as petroleum, oil and gas liquefaction (RIMA 2012).

The capital, Port Harcourt, is the Centre of the famous Nigerian Oil industry and over ninety industrial concerns, including the Shell Petroleum Development Company of (Nigeria) Limited, AGIP, Texaco, Elf, other Industry include Michelin, West African Glass Industry, Alcan Aluminium, Metaloplastica, Risonpalm, Pabod Breweries, to mention a few.Also agricultural and agro based businesses exist in the city. Some of which are logging and timber processing, plastic moulding and the manufacturing of rubber based products like tyres, bands, tube and glassmaking. Imports are mainly automobile, electronics, textiles and processed food. Sometimes rice, millet, meat and other agricultural produce arealso

imported.Numerous small scale enterprises like consumer retailing, artisanship and transportation businesses also thrive in the city (Nigeria Business Directory, 2014).

CHAPTER FIVE

5.0   **METHODS AND PROCEDURES.**

This chapter addresses the research design used for this study and describes in detail the research processes in this study.This entails the specificationof procedures that was deployed in the field work as stated by Chukwuemeka (2002). To be more specific, this chapter takes account of the source of data collection, the population and sample size determination, the description of research instrument, and the data analysis technique.

5.1 Source of Data

The data used for this research work are from two (2) sources: primary and secondary sources.

5.1.1 Secondary Sources

The secondary data were obtained from the library, and available literatures. The secondary sources of data used include research journals, text books, newspapers, and magazines, published and unpublished articles.

5.1.2Primary Sources

This is the data collected directly from the field. Primary data including on the spot observation was relevant to assess the general aspect of waste disposal practise in Mile One market, Port Harcourt.

The major instruments used in primary data collection were the use of questionnaire, physical observation and interview method.

1. Questionnaire: Questionnaire was administered to generate information for data analysis, this questionnaire contained series of questions (question statement)

which were used to induce answers or information about the practice of waste disposal from respondents. The questions were divided into two (2) sections.

Section one illicit demographic information about respondents such as age , sex, and educational qualification, while section two provides general information on waste disposal pattern in the market. Respondent were to provide answers to the questions by ticking (√) wherever is applicable to them.

2. Personal Observation: Personal observation helped the researcher to observe the physical environment and facilities provided for waste disposal in the market

3. Oral Interview Method: Oral interview was used to get information from the non-educated sellers among the respondent who cannot read and understand the questions. The Rivers State Waste management Agency and the Rivers State Waste Sanitation Authority personnel were interviewed and information about their activitieson solid waste management - from collection of waste to final disposal- were asked.

5.2 Population of the Study

5.2.1 Population Distribution and Sample Size determination

Sampling according to Eboh(2009) is the process of selecting a number of study units from a predefined study population.The target population for the study mainly consists of the market sellers in Mile One Market Port Harcourt. Since the total population of sellers are not quite clear, a representative sample population was determined from the total number of sellers registered in the market.

Table 5.1 Population Distribution of Market Sellers

Market Area	Population of Sellers
Ultra-modern Building	224
Railway axis	242
Afikpo Street	188
Sangana	184
By the main Road	212
Total	1050

Source: Market Traders Association 2014

5.2.2 Sample Size determination

The total market sellers sample populationwas determinedadopting the Taro Yamaneøs formula with 5% error of tolerance.

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

Where

n = Sample Size

N = population

E = Error of tolerance

1 = Statistical Constant

Therefore

$$n = \frac{1050}{1 + 1050\,(0.05)^2}$$

$$n = \frac{1050}{1 + 1050\,(0.0025)}$$

$$n = \frac{1050}{1 + 2.62}$$

$$n = 290.$$

The sample size for market sellers in this study was a total of Two Hundred and ninety persons, while 30 persons from the Rivers State Waste management Authority responded.

The sample size distribution was obtained systematically by applying the following equation

Q = A/N x n/1

Where:

Q = The number of questionnaire to be allocated to each market section

A = The population of each market section

N = The total population of market sellers

n = The estimated sample size used in this study

Thus:

Proportion of market sellers at Ultra-modern building.

$$Q = \frac{224}{1050} \times \frac{290}{1} = 62$$

Proportion of sellers by the railway

$$Q = \frac{242}{1050} \times \frac{290}{1} = 67$$

Proportion of sellers by Afikpo Street

$$Q = \frac{188}{} \times \frac{290}{} = 52$$

1050   1

Proportion of market sellers by main road

$Q = \dfrac{212}{1050} \times \dfrac{290}{1} = 58$

Proportion of sellers by the Sangana

$Q = \dfrac{184}{1050} \times \dfrac{290}{1} = 51$

Table 5.2 Breakdown of Sample Size for Market Sellers.

Market Area	Population (A)	Questionaire (Q)
Ultra modern building	224	62
Railway Axis	242	67
Sellers at Afikpo street	188	52
Sangana	212	51
Sellers by the Main Road	184	58
Total	1050	290

Source: Field survey 2014.

5.2.3 Sampling Technique

The sample technique used in this study was the cluster sampling method.This clusters represent the different stall location in the market.The Market Sampling was grouped into the various section of the market which are: the stalls in the ultra-modern building, Sellers at sangana street, afikpo street sellers, stalls by the main road and lastly the railway market these sum up to five (5) separate sections of sellers in the market.Thereafter the questionnaire was distributed by simple random selection. This process was adopted to ensure that every unit representedhave an

equal chance of being selected. A total of 62 copies of questionnaires were distributed to sellers at the Ultra-modern building; total of 67 copies of questionnaires were distributed to sellers at the railway axis; a total of 52 copies of questionnaires were distributed to sellers at Afikpo street; 58 copies were distributed to sellers at SanganaStreet; while 51copies of questionnaires were distributed to sellers by the main road. The overall number of questionnaires distributed sum up to 290(Two hundred and ninety) copies. The researcher and a trained agent called an enumerator visited the market between the hours of 10am to 4pm daily, Mondaysthrough Fridays distributed questionnaire and got replies in special blanks of the questionnaire called schedules.

5.3   Sample of Questionaire Content

Two structured questionnaires were used in this study to collect the necessary data

1. Questionnaire for sellers in the market

2. Questionnaire for environmental waste management authorities

The study was based mainly on primary data from Mile Onemarket survey, Thesample questionnaire contentare:

(i)   Sex and age of the respondent

(ii)   Source of waste generation

(iii)   Categories of solid waste in market

(iv) Availability of waste storage facilities.

(v) Various waste storage medium (waste can, waste bags, waste baskets)

(vi) Method of waste disposal (Open space, road sides, dumpsters, drainages)

(vi) Frequency of waste disposal (Daily, two to four times a week, weekly)

(v) Provision and availability of dumpster in market

(vi) Accessibility of dumpster to market sellers

(vii) The frequency of the collection and evacuation of waste by waste management agency.

5.4 Method of Data Collection

The methods for data collection involved the primary source (Questionnaire administration, personalobservation and oral interview).The data collection approach that was used in this study is structured data collection tool that entails a fixed set of questioning that were answered by respondent in a specified sequence and with designated response options as stated by Polit& Beck,(2008). Method of data collection refers to a precise and systemic gathering of information that is relevant to the research design and measurements methods (Burns & Grove, 2005)..In accordance withHeppner et al.,(2008)the essential content that needs to be covered in the questionnaire was identified,with investigation on the main concepts of the study and objective.

5.5Description of Statistical Tools Usedfor the Study.

After the collation of data, the statistical tools used in this study were descriptive statistics and inferential statistic.

5.5.1 Descriptive Statistic Tool

A summary statistics was used to describe the variables of the study. This entailed the listing of descriptive statistics which includes statistical tables and charts.

5.5.2 Inferential Statistic Tools

The data was collected from stall holdersincluding owners of booths, kiosks, stands and counters.

Hypothesis One:The One Way Analysis of Variance (ANOVA) was used to analyse hypothesis one which is: Waste disposal pattern of sellers does not significantly vary with sellersøaccessibility to waste dumpsters at the Mile One Market.

Hypothesis Two: Hypothesis two was analysed using One Way Analysis of Various (ANOVA) to determine the significant variation in waste disposal pattern among the various sections of the market.The Tukey post-hoc test was used to conduct post-hoc tests on a one-way ANOVA.

Mathematically, ANOVA is presented below

The equations for simple factor ANOVA are as follows:

$$SST = Û(X^2) \text{ ó} \quad \frac{(ÛX^2)}{N} \qquad í \ í \ í \ í \ í \ í \ í \ í \ í \ . (1)$$

$$SSB = \frac{(ÛX_1)^2}{N} + \frac{(ÛX_2)^2}{NNN} + \frac{(ÛX_3)^2}{} + \frac{(ÛX_4)^2}{} \qquad í \ í \ í \ í \ í \ í \ í \ í \ í \ í \ . (2)$$

$$SSW = SST \text{ óSSB} \qquad í \ í \ í \ í \ í \ í \ í \ í \ í \ í \ . (3)$$

Where,

SST = Total Sum of Squares

SSB = Sum of Square between (Variation between groups)

SSW = Sum of Squares within (Variations within groups)

Degrees of freedom

df (total) = number of cases in total N minus 1 (n-1)

df (between groups) = Number of groups K minus 1 (K-1)

df (within groups) = sum of the number of cases within each group n minus 1 (n-1)

Mean Squares:

MSB (Mean Square for between Groups) =
$$\frac{SSB}{df(\text{between groups})}$$

MSW (Mean Square for within Groups) =
$$\frac{SSB}{df(\text{within groups})}$$

$$F = \frac{MSB (\text{Mean- Square for between groups}}{MSW (\text{Mean Square for within groups})}$$

5.6 Validity of Research Instrument.

Validity can simply be defined as the extent to which a measuring instrument, on application performs the function for which it was designed (Onwumere, 2009). To

ensure that the research instrument applied in this work is valid, the researcher ensured that the instruments measured the concept they are supposed to measure. Content validity of instruments was established through the adoption of constructs that have already been used and validated by other researchers. The structure questionnaire was properly reviewed by the project supervisor.

5.7 Data analysis method

Statistical Packages of the Social Sciences (SPSS), Version 21 software program was used for the data analysisat 0.05level of significance.

CHAPTER SIX

6.00   DATA PRESENTATION, ANALYSES AND DISCUSSIONS OF FINDINGS

This chapter covers data presentation, analyses and discussion of findings. The stages illustrates sample distribution of respondents, waste disposal habits of sellers among the different stall location (sections of the market), waste disposal pattern of sellers by sex and among different age range, frequency of waste evacuation from dumpsite, accessibility to waste dumpsters, Sanitary condition of the market and hypotheses testing.

The tables for each data obtained in this study are shown at the appendices. Multiple bar charts were used for data presentation in this chapter.

6.1 Stall Locations of Sellers in Mile One Market

Table 6.1 below shows the proportionate distribution of questionnaire to sellers in Mile one market Port Harcourt. A total of 290 questionnaires were administered and 256 were properly filled and returned. This gave a return rate of 88.3%.

Table 6.1 Stall Location of Sellers and Questionnaire Distribution

Stall Location (Sections of the market)	No of questionnaire distributed	No. of questionnaireproperly filled and returned	Percent
Ultramordern	62	58	22.7
Afikpo	52	43	16.8
Mainroad	58	46	18.0
Sangana	51	49	19.1
Railway	67	60	23.4
Total	290	256	100.0

Source: Researcher's Field Survey, 2014

6.2 Stall Locations and Waste Disposal Pattern of Sellers
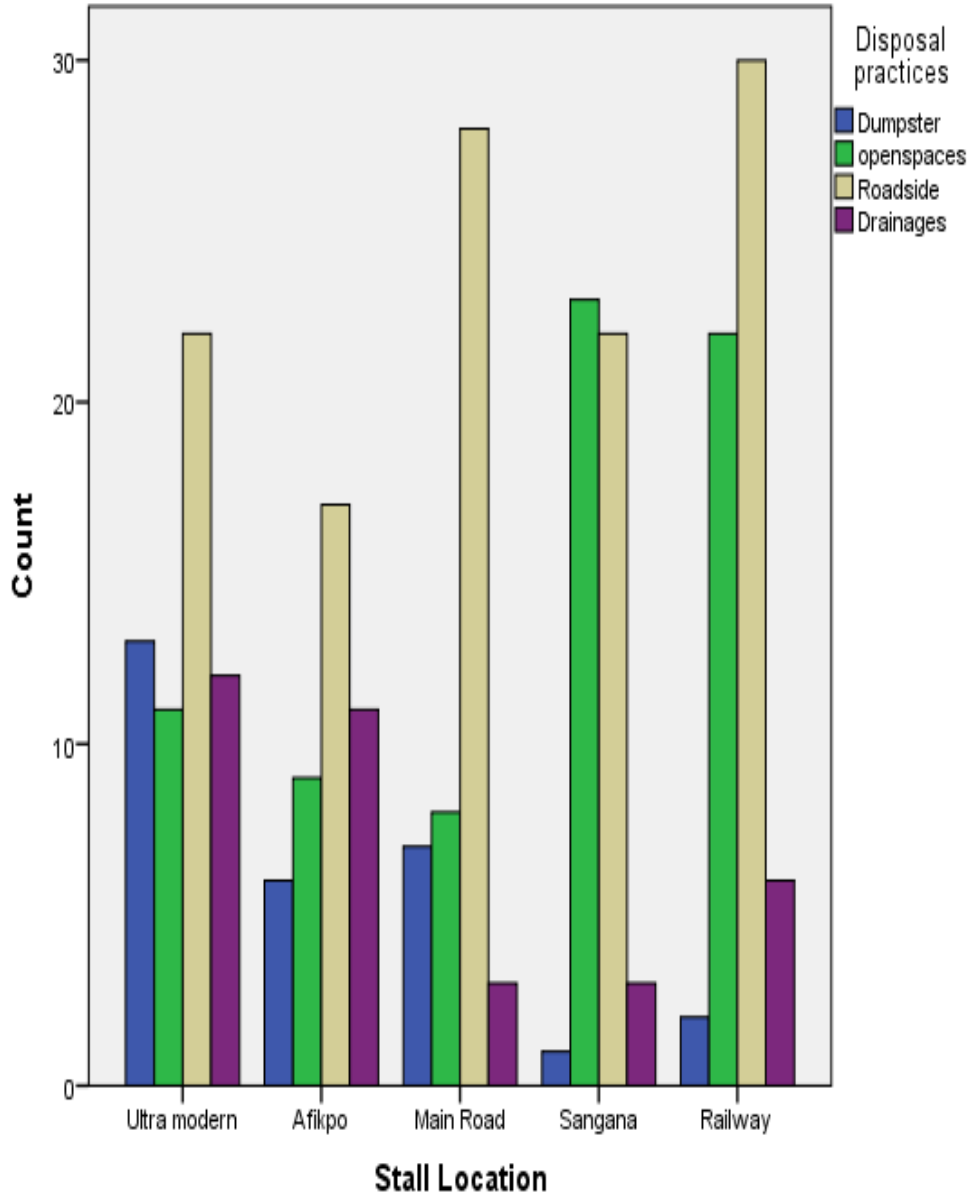
Figure 6.1 Showing Stall Location and Responds on Waste Disposal practice.
 Source: Researcher's Field Survey, 2014

The figure 6.1 above, shows the waste disposal pattern of sellers by different stall location. Among the various sections of the market,11% of sellers dispose waste at dumpsters.

6.3 Stall Locations and Frequency of Waste Evacuation.
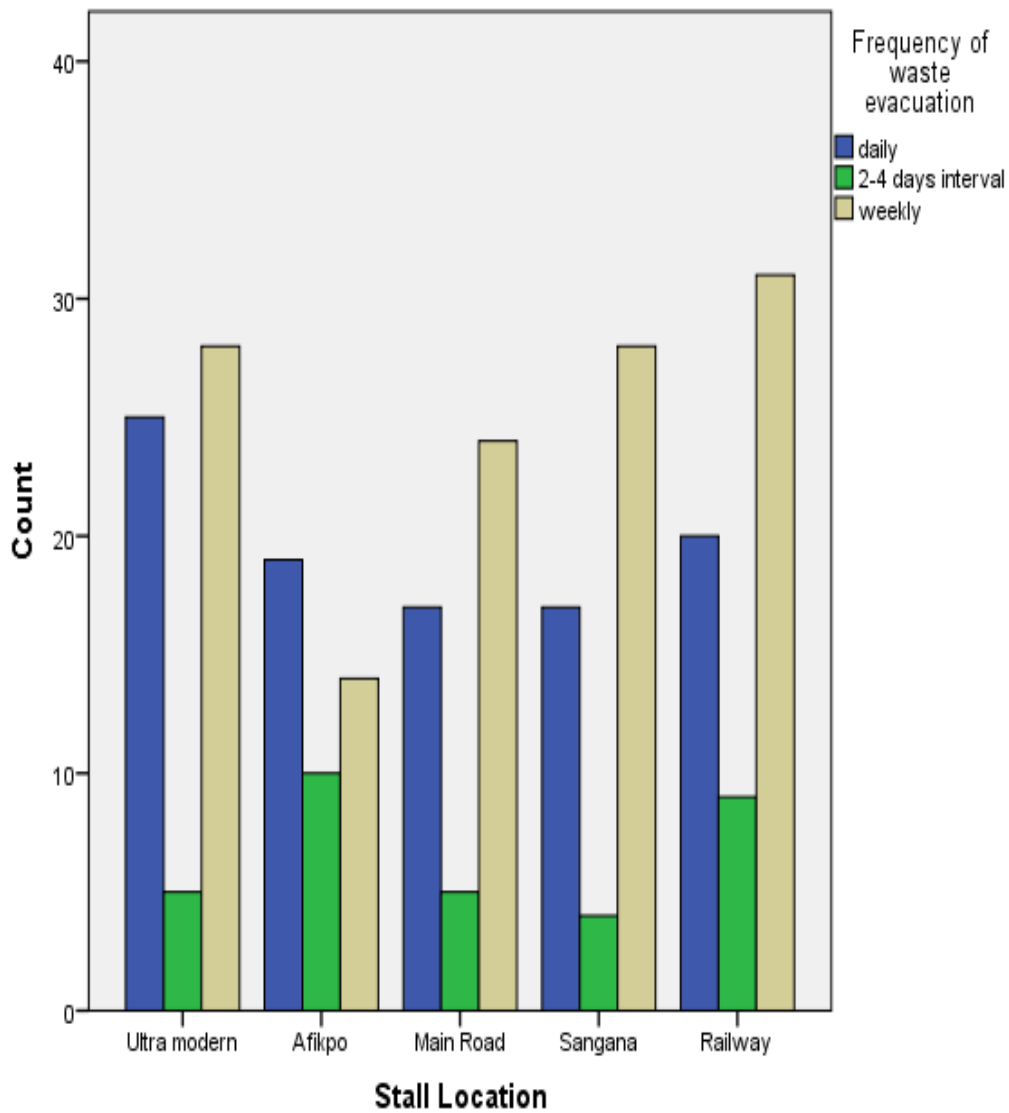
Figure 6.2 Stall Locations and   Frequency of Waste Evacuation.

Source: Researcher's Field Survey, 2014

Figure 6.2 above shows frequency of waste evacuation at various stall location.At the Ultra-modern building, 25 out of 58 sellers evacuation waste daily; Afikpo, 19 out of 43; Mainroad,17 out of 46; Sagana, 17 out of 49; and railway 20 out of 60. A total of 98out of 256 ; (38%) evacuate their waste daily while 13% evacuate waste between two to four days interval and 49% dispose waste weekly.

6.4 Sex Distribution of the Sellers.

The bar chart below shows sex distribution of respondent and waste disposal practice. A total of 57% of sellers were female while 43% were males.
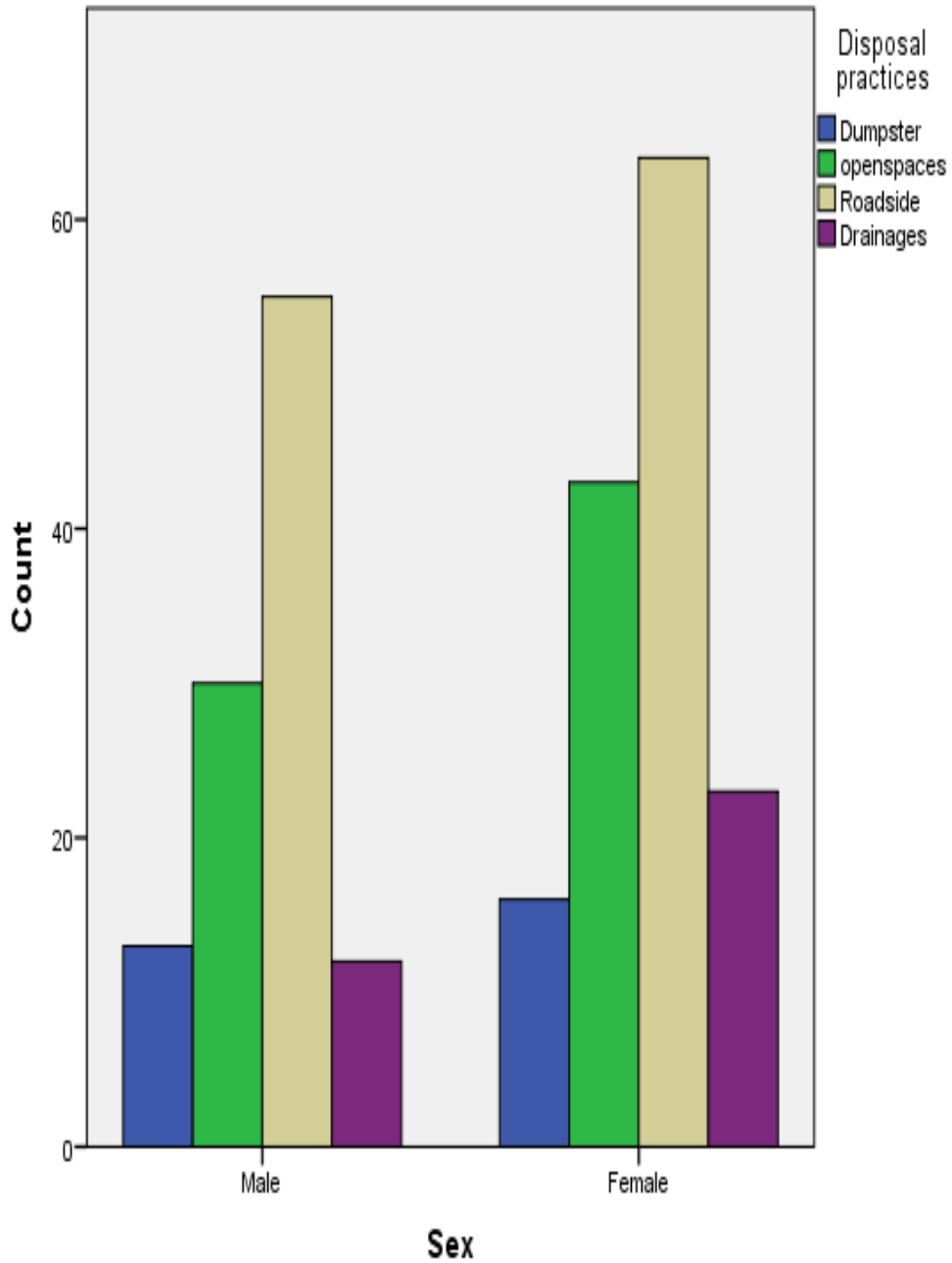
Figure 6.3 Sex Distribution of Sellers and Waste disposal Practice.
Source: Researcher's Field Survey, 2014

6.5 Age Distribution of theSellers

The age distribution of the respondents is presented in figure 6.4 below.
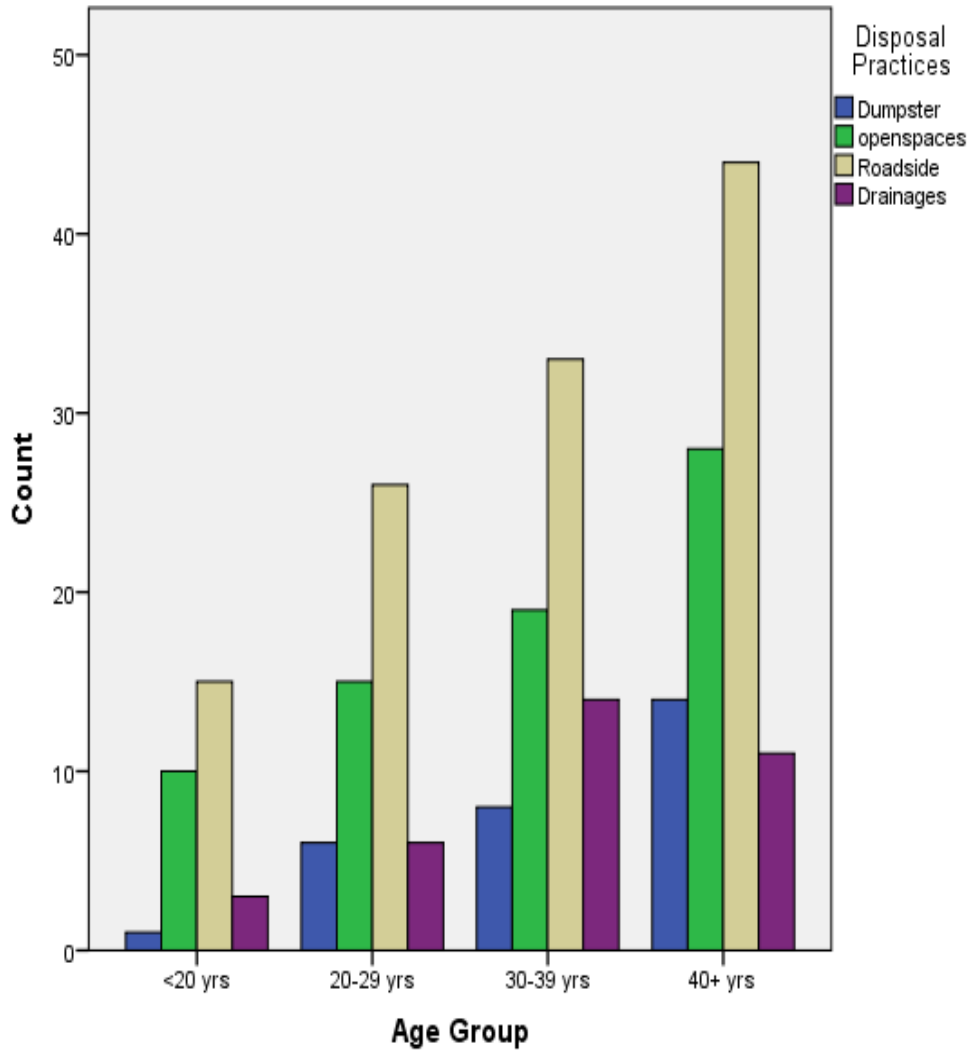
Figure 6.4 Age Distribution of Respondent and Disposal Sites.
Source: Researcher's Field Survey, 2014

At the mile one market, 12% of sellers age ranged<20years;21% of sellers were between 20-29 years;29% of sellers age ranged between 30-39years and 39% of sellers were 40years and above.

6.6 Accessibility to Waste Dumpsters.
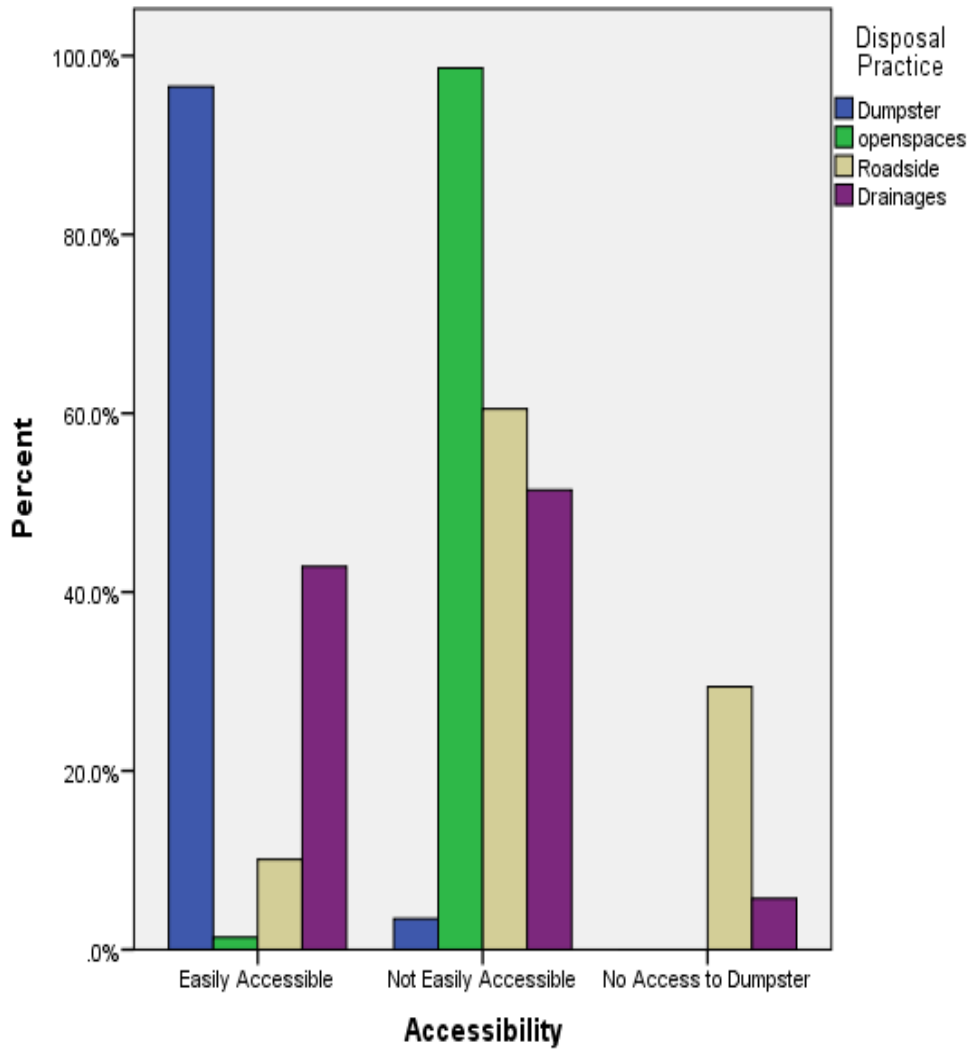
Figure 6.5Accessibility to Waste Dumpster.
Source: Researcher's Field Survey, 2014

Figure 6.5 above shows the accessibility of waste dumpster to sellers.Only 56 out of 256(22%) of sellers have easy access to waste dumpsters.Result shows that 97% of sellers who dispose waste at dumpsters were sellers who have easy access to dumpster.

6.7 Sellers' Responds on theRIWAMAFrequency of Emptying Dumpsters
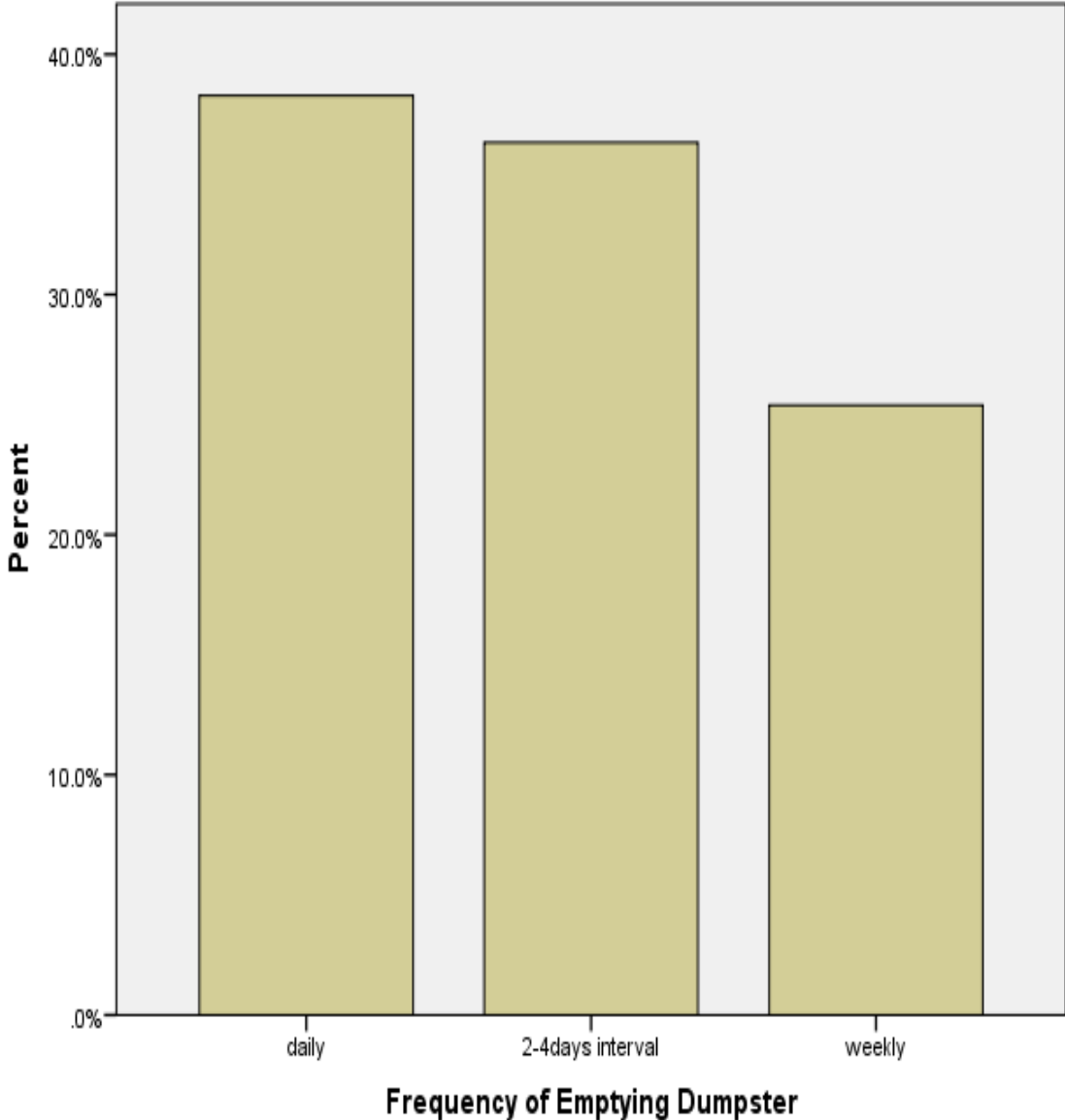
Figure 6.6Frequency of Emptying Dumpster.
Source: Researcher's Field Survey, 2014

Figure6.6 shows 38% of sellers hadresponds that RIWAMA evacuate the wastes daily from the market while 36% says 2-4 days interval and 26% says weekly.

6.8 Awareness on Waste Management
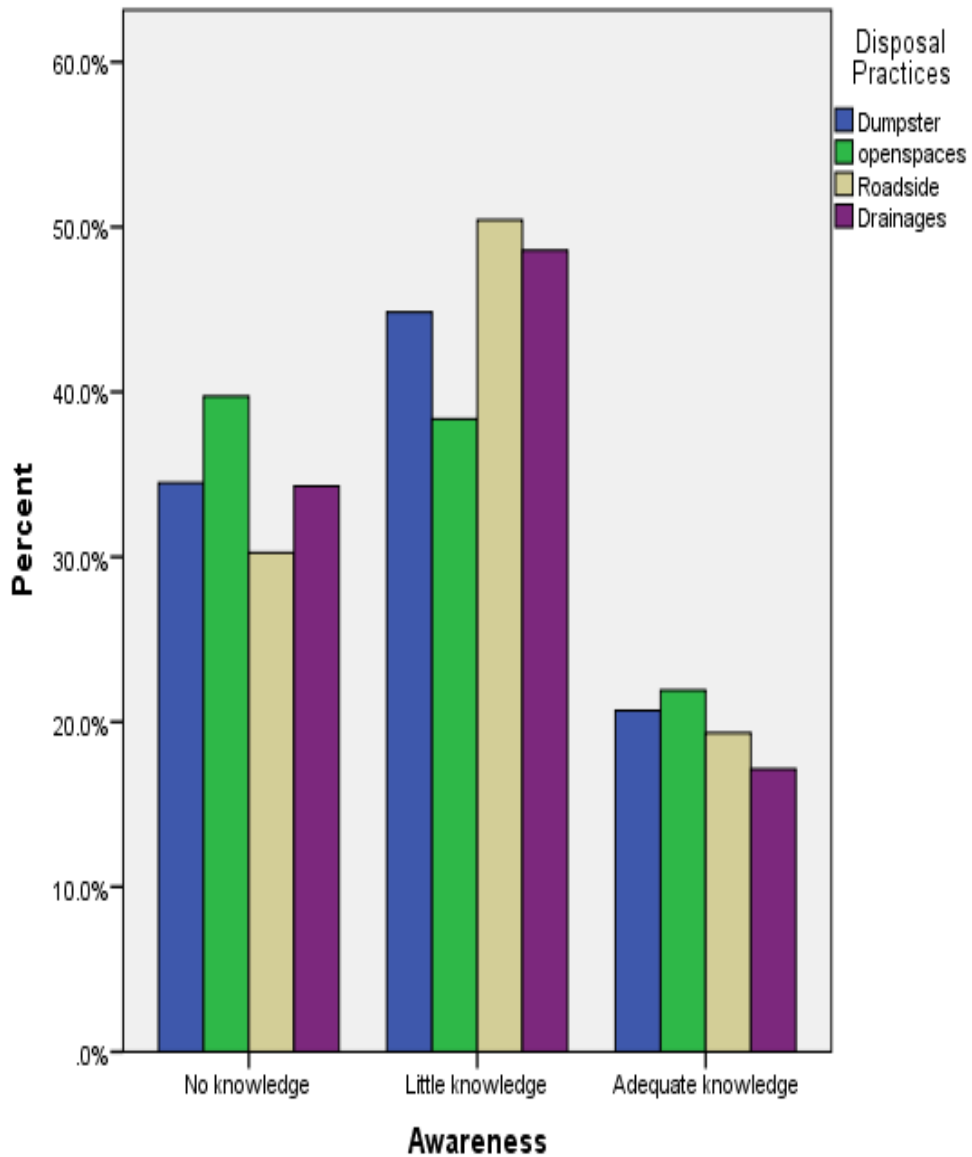
Figure 6.7 Awareness on Waste Management

Source: Researcher's Field Survey, 2014

The study reveals that 46% of respondent have little knowledge on waste, 34% have no knowledge of waste management, only 20% have adequate knowledge on waste management as seen in figure 6.7.

6.9 Sanitary State of the Mile One Market

The responds on sanitary condition in the market is represented in figure 6.8 below.
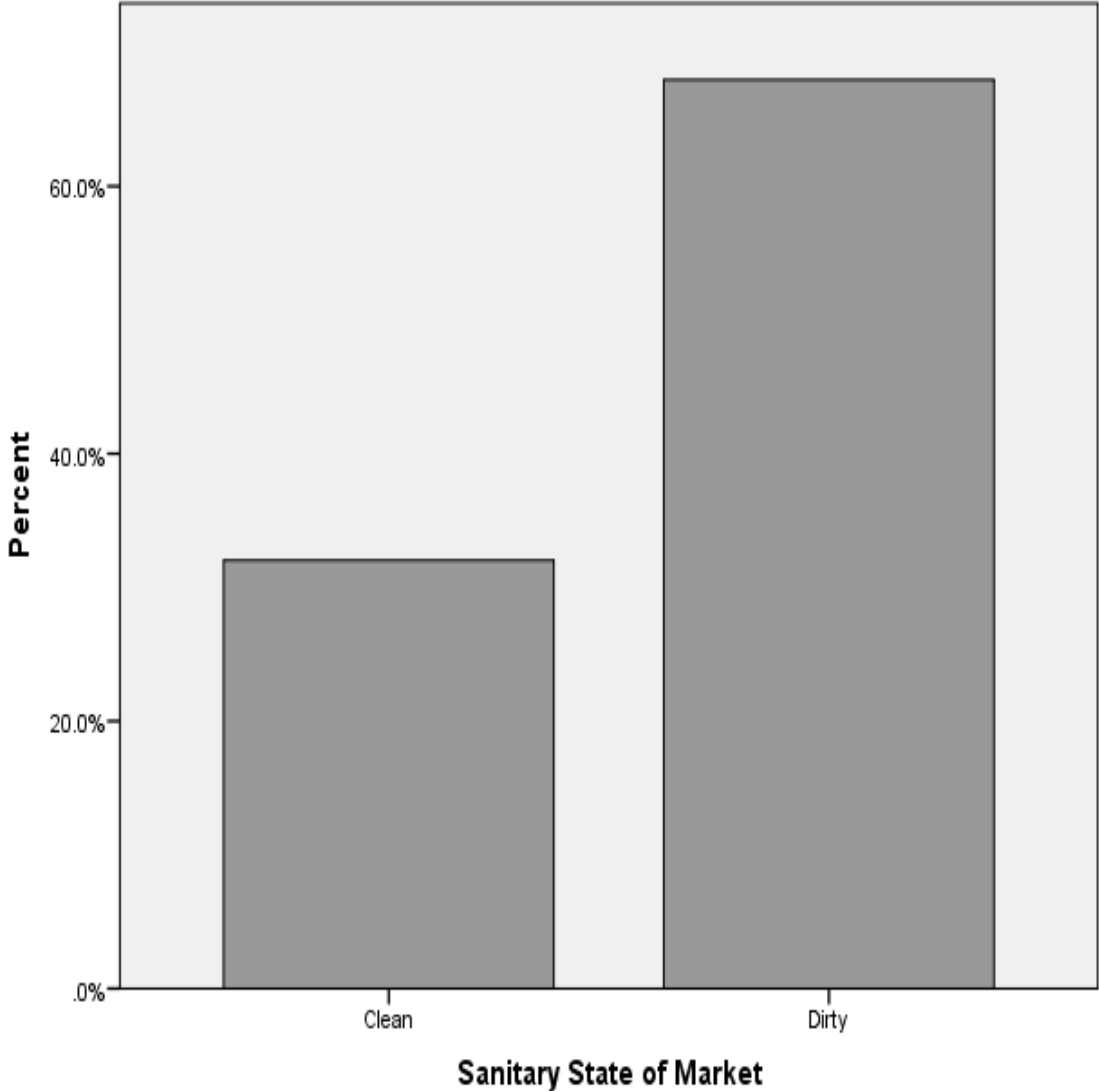
Figure 6.8 Showing cleanliness of the market.
Source: Researcher's Field Survey, 2014.

6.10 Test of Hypotheses

Hypothesis One: Hypothesis Onestates thatwaste disposal pattern of sellers does not significantly vary with sellersø accessibility to waste dumpsters at the Mile One Market.In testing this hypothesis, one -way analysis of variance test was carried out. The test result of this hypothesisis presented in table6.2 below.

Table 6.2:One – Way Analysis of Variance (ANOVA) Test for Hypothesis One

Descriptives

Accessibility

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Dumpster	29	1.03	.186	.034	.96	1.11	1	2
openspaces	73	1.99	.117	.014	1.96	2.01	1	2
Roadside	119	2.19	.601	.055	2.08	2.30	1	3
Drainages	35	1.63	.598	.101	1.42	1.83	1	3
Total	256	1.93	.599	.037	1.85	2.00	1	3

Test of Homogeneity of Variances

Accessibility

Levene Statistic	df1	df2	Sig.
54.245	3	252	.000

ANOVA

Accessibility

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.912	3	11.637	51.742	.000
Within Groups	56.678	252	.225		
Total	91.590	255			

The sum of squares between groups is 34.912 with sum of squares within groups as 56.678, and their corresponding mean squares as 11.637 and .225 respectively.

The F calculated is greater and significance at (p value<0.05);.The null hypothesis was rejected at p value <0.05, thereby accepting the alternative hypothesis which is;waste disposal pattern of sellers significantly vary with sellersø accessibility to waste dumpsters at the Mile One Market.

Hypothesis II: Analysis of variance (ANOVA) was used to determine the significant difference in the pattern of waste disposal among the different sections of the market. Accordingly, the null hypothesis states that the pattern of waste disposal does not significantly vary among the different sections of market.

Table 6.3 Analysis for Variance Test for Hypothesis Two

Descriptives

Diposalpractice

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Ultramordern	58	2.57	1.061	.139	2.29	2.85	1	4
Afikpo	43	2.77	.996	.152	2.46	3.07	1	4
Mainroad	46	2.59	.832	.123	2.34	2.83	1	4
Sangana	49	2.55	.647	.092	2.37	2.74	1	4
Railway	60	2.67	.705	.091	2.48	2.85	1	4
Total	256	2.63	.859	.054	2.52	2.73	1	4

Table 6.4 ANOVA

ANOVA

Diposalpractice

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.493	4	.373	.502	.734
Within Groups	186.507	251	.743		
Total	188.000	255			

6.11 DISCUSSIONS OF FINDINGS.

Hypothesis One: Hypothesis One states thatthedisposal pattern of sellers does not significantly vary with sellersø accessibility to waste dumpstersat theMile One Market.Table 6.2 showed that disposal pattern of sellers significantly vary with sellersø accessibility to waste dumpsters at the Mile One Market (p value < 0.05). The null hypothesis was therefore rejected. Accordingly, a cross tab result between the waste disposal pattern of sellers and accessibility to waste dumpster revealed that greater percentage of sellers who dispose waste at dumpster were sellers who have easy to waste dumpsters.

Physical observation by the researcher during the study reveals that there was insufficient provision of dumpsters in the market. The study revealed that only 22% of market sellers have easy access to waste dumpster. This is because some part of the market are swampy, dumpsters location are far from stalls and there are display of goods by access way causing an obstruction to the disposal site where dumpsters are located. This finding is in agreement with a report by The Nigerian Times publication (2014) in which they reported that sellers at Utako ultramodern market Abuja dispose waste indiscriminately as a result of inaccessibility to waste disposal facilities in the market.

Hpothesis Two: The test shows that the pattern of waste disposal does not significantly vary from the different sections of the market as presented in table 6.4. The null hypothesis is accepted at (p=0.734) that is p value > 0.05;

The study revealed that the pattern of waste disposal does not significantly vary among the different sections of the market. This implies that any waste disposal challenge peculiar to a section of the market can be peculiar to the other

Accordingly, the descriptive statisticsrevealed thata total of 11% of the sellers dispose their waste at the dumpster. The remaining 89% dump their refuse by road side, open spaces and drainages (Tables seen at the appendix).Attention is therefore needed in all the sections of the market for an organised and adequate waste disposal practices in the market.

 This is in consistent with a study by Foday*et al*., (2013) in which they found lesser population; 21%   (84 out of 398) respondent in Freetown city markets, Sierra Leone to dispose waste at dumpsters.

Frequency of Waste Evacuation

At the Mile One market, 38% of respondents evacuate their waste daily, 13% evacuate wastes within two to four days interval and 49% evacuate wastes weekly. This is consistent with a study by Abejegah*et al.,* (2013) on a case study of Oregbeni market Benin-City Edo State in which they found that waste generated by sellers around the markets are left unattended to for several days before evacuation.

However, the Rivers State Waste Management Agency report shows that wastes generated from the Mile One market is cleared daily contrary to the findings from sellers. It is suggested that a monitoring agency be set-up to oversee the compliance

level of sellers and Waste Management Agencies in the country.Respondents of RIWAMA also mentioned the following reason as impediment to effective waste disposal effort: Frequent vehicular breakdown, insufficient equipment, low budgetary allocation and poor sellers attitude towards procurement of waste disposal containers.

Other Relevant Findings

At the Mile One market Port Harcourt, waste generated were in the form of packaging materials, waste from spoilt fruits and vegetables, potentially hazardous waste such as asbestos and solvents. The agencies responsible for the evacuation of waste from Mile One Market is the Rivers State Waste Management Agency and the Rivers State Sanitation Authority situated at No 128, Ikwere Road Mile Three Port Harcourt

At the Mile One market, 57% of the respondents lack waste storage containers thus they dispose their waste by the roadside, drainages and any open space around them.Only 35% of sellers have waste storage containers provided by RIWAMA. Sellers in the market complained that waste storage containers were gotten from RIWAMA at high price of N2,500 per container, sellersthat couldnot afford the containers were left with no option but to dump their refuse indiscriminately. It is suggested that the cost of waste storage contain be reduce to allow all the sellers to purchase them. About 68% of sellers at the Mile One market adjudged that the market and its environs are dirty.

CHAPTER SEVEN

7.00 SUMMARY, RECOMMENDATIONS AND CONCLUSION.

This chapter presents recommendations and conclusion after a careful assessment of solid waste disposal practises of sellers in mile One Market, Port Harcourt.

7.10 CONCLUSION

This study shows that solid waste disposal practices of sellers in Mile One market is inappropriate, and this can be attributed to the following reasons; inaccessibility to waste dumpsters, insufficient provision of dumpsters in the market , irregularities in evacuation of waste from dumpster and poor sellers-agencies co-operation. The exposure of carelessly dispose waste not only pose harm to sellers but also to buyers that visit the market. There is an urgent need for government, waste management agencies, sellers, traders association and the general public to co-operate in ensuring that market and its environs are kept clean for healthy business transaction.

7.20 Recommendations

Based on the research findings on the assessment of the solid waste disposal practises of sellers in Mile One Market Port Harcourt, the following recommendations are made.

Public Participation.

The private sectors could be employed to complement the effort of the government and waste management agencies. Also, environmentalists and planners should be encouraged to participate in market waste management practice.

Definition of Roles

The private sector should be authorised to handle waste collection within market vicinity while the government should give statutory power to the Environmental Sanitation Agency to function as the direct authority under the government in the monitoring of waste disposal practices among sellers in the market. The agency could be charge with performing functions such as:

a). Ensuring proper market waste collection and disposal.

b).Collection of environmental sanitation fees, determination of market waste collection and disposal centres.

c). Establish sanitation monitoring team to inspect the environment on a regular basis and prosecute defaulters accordingly.

Strategic Placement of Dumpsters in the Market.

Proper physical planning and placement of dumpsters at strategic location can aid sellers have easy access for disposal of waste generated irrespective of the section of the market where the stalls are located. This dumpster should be properly protected and constantly evacuated.

Sensitization and Awareness Creation

Enlightenment and sensitization programs should be intensified and brought down to the grass root.

Proper education on the hazard of indiscriminate disposal of refuse should be done were possible, it should be incorporated into the school curriculum at both primary and secondary levels. The media publicity may not be enough since not everyone have access to the media.

Federal Government through relevant agencies should encourage active public participation. The benefits of maintaining a healthy environment could be brought to the notice of the citizen via promos.

Funds and Budgetary Allocation

From the findings, one basic challenge in waste collection and disposal is finance. The lack of finance can imply inadequate government intervention and support to agencies. Provision of adequate finance can serve in the purchase of more equipment, purchase of spare parts, repair of vehicles and maintenance of vehicles. The need for finance cannot be overemphasised in such establishments.

Other suggestions include: Waste storage containers should be given at a subsidise and affordable price to sellers, review and update existing laws and regulations to permit adequate punishment on defaulters.

The researcher further suggest that door to door waste evacuation is the ultimate pattern which for markets, if possible should be stall to stall collection and evacuation of waste for a more uniform waste disposal practice.

REFERENCES.

Abejegah C.,Abah S.O., Awunor N.S., Okoh (2013): Market Sanitation: A Case Study of Oregbeni Market Benin - City Edo State, Nigeria. *International Journal of Basic, Applied and Innovative Research IJBAIR*, Vol.1. No 2: p 26.

Adekiya A.O (2005): ―Solid Waste Management Bodija Market, Amadu Bello University Zaria‖, *A Journal of Educational research and development.* Vol.1 No.17

Adewole, T. (2009): ―Waste Management Towards Sustainable Development in Nigeria: A Case Study of Lagos State‖ *International Non-Governmental Organisation Journal,* Vol. 4No.4, 173

Afangideh, Asuquo.I Joseph, Kinuabeye Joy (2012): ―Attitude Of Urban Dwellers To Waste Disposal And Management In Calabar, Nigeria‖ *European Journal Of Sustainable Development* Vol.1, No.1 p.26

Afon, A.O., (2006): ―Estimating the Quantity of Solid Waste Generation in Oyo, Oyo state, Nigeria‖ *Journal Nigerian Institute Town Planners,* Vol.19 No.1,p 49

Agbola, S. B. (2005): The Housing Debacle. Paper of Inaugural lecture Delivered at the University of Ibadan.

Aina, T.A. and A.T. Salan, (1992): The Challenge of Sustainable Development in Nigeria, Intec Printers, Ltd., Ibadan, p: 247,

Alam, R., Chowdhury, M., Hassan, G., Karanjit, B., &Shrestha, L. (2008): ―Generation, Storage, Collection and Transportation of Municipal Solid Waste- A Case Study in the City of Kathmandu, Capital of Nepal‖, *Journal on Environmental Management* Vol.28 No 6 p.1088

Ali, M., Cotton, A., & Westlake, K. (1999*): Solid Waste Disposal for Low-Income Countries.*Publication on Water, Engineering and Development Centre (WEDEC).Earthscan Publication London: United kingdom. p 10

Allaby, M. (*1998)*: Livestock and Slaughter Waste Management: *A dictionary of Plant Science* Oxford University Press,City of Cape Town p.61

Anake W.U. G.U. Adie and O. Osibanjo (2009): ―Heavy Metals Pollution At Municipal Solid Waste Dumpsites In Kano And Kaduna States In Nigeria‖, *A journal of Chemical society of Ethiopia* Vol. 23 No.1, p.282

Anikwe and Nwobodo, (2002): ―Long Term Effect of Municipal Waste Disposal On Soil Properties And Productivity Of Sites Used For Urban Agriculture In Abakaliki, Nigeria‖, *BioresourceTechnology* Vol.83 No.3, 241

Ankit Kumar, ChatriArslan Aziz (2012)*Public Private Partnerships in Municipal Solid Waste Management: Potentials and Strategies:* Athena Infonomics India Pvt. Ltd

Anoliefo, G.O., O.S. Isikhuemhen and S.O. Agbuna, (2001): ―Small-Scale Industrial Village in Benin City,Nigeria: Establishment, Failure AndPhytotoxicityAssessment Of Soils From The Abandoned Site‖ Spring Journal on Water,Air and Soil Pollution, Vol.131: No.1 p. 169

Arnold van de Klundert and Justine Anschütz (2001) : UWEP Urban Waste Expertise Programme Integrated Sustainable Waste Management - the Concept Tools for Decision-makers. Experiences from the Urban Waste Expertise Programme editor: Anne Scheinberg Gouda the Netherlands

Awortwi, N. (2004): *Getting the Fundamentals Wrong: Woes of Public-Private Partnerships in Solid Waste Collection in Ghanaian Cities.* An Aticle on Public Administration and Development First Published online 25/3/2014 Vol. 24: Issue 3, 213.

Babayemi, J. O. Dauda, K. T. (2009) ÷Evaluation of Solid Waste Generation, Categories and Disposal Options in Developing Countries ÷A Case Study of Nigeriaø *Journal of Applied Science Environmental Managentment.* Vol. 13No.3. pp. 83 ó 88

BalaMande (2004): Policy Guidelines GuidelinesOn Market And Abattoir Sanitation By Colonel Honourable Minister of Environment Federal Ministry of Environment. Market Inspection form 13. 10 Available at *www.ehorecon.org.ng/.../Sanitary%20Inspection*

BalaMande (2004): An Article On Environmental Health Watch Policy Guidelines On Solid Waste Management Sanitation By Colonel Honourable Minister Of Environment Federal Ministry Of Environment First published July 2005 available at http://tsaftarmuhalli .blogspot. com/2011 /12/ policy-guidelines-on-solid-waste.html

Bichi, M. H.1 and Amatobi, D.(2013): ÷Characterization of household solid wastes generated in Sabon-gari area of Kano in Northern Nigeriaø*American Journal of Research Communication* Vol.1 No 4. P.1

Bruce, J. H. (1998): Sustainable Development: ÷The Essential Elementø *European Journal on Waste Management.,* Vol.4 p.10,

Burns, N. & Grove, S.K. (2005): *The practice of nursing research*. Ethics and research. 5th ed. St Louis: Elsevier. 375,430

Census (2006): National Population commission data available at http://www.population.gov.ng/index.php/data Accessed 03/03/2014.

Chen, X. (2008): A Systematic Comparison of Municipal Solid Waste Management Systems: Case Studies of Dalian City, China and the Region of Waterloo, Ontario, Canada, 2008 Unpublished M.-thesis. Waterloo: University of Waterloo

Christopher, O. O. (2008): ÷An Assessment of Peopleøs Perception on the Impact of Urban Generated Solid Waste on the Environment in Kubwa Satellite Town, Abujaø An M.Sc Research Proposal, Department of Geography, University of Abuja.

Chukwuemeka E. (2002) Research methods and thesis writing: A multidisciplinary approach; Enugu

Chung S. S. and Lo, C. W. H. (2003): Evaluating Sustainability in Waste Management: A Case of Construction and Demolition, Chemical and Clinical in Hong Kong Resources conservation and Recycling, p.37

Cointreau, S. J. A. (1982): Project Guide Considerations for Economic Development, Belmont Walwort Department Of Geography, Urban Development University Of Chicago, available at http://www.worldbank.org/html/fpd/urban//solid-wm/techpaper5.pdfCompany.

Daniel Hoornweg and PerinazBhada-Tata (2012): Urban Development Series Knowledge Papers, A Global Review Of Solid Waste Management. Encyclopaedia Britannica company, Washington D.C.p.16 available at. http://documents .worldbank.org/curated/en//waste-global-review-solid-waste-management

Daniel Hoornweg and PerinazBhada-Tata (2012):What a Waste : A global Review of Solid Waste Management. Urban development series ; knowledge papers no. 15.Encyclopaedia Britannica company, Washington D.C. - The available at. http://documents .worldbank.org/curated/en//waste-global-review-solid-waste-management

Davies (2008): Health habit and development, University Press Britain

De Vos, A.S.; Strydom, H.; Fouche, C.B. &Delport, C.S.L. (2005).*Research at grass roots, for the social sciences and human professions. (3rd ed.)* Pretoria: Van Schaik.: 82

DELM (1993);Department of Environment and Land Management. A publication on Environmental Code of Practice for Meat Premises (Slaughtering):University of Tasmania

Eboh, E.C (2009), Social and Economic Research: Principles and Methods, Enugu: African Institute for Applied Economics.

Edu, N. (2003). *Environmental Waste and Management:*Ushie printers and publishing Co.Ltd. Calabar.

Eguniobi, E., (1996). *Fundamentals of Urban Administration in Nigeria.*HRV Publishers, Enugu.

Egunjobi, L. (1999). Our Gasping Cities. An Inaugural Lecture delivered at the University of Ibadan.

Emeribe, A.C., (2000). *Environment, Solid Waste management for Sustainable Development in Nigeria: Some New Perspectives, Policy and Contending Issues in Nigerian National Development Strategy.* John Jacobs Classic Publishers, Enugu.

Emma Chukwuemeka, Joy Ugwuand Dan Igwegbe, (2012): Implications of Solid Waste Management in Nigeria . Faculty of Management Sciences, Management and Development *Asian Journal of Business Management* Vol.4 No.4 p.354

Encyclopedia Britannica Solid Waste Management, Generation And Storage 2013

Environmental Protection Agency EPA (2008):Classification Of Wastes Information Bullet in EPA Publication 448: Environmental Data Base Management Team, Australia available at http:// www.esdatnet.

EQI Environmental Quality International (2005): Alternative Methods for Solid Waste Management, Treatment and Disposal of Wastewater. International Resource Group Report No. 7.

Fadamiro, J. A. (1998). Landscape Design and the Environment. (1st Ed.) Akure: Alfad Publications Limited. p 116

Fadamiro, J. A. (2003). Landscape Sculpturing and the Natural Response to Urban Recreation: A case study of Oyemekun Rock Tourist Centre, Akure, Nigeria. *Journal of Science and Technology Research*. Vol.2 No.4 p.22

Fadamiro, J. A. (2010). *Landscape Architecture: Dynamics of City Development*. Inaugural Lecture Series 58 , Delivered at The Federal University of Technology, Akure. p10

Fadamiro, J. A. and Atolagbe, A. O. (2005). The Architecture in Urban Renewal Scheme: An Enduring Contribution To A Qualitative Urban Environment. *Journal of the Nigerian Institute of Architects,* Vol.15 No.1, 7

Farlex Free Dictionary online. Definition of the Word Disposal, Available at http://www.thefreedictionary.com/ disposal.

Federal Environmental Protection Agency (1991) Guidelines and Standards for Environmental Pollution Control in Nigeria.

FMHE (2001) Federal Ministry of Housing and Environment; The State of the Environment in Russia

FodayPinkaSankoh, Xiangbin Yan1, Quangyen (2013) Environmental and Health Impact of Solid Waste Disposal in Developing Cities: A case study on Freetown, Sierra Leone. Journal on environmental protection, Vol. 4 No.1   available at http://www.scirp.org/journal/jep

Future. Oxford: Oxford University Press.

Ghana Environmental Protection Agency (2002): Health Development and Environment. Ghana EPA Switzerland.

GoranRisti (2005), Basic Indicators Of Integrated Solid Waste Management: Working and Living Environmental Protection FactaUniversitatis Series: *European Journal of Scientific Research,*.Vol. 2, No 5, p.383

Greenwood, Lisa, and Alexis Bliss (2010) õAn Exploration of Disparate Missions Served by the Sustainability Manager.ö Sixth Environmental Management Leadership Symposium: From Environmental to Sustainability Management. Leuphana University, Lüneburg, Germany. Environment Health and Safety Management program

Heppner, P.P.; Wampold, B.E. &Kivlighan, D.M. (2008).*Research design in counselling.Choosing research design.* 3rd ed. Belmont: Thompson Brooks/Cole: 66

Ibrahim, A. M. (2002): Introduction to Environmental Problems and Management. Waadallah Environmental Consultants, Kano: p.13

Idoce   (2002):   Classification   of   Waste   Available   at http//www..ldoceonline.com/Environmentand+waste-topic/waste-disposal

Igbinomwanhia, D. I. (2011). Status of Waste Management. Kumar, Integrated Waste Management, Rijek Technology. P.11.

InyangEkanem (2012). Problems and Prospects of Waste Disposal In Port-Harcourt Metropolis.

John Morelli(2011) Environmental Sustainability: A Definition for Environmental Professionals John Morelli Rochester Institute of Technology, jxmctp@rit.edu *Rochester Institute of Technology Journal,*Vol.1 issue 1 article 2 p3.

Joseph A. (2012): Decentralization of Markets and Environmental Sanitation Scheme: A Focus on Urban Core of Akure, *Nigeria Journal of Environment and Earth Science.* Vol. 2, No.8, p.1

Joseph Shekwo (2012): Managing Solid Waste in Nigeria: Social and Health Implications, *Journal of Humanities* Vol. 5 No.1, p.174.

Kalu C, Modugu W.W., Ubochi I. (2009).Evaluation of Solid Waste Management Policy in Benin Metropolis, Edo State, Nigeria.*African Scientist Journal*, Vol.10 No.1, p 117.

Kaseva, M. E., Mbuligwe, S. E., &Kassenga, G. (2002): Recycling *Inorganic Solid Wastes: Results From a Pilot Study in dares salaam. Resources conservation and recycling,* Elsevier Sciences, 35, 243

Kent, P. Marshall, and L. Hawke R. (2003): Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories. Canada p.17

Kerlinger, F.N. and Lee, H. B. (2000) Foundations of Behavoural Research, Fourth Edition

Kofoworola, O. F. (2007): Recovery and Recycling Practices In Municipal Solid Waste Management In Lagos, Nigeria. *Journal onWaste Management,* Vol.27No.9 , 113

Kreith, F. (1994).Handbook of Solid Waste Management. McGraw Hill, USA

Labspace, (2014): Hygiene and Environmental Health Module: Solid Waste Management Study Session 22 Solid Waste Management available at http://labspace.open.ac.uk/ mod/oucontent/view.php?

LawalSaniDanbuzu (2011):Composition And Spatial Distribution Solid Waste Collections' Points In Urban Katsina, Northern Nigeria

Long, Norman & Long, Ann, (1992).*Battlefields of Knowledge*: The interlocking of Theory and Practice in Social Research and Development. Long & Long eds., London & New York: Routledge .p23

Meidiana, C. and Thomas Gamse. (2010): Development of Waste Management Practices in Indonesia. *European Journal of Scientific Research,* Vol.40 No.2 p.199

Melissa Anne, Nympha Rose Ozaraga (2013). Vegetable Waste Disposal And Management In Cebu City Public Markets Boco, Philipinessavailable at   http://www.studymode. com/essays/Vegetable-Waste-Disposal

Mike Moffatt (2014): Definition of Market. Education   ecomicsabout.com/cs/economics glossary /g/market.htm

Minghua, Z., F. Xiumin, A. Rovetta, H. Qichang, F. Vicentini, L. Bingkai, A. Giusti and L. Yi, (2009): Municipal solid waste management in the Pudong New Area, China. Waste Management, 29, 1227

Ministry of Health. (2011). Hygiene and Environmental Health, Part 1: Blended Learning Module for the Health Extension Programme. Addis Ababa: Ministry of Health.p.1

Momoh, J.J. and Oladebeye, D.H. (2010).Assessment of Awareness of Attitude andWillingness of People to Participate in Household Solid Waste Recycling Programme inAdo-Eketi, Nigeria, in the.*Journal of Applied Science in Environmental Sanitation.*Vol. 5 No. 1. pp.95,98.

Nabegu, AB. (2010): An analysis of municipal solid waste in Kano metropolis. *Journal Of Human Ecology* Vol.31 No.2 :111

Narayan, D., (1995). Participatory Evaluation: Tools for Managing Change in Water and Sanitation. Paper NO. 207, Washington, D.C: The World Bank

National Population Commission (NPC, 2006) *National Population Census Figure, 2006* National Population Commission, Abuja.

Ndinwa et al ChuksChukwukaGabriel,Akpafun, (2012): Improvising Municipal Waste Disposal Through Integrated Waste Management: The Southern Nigerian Experience *Journal of Environmental Sciences and Resource Management* Volume 4, No.34 p. 1

NEST (1991): (Nigerian Environmental Study Action Team), Nigeriaøs Threatened Environment: A National Profile Ibadan, A NEST Publication.

Nigeria Business Directory 2014 available at http://www.ngex.com/nigeria/ places/states/rivers.htm accessed 03/03/14

Nnunduma, Bakar J. 2003.Structure and Behavior of Food Trading Networks: The Case of Collecting Wholesalers in Da-re-Salaam and Arusha, Tanzania. Department of Human Geography, Stockholm: Stockholms University.p20

Nshimirimana, J. (2004): Attitudes and Behaviour of Low-income Households Towards the Management of Domestic Solid Waste in Tafelsig, Mitchelløs Plain. Unpublished Masterøs Thesis. Cape Town: University of the Western Cape.

Nwabuokei Precious (1986) Fundamentals of Statistic, Institute Of Management And Statistic Enugu.

Okecha, S.A. (2000). Pollution and Conservation of Nigeria Environment.TøAfrique International Associates Owerri Nigeria

Ololade, I.A.,Adewunmi, A., Ologundudu, A and Adeleye, A (2009): Effects Of Household Wastes On Surface And Underground Waters *International Journal of Physical Sciences* Vol. 4 No.1, p. 22.

Ololade, I.A.,et al. (2009): Effects Of Household Wastes on Surface And Underground Waters *International Journal of Physical Sciences* Vol. 4 (1), p. 22

Onwumere, J.U.J (2009), Business Economic Research Methods, Enugu: VougaenLimied.

Ossai, R.M.(2006): Moving Solid Waste Management into the 21st Century in Nigeria6[th] National Council on Environment Meeting Held At Katsina State Secretariat.

Palmer (1999) Use of Land fill mining in Solid Waste management; Proceedings of Water Quality Management Landfills, Water Pollution Control Federation : Chicago 11:9

PalmaresMelchor S. (2000). Integrated Sustainable Waste Management in Tingloy, Batangas. UWEP Case Study Report . Gouda, the Netherlands:

Peter Schübeler KarlWehrle and Jürg Christen(1996): Conceptual Framework for Municipal Solid Waste Management Urban Management And Infrastructure First edition Published by: Swiss Centre for Development Cooperation in Technology and Management Switzerland Working Paper No. 9 UNDP (Habitat)/World Bank/ Swiss Agency for Development and Cooperation Collaborative Programme on Municipal Solid Waste management in Low-Income Countries. pp. 9,10

Philip Sutton (2004). A Perspective on environmental sustainability: A paper for the Victorian Commissioner for Environmental Sustainability, Strategy of Green Innovation. Available at http://www.green-innovations.asn.au/ Accessed 17/03/14

Polit, D.F. & Beck, C.T. (2010).*Generating and assessing evidence for nursing practice.* 8th ed. Philadelphia: Lippincott Williams & Wilkins 371, 372

RIMA (2012): About River State and River State Micro Finance Agency available at http://www.rimanigeria.com/history.php accessed 03/03/14

Robert Goodland 2005 The Concept of Environmental Sustainability Annual Review and systematics. Volume 26: 1,24Envirnmental Department, The world bank, Washington.

 Robinson, John (2011). õSquaring the Circle? Some Thoughts on the Idea of Sustainable Development.ö Ecological Economics 369, 384.

Rodgers, M., (2011).*Fundamentals of Development Administration*.S.K. Publishers, London.)

ShaøAto R, Aboho SY, Oketunde FO, Eneji IS, (2007): *Survey of solid waste generation and composition in a rapidly growing urban area in Nigeria.* Waste Management p.27

Shonibare, O. (1996): The Management of Open Space in Nigerian Urban Cities. An unpublished Diploma Degree Project. Department of Architectural Technology

Simon J. A. (1994); The Environmental Public Health And Human Ecology: Considerations For Economic Development, Belmont Calf6nia Walworth Publishing, Company.p.1

Stu B (2003): *Flame retardants*, American Chemical Society Publication. pp19

Sule, R. O.I (2004): Solid and Faecal Waste Disposal Urban Development Planning.Thumbprint International Company, Nigeria p.12.

Sunday Punch, "Lagos Dwellers Attitude Towards Waste, Framework the Nigeria Experience ; Nigeria. June 17, 1996 p.11

Surrey county (2000) Surrey county material classification of waste Available at www.wiley.com&clientid

Tajuddeen, I. (2003): Solid Waste Management Strategy in Katsina Metropolis: A case study of Katsina Local Government Area. An unpublished graduate research project submitted to the Department of Geography, Bayero University, Kano.

Tammemagi, H. (1999): The Waste Crisis, Landfills, Incenerators and the Search for Sustainable

The Nigeria Times (2014) publication on FiltyUtako ultra-modern building. Available online @http://nigeriantimes.ng/uncategorized/filthy-utako-ultra-modern-market-managers-trade-blames/

Tribe (2001): Problems of Solid Waste Management in Montreal Urban Center and Washington D.C

Turan et al, (2009) Turan NG, Atoru S, Akdemir A. Ergun ON. 2009. Municipal solid waste Management Strategies in Turkey. Waste Management 29(1), 465.

Turner, J. F (1969): Uncontrolled Urban Settlements, Problems and Policies. Readings on Urbanization pp. 507

Uchegbu, S. N. (2002): *Environmental Management and Protection.* Spotlite Publishers, Enugu, Nigeria. 64

UN. (United Nations) (2005): Agenda 21, retrieved 21/2/14 from http://un.org/esa/sustdev ldecuments/agenda21.

UNEP. (2005): Solid Waste Management: United Nations Environment Programme- International Environmental Technology Centre. Cal Recovery, Inc. Vol. I.

UNEP. (2013): United Nation Institute For Training And Research, Guidelines For National Waste Management Strategy. Moving from challenge to opportunity. Mark Hyman publisher p.10

UNESCO (1992). Report of the United Nations Conference on Environment and Development (UNCED) Rio de Janeiro, 3-14   Junehttp://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm

United Nations Environment Programme. (2009). Developing Integrated Solid Waste Management Plan - Waste Characterization and Quantification Developing Integrated Solid Waste Management Plan (Training Manual). Osaka/shiga: united nations environmental programme (UNEP)Vol. 1p.10

USEPA (2008): United State Environmental protection Agency; Health and Solid Waste Management USEPA.

Uwadiegwu B.O. and K.E chukwu. (2013): Strategies for Effective Urban Solid Waste Management In Nigeria, *European Scientific Journal* March edition vol.9, No.8 pp. 18, 296

Uwaegbulam, C. (2004). World is Meeting Goals of Safe Drinking Water but Falling Behind on Sanitation, Says UN. The Guardian, Monday, August 30, 2004. P. 50.

W.H.O (2008), Traditional and Current Environmental Risks to Human Health.Health security through healthy environment.First interministerial conference on health and the environment. P.5

Wasserman,S. & K. Fraust 1999, Social Network Analysis: Methods and Applications. Cambridge: Cambridge University press.p3

WFI (Wikimedia foundation International), (2013): Coordinates location of Rivers State in Nigeria. 2013http://en.wikipedia.org/wiki/Rivers State

Wikipedia (2013). The Free Encyclopedia available at   http://en.wikipedia.org/wiki/Market. Accessed 11/1/2014.

Wilson D. et al., (2013): *Benchmarking Indi-cators for Integrated and Sustainable Waste Management (ISWM)*, ISWM World Congress, 7-11

Wilson et al. (2012).*Comparative Analysis of Solid Waste Management in 20 Cities*. Waste Management & Research. Vol.30 No. 3 237

World Bank (2013): A Global Review of Solid Waste Management for projection of the rate of waste generation available at http://www.worldbank.org

World Health Organization (2008): A Publication On West African Dumping Convention: The First And Second DecadeWHO, Geneva. Available at http://www.who.int/ water_sanitation_health/ Environmental_sanit/MHCWHanbook.htm. Accessed 09/12/13

Zakariyaøu, M. M. (2006): Problem of Solid Waste Management in Funtua Town. An M.Scresearch Submitted to the Department of Geography, Bayero University, Kano.

Zerbock, O. (2003). Urban Solid Waste Management: Waste Reduction in Developing Nations available at http:// www.MichiganechnologicalUniversity.mtu.edu/sustainable_ engineering /resources/technical/Waste_reduction_ Accessed 12/1/14.

RESEARCH QUESTIONAIRE ON THE ASSESSMENT OF SOLID WASTE DISPOSAL PATTERN OF SELLERS IN MILE ONE MARKET, PORT HARCOURT RIVERS STATE.

Centre for Environmental Management and Control

University of Nigeria, Enugu campus Enugu state

Dear Respondent,

I am a Post Graduate student from the Centre for Environmental Management and Control of the University of Nigeria Enugu State. I am carrying out a study to Assess Waste Disposal Pattern at Mile One market in Rivers State.

The purpose of this questionnaire is to obtain data for research purpose only. All information will be treated with utmost confidentiality.

Your co-operation will be highly appreciated.

DavidsBoma Gloria

Section A.

Please carefully tick the appropriate option applicable to you.

1. Sex: Male ☐ Female ☐

2. Age in years ……

3. Level of Education: Primary ☐ Secondary ☐ Tertiary ☐ No Formal Education ☐

Section B.

4. What Section of the Market is your Stall, Shop Stand, booth, kiosk, or counterLocated? Ultra ☐ -Modern Building   Afikpo Street ☐
By the Main Road ☐   Sangana Street ☐ The Rail Way ☐

5. What kind of business are you into? ………………

6. What Class of Solid Waste Do You Generate? ☐ Vegetable Paper ☐   plastic ☐   wood ☐ s glass ☐ Others ☐ ☐

If others please specify…………

7. Do You Have Personal Waste Storage Container? ☐ Yes ☐No

8. After Sweeping Your Shop/Stall Where Do You Dump The Waste? By the ☐Side of my shop. Waste Container inside my Store. Waste Container outside my store ☐

9. How do you Store Your Waste? ☐ In bags ☐ Waste Containers with LidWaste Containers Without Lid Waste ☐ sket.

10. Is Your Waste Storage Container Provided By Rivers State Sanitation Authority? ☐ Yes ☐No

11.Where You Asked to Pay for the Waste Storage Container Provided? ☐Yes ☐ No.

12. If Yes, At What Cost Was it Purchased? Amount in Naira…………….

13. Is There Provision of Dumpsters By Rivers State Sanitation Authority For Evacuation Of Waste? ☐ Yes ☐ No

14. How Do You Evacuate Your Waste From Your Storage Contain ☐ ?I dispose my Waste at Dumpster At th☐Open Space In The Market ☐ By The Road Side ☐ drainages

15a. Proximity of waste dumpsters to your stall ☐ Very Close ☐ Quite CloseF☐

15b. How Accessible are The Dumpsters to You? ☐ Dumpster is Easily Accessible ☐ Dumpster is Not Easily Accessible ☐ No Access to Dumpster

15c. Approximate distance from stall to the dumpsters?………………..

16. How often do you Dispose Your Waste? Dai☐2-4 days inter☐lWeekly

17. Do You Pay For Evacuation Of The Dirt? ☐ Yes N☐

18. How Adequate are the Waste Collection Containers

N☐Adequate   Quite Ade☐uate Very Adeq☐te

19. How Frequent Is Waste Evacuated From Dumpsters? I☐ly

2☐days IntervalWeekly ☐

20. What Level Of Awareness Do You Have On Waste Management?

No ☐ nowledgeI haveLittle K ☐ wledge on Waste Management   I have AdequateKnow ☐ lge on Waste Management

21.How Do You Rate Effectiveness Of Sanitation Enforcement Authority In Performing Their Duty?Poor ☐   Fair ☐   Effec ☐ ve Very Effec ☐ e.

22. Is The Market Clean to Your Own Estimate? ☐ Yes   ☐ o

22b. How would you rate the cleanliness of the market ☐ Very Clean
☐ Quite Clean ☐ Dirty ☐ Very Dirty

23. What are the Waste Disposal Challenges you encounter in this Market?......................................………………………………………………………
………………………………..

24.Give Suggestion To Improve Waste Disposal Practices In This Market
……………………………………………………………………………………
……………………………………………………………………………………
…………………………………

University of Nigeria, Enugu campus Enugu state

River State Waste Management Authority, Port Harcourt.

Dear Respondent,

I am a post graduate student from the Centre for Environmental Management and Control of the University of Nigeria. I am carrying out a study on waste disposal pattern in Mile One Market Rivers State.This questionnaire is designed to assess the current situation of solid waste disposal pattern in the mile one market.

You are kindly requested to answer all the questions. Your responds will be treated with utmost confidentiality and will be used for academic purposes only. Your Cooperation will be highly appreciated.

DavidsBoma Gloria

PG/MSc/62744

Please tick the option below appropriately.

1. Sex (a)Male (b)Female

2. Age in Years …………………..

3. How Long Have You Been in Rivers State Waste Management Authority?Less than a Year More Than a Year ☐ More Than Two Years.

4. Are There Private Agencies Working for Rivers State Waste Management Authorities or Are They Civil Servant only?   Yes   ☐No   ☐

5. Do Rivers State Waste Management Authority use Civil Servant only for Waste Evacuation?   Yes   ☐   No   ☐

6. What is the Staff Strengthof Rivers State Waste Management Authority? ....

7. Does Rivers State Environmental Waste Management Authority Undertake Periodic Checks? ☐ Yes ☐ No

If Yes, How Often ………………………..

8. Do People In The Market Comply With Payment Of Sanitation Rate?

Yes ☐ No ☐

9a. Do You Have Any Dumpster at Mile One Market? ☐ Yes ☐ No

9b. If Yes, How Many? Please Specify …………………………….

10. How Often do You Evacuate Waste From The Dumpster? ☐ Daily

☐ 2-4 days Interval ☐ Weekly ☐ More Than a Week

11. How is Solid Waste Evacuated from Mile One Market? ☐ From Designated Dumpsters in the Markets ☐ Collected From Dumpsters Along the Market Streets. ☐ Others. If others Please Specify…………

12. How Frequent Are Waste Been Evacuated From Collection Van To The Final Disposal Site? ☐ Daily ☐ 2-4 days Interval ☐ Weekly More Than a Week ☐

13. Where is the Final Point Of Disposal?.................................

14a. Do you Consider the Evacuation Pattern Adequate? ☐ Yes ☐ No

14b. If No Give Reasons ………………………………………..

15a. Do You Have the Necessary Equipment to Evacuate Solid Waste? ☐ Yes ☐ No

15b. If No, What category of Equipment are Lacking? Please Specify……………………..

15c. If Yes, Are the Equipment Sufficient? ☐ Yes ☐ No

16. Does The Department Have Its Own Workshop To Maintain And Repair Its Vehicles And Equipment? ☐ Yes ☐ No

16b. If Yes, What Is The Average Time Taken for the Purchase and Repairs?..

17. Do You Think You Can Do Better If Resources and Equipment Are Made Available To You? ☐ Yes ☐ No

18. Availability of Staff and Equipment Which is Suboptimal? ☐   Staff ☐ Equipment

19. Do You Think Contracting To Private Agency Will Promote Cleanliness in Mile One Market? ☐ Yes   ☐ o

20. How Frequently Are Sensitization Programs Conducted?   ☐ Quarterly At L☐tTwice a Year.   Yearly ☐

21. The Table Below Gives Brief Summary of the Challenges You Must have Encountered in   Solid Waste Management Service?   Please Tick The Appropriate Option below.

Challenges	Very Serious	Serious	No Challenge
Poor Budgetary Allocations			
Limited Numbers of Vehicles			
Limited Equipments			
Frequent Breakdown Of Vehicles			
Absent Of Legislation			
Poor Public Cooperation/Attitude			
Need Private Contractors			
Others			

22. How Would You Rate the Attitude of Traders to Waste Disposal? Poor ☐   Fair   ☐   Good.Very☐od   ☐

23. How Do You Enforce Non Compliance? Briefly State……… ………..……
………………………………………….

Appendix II

Waste Disposal Practice of Sellers at Different Sections oftheMile One Market.

Stall Location	Disposal Practice				Total
	Dumpster	openspaces	Roadside	Drainages	

Ultra-modern	13	11	22	12	58
Afikpo	6	9	17	11	43
Main Road	7	8	28	3	46
Sangana	1	23	22	3	49
Railway	2	22	30	6	60
Total Count	29	73	119	35	256
% of Total	11.3%	28.5%	46.5%	13.7%	100.0%

Source: Researcher's Field Survey, 2014.

Waste Disposal Practices

Waste Disposal Practices		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dumpster	29	11.3	11.3	11.3
	openspaces	73	28.5	28.5	39.8
	Roadside	119	46.5	46.5	86.3
	Drainages	35	13.7	13.7	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

Waste Disposal Pattern of Sellers by Sex.

Sex	Disposal Practice				Total
	Dumpster	Openspaces	Roadside	Drainages	
Male	13	30	55	12	110
Female	16	43	64	23	146
Total Count	29	73	119	35	256
Total%	11.3%	28.5%	46.5%	13.7%	100.0%

Source: Researcher's Field Survey, 2014

Waste Disposal Practices By Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<20 yrs	29	11.3	11.5	11.5

		Frequency	Percent	Valid Percent	Cumulative Percent
	20-29 yrs	53	20.7	20.9	32.4
	30-39 yrs	74	28.9	29.2	61.7
	40+ yrs	97	37.9	38.3	100.0
	Total	253	98.8	100.0	
Missing	System	3	1.2		
Total		256	100.0		

Source: Researcher's Field Survey, 2014

Frequency of Emptying Dumpster

		Frequency	Percent	Valid Percent	Cumulative Percent
	daily	98	38.3	38.3	38.3
	2-4days interval	93	36.3	36.3	74.6
Valid	weekly	65	25.4	25.4	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

Accessibility to Waste Dumpster

		Frequency	Percent	Valid Percent	Cumulative Percent
	Easily Accessible	56	21.9	21.9	21.9
	not easily accessible	163	63.7	63.7	85.5
Valid	No acess to dumpster	37	14.5	14.5	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

Accessibility * DiposalpracticeCrosstabulation

			Diposalpractice				Total
			Dumpster	openspaces	Roadside	Drainages	
Accessibility	Easily Accessible	Count	28	1	12	15	56
		Expected Count	6.3	16.0	26.0	7.7	56.0
		% within Accessibility	50.0%	1.8%	21.4%	26.8%	100.0%
		% within Diposalpractice	96.6%	1.4%	10.1%	42.9%	21.9%
	not easily accessible	Count	1	72	72	18	163
		Expected Count	18.5	46.5	75.8	22.3	163.0
		% within Accessibility	0.6%	44.2%	44.2%	11.0%	100.0%
		% within Diposalpractice	3.4%	98.6%	60.5%	51.4%	63.7%
	No acess to dumpster	Count	0	0	35	2	37
		Expected Count	4.2	10.6	17.2	5.1	37.0
		% within Accessibility	0.0%	0.0%	94.6%	5.4%	100.0%
		% within Diposalpractice	0.0%	0.0%	29.4%	5.7%	14.5%
Total		Count	29	73	119	35	256
		Expected Count	29.0	73.0	119.0	35.0	256.0
		% within Accessibility	11.3%	28.5%	46.5%	13.7%	100.0%
		% within Diposalpractice	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Researcher's Field Survey, 2014

SanitaryStateOf The Market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Clean	82	32.0	32.0	32.0
	Dirty	174	68.0	68.0	100.0
	Total	256	100.0	100.0	

Is waste storage container provided by RSESA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	90	35.2	35.2	35.2
	No	166	64.8	64.8	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

PerformanceRating of Waste Management Authority.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	poor	56	21.9	21.9	21.9
	fair	91	35.5	35.5	57.4
	effective	66	25.8	25.8	83.2
	very effective	43	16.8	16.8	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

Level of Education and Waste Disposal Practices of sellers.

Lev Edu	Disposal Practice				Total
	Dumpster	openspaces	Roadside	Drainages	
Primary	10	31	39	10	90
Secondary	9	26	45	13	93
Tertiary	0	2	1	0	3
No formal education	10	14	34	12	70
Total Count	29	73	119	35	256
% of Total	11.3%	28.5%	46.5%	13.7%	100.0%

Source: Researcher's Field Survey, 2014

Awareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no knowledge	87	34.0	34.0	34.0
	Little knowledge	118	46.1	46.1	80.1
	Adequate knoledge	51	19.9	19.9	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014.

Wastetype

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Vegetable	46	18.0	18.0	18.0
	Paper	62	24.2	24.2	42.2
	Plastic	46	18.0	18.0	60.2
	Wood	46	18.0	18.0	78.1
	Cans	28	10.9	10.9	89.1
	Glass	28	10.9	10.9	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014

Waste Storage Medium

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bags	51	19.9	19.9	19.9
	Contwtlid	51	19.9	19.9	39.8
	Contwtoutlid	102	39.8	39.8	79.7
	Basket	52	20.3	20.3	100.0
	Total	256	100.0	100.0	

Source: Researcher's Field Survey, 2014.

Duration of stay in RRIWAMA

Length of Time	Number of Response
Less than a year	4
More than a year	10
More than two years	16
Total	30

Source: Researcher's Field Survey, 2014

Do RIWAMA undergo periodic check?

Periodic Check	Number of Response
YES	30
No	-
Total	30

Source: Researcher's Field Survey, 2014

Do sellers Comply with Payment of Sanitation fees

Responds	Number of Response
YES	-
No	30
Total	30

Source: Researcher's Field Survey, 2014

Frequency of Waste Evacuation from the Market

Frequency	Number of Response
Daily	30
2-4 days interval	-
Weekly	-
More than a week	-
Total	30

Source: Researcher's Field Survey, 2014

Impediments to Effective Waste Disposal Effort.

Challenges	Very Serious	Serious	No Challenge	Total Responds
Poor Budgetary Allocations	27	03	-	30
Limited Numbers of Vehicles	17	09	04	30
Limited Equipments	17	10	03	30
Frequent Breakdown Of Vehicles	22	04	04	30
Absent Of Legislation	01	01	28	30
Poor Public Cooperation/Attitude	30	-	-	30
Need Private Contractors	-	04	26	30

Source: Researcher's Field Survey, 2014

```
DATASET NAME DataSet1 WINDOW=FRONT.
ONEWAY Accessibility BY Diposalpractice
  /STATISTICS DESCRIPTIVES HOMOGENEITY

  /POSTHOC=TUKEY ALPHA(0.05).
```

Oneway

Descriptives

Accessibility

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Dumpster	29	1.03	.186	.034	.96	1.11	1	2
openspaces	73	1.99	.117	.014	1.96	2.01	1	2
Roadside	119	2.19	.601	.055	2.08	2.30	1	3
Drainages	35	1.63	.598	.101	1.42	1.83	1	3
Total	256	1.93	.599	.037	1.85	2.00	1	3

Test of Homogeneity of Variances

Accessibility

Levene Statistic	df1	df2	Sig.
54.245	3	252	.000

ANOVA

Accessibility

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.912	3	11.637	51.742	.000
Within Groups	56.678	252	.225		
Total	91.590	255			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Accessibility

Tukey HSD

(I) Diposalpractice	(J) Diposalpractice	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Dumpster	openspaces	-.952*	.104	.000	-1.22	-.68
	Roadside	-1.159*	.098	.000	-1.41	-.90
	Drainages	-.594*	.119	.000	-.90	-.29
openspaces	Dumpster	.952*	.104	.000	.68	1.22
	Roadside	-.207*	.071	.019	-.39	-.02
	Drainages	.358*	.098	.002	.11	.61
Roadside	Dumpster	1.159*	.098	.000	.90	1.41
	openspaces	.207*	.071	.019	.02	.39
	Drainages	.565*	.091	.000	.33	.80
Drainages	Dumpster	.594*	.119	.000	.29	.90
	openspaces	-.358*	.098	.002	-.61	-.11
	Roadside	-.565*	.091	.000	-.80	-.33

*. The mean difference is significant at the 0.05 level.

Accessibility * Diposalpractice Crosstabulation

			Diposalpractice				Total
			Dumpster	openspaces	Roadside	Drainages	
Acces sibility	Easily Accessible	Count	28	1	12	15	56
		Expected Count	6.3	16.0	26.0	7.7	56.0
		% within Accessibility	50.0%	1.8%	21.4%	26.8%	100.0%
		% within Diposalpractice	96.6%	1.4%	10.1%	42.9%	21.9%
	not easily accessible	Count	1	72	72	18	163
		Expected Count	18.5	46.5	75.8	22.3	163.0
		% within Accessibility	0.6%	44.2%	44.2%	11.0%	100.0%
		% within Diposalpractice	3.4%	98.6%	60.5%	51.4%	63.7%
	No acess to dumpster	Count	0	0	35	2	37
		Expected Count	4.2	10.6	17.2	5.1	37.0
		% within Accessibility	0.0%	0.0%	94.6%	5.4%	100.0%
		% within Diposalpractice	0.0%	0.0%	29.4%	5.7%	14.5%
Total		Count	29	73	119	35	256
		Expected Count	29.0	73.0	119.0	35.0	256.0
		% within Accessibility	11.3%	28.5%	46.5%	13.7%	100.0%
		% within Diposalpractice	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix IV

Descriptives

Diposalpractice

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Ultramordern	58	2.57	1.061	.139	2.29	2.85	1	4
Afikpo	43	2.77	.996	.152	2.46	3.07	1	4
Mainroad	46	2.59	.832	.123	2.34	2.83	1	4
Sangana	49	2.55	.647	.092	2.37	2.74	1	4
Railway	60	2.67	.705	.091	2.48	2.85	1	4
Total	256	2.63	.859	.054	2.52	2.73	1	4

ANOVA

Diposalpractice

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.493	4	.373	.502	.734
Within Groups	186.507	251	.743		
Total	188.000	255			

Homogeneous Subsets

Diposalpractice

TukeyHSD[a,b]

StallLoc	N	Subset for alpha = 0.05
		1
Sangana	49	2.55
Ultramordern	58	2.57
Mainroad	46	2.59
Railway	60	2.67
Afikpo	43	2.77
Sig.		.716

Means for groups in homogeneous subsets
are displayed.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Diposalpractice

Tukey HSD

(I) StallLoc	(J) StallLoc	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Ultramordern	Afikpo	-.198	.173	.783	-.68	.28
	Mainroad	-.018	.170	1.000	-.49	.45
	Sangana	.018	.167	1.000	-.44	.48
	Railway	-.098	.159	.973	-.53	.34
Afikpo	Ultramordern	.198	.173	.783	-.28	.68
	Mainroad	.180	.183	.861	-.32	.68
	Sangana	.216	.180	.751	-.28	.71
	Railway	.101	.172	.977	-.37	.57
Mainroad	Ultramordern	.018	.170	1.000	-.45	.49
	Afikpo	-.180	.183	.861	-.68	.32
	Sangana	.036	.177	1.000	-.45	.52
	Railway	-.080	.169	.990	-.54	.38
Sangana	Ultramordern	-.018	.167	1.000	-.48	.44
	Afikpo	-.216	.180	.751	-.71	.28
	Mainroad	-.036	.177	1.000	-.52	.45
	Railway	-.116	.166	.957	-.57	.34
Railway	Ultramordern	.098	.159	.973	-.34	.53
	Afikpo	-.101	.172	.977	-.57	.37
	Mainroad	.080	.169	.990	-.38	.54
	Sangana	.116	.166	.957	-.34	.57