**THE EFFECT OF REFUSED DISPOSAL ON HUMAN HEALTH IN NIGERIA**

**( A CASE STUDY OF BAYELSA STATE)**

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background of the study**

The importance of living in a clean environment cannot be over-emphasized. Once an environment is free of indecent waste, its impact is usually seen in all aspects of life of individuals having contact with that environment. The focus of this study was to assess the effect of waste disposal practices in Yenagoa metropolis of Bayelsa State. The need for effective management of solid waste is an issue that has required public health attention in various parts of the globe. It is of utmost importance to ensure that solid waste products are properly managed in order to prevent the occurrence of attendant problems associated with poor waste management including water contamination, air contamination, increased prevalence of vector-borne diseases, infection spread etc. Improper waste management methods have been shown to contribute to the decrease in the quality of health of a population as a result of environmental health nuisances that have arisen as a result of these poor waste management methods (Oyebode, 2013; Igbinomwanhia et al., 2014; Awajiogak, 2013). These waste products broadly called Municipal Solid Waste (MSW), includes effluents arising from agricultural, industrial, construction, mining and exploration or commercial activities which could be gaseous, solid, semi-solid or liquid in nature; garbage disposed at refuse dumps, abandoned non-functional cars/equipments and all other materials which are regarded as no longer useful. These waste products are however at certain times are not properly disposed or managed which in turn leads to the occurrence of environmental of environmental and public health challenges (Onwughara et al., 2010; Schübeler et al., 1996; Karija et al., 2013). Municipal solid waste management however remains a major environmental health challenge in Nigeria which has been attributed to indiscriminate roadside refuse disposal, open dumping of waste products, a massive unplanned urbanization trend and growth of the population, absence of actionable guidelines as regards refuse dumping and refuse dumpsites, inadequacy in funding, laxity in the practice of effective waste management as well as absence of organized waste management systems etc (Igbinomwanhia et al., 2014; Abah and Ohimain, 2010; Agwu, 2012). An assessment of the urban waste problem in Nigeria has revealed that Nigerian cities were among the dirtiest cities in the world and that over 80% of Nigerians use waste disposal methods that are not in line with World Health Organization standards (Federal Ministry of Environment, 2002). It is noteworthy to state that the government of Nigeria on its own part has played significant roles in ensuring that this menace is curbed through the enactment of regulations and legislations that ensure the practice of adequate waste management. This is however not enough on its own as the populace must also be educated on how best they can adhere to these laws as non-adherence not just only leads to facing penalties from environmental health agencies but can also lead to deterioration in health as well as deaths. This is an issue that must be addressed round the clock despite the many challenges being faced by the relevant waste management authorities. Environmental health education should be put into play, strict adherence and enforcement of environmental health laws and regulations, provision of adequate waste disposal methods for the populace, timely and proper waste management by relevant authorities, recycling of waste materials etc are some ways by which the prevailing occurrence of poor waste management can be tackled and thus providing a more healthy environment for labour and productivity (Onwughara et al., 2010; Karija et al., 2013; Owoeye and Okojie, 2013; Kafando et al., 2013). Seeing that effective and proper waste management practice is a problem that impacts on the health of individuals in Nigeria, it was necessary to carry this study to assess the waste disposal practices in Yenagoa metropolis of Bayelsa State as it provided a framework for evaluation of waste management efforts and provided areas that needed further attention in order to ensure achievement of effective waste disposal and management in Bayelsa State. The management of solid waste, perhaps, stands as the most visible environmental problem facing the capital and communities of Bayelsa State. The problem is growing daily as a result of increasing urbanization. The solid waste problem is visible in most parts of the communities within the Yenagoa metropolis, on the roads, within the neighbourhoods and around residential buildings. The environment of man lies at the mercy of both natural disaster and negligence on the part of man in the course of controlling the gifts of nature. The later takes the form of dumping solid waste in an uncompromising pattern, that can cause; desert encroachment, erosion, depletion of ozone layer, depletion of natural resources, pollution of land, rivers, the air and generally the environment (Aguwanba,1998). According to Egunlobi (2004), in the early times (pre- colonial days) up till 1970s, the disposal of refuse and other waste did not pose any significant problem. The population was small and enough land was available for assimilation of waste. Solid waste problem started with urban growth, resulted partly from national increase in population and more importantly from immigration. Ndakara (2011) also states that the quantity of such waste depends mainly on location, activity and number of people in the household. However, it was not until the mid- 19th century, spurred by increasingly devastating cholera outbreaks and the emergence of a public health debate that the first legislation on the issue emerged. Thus the social reformer, Sir, Edwin Chadwick’s 1842 report on “The Sanitary Condition of the Labouring Population, became influential in securing the passage of the first legislation of waste clearance and disposal, in which he argues for the importance of adequate waste removal and management facilities to improve the health and wellbeing of the city’s population. (Barbalace, 2003). Early garbage removal trucks were simply open bodied dump trucks pulled by a team of horses. They became motorized in the early part of the 20th century and the first closed body trucks to eliminate odours with a dumping lever mechanism were introduced in the 1920s in Britain. These were soon equipped with “hopper mechanisms” where the scooper was loaded at floor level and then hoisted mechanically to deposit the waste in the truck. The Garwood Load Packer was the first truck in 1938, to incorporate a hydraulic compactor (Herbert, 2007). Mba (2003), noted that no town in Nigeria especially the urban and semi- urban centres of high population density can boast of having found a lasting solution to the problem of filth and huge piles of solid waste, rather the problem continues to assume monstrous dimensions. To urban and city dwellers, public hygiene starts and ends within their immediate surrounding and indeed the city would, take care of itself. The situation has so deteriorated that today the problem of solid waste management has become one of the nation’s most serious environmental problem (Okpala, 2002). Ineffective waste management could rubbish all the resources and efforts put in beautifying the environment. Every year, the government of Nigeria, Bayelsa state inclusive spends billions of naira to roll back malaria, without focusing on some environmental factors such as poor waste management that makes malaria to thrive. Blocked drains provide stagnant water which facilitates the breeding of mosquitoes and other sickness causing germs (Ogadimma, 2011).

**1.2 STATEMENT OF PROBLEM**

The problem of ineffective and inadequate Waste management is a major problem to our society and the world at large, this is because improper waste management has led to the outspread of various diseases and health and environmental hazard.

1. Generation of toxic air and water pollutants, along with mountains of solid and hazardous wastes, which is becoming an overwhelming problem in Yenagoa Metropolis.
2. Strong possibility of a situation where failure to decide where to put waste or how to dispose them safely will lead to the close down of some industries and result in waste being spread every where
3. The health effects of pollution, toxic waste and other environmental ills of modern society becomes a greater threat to man than diseases.

1.3 **OBJECTIVE OF THE STUDY**

The main objective of this study is to examine the effectiveness of waste management as a panacea to disease prevention and healthy environment in Bayelsa state. Specifically it seeks to:

1. Examine the effectiveness of waste management in Bayelsa state.
2. Examine how proper waste management can prevent disease and sustain healthy environment.
3. To ascertain how effectively managed waste disposal in Bayelsa state
4. To evaluate the consequences of improper waste management in Bayelsa state.

**1.4 RESEARCH QUESTION**

The following questions shall be answered in the course of this essay.

1. What are the implications of an improper waste disposal system?
2. What is the present state of waste disposal in Bayelsa state?
3. What are the modern technologies involved in waste management and their long term benefits?
4. What method can be used to effectively managed waste in Bayelsa state?

**1.5 SIGNIFICANCE OF THE STUDY**

When Bayelsa State was created in 1996 from the still existing Rivers State, it became obvious from inception that the fledgling state will face great challenges on its path to attaining the growth and development that autonomy had bestowed on her. The challenges of waste disposal being experienced in the State Capital City (Yenagoa) is on the increase and at a very fast rate, upon this ills this research finds its significance .As Nigeria aims to be amongst the top 20 economies in the world by 2020, it is imperative that issues of waste management be tackled from the state level, and addressed from city to city.

**1.6 SCOPE AND LIMITATION OF THE STUDY**

The study covers the effect of refused disposal on human health in Bayelsa state. However the study has some limitation which ranges from:

**Finance:** finance is a major limitation to the study as resources allocated to the study is limited

**Time:** time is a major constrain to the research as time allocated to the study is very limited

**Research material:** availability of research material is a major set back to the scope of the study

**1.7 DEFINATION OF TERMS**

Waste and wastes are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or it is worthless, defective and of no use. Examples include [municipal solid waste](https://en.wikipedia.org/wiki/Municipal_solid_waste) (household trash/refuse), [hazardous waste](https://en.wikipedia.org/wiki/Hazardous_waste), [wastewater](https://en.wikipedia.org/wiki/Wastewater) (such as [sewage](https://en.wikipedia.org/wiki/Sewage), which contains bodily wastes ([feces](https://en.wikipedia.org/wiki/Feces) and [urine](https://en.wikipedia.org/wiki/Urine)) and [surface runoff](https://en.wikipedia.org/wiki/Surface_runoff)), [radioactive waste](https://en.wikipedia.org/wiki/Radioactive_waste), and others.

**WASTE MANAGEMENT**

The collection, transportation, and disposal of garbage, sewage, and other waste products. Waste management encompasses management of all processes and resources for proper handling of waste materials, from maintenance of waste transport trucks and dumping facilities to compliance with health codes and environmental regulations.

**ENVIRONMENTAL MANAGEMENT**

This is the combination of all actions taken to reduce the impact of human activities on the environment; such actions are specifically geared towards sustainable development .Sustainable development can be describes as a form of development that is able to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.

**ENVIRONMENT**

The word “environment” is of French origin “environner”, meaning to encircle or surround. (Webster, 2015) defined the environment as the conditions that surround someone or something: the conditions and influences that affect the growth, health, progress, etc., of someone or something. These are the very things we depend upon on a daily basis e.g. water, food, market, industries, air, plants, and animals etc, the environment is a complexly interwoven system of ecology where a simple or drastic change in one aspect can emphatically or continually affect other aspects.

**BAYELSA YENAGOA METROPOLIS**

Yenagoa is the capital city of Bayelsa state, located in the southern part of Nigeria. The growing metropolis is one off the eight (8) local government areas within the state.

**1.8 ORGANIZATION OF THE STUDIES**

This research work is organized in five chapters, for easy understanding, as follows

Chapter one is concern with the introduction, which consist of the (overview, of the study), statement of problem, objectives of the study, research question, significance or the study, research methodology, definition of terms and historical background of the study. Chapter two highlight the theoretical framework on which the study its based, thus the review of related literature. Chapter three deals on the research design and methodology adopted in the study. Chapter four concentrate on the data collection and analysis and presentation of finding. Chapter five gives summary, conclusion, and recommendations made of the study.

**CHAPTER TWO**

**REVIEW OF RELAED LITERATURE**

**2.1 Introduction**

In order to protect man’s environment and promote his health, waste disposal and management should be more aggressively addressed in our society. Waste is more easily recognized than defined. Something can become waste when it is no longer useful to the owner or it is used and fails to fulfill its purpose (Gaurlay, 2012). Solid waste according to Milter (2008) is any useless unwanted or discarded materials that are not liquid or gas. It is a great mixture of substances including fine dust, metal, glass, paper and cardboards, textiles, vegetable materials and plastic characterise solid waste (Simmens, 2001). Wastes as opined by Oluwade (2009) are refuse (empty containers, papers rubbish e.t.c) sewage (faeces, water urine) and industrial waste (chemical nuclear) that result from the manufacturing of certain substances, materials and equipment. The interaction organisms and their environment leads to the generation of waste. Waste is non-beneficial materials discarded; therefore all these have to be properly disposed. Refuse are waste materials that have been thrown away. The statutory definition of refuse is not based on the physical form of materials, that is, whether or not it is solid, as opposed to liquid or gas but on the fact that the material is a waste. The United State Environmental Protection Agency (2011) defines solid refuse as any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant or air deed material, including solid, liquid, semi-solid or contaminated gaseous material and agricultural operation and from community activities. Human has always produced waste that included not only the discarded bones of animals slaughtered for food. Refuse according to Clesceri (2008) can be divided into two main groups these are: that which is mainly dry and can be put directly in the dustbins and that which is liquid and may be drained away through pipes. The dry household refuse can be disposed using galvanized iron or plastic bins having a well – fitted lids and two handles for easy transportation. The bins are placed away from the kitchen or the back door. The only waste that should be put in this bin are dusts, waste papers, leaves, nylon or cellophane wrappers tins and bottles. The other type of wastes includes faeces, urine and water wastes from our kitchen and bathroom. United Nations Environmental Programme (2010), states that human beings are faced with the problem of the disposal of waste. In villages people have a lot of land at their disposal. Organic matters can be thrown away and they are allowed to decompose on these land. However, in cities and towns, people run the risk of being infected with diseases due to limited land to spare for refuse. The effects of indiscriminate waste disposal in man are numerous. The flora or fauna on the environment in form of health problems from convulsion, dermatitis, irritation of nose, throat, anemia, skin burns, chest pains, blood disorders, stomach aches, vomiting, diarrhea, lungs cancer to death. Other health effects includes flies which carry germs on their bodies and legs and also excrete them, mosquitoes breed in stagnant water, blocked drains in favourable location (Freeze and Cherry, 2006). Some residents burn their refuse, while others indiscriminately burry it. Indiscriminate disposal, burning and burying of refuse pose major environmental and health threats through soil and water which put the entire eco-system of an area in danger. The contamination of waste cause severe problems for human and animals alike. The major environmental effects include air pollution which includes odour, smoke, noise, dust and so on. The rapid growth of cities in the developing world in recent decades has resulted in increased consumption of resources to meet the growing demands of urban population and industry. This situation leads to generation of large amount of waste. Seventy to eighty percent of refuse in African cities are disposed of by dumping in open spaces, water bodies and surface drains as a result of inadequate infrastructure and ignorance of inhabitants (United Nations Environmental Programme, 2010). Indiscriminate disposal of waste is detrimental to health because it creates unsanitary environment that have adverse impacts for urban residents where sanitary facilities are scarce and the household refuse are not disposed properly, compound the health hazards. (Oluwade, 2009). Nigerian cities have been described as some of the dirtiest, most unsanitary and the least aesthetically pleasing in the world (Gomez and Nakat 2007). It has been suggested that the quantity of wastes generated in the state is proportional to population size. As population increases so also waste generated also increases. When materials are stored in a place or container before it is being transported for the point of storage, the point of disposal, this can then be dumped on land at a tip either in engineered and hygienic way or indiscriminately disposed. A healthy man is a wealthy man; if a nation is healthy the nation will be wealthy. A healthy man brings about a wealthy man which brings the expression “health is wealth.” The dangers of indiscriminate waste disposal are all around the nooks and crannies of the country and the effects constitute nothing but negative effects to the inhabitants.

**2.2 Types of Solid Waste**

Solid wastes are classified into different types depending on their sources namely, household generated waste, known as municipal waste. Industrial waste is described as hazardous waste, while waste generated in the hospital is termed infectious waste. Oreyomi (2005) classified solid waste as combustible items such as cartons, boxes, plastic, clothing etc. And non combustible articles such as cans, ashes, glass, metals, furniture and bathtubs etc. Oreyomi (2005) further observed that garbage denotes waste resulting from growing, handling, preparation and consumption of food. It attracts and breeds flies and other insects, tats and it emits odour. Rubwish comprises of combustible and non-combustible items such as papers, plastic, cans and glass, while industrial wastes are sawdust, paper and iron. Agricultural wastes are wastes originating from agricultural products such as corncob, banana stub, skin and leaves etc.

**2.3 Methods of Managing Waste**

The four common methods of managing waste according to Seo (2004) are land filing, incineration, composting and anaerobic digestion. Incineration, composting and anaerobic digestion are volume reducing technologies. Ultimately, residue from these methods must be land filled Ayodele(2007) viewed waste management as source reduction, refuse recycling, controlled combustion and controlled landfill.

Furthermore, value can be recovered by generating energy from waste (energy recovery) and lastly, solid waste should only be disposed, if the aforementioned do not offer appropriate solution.

**Source Reduction**

Involves efforts to reduce hazardous waste and other materials by modifying industrial production. This method includes change in manufacturing technology, raw material input and change in product formulation. RE-USE is using an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material.

**Recycling**

Offers one means of reducing the impacts of waste disposal on the atmosphere. It involves using waste as material to manufacture a new product. Recycling involves altering the physical form of an object or material and making a new object from the altered material.

**Energy Recovery**

Modern incinerators can use waste to generate electricity, thus preventing the energy in waste from being wasted. Nordstrom and Enochsson (2009) see waste disposal as a global problem contributing to the ongoing climate change by large emissions of greenhouse gases. By using waste material as a resource instead of land filling, the greenhouse emissions from landfills would be reduced.

**Waste Disposal**

Open dumping occurs when large quantities or piles of waste are deposited in areas, not designed to handle such materials. Improper disposal of waste is not only unsightly; it may affect the public health and the environment.

**Land Filling**

A sanitary landfill is a site for the disposal of waste materials by burial and is the oldest form of waste management. Land filling involves pitching refuse into a depression or closed mining sites**.**

**Composting**

Waste decomposes in an enclosed chamber due to activities of bacteria, using the oxygen that combined chemically with waste. Composting is a process of biological decomposition of waste under aerobic and hemophilic conditions, which breakdown organic materials leaving a humus rich residue.

**Incineration**

Incineration is a process of destroying waste material by burning. It is the most practical method of disposing hazardous waste. Incineration is the high temperature, combustion of solid waste after separating the non combustibles

**2.4 Theoretical review: Integrated Sustainable Waste Management**

Integrated Solid Waste Management, ISWM, is a planning framework for solid waste management. The programme was initiated of the Urban Waste Expertise Programme (UWEP), supported by the Netherlands Ministry of Foreign Affairs, and designed and carried out by WASTE, Advisors on Urban Environment and Development in Gouda, Netherlands. UWEP has focused on bottom-up, participatory processes designed to improve waste management, livelihoods and urban governance in developing countries. The programme has been developed in cooperation with partner organizations in the South. In the first six years of research, between 1995 and 2001, the solid waste management was observed by local researchers in the participating countries, and the importance of micro and small enterprises and the informal sector was noticed. Through some pilot project, where local experts and organizations set their own priorities and designed the projects, the ISWM framework was created as a way to understand and theorize the factors that influenced the success and failure of these activities (Scheinberg, Jgosse, & Anschütz, 2004, p. 11

The ISWM insight is that problems with solid waste management often have to do with more than lack of money and equipment. It can be attitude problems among the residents, waste management staff or private enterprises, or more serious factors as the institutional framework or social or cultural context. In these cases money is not the solution, but a change in social, institutional or political conditions is. It is important to remember that there is no absolute solution of solid waste management that fits to all cities and towns. Different systems in different parts of a city can also be needed. What works in the rich areas, might not be suitable in low income areas or on hillsides (Scheinberg, Klundert, & Anschütz, 2001, p. 10). The ISWM concept takes as a point of departure four basic principles: Equity, Effectiveness, Efficiency and Sustainability. Equity meaning that all citizens are entitled to an appropriate waste management system for environmental health reasons; Effectiveness saying the waste management model will lead to the safe removal of all waste. Efficiency makes the management of waste maximizing the benefits, minimizing the costs and optimizing the use of resources and Sustainability refers to the fact that the waste management system should be appropriate to the local conditions and feasible from a technical, environmental, social, economic, financial, institutional and political perspective. It can maintain itself

**2.5 Stakeholders and participation**

The municipalities with the general responsibility for urban cleanliness and the households using the system are always stakeholders in waste management. The local authority have several roles, they should be policymakers to legitimize and support the roles of community and micro- and small enterprises (MSE), support and participate in information campaigns, and providing reliable disposal facilities. Households can have different socio-economic and gender characteristics, but have a very important role in garbage storage and collection, recycling, re-use and disposal. They have both an individual responsibility and a collective responsibility together with the community. Beside these two groups the stakeholders can vary between towns. One primary group though, is MSEs and Community Based Organizations (CBOs). The groups can differ in characteristic which influence their waste activities. MSEs can vary in orientation towards services, production, or values, while CBOs can have variations in communication structure and legitimacy. According to the ISWM the roles of CBOs is to mobilize the households, to supervise performance by service providers and to coordinate waste management activities, including the local authority. Other stakeholders in the community may be active as waste generators or waste service users. It can also be the formal or informal sector that trade with used items or initiators of awareness raising campaigns. This is making the community very complex. They have all different interest in waste and the aim for ISWM is to make them co-operate to improve the solid waste system (Scheinberg, Muller, & Hoffman, 2001, p. 39)

Local authorities used to have the only responsible for providing solid waste management. They did everything from physical infrastructure, institutional framework to everyday services. This is not always the best solution for developing countries according to Scheinberg, Muller, & Hoffman (2001), when the authorities can only provide waste services for a smaller part of the city, while other have no service at all. Structural adjustments and fiscal discipline are imposing strict limits on governmental funds, restricting expansion. An expanding urban population demands traditional and new services, but the authorities are less and less able to provide it. The ISWM-concept is instead promoting the use of MSE and CBO in the daily work of the waste management. When local governments are lacking money to provide a sustainable service, well managed privatization can increase the capacity for the government to provide a reliable service to all residents. Private businesses often have the capital to make investments in equipment that the municipality lack and have also the knowledge about the neighborhood so they can provide a suitable service (Scheinberg, 2001, p. 11). ISWM promotes encouragement of MSEs and CBOs to get involved in the recycling sector. This sector is important because it reduces the volume of waste and avoids the disposal cost, it can also make an income for poor people. Micro- and small enterprises are often informal. When using MSE, ISWM promotes to give the MSE recognition and formal status. This creates a formal management and control the relationship between the government and the MSE. Another step to take is to institutionalize the MSEs and CBOs in waste management by making long term plans based on the integration of their services (Scheinberg, 2001, p. 9). ISWM wants to see MSEs as building blocks in an urban privatization strategy that gives the municipality the opportunity to create a more sustainable and integrated approach. (Scheinberg, 2001, p.17 It is understood through experience that consultation with actors concerned is likely to result in sustainable, widely supported activities. To form this kind of partnership it takes at least two parties, the authority and the community. The local authority is important because they make the rules and frames in which the partnership can operate. The community contains of several different groups as, people, households, businesses and organizations that have different stakes. The ISWM concept means that through information and awareness-raising, organization and participation, the neighbourhood communities can play significant roles in waste management, as long as the authorities provides a supportive context. The partnership can also result in a combination of different types of waste systems that is more likely to meet the demands of the residents. It can also give jobs and income opportunities among waste collection and recycling, and the community is more likely to be positive to the system and 16 cooperate when they are a part of it. To increase the sustainability in the waste management system it is also important to have a fair pricing on the waste services, but also to calculate the costs and investigate how much the waste generators are willing to pay. This includes both when entrepreneurs are contracted by the local government and get paid to do a service, and the collection fees (Scheinberg, Muller, & Hoffman, 2001, p. 39).

**2.6 conceptual reviews;** **Wastes and solid wastes**

The concept of waste is one that has attracted so much concern from various researchers. This is because many items can be regarded as waste yet what is waste to one individual may not be waste to another. Wastes may be useful materials but are in places where they are not needed. A discarded empty beer bottle or empty bottled water container may be useful to a ‘zobo’ seller. Though these empty containers are discarded because their owners found them useless, they can become a resource to another person. In the light of this, waste has been conceptualized by different authors. Adewumi (2001) defined waste as a resource in the wrong place. In a different perspective, Tchobanoglous and Kreith (2002) opined that wastes are discarded tangible products of human activities that are regarded as unwanted and useless. Similarly, Abiodun (2003) refers to waste as lack of use or value or useless remains. According to him, it is a by-product of human activities. Oyeniyi (2011) defined waste as any material which has been used and is no longer wanted because the valuable or useful part of it has been taken out. This means that wastes are such items which people are required to discard because their owners no longer see any value in them but can serve another person a useful purpose. MerriamWebster dictionary (2013) defined waste as refuse from places of human or animal habitation. In the same light, The World Book Dictionary (2013) defined waste as useless or worthless material; stuff to be thrown away. Unfortunately, these definitions of wastes, except that of Adewumi, reflect a widespread attitude that does not recognize waste as a resource. But then, Zero Waste America (2013) saw waste in the light of Adewumi (2001), as a resource that is not safely recycled back into the environment or the marketplace. This definition takes into account the value of wastes as a resource, as well as the threat its unsafe recycling can present to the environment and public health. From the foregoing review, it can be said that waste is a useless material that can become a resource if treated well. For this study, wastes are materials that their owners no longer see any value in but can become a resource to another person when safely recycled. Various items can be considered as waste. Ezigbo (2012) stated that waste can be any garbage, sludge, and gaseous and other discharged materials resulting from various community activities. He further stated that waste consists therefore of discarded materials resulting from domestic and community activities, and from industrial, commercial, and agricultural operation e.g., household rubbish, sewage sludge, wastes from manufacturing activities, packaging items, discarded cars, old televisions, garden waste, and old paint containers. Rathi, (2007) opined that waste is an unavoidable by-product of human activities. It then follows that waste can be generated anywhere, thus, all our daily activities can give rise to a large variety of different wastes arising from different sources. These may include wastes coming from households, commercial activities (e.g., shops, restaurants, and hospitals), industry (e.g, pharmaceutical companies, clothes manufacturers etc.), agriculture (e.g., slurry), construction and demolition projects, mining and quarrying activities and from the generation of energy. Wastes can exist in liquid, solid and gaseous forms which simply denote the state of matters that make up the waste. Matter refers to a substance or thing of a particular sort and can exist in liquid, solid or gaseous state. It then follows that substances in liquid form constitute liquid waste e.g waste water from domestic use, substances in gaseous form constitute gaseous waste e.g carbon (iv) oxide, a waste product of respiration, while substances in solid form, that is, hard or firm forms constitute solid waste e.g. garbage, rubbish etc. Of the different categories of wastes being generated, solid wastes poses a hydra-headed problem beyond the cope of various solid waste management systems in Nigeria (Geoffrey, 2005), as streets experience continual presence of solid waste from commercial activities. Solid waste has been variously defined by different individuals and groups. Solid waste is any useless, unwanted and discarded material, resulting from normal community activities which have lost its original purpose and usage with insufficient liquid content to be free flowing (American Public works Association, 1975; WHO, 1977, West African Health Examination Board-WAHEB, 1991; Obionu, 1999; and Okereke, 2000). Additionally, Nnamani (2000) conceptualized solid wastes as all materials that the possessor or owners no longer considers of sufficient value to retain. Avinash , Manoj, and Eonkar (2008) defined solid waste (SW) as the material that no longer has any value to the person who is responsible for it and is not intended to be discharged through a pipe. The researchers posited that solid wastes does not normally include human excreta but it is generated by domestic, commercial, industrial, healthcare, agricultural and mineral extraction activities and accumulates in streets and public places. Babayemi and Dauda (2009) added that solid wastes are nonliquid and nongaseous products of human activities, regarded as being useless. The U.S. Environmental Protection Agency (EPA) (2012) defined solid waste as any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Oyeniyi (2011) referred to solid waste as human and animal excrement or faeces. Smartranger (2013) defined solid waste as the useless and unwanted products in the solid state derived from the activities of and discarded by the society; produced either by product of production processes or arise from the domestic or commercial sector when objects or materials are discarded after use. In the view of County (2013) solid waste are material such as household garbage (includes recycling), food wastes, yard wastes, and demolition or construction debris. He further opined that waste includes discarded items like household appliances, furniture, scrap metal, machinery, car parts and abandoned or junk vehicles. In the view of Desa, Kadir and Yusooff (2012) solid wastes are useless and unwanted products in the solid state derived from the activities of and discarded by society. In this study, solid wastes refer to materials in solid form that have lost their useful values and are discarded.

**2.7 Management and solid waste management**

Management is vital in every aspect of life, be it family, job, church or any other formal and informal organization. This is because human and material resources need to be coordinated to ensure that everything is put in place accordingly. Aluko (2001) opined that management is the act of arranging and organizing materials and conditions that the goals and purposes of an organization may be achieved. In similar opinion Maxwell (2004), posited that management is the process of organizing, controlling, coordinating and utilizing human and material resources towards achieving organizational goals. According to Maxwell (2004) how best or successful the human resources are managed, goes a long way to determine how successful the material and financial resources are to be utilized to adequately achieve the organizational goals and objectives for which the organization stand for. Therefore, management may be proper or improper because the way resources are coordinated is vital in determining effectiveness. A more comprehensive definition of management is given by Gomezmejia, Balkin, and Cardy (2008). According to them, management in all business and organizational activities is the act of coordinating the efforts of people to accomplish desired goals and objectives using available resources efficiently and effectively. To them, Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal; Resourcing encompasses the deployment and manipulation of human resources, financial resources, technological resources, and natural resources. They went further to state that since organizations can be viewed as systems and that management can also be defined as human action, including design to facilitate the production of useful outcomes from a system. Hornby (2006) defined management as the act or skill of dealing with people or situations in a successful way. According to Akrani (2008) management is an individual or group of individuals that accept responsibilities to run an organization; they plan, organize, direct, and control all the essential activities of the organization. He went further to state that management is the organizational process that included strategic planning, setting, objectives, managing, resources, deploying human and financial assets needed to achieve objectives and measuring results. It can be deduced from these definitions that management is an art, and a process. It also implies the use and coordination of human and material resources within to achieve objectives. It also be deduced that management involves planning, setting objectives, organizing, staffing, leading or directing, and controlling. In this study, management is the process of coordinating the efforts of members of an organization using the organizational material and human resources to achieve the organizational objectives. Management is crucial in every activity, even in solid waste. This is because when useless discarded solid materials litter the environment, proper planning, organization and coordination of human and material resources are necessary to ensure that these discarded solid materials are removed safely from the environment so that they do not constitute hazard to health and environment if left unattended to. Thus, for healthy environment, improved human health, increased productivity and improved environmental aesthetics, management of solid waste is very necessary. Management started to be associated with waste not quite long. According to Agwu (2012) over the last decades; wastes began to be associated with management because of the need for plans and methods for its disposal; a procedure which requires specific and well-tailored policies. This is waste has contributed to a number of health and environment hazards to man. This situation has raised a great concern among public health sector as well as researcher all over the world. Thus solid waste management becomes necessary for a clean environment. Agwu (2012) defined solid waste management as the process of collecting, storing, treating and disposing of solid wastes in such a way that they are harmless to humans, plants, animals, the ecology and the environment generally. Abiodun (2003) opined that waste management is the collection, transport, processing or disposal, managing and monitoring of waste materials. According to Abiodun, the term usually relates to materials produced by human activity, and the processes generally undertaken to reduce their effect on health, the environment or aesthetics. He further stated that all wastes materials whether they are solid, liquid, gaseous or radioactive fall within the remit of waste management. Geek (2012) perceived solid waste management as the process used to dispose of garbage. Nathanson (2013) defined solid waste management as collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. A more comprehensive definition of solid waste management was given by Tay (2012), as the discipline associated with controlling the generation, storage, collection, transfer and transport, processing, and disposal of solid waste. This according to Tay, is done in a manner that is in accordance with the best principles of health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes.

**2.8 Obstacle to waste management**

Impediments are hindrances. Things that tend to prevent smooth running of a process. According to Hornby (2006) impediments refer to something that delay or stop the progress of something. Free online Dictionary (2013) defined an impediment as anything that slows or blocks progress; factor causing trouble in achieving a positive result or tending to produce a negative result. In this study, impediments refer to things that prevent efficient management of solid waste in Anambra State. In Anambra State, part of the reasons why management of solid waste appears to be challenging is in waste collection and transportation. Sometimes, when waste workers come to designated dumpsites in the streets to collect waste, their vehicles may not be sufficient in number. This makes them to overload the vehicles. When this happens, wastes fall from the vehicles as the vehicle moves from one street to another in a bid to get to their disposal sites. These wastes that fell from the waste vehicles as a result of over loading of the few available vehicles, litter the environment. This situation further causes waste to litter the environment thus, wastes appears to be improperly collected. Thus impediments to management of solid waste can manifest in collection, storage, transportation, treatment and disposal of solid waste. To buttress this observation, Dauda and Osita (2000) stated that Borno State Environmental Protection Agency (BOSEPA) has a total of nine vehicles in Maiduguri, seven tippers, one loader and one gully emptier, out of which only four tippers and one loader are functioning. This according to these researchers impedes proper management of solid waste in Borno State. Ogwueleka (2009) observed that solid waste management in Nigeria is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal of solid waste. According to this researcher, solid waste generation exceeds collection capacity because there is no regular routine collection. Also, 60 percent of trucks available for waste collection in Nigeria are always out of service at any one time. Ogwueleka (2009) in support of Dauda and Osita (2000) added that the collection vehicles are in a state of disrepair in most Nigerian cities and that there is inadequate service coverage in most urban areas, while in rural areas, there is no waste collection. He further stated that rural dwellers have no access to waste collection services. They dump waste at any vacant plot, public space, and river or burn it in their backyard thereby polluting the air. In highlighting these impediments, it appears that these management impediments are as a result of certain logistic factors. Ogweleka (2009) opined that certain logistic factors such as poor funding, lack of institutional arrangement, lack of expertise and manpower to run solid waste management programme, little or no functional background or training in engineering and management of majority of environmental agency workers, no reliable measurement of generated waste, contribute the impediments to management of solid waste in Nigeria. The conditions of Nigerian roads are terrible. In some streets and market places, the roads are so narrow for waste vehicles to pass through. In places where the roads are wide enough for the vehicles to pass through, the road is so bad with lots of potholes and sharp objects (arising from flood water due to waste blocked gutters) that can puncture the waste vehicles. Among the factors that hinder effective SWM in Nigeria as pointed out by Ogwueleka (2009) are poor cities networks, traffic congestion and narrow roads. According to this researcher, harsh condition of roads and infrastructures, leads to constant break down of the waste collection truck. The researcher pointed out that slums and squatter areas in the poor neighbourhood of most cities with narrow, hilly, bad and unpaved streets, non-rational routes for collection services contribute to poor waste management in Nigeria. This researcher further identified collection cost and the crippling fuel crisis, use of compaction trucks that are uncommon, expensive and difficult to repair and designed to handle low density waste as challenges facing proper waste management in Nigeria. In addition to management and logistic impediments to solid waste management, Eja, Asikong, and Arikpo (2008) opined that absence of data on the quantity and composition of wastes generated over the years, besides the planlessness of the urban areas, constituted an obvious impediment to effective solid waste management in Nigeria, which includes Bayelsa State where this study will be carried out. Thus, there is obvious need to devise an optimization strategy that will help overcome these impediments.

**2.9** **ENVIRONMENTAL HAZARD AND HEALTH EFFECT**

According to Udo et al (2008), hamattan haze and increased aerosols in the sky due to bush burning activities influence the quality of air on earth. Many studies have shown links between pollution and health effects. Increases in air pollution have been linked to decreases in lung function and increases in heart attacks. High levels of air pollution according to the EPA Air Quality Index directly affect people with asthma and other types of lung or heart diseases. Overall air quality has improved in the last 20 years but urban areas are still in concern. The elderly and children are especially vulnerable to the effects of air pollution. The level of risk depends on several factors;

* The amount of pollution in the air
* The amount of air we breathe in a given time
* Our overall health

Other less direct ways people are exposed to air pollutants are;

* Eating food products contaminated by air toxins that have been deposited where they grew
* Drinking water contaminated by air pollutants
* Ingesting contaminated soil
* Touching contaminated soil, dust or water.

Although many air pollutants are invisible, they can seriously impact our health, the environment, and our quality of life. Air pollutants may cause respiratory diseases, cancer and other health effects. Pollutants also may create odors and smog, diminish the protective ozone layer, and contribute to other environmental problems, such as acid rain and global climate change. The air inside homes, schools, and other buildings also may contain pollutants that enter from outdoors and those generated indoors. Mold, radon, tobacco smoke, carbon monoxide, and chemical emissions from products and furnishings are some of the important pollutants that may be present in our homes and other indoor environments. The Air pollution and Respiratory Health Program (APRHP) leads CDCs fight against environmental related respiratory illness, including asthma, cancer and other forms of illness.

**Asthma**

Asthma is a serious environmental health threat, but it can be controlled by taking medication and by avoiding contact with environmental “triggers” such as dust mites, furry pets, mold, tobacco smoke, and certain chemicals. CDC works with state grantees to reduce the number of deaths, hospitalizations, emergency department visits, school days or workdays missed, and limitation on activity due to asthma.

**Cancer**

A cancer cluster is a greater-than-expected number of cases that occurs within a group of people in a geographic area over a period of time. CDC provides cancer cluster information and resources, responds to inquiries about cancer clusters, and works with state health departments to address public health concerns about potential cancer clusters. The most common symptoms associated with short-term exposure to pollution (a few minutes to a few days) are:

* Irritation of the respiratory tract (cough, irritated throat);
* Wheezing
* Tightness in the chest
* Pain while deep breathing
* Difficulty breathing

**CHAPTER THREE**

**RESEARCH METHODOLOGY**

* 1. **Introduction**

This chapter deals with the method used in collecting data required in carrying out this research work it explains the procedures that were followed and the instrument used in collecting data.

* 1. **Sources of data collection**

Data were collected from two main sources namely:

(i)Primary source and

(ii)Secondary source

**Primary source:**

These are materials of statistical investigation which were collected by the research for a particular purpose. They can be obtained through a survey, observation questionnaire or as experiment, the researcher has adopted the questionnaire method for this study.

**Secondary source:**

These are data from textbook Journal handset etc. they arise as by products of the same other purposes. Example administration, various other unpublished works and write ups were also used.

* 1. **Population of the study**

Population of a study is a group of persons or aggregate items, things the researcher is interested in getting information from the study of the effect of refuse disposal on human health in Nigeria. A total of 200 staff of Bayelsa state waste management agency (BSWMA) was selected randomly by the researcher as the population of the study.

* 1. **Sample and sampling procedure**

Sample is the set people or items which constitute part of a given population sampling. Due to large size of the target population, the researcher used the Taro Yamani formula as the procedure of arriving at the sample size.

n= N

1+N(e)2

n= 200

1+200(0.05)2

= 200

1+200(0.0025)

= 200 200

1+0.5 = 1.5 = 133

**3.5 Instrument for data collection**

The major research instrument used is the questionnaires. This was appropriately moderated. The students were administered with the questionnaires to complete, with or without disclosing their identities. The questionnaire was designed to obtain sufficient and relevant information from the respondents. The primary data contained information extracted from the questionnaires in which the respondents were required to give specific answer to a question by ticking in front of an appropriate answer and administered the same on staff of the organizations: The questionnaires contained about 16 structured questions which were divided into sections A and B.

* 1. **Validation of the research instrument**

The questionnaire used as the research instrument was subjected to face its validation. This research instrument (questionnaire) adopted was adequately checked and validated by the supervisor his contributions and corrections were included into the final draft of the research instrument used.

* 1. **Method of data analysis**

The data collected was not an end in itself but it served as a means to an end. The end being the use of the required data to understand the various situations it is with a view to making valuable recommendations and contributions. To this end, the data collected has to be analysis for any meaningful interpretation to come out with some results. It is for this reason that the following methods were adopted in the research project for the analysis of the data collected. For a comprehensive analysis of data collected, emphases were laid on the use of absolute numbers frequencies of responses and percentages. Answers to the research questions were provided through the comparison of the percentage of the staff response to each statement in the questionnaire related to any specified question being considered.

Frequency in this study refers to the arrangement of responses in order of magnitude or occurrence while percentage refers to the arrangements of the responses in order of their proportion.

The simple percentage method is believed to be straight forward easy to interpret and understand method . The researcher therefore chooses the simple percentage as the method to use. The formula for percentage is shown as.

% = f/N x 100/1

where f = frequency of respondents response

N = Total Number of response of the sample

100 = Consistency in the percentage of respondents for each item contained in questions.

**CHAPTER FOUR**

**PRESENTATION ANALYSIS INTERPRETATION OF DATA**

**4.1 Introduction**

Efforts will be made at this stage to present, analyze and interpret the data collected during the field survey. This presentation will be based on the responses from the completed questionnaires. The result of this exercise will be summarized in tabular forms for easy references and analysis. It will also show answers to questions relating to the research questions for this research study. The researcher employed simple percentage in the analysis.

**DATA ANALYSIS**

The data collected from the respondents were analyzed in tabular form with simple percentage for easy understanding.

A total of 133(one hundred and thirty three) questionnaires were distributed and 133 questionnaires were returned.

Question 1

Gender distribution of the respondents.

TABLE I

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Gender distribution of the respondents** | | | | | |
| Response | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Male | 77 | 57.9 | 57.9 | 57.9 |
| Female | 56 | 42.1 | 42.1 | 100.0 |
| Total | 133 | 100.0 | 100.0 |  |

From the above table it shows that 57.9% of the respondents were male while 42.1% of the respondents were female.

Question 2

The positions held by respondents

TABLE II

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **The positions held by respondents** | | | | | |
| Response | | Frequency | Percent | Valid Percent | Cumulative Percent |
| **Valid** | **Environmentalist** | 37 | 27.8 | 27.8 | 27.8 |
| **Waste collectors** | 50 | 37.6 | 37.6 | 65.4 |
| **Drivers** | 23 | 17.3 | 17.3 | 82.7 |
| **managers** | 23 | 17.3 | 17.3 | 100.0 |
| **Total** | 133 | 100.0 | 100.0 |  |

The above tables shown that 37 respondents which represent 27.8% of the respondents are waste environmentalist, 50 respondents which represents 37.6 % are waste collectors, 23 respondents which represents 17.3% of the respondents are news drivers, while 23 respondents which represents 17.3% of the respondents are managers.

Question III

Are there implications of an improper waste disposal system?

Table III

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Are there implications of an improper waste disposal system?** | | | | | |
| Response | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Yes | 89 | 66.9 | 66.9 | 66.9 |
| No | 30 | 22.6 | 22.6 | 89.5 |
| Undecided | 14 | 10.5 | 10.5 | 100.0 |
| Total | 133 | 100.0 | 100.0 |  |

From the table above, the researcher asked the respondents are there implications of an improper waste disposal system, it can be observed that 89 respondents which represents 66.9% said yes that improper refused disposal has a negative implications on the health of the populace, 30 respondents which represents 22.6% said No, that improper refused disposal has no implication on the health of the populace, while 14 respondents which represents 10.5% of the respondents were undecided.

The researcher therefore concludes that improper refused disposal has a negative implication on the health of the populace.

Question IV

 is the present state of refused disposal in Bayelsa state appropriate?

Table IV

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **is the present state of refused disposal in Bayelsa state appropriate** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | No | 83 | 62.4 | 62.4 | 62.4 |
| Yes | 32 | 24.1 | 24.1 | 86.5 |
| Undecided | 18 | 13.5 | 13.5 | 100.0 |
| Total | 133 | 100.0 | 100.0 |  |

From the table above, the researcher asked the respondents is the present state of refused disposal in Bayelsa state appropriate, it can be observed that 83 respondents which represents 62.4% of the respondents said No, 32 respondents which represents 24.1% of the respondents said Yes, while 18 respondents which represents 13.5% were undecided.

The researcher therefore concludes that refused disposal in Bayelsa state is inappropriate.

Question V

are the modern technologies involved in waste management and their long term benefits compared to their cost?

Table V

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **are the modern technologies involved in waste management and their long term benefits compared to their cost?** | | | | | |
| Response | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Agreed | 69 | 51.9 | 51.9 | 51.9 |
| Strongly Agreed | 21 | 15.8 | 15.8 | 67.7 |
| Disagreed | 32 | 24.1 | 24.1 | 91.7 |
| Strongly Disagreed | 11 | 8.3 | 8.3 | 100.0 |
| Total | 133 | 100.0 | 100.0 |  |

From the table above, the researcher asked the respondents are the modern technologies involved in waste management and their long term benefits compared to their cost, it can be observed that 69 respondents which represents 51.9% agrees that it benefit supersede the cost, 21 respondents which represents 15.8% are strongly agreed to this fact, 32 respondents which represents 24.1% disagreed, while 11 respondents which represents 8.3% strongly disagreed.

The researcher therefore concludes that the benefit of modern waste management machine supersede the cost

Question VI

Is there more effective method that can be used to effectively managed waste in Bayelsa state?

Table VI

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Are there more effective method that can be used to effectively managed waste in Bayelsa state?** | | | | | |
| Response | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Agreed | 65 | 48.9 | 48.9 | 48.9 |
| Strongly agreed | 23 | 17.3 | 17.3 | 66.2 |
| Disagreed | 31 | 23.3 | 23.3 | 89.5 |
| Strongly Disagreed | 14 | 10.5 | 10.5 | 100.0 |
| Total | 133 | 100.0 | 100.0 |  |

In the table above, the researcher asked the respondent Are there more effective method that can be used to effectively managed waste in Bayelsa state, 65 respondents which represents 48.9% Agreed that there are more effective method of refused management, 23 respondents which represents 17.3% strongly Agreed, 31 respondents which represents 23.3% Disagreed while 14 respondents which represents 10.5% strongly disagreed.

The researcher therefore concludes that there are more effective way of refused management.

**CHAPTER FIVE**

**SUMMARY CONCLUSION AND RECOMMENDATION**

**5.1 Introduction**

It is important to ascertain that the objective of this study was to ascertain the effect of refuse disposal on human health in Nigeria.

In the preceding chapter, the relevant data collected for this study were presented, critically analyzed and appropriate interpretation given. In this chapter, certain recommendations made which in the opinion of the researcher will be of benefits in addressing the challenges refuse disposal in Nigeria

**5.2 Summary**

In refuse disposal management there is no ‘away’. When ‘throwing away’ waste, system complexities and the integrated nature of materials and pollution are quickly apparent. For example, waste incineration is expensive and poses challenges of air pollution and ash disposal. Incineration requires waste placed outside for collection to be containerized to stay dry, and much of the waste stream is not combustible. Landfills require land availability, and siting is often opposed by potential neighboring residents. Solving one problem often introduces a new one, and if not well executed, the new problem is often of greater cost and complexity.

**5.3 Conclusion**

Waste management plays an integral role in human activity. The overall view of solid waste management is to collect, treat and dispose solid waste by urban dwellers in an environmentally and socially satisfactory manner. Until recently, Nigerians have not been particularly concerned about proper waste management, open dumping and open burning in unapproved locations has been the norms. The constraints to effective solid waste management are not limited to lack of policy or laws, but poor infrastructure, education, social awareness of problems and solutions, and lack of institution promoting sustainable environmental actions.

**5.4 Recommendation**

Haven successfully completed the study, the following recommendations were made: Strategic environmental planning of waste disposal and management practices in the study area. There is need to ensure strict adherence to guidance and cost analysis of solid waste options in the area. Community participation in collection, selection of sites and design of facilities is inherently essential for sustainability. There is need to strengthen the work force, by recruiting more personnel in the Waste Management Authority. Government should provide adequate funds for waste management personnel for the purchase of more evacuating vehicles and waste disposal containers. There is need for environmental and public health education on the danger of indiscriminate waste disposal in the study area.

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