

**ACCESS, USE AND DISSEMINATION OF INFORMATION ON WASTE
DISPOSAL BY ENVIRONMENTAL HEALTH WORKERS FOR
HYGIENIC LIFESTYLE, A STUDY OF MINNA, NIGERIA**

BY

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ABSTRACT

The study investigated the access, use and dissemination of information on waste disposal by environmental health workers for hygienic lifestyle, a study of Minna, Nigeria. This research sought to determine the level of awareness of environmental information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace, to determine the effect of access to information by environmental health workers on waste disposal and the use and subsequent dissemination of information for the hygienic lifestyle of the populace. Survey and content analysis research methods was adopted for this study. The total population of the study comprises 150 environmental health workers selected from four (4) departments that are made, up of: waste management department, environmental monitoring, conservation department and environmental health. Questionnaire was adopted and designed as a survey instrument for data collection. From research question one and hypothesis one, 42% of the respondents were in the affirmative that they are aware that radio, television, posters, newspapers and libraries are used for disseminating information on waste management. As part of waste management practice, from the different sizes and types of waste containers listed such as large waste bins, small waste bins, metal or plastic cans and polythene bags, the result revealed that 18.4% of the respondents use large waste dump-bins provided by the local authorities. It is pertinent to conclude as follows: the access, use and dissemination of environmental information by health workers for hygienic lifestyle of the populace has great impact on the overall wellbeing of the people. However, there is still more work to be done by the environmental health workers. It was observed in the study there were inadequate and insufficient information dissemination by the environmental health workers on environmental issues in general and solid waste in particular. There is, therefore, the need for intensive enlightenment campaigns on solid waste management by environmental health workers for public behavioural change. There should be regular campaigns by environmental health workers on the environment are essential for environmental management. Solid waste management policies and enforcement of sanitation laws in

various states should be energised, and various environmental organisations should do more until the dream of a clean environment in Minna becomes a reality.

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CHAPTER ONE

1.0

INTRODUCTION

1.1 Background to the Study

The rapid urbanization in major cities in the developing countries of Africa has brought a serious environmental degradation. One of its most pressing matters is the management of solid, liquid and hazardous waste. The Management of solid waste is an enormous challenge in developing countries all over the world due to factors like: poverty, population explosion and urbanisation. The management is also ineffective and underfunded by governments (Adewale, 2011). A sustainable system in place for handling waste is an acute need within rural settlements. This is because many of these small towns are growing fast and increasing human populations will lead to production of more waste. The generation of Municipal Solid Waste (MSW) has been rapid, while the capacity to collect and safely dispose of the material has been on a general decline. Today, municipal solid wastes are getting disposed in open and illegal dump sites which is due to improper environmental pollution control and monitoring.

Open dumpsite approach as solid waste disposal method is a primitive stage of solid waste management in many parts of the world. It is one of the most poorly rendered services by municipal authorities in developing countries as the systems applied are unscientific, outdated and in-efficient. Solid waste disposal sites are found both within and on the outskirts of developing urban cities. With increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household (Foday *et al.*, 2013). This waste is ultimately thrown into municipal disposal sites and due to poor and ineffective management, the dumpsites

turn to sources of environmental and health hazards to people living in the vicinity of such dumps. One of the main aspects of concern is the pollution caused to the earth; be it land, air and water. According to Nguyen *et al.* (2011) many cities in developing countries face serious environmental degradation and health risks due to the weakly developed municipal solid waste management system. Several studies have been conducted in order to examine the health and environmental effects arising from waste dumps. Such studies showed that a link exists between the two (Aatamila *et al.*, 2010). The ever-increasing consumption of resources results in huge amounts of solid wastes from industrial and domestic activities, which pose significant threats to human health (Foday *et al.*, 2013).

However, the ills of inappropriately disposed municipal solid wastes are quite numerous to be mentioned. Health deterioration, accidents, flood occurrences, and environmental pressures are just a few of the negative effects. In many developing countries, solid waste disposal sites are found on the outskirts of urban areas. These areas become children's sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents. They, in turn, are disease transmitters that affect population's health, which has its organic defences in a formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic, and several other kinds of infectious diseases (Foday *et al.*, 2013; Salam, 2010). Open dumpsites in developing urban cities involve indiscriminate disposal of waste. They are uncontrolled and therefore pose major health threats which affect the landscape of urban cities. Wastes that are not managed properly, especially solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. It is also evident that unattended wastes lying around attract flies, rats, and other creatures that, in turn, spread diseases. Normally, it is the wet waste that decomposes and releases a bad odour. The bad odour

affects the people settled next to the dumpsite, which shows that the dumpsites have serious effects to people settled around or next to them.

The group at risk from this unscientific disposal of solid waste includes the population in areas where there is no proper waste disposal method, especially the pre-school children, waste workers and workers in facilities producing toxic and infectious materials. Other high-risk group includes population living close to the waste dump (Aatamila *et al.*, 2010; Foday *et al.*, 2013). In particular, organic domestic waste poses a serious threat, since they ferment creating conditions favourable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and rag pickers being the most vulnerable (Foday *et al.*, 2013). Studies conducted showed that exposure to hazardous waste in dumpsites can affect human health, children being the most vulnerable to these pollutants. Direct exposure can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Health care waste and other medical waste disposed in dumpsites, mixed with domestic wastes are grossly increasing the risk of infection with Hepatitis B and other related diseases.

Open dumpsites are a major problem to the environment especially to the air that we inhale. Pollutants deposited on land usually enter the human body through the medium of contaminated crops, animals, food products, or water. Also, the dumpsite has smelly and unsightly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material. Disposal sites can also create health hazards for the neighbourhood (Foday *et al.*, 2013). In addition, dumpsites closer to residential areas are always feeding places for dogs and cats. These pets, together with rodents, carry diseases with them to nearby

homesteads which will in turn will help to spread diseases among the people living within the vicinity and this will affect the health and living condition of the people. There is no way development will thrive in an unhealthy condition.

Development is incomplete without sustainability. In this digital age, there is need for not only development but sustainability of the environment and the world in general. There is a massive need for heads to be put together towards this subject “sustainability”. Sustainability is the continuous improvement of a present state without compromising the future state and for the betterment of the future generation. As a result of the need for sustainability, there comes the emergence of turning waste to wealth for the benefit of the population. Increasing population, domestic and industrial activities have led to increase in overall waste generation. Therefore, organisations, communities and individuals have to find ways of managing these wastes in order to preserve and benefit from their habitat. Today, the economic value of waste is enormous. It has been managed to generate a lot of resources (clean and green power, revenues, employment and other forms of development) and its effective utilisation has led to greener environment and less polluted environment. For an economic value of waste to be generated, the government, organizations and individuals at a particular setting have to be educated massively on waste management. This is important in order to have good knowledge about the economic importance of waste and cooperate towards acquiring the profitable value.

1.2 Statement of Research Problem

Solid waste management and indiscriminate disposal of waste is one of the major problems faced by city planners in developing countries due to poor planning, increased urbanization and inadequate resources. Recently, there have been growing concerns about the environmental and health effects associated with the generation of solid waste as well

as the increasing cost of municipal solid waste management. Improper waste disposal can result in environmental health hazards and negative impact on the environment in general. In major cities of Nigeria most especially Minna, the disposal of solid wastes within the last few decades have posed major environmental and public health issues as the majority of open dumpsites which are initially located in the outskirts are now within the heart of the city as a result of urbanisation and migration. Solid waste management is on a downward spiral in Nigeria, with most communities especially within city centres not benefitting from the municipal waste disposal services. In some parts of Nigeria, it is common to see refuse being dumped along major roads and highways constituting nuisance in those locations. This has become an eyesore as major streets have been turned into refuse dumps with ugly mountains of waste causing serious traffic problems. Besides the aesthetic issues caused by these improper disposal methods, the health and environmental implications cannot be ignored. The dumpsite is an ideal breeding ground for disease vectors such as rats and mosquitoes which present serious health issues to nearby household residents. Such unsanitary environment is a predisposing factor for the spread of diseases/infections like malaria, dengue fever, typhoid, tetanus, cholera, eczema and dysentery.

Recently, the emphasis has been directed towards participatory approaches in solid waste management in most developing countries. This involves participation of the concerned actors at various levels to enhance co-operation. The level of access to information about solid waste management by urban dwellers is crucial for the success of these participatory initiatives. Awareness, access and use of relevant information about sustainable solid waste management is critical in ensuring waste reduction, reuse, recycling, and resource recovery.

Several works have been done on solid waste and its management, however, research on the health implications associated with solid waste and access to relevant information on waste disposal is negligible. Research on the health risks posed on waste workers, the health threats posed on those living near dumpsites and landfill sites, the different types of diseases and the frequency of occurrence on dwellers near and far from dumpsites have not been dealt with. It is from this basis that the research has been embarked on to investigate into the access, use and dissemination of information on solid waste management evident in Minna metropolis for hygienic lifestyle of dwellers in communities(near and far) surrounding solid waste disposal sites in Minna, Niger State. Municipal waste collection, disposal and management of waste and information dissemination and use of proper waste disposal practices were the main focus of this research.

1.3 Research Objectives

The objective of the study is to determine the access, use and dissemination of information on waste disposal by environmental health workers. A case study of Minna metropolis, Niger State, Nigeria.

The specific objectives are to determine:

1. the level of awareness by environmental health workers on the use of media channels for disseminating environmental information on waste disposal for hygienic lifestyle in Minna, Nigeria.
2. the various media channels used for disseminating environmental information for effective waste disposal in Minna, Nigeria.

3. how the use of information by environmental health workers would affect the hygienic lifestyle of the populace in Minna, Nigeria.
4. the impact of information dissemination on waste disposal on the health of the populace for hygienic lifestyle in Minna, Nigeria.
5. the constraint of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna, Nigeria.

1.4 Research Questions

The following questions guided the study

1. What is the level of awareness by environmental health workers on the use of media channels for disseminating environmental information on waste disposal for hygienic lifestyle in Minna, Nigeria?
2. What are the various media channels used for disseminating environmental information for effective waste disposal in Minna, Nigeria?
3. What are the effects of the use of information by environmental health workers on the hygienic lifestyle of the populace in Minna, Nigeria?
4. What is the impact of information dissemination on waste disposal on the health of the populace in Minna, Nigeria?
5. What are the constraints of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna, Nigeria?

1.5 Research Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significance.

H₀₁: There is no significant relationship on access to information by environmental health workers on waste disposal for the hygienic lifestyle of the populace of Minna.

H₀₂:

There is no significant relationship on use of information by environmental health workers on waste disposal for the hygienic lifestyle of the populace of Minna.

H₀₃:

There is no significant relationship on awareness of environmental information by environmental health workers on waste disposal for the hygienic lifestyle of the populace of Minna.

H₀₄:

There is no significant composite relationship among: access, use and dissemination of information by environmental health workers and hygienic lifestyle of Minna dwellers.

1.6 Significance of the Study

The findings from this study will be beneficial to information professionals, environmental health workers, waste management authorities, the government and other researchers.

Essentially, for information professionals and environmental health workers it will provide crucial information for future decision making and any other subsequent feasibility study. Establishing a market avenue for recycling company abroad is another objective of this research, generating employment opportunity for Niger inhabitants and at the same time to create conducive and social improvement in Niger state.

This research will educate and analyse the methods to be utilised by Government, and waste management authorities in order to ensure a greener environment in Niger state.

In addition, the area where Niger state need to focus and improve on in order to optimally create sustainability development will also be pointed out and explained in details. Their challenges while they are making efforts to effectively manage waste will also be extracted and analysed.

This research will be emphasising majorly on Niger State in Nigeria. It will focus on approach the inhabitants of Niger State have been well educated on method to effectively dispose their waste and at the same time the knowledge on the significance value of waste they dispose. Furthermore, emphases will be laid on the efficient and effectiveness of the state environmental agency toward educating the citizens on waste disposal and its values. It will also look into the success the state agency has recorded or attained as well as the challenges they are encountering when it comes to effective management of waste materials. It will further check the lapses in the state agency and how it can be managed and re-established. By so doing, emphasis will be laid on waste management system.

1.7 Scope of the Study

The study Access, Use and Dissemination of Information on Waste Disposal by Environmental Health Workers for Hygienic Lifestyle, will cover the communities within Minna, Niger State, Nigeria. Minna, the capital of Niger State in the north central of Nigeria. As at 2009, Minna has an estimated population of 356,446. Minna is an area located on latitude 90 33`N and 90 45`N and longitude 60 34`E and 60 42`E. It is a local Gwari town and the word “Minna” in Gwari means to spread fire. The main agricultural products of the city are cotton, guinea corn, yam and ginger. It is connected to Abuja the Country’s capital by road with a distance 150km. The city also has a small airport. The geological formations present in Minna are basement complex and sedimentary rocks.

Minna experiences a distinct wet and dry season with annual rainfall varying from 1100mm to 1600mm. The rainy season starts from the month of April to October with peak in June and July or August and September in some years. The mean monthly temperature is highest in March at 30.50C and the lowest in August at 25.10C. Fadama soil is the major type of soil in Bosso, this gives room for extensive farming operation in the area. Minna is somewhat zoned for different land use but in most of the zones, mixed uses exist. There are forms of residential, governmental, education, commercial and industrial. There are prominent ridges in the area and these ridges extend to a distance of about 7km, the major rivers that made up the drainage of the rivers, Ekpa, Suka and Gora most these have extensive tributaries that covers most part of the areas and serve as a major source of water supply in Bosso and its environs zones.

Therefore, it is necessary to assess the effective use and dissemination of information on municipal solid waste disposal and its effects on the hygienic lifestyle of Minna dwellers. This research is therefore aimed at looking at the various municipal solid waste disposal systems in some parts of Minna metropolis and also to examine the environmental issues associated with these waste as well as determine the best information channels on dissemination of information and make necessary recommendations on waste disposal and management practices to prevent further deterioration of the environment and the negative effects on the human population in Minna metropolis.

1.8 Operational Definition of Terms

The following terms are defined as used in the context of the study alone.

Environment: the total surroundings of human that support life.

Health: a condition of the body which makes a person to function effectively. It is the absence of sickness or stress of any form.

Public health: the control of all those factors in human's physical environment that exercise or may exercise deleterious effects on their physical fitness, health or survival.

Waste: the leftovers, used products whether liquid or solid having no economic value or demand and which must be disposed or thrown away.

Waste management: the act of maintaining acceptable environmental quality, sound public health and creation of aesthetic value.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

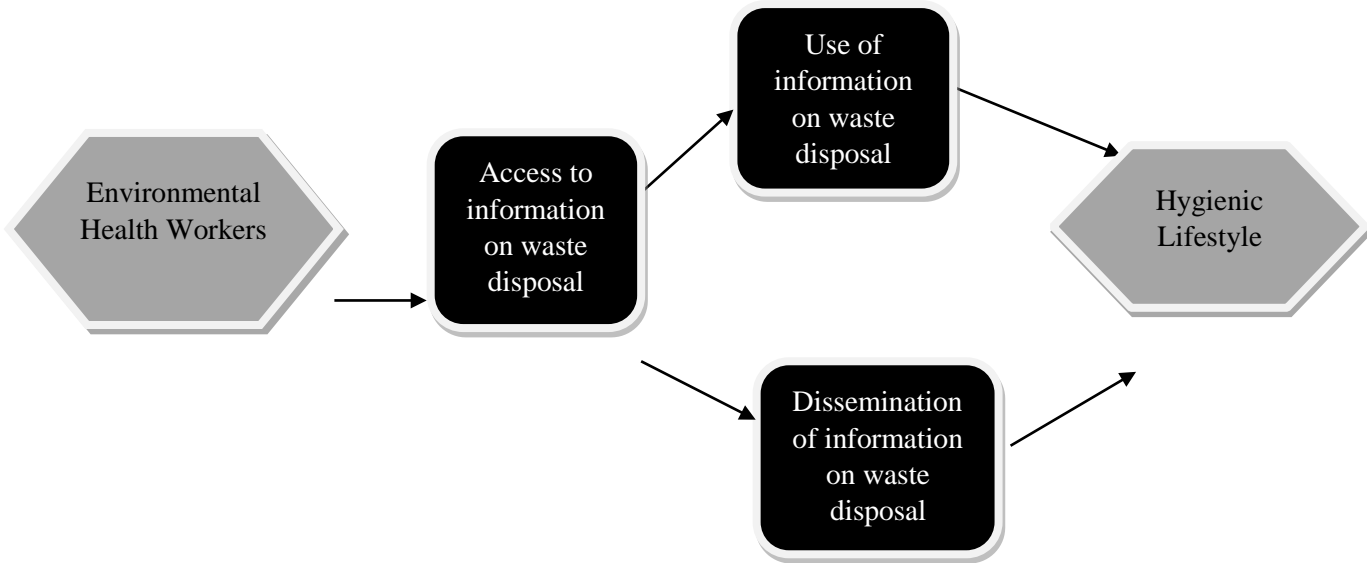


Figure 2.1: Conceptual framework using original author’s construct.

The model (Fig. 1) shows the relationship existing between the various concepts used in this study. Access to information on waste disposal, use of information on waste disposal and dissemination of information on waste disposal are independent variables which environmental health workers will act on to ensure a hygienic lifestyle for the populace. The relationship shows that it is possible for an environmental health worker to have access to information on waste disposal and decides to only use it for personal consumption to better his living without sharing the information with others. The model also shows that an environmental health worker can have access to information relating

to health, use it and equally disseminate this piece of information with colleagues and the populace to improve their standard of living.

One of the greatest environmental challenges facing developing countries is the unhealthy disposal of solid waste which results from human activities of development and survival. It is a problem recognised by all nations at the 1992 Conference on Environment and Development, and regarded as a major barrier in the path towards sustainability of the environment (Ifegbesan, 2009). After the United Nations Conference on Environment and Development held in Rio de Janeiro in January 1992, countries began to formally adopt Environmental Impact Assessment (EIA) policies, undated legislation, strategies, and guidelines that required information dissemination and public consultation on projects for which development permits were required. Sound environmental management of waste was highlighted as a major environmental issue at the Rio Conference which re-affirmed the Declaration of the United Nations

Conference on Human Environment that was adopted in Stockholm in June 1972. Principle 10 of the Rio Declaration states that: Environmental issues are best handled with the participation of all concerned citizens, on a relevant level. On a national basis, each individual should have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States should facilitate and encourage public awareness and participation by making information widely available.

The above declaration laid the basis for the participatory planning of solid waste management (SWM). Poor waste management practices, in particular, the widespread dumping of wastes in bodies of water and uncontrolled dump sites aggravate the problems

of general low sanitation levels across the African continent. Kalantari and Asadi (2010) lament that environmental problem and the accelerating changes in living conditions have become a fundamental part of the world in general and metropolises in particular. In Nigeria, the problem of solid waste management (SWM) has been a concern which has existed for a long time. The management of solid waste is one of the important obligatory functions of the Local Government Areas (LGAs) in the entire country (Longe *et al.*, 2009), and has emerged as one of the greatest challenges facing state and local government environmental protection agencies (Ogwueleka, 2009). Ajayan and Saharsh (2003) observed that lack of financial resources, institutional weakness, improper selection of technology, transportation systems and disposal options, public's apathy towards environmental cleanliness and sanitation have made this service unsatisfactory.

Conceptually, solid wastes as Agbede and Ajaigbe (2009) put it, "are all the wastes arising from human and animal activities that are normally solid and are discarded as useless or unwanted". It is commonly known as garbage, refuse, rubbish or trash. This does not mean that they cannot be recycled and converted into economic value. After all, 'waste is wealth'. Ajayan & Saharsh (2003) described solid waste as non-liquid waste material arising from domestic, trade, commercial, agricultural and industrial activities, and from public services. Waste is a combination of various heterogeneous discarded materials. Municipal solid wastes (MSW), as Ogwueleka (2009) puts, it "are refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (like hospitals), market waste, yard waste and street sweepings". Waste problems affect land, air and water "not to mention its hazards to health and other natural resources of social and economic importance" (Agbede & Ajaigbe, 2009).

Municipal Solid Waste, has been defined as household waste and any other waste collected by a Waste Collection Authority or its agents, including waste from parks, beaches, commercial establishments, offices, industries and fly tipping. Other experts insist that Municipal Solid Waste include all non-air and sewage emissions created within and collected by private as well as public authorities in any municipality from domestic, commercial and industrial (non-hazardous) sources (Loboka *et al.*, 2013). A variety of environmental hazards are associated with the mishandling or mismanagement of refuse.

Solid wastes that are not properly stored, collected, transported and disposed off will lead to short-term as well as long term health risks. In the long term, there may be dangers arising from waste dumps particularly on ground, and then, to the pollution of drinking water sources. Fly breeding occurs as a result of uncovered piles of rotting refuse and the flies may play a role in the transmission of faecal-oral diseases. The mosquito, *Anopheles* will survive in these conditions and may transmit malaria, yellow fever, and other diseases and infections especially during the rains. Rats will also live in and around refuse.

The main source of food for rats and other small rodents is refuse, and in dump yards, they quickly proliferate and spread to neighbouring houses. They may carry and transmit a variety of diseases, including diarrhoea, dysentery, typhoid, cholera and others. Piles of refuse not properly managed present a fire risk. Flammable waste materials when dumped together at dump yards may cause fire when hot ashes are accidentally added to the dumped wastes. Usually, the fire starts with the practice of open burning of refuse. Sometimes this becomes uncontrollable. When the open dumps are fired, toxic gases will be released into the atmosphere. The problems of burning refuse result in loss of potentially valuable recyclable material and the degrading of the land. Burning of materials like polythene, tires, plastics, electronic components and other substances

produces dangerous gases to the atmosphere, thus causing pollution. Badly managed refuse can promote water pollution by rain washing debris out of piles of refuse and into surface water. Ground water pollution may also occur. The smell of refuse is a nuisance and aesthetically displeasing to the environment.

In places where refuse disposal services are lacking, wastes are usually deposited in open street drains and urban waterways. Waste dumped at water channels not only block the running of water but may cause flooding. That is, uncollected refuse obstructs streets and drainage channels. Improper handling of refuse can also cause illness to workers who work in collection and transportation process. Infections of roundworm and whipworm are common among people who work with solid waste disposal activities without proper protective measures.

The existing solid waste management system in Nigeria is very rudimentary, inefficient and unsustainable. Accurate data on the quantities of municipal solid waste generated are not easy to come by (Afun, 2009). Also, informal solid waste collection operations exist in parallel with official agencies in some cities in Nigeria. Informal collectors provide the service for a fee. In most urban areas, stationary container system is adopted for waste collections and the waste containers remain at the points of waste generation.

This method requires the delivery of waste by the residents to a storage container. Proper dump sites and containers are not adequately provided by the appropriate authorities. Even when provided, poor public attitudes of improper disposal and utilisation of these containers as well as lack of self-consciousness of a clean environment constitute one of the greatest problems of solid waste management in Nigeria. Solid wastes generation exceeds collection capacity. Ogwueleka (2009) believes that one to two thirds of the solid waste generation in developing countries is not collected. Also, local agencies do not have

adequate capacity to handle the increasing solid waste mainly due to limited budgets. Solid waste collection efficiency in Nigeria ranged from 5 percent in some semi-urban areas to 50 percent in urban areas (Ogwueleka, 2009).

The poor state of waste management has been attributed to inadequately formulated and poorly implemented environmental policy, among other factors. Basically, the discovery of major toxic waste dumped by an Italian company at Koko town near Warri in Delta State in 1988 led to the establishment of Federal Environmental Protection Agency (FEPA) by Decree No.58 of 1988.

However, in June 1999, the Federal Government of Nigeria created the Ministry of Environment and, as a result, FEPA's function was absorbed by the new ministry (Afun, 2009). Among FEPA's instructions in combating environmental degradation are the Waste Management Regulation of 1999 and Environmental Impact Assessment (EIA) Decree No. 86 of 1992. FEPA policies regulate the collection, treatment and disposal of solid and hazardous wastes for municipal and industrial sources. The EIA has the mandate for any major development project likely to have adverse impact on the environment. Even with the establishment of Ministry of Environment, Environmental Protection Agency and Environmental Impact Assessment in many cities in Nigeria, solid waste is still poorly managed (Adewole, 2009).

2.1.1 The impact of environmental information of waste disposal on hygienic lifestyle

Studies have shown that information has helped to promote environmental behaviour. Relevant information can help individuals to understand the interaction between resources

(natural) and the environment. It is observed that greater knowledge of environmental principles, attitudes and theories of waste reduction through access and use of information can enhance individual's ability to participate in solid waste management. Information is an integral part of environmental management because it is central to every human activity and as such, would be used in coordinating the resources for a 'synergistic' approach to management of the environment.

Therefore, environment information consists of all forms of information to keep the public enlightened about and aware of environmental issues and trends. It is based on this reason that the role of information in solid waste management becomes imperative. These roles are to raise awareness in environmental issues and it can be used to promote responsible environmental behaviour, especially for solid waste management. In addition, it enables government and its agencies to know areas where solid waste management needs serious and urgent attention. In the same vein, Macawile and Sia Su

(2009) believe that a conscious effort through information dissemination is needed to "incorporate the interests of both the community leaders and the public in understanding their roles, relationships and contributions through their perceptions and attitudes as all are recognised as important stakeholders in attaining a sustainable environmentally oriented effort". In essence, communication is one of the vital ways by which people in any given environment could relate. The essence of environment which deals with living together of all organisms in the environment is only possible and realisable through the use of communication.

Information dissemination in this study goes beyond mere sharing of information, but as a way of influencing beliefs, views, perceptions and to induce behavioural or attitudinal change. The public holds the media in high esteem in terms of information and

enlightenment. McQuail (2010) believes that whenever the media exert influence, they also cause change. Information therefore, can be a potent force to influence public perceptions on various issues of life. Alabi (2010) noted that attitudes and predispositions are at work before and during exposure to information, and they in fact largely determine the use of information, how we interpret the contents and the effect which information has upon us. In other words, “messages received from the media affect our thoughts and beliefs formation as well as responses to attitude” (Alabi, 2010).

Information through effective communication can therefore be used to influence people’s dispositions for a friendly environment. Although, mass communication messages may not change existing deep-rooted attitudes but may rather influence it. The ultimate goal is to activate public efforts towards behavioural change in environmental management. Behavioural change for environmental management may sometimes require consistent and systematic applications or activities to achieve desired goals. This may be achieved through public enlightenment campaign by environmental health workers. A campaign is the planning and coordination of series of consistent activities aimed at achieving a central objective. In the same vein, McQuail (2010) defines a campaign as the planned attempt to influence public opinion, behaviour, attitudes and knowledge on behalf of some cause, person, institution or topic, using different media over a specific period of time. Public campaigns are usually directed towards socially approved goals. In this wise, environmental communication campaign entails the adoption of specific steps towards an environmental objective. The essence is to bring behavioural change, and inculcate an environmentally friendly attitude or culture in people.

Environmental campaigns could be pursued using different media like radio and television. Radio, for example, is believed to be the most effective, popular and credible medium for reaching a large and heterogeneous audience. It is relatively cheap, available and accessible. It can be powered by battery, requiring insignificant literacy level to comprehend. Radio remains the most potent and effective environmental communication tool for reaching a vast range of audience in developing nations like Nigeria.

In the same development, television is believed to make the most impact on the audience. This is because of its audio-visual advantage. It leaves a lasting impression in the minds of the audience. Television can reach diverse people simultaneously and provide opportunity for a message to be demonstrated in images or pictures. In a study of inhabitants' perception on domestic waste disposal in Ijebu Ode, Southwest Nigeria, Banjo *et al.* (2009) result showed that radio and television were the most available (93% and 96% respectively), the most easily accessed (70% and 73% respectively) and the most effective sources of environmental information (61% and 64% respectively). Their study showed the effectiveness of the mass media, particularly the radio and television in creating awareness about public health and environmental issues. Radio and television are often associated with their wide geographical coverage and the relatively cheap cost of acquiring and using them in contrast to the print media (Banjo *et al.*, 2009). Both media (radio and television) are effective environmental communication tools which could be used to raise public awareness and consciousness towards environmental concerns with a high degree of effectiveness.

Broadcast media enlightenment campaigns on solid waste management can come in any form of: radio jingles, television commercials (green advertising), main news bulletin, public service announcement, health programmes and so on. It is instructive to know that

the degree to which the broadcast media devote air time to environmental news also affect people's attitudes towards the environment. As it were, heavy dependency and exposure to the media tend to shape people's beliefs and perceptions about various issues of life. Aptly put, the degree of dependency on the media is a key variable that help to explain why audience's beliefs, feelings or behaviours are altered.

In this wise, environmental news is a potent force for responsible environmental behaviour. Individual exposure to a greater amount of environmental news is more likely to show concern with environmental management. Taken from above, much of contemporary environmental studies are predicated on the belief that human and nonhuman welfare are threatened by a growing array of human-induced environmental problems namely pollution, over-population, consumption of non-renewable biodiversity loss, ozone depletion, greenhouse warming and others. It is universally agreed that human behaviour has been and will continue to be, of central importance in identifying, understanding and dealing with such problems. Therefore, it can be taken that environmental behaviour is affected by the level of public awareness created by the mass media on environmental issues.

Most researchers only focus on the best practices to adopt for proper waste disposal without adequately looking at the perspective of proper information dissemination on the way to better practice effective waste disposal. This is the gap this research intends to fill. This research therefore will address the access, use and dissemination of information on waste disposal by environmental health workers for hygienic lifestyle of the populace.

2.1.2 Municipal solid waste management in Nigeria Demographic

and socio-economic background:

Nigeria is located in the West African sub-region on geographic co-ordinates 10° 00' North of the Equator and 8° 00' East of the Greenwich Meridian. It has a total land area of 910, 768 km². Administratively, Nigeria is divided into 36 states excluding the Federal Capital Territory, Abuja (Adama, 2007). Nigeria exemplifies the chronic solid waste management problems prevalent in most SSA countries, as it grapples with the twin challenges of waste and population growing at rates that are currently unsustainable.

A primary consequence of this economic dynamic is that often certain proportions of the urban population find themselves unable to afford basic utilities such as water and sanitation. As a result, they resort to self-help settling at the fringes of cities in informal settlements often referred to as slums. Such settlements are common features of the urban landscape in Sub-Saharan Africa (World Bank, 2000; Jibril, 2006).

Nigeria is the most populous country in Africa. Over the past 50 years, it has had the third highest urban growth rate in the world at 5.51% per annum (Walling *et al.*, 2004). Adult literacy is higher than the average in developing countries at about 45%, comparing favourably with other developing nations such as India (57%) and Southeast Asian countries (56%) according to World Development Indicators (WDI) published by the World Bank (World Bank, 2000). Though statistics from the central bank of Nigeria in 2006 put the country's GDP at 176.7 billion US Dollars, growing at an average 8.3%, over 70% of the population still live on less than \$1 per day (World Bank, 2000). The top 2% of the population earned as much income as the bottom 55% in 2000, up from 12% in 1970 (Aboyade, 2004). It has been argued that this lop-sided economic performance is the root cause of the urban slum phenomena in Nigeria as is the case in many other developing nations.

2.1.3 Awareness and attitude towards solid waste management

Few studies exist on public awareness of solid waste in Nigeria. But there are ample evidences of individual or group awareness and attitude towards waste management (Ifegbesan 2009, Macawile & Sia Su, 2009). Ifegbesan (2009) sees public awareness and attitude towards waste management as critical in the effort to respond to waste management challenge. In a study of secondary school students' understanding and practices of waste management in Ogun State, Ifegbesan (2009) found that students possessed high environmental awareness and knowledge of waste problem but have low attitudes towards waste management. Thus, the concepts of awareness and attitude have been associated with environmental behaviour. McQuail (2010) defines attitudes as underlying dispositions or mental sets towards some objects that are generally measured in terms of verbal response to evaluative statement. This implies that attitudes are primarily valuations and attributes made by individuals that are determined by more fundamental and enduring personal circumstances. Attitude towards a concept can be defined as an individual or group of individuals, general feeling of favourableness and unfavourableness for that concept (Ifegbesan, 2009). Many studies on attitudes have found a positive and often significant relationship between the two concepts (awareness and attitude). In a study of effectiveness of education strategy in raising levels of knowledge and attitudes towards nature conservation, Olson, Bowman and Roth (Ifegbesan, 2009) found a positive relationship between scores on the knowledge test and scores on the attitude test for all concepts measured. The programme was successful in raising both the levels of knowledge and improving attitudes towards environmental management.

This implies that there is a positive knowledge and attitudes towards environmental behaviour. In the same vein, many studies in the last two decades on socio-demographic

variables and environmental awareness have helped in understanding people's views and their thoughts about the environment. They have attempted to predict environmental awareness and attitudes of people based on their socio-demographic characteristics. For instance, Raudsepp (2001) reported that age, education and gender have shown strong and consistent relations with environmentalism. He believes that these factors affect environmental attitudes. Older people with their exposure and experience show more concern for the environment than younger ones with less exposure and experience.

Also, Longe *et al.* (2009) suggest that gender difference, age, and level of education could influence people's perception on solid waste management. Age is expected to play a significant role as maturity could affect one's level of awareness on environmental health and sanitation. Matured adults whose reasoning level as regard household waste and management are expected to be high and thus facilitate public involvement in solid waste management process. The influence of educational attainments could as well be an important factor that could influence people's perception on waste management. Sida, (2012) have attempted to ascertain the correlation of environmental knowledge with that of environmental quality awareness and concern. They found a positive correlation. Their research also explored the influence of education, income, age and gender on public awareness and attitude towards environmental quality issues. The average monthly income of respondents has also been considered as an important variable that could influence people's perception and attitude on solid waste management system (Longe *et al.*, 2009). Sociodemographic application to environmental studies has shown in these researches that the level of education, age and income affect environmental awareness and attitude towards the environment.

In all, it is obvious that there is a paradigm shift from technical/mechanical solutions of environmental problems or management to modifications of human behavioural patterns through developing responsible environmental behaviour (REB). Consistent with this, Kalantari and Asadi (2010) had observed that environmental attitudes and ecological behaviour and their environmental consequences have been investigated in developing and developed countries during the last few decades, moving from technical and economic problems to social problems.

Environmental awareness has been seen as a combination of motivation, knowledge and skills (Olgyaiová *et al.*, 2008). This knowledge has to be supported by will, information and abilities to behave in an environmentally friendly way. When the environmental awareness of an individual is combined with external stimulating physical and practical conditions, the result can be a desire and will to make environmental friendly choices. Environmental awareness starts to develop when people notice that unfavourable or threatening changes in the surroundings emerge, and the effect of which cannot be corrected easily. The realisation that environmental damages need a long time to recover stimulates the arising environmental awareness further. Olgyaiová *et al.* (2008) believed that motivation is necessary to increase the level of knowledge and skills in health matters. Even though people and organisations think that the state of the environment should be improved, they do not see themselves as active actors in this process. They consider that somebody else, for instance scientists, environmental nongovernmental organisations or international organisations should focus on, or solve environmental problems.

Motivation as Olgyaiová *et al.* (2008) defined it is the driving force that causes an individual to act in order to achieve a specific goal. Motivation is usually perceived as a positive force, the desire to achieve a goal. The driving force of the society changes from

the growing production and economy towards a steady sustainable welfare. Raising environmental awareness supports the development towards sustainability. Media enlightenment on waste management can motivate the public to achieve a common goal of environmental friendliness. Environmental awareness is affected by external stimulus (motivation, knowledge and skill). The right motivation, for example, brings about the desire and will to make environmentally friendly choices when given opportunities to act. Improved state of the environment is based on environmentally friendly actions and choices taken.

Environmental attitudes are recognised as an indicator and component of environmental behaviour (Kalantari & Asadi, 2010). Many theoretical and empirical approaches on attitude towards environmental management have been researched (Sida, 2012). Most of the studies related to this issue have been conducted since 1970 onwards when conceptualisation of environmental attitudes as a scientific research concept gained closer attention by researchers. Environmental concern represents values of respondents about the relationship between the environment and society and the relationship between individual and the environment and also perceptions of respondents about specific environmental problems.

Environmental commitment represents values of respondents about commitment issues for better environmental quality. The environmental commitment issues might have willingness to pay higher taxes or costs for better environmental protection and be willing to reduce living standards to achieve a higher environmental quality. The above indicated that most approaches identify environmental attitude and behaviour as multidimensional phenomena. These studies, however, reveal some factors that are consistently related to environmental behaviour over time and across studies. Several studies have shown that a

cognitive hierarchical framework consisting of basic values, general beliefs, specific attitudes, and behaviour provide a suitable basis for understanding environmentalism (Kalantari & Asadi, 2010). Although the effect of knowledge is not conclusive, there have been several studies suggesting that knowledge plays an important role in enhancing the environmental attitude and behaviour relationship by providing individuals with the ability to better formulate alternative views and present arguments to support their beliefs and behaviours.

In the same vein, Olgyaiová *et al.* (2008) argued that environmentally responsible behaviour may be characterised as a multidimensional and fairly complex phenomenon. It is both morally and intellectually demanding. This kind of behaviour can be encouraged by various motives, including self-interest as well as selfless ones. Selfinterested motives usually refer to various side payments, selective financial incentives, sanctions, punishments, laws and regulations etc., while selfless motives include, ecologically responsible behaviour refer to the integration of the long-term collective utility into the personal utility function of the individual. The point here is on environmental responsible behaviour which is considered to have a long-term solution to environmental problems.

However, the element of awareness is not sufficient without knowledge, understanding, the change of attitude and physically participation. According to Hassan *et al.* (2009), no matter how much knowledge that has been gained by someone, still, it cannot be assumed as perfect as the individual does not apply the knowledge within his life to differentiate between the right and wrong. For instance, by looking at the context of environmental issues, there are lots of individuals that gain knowledge and awareness regarding the environment still they have irresponsible attitude towards their surroundings. They fail to interpret the environmental awareness as mutual commitment (Hassan *et al.*, 2009). Some

aspects of environmental awareness have been discussed from the view of religion and epistemology (Hassan *et al.*, 2009). For instance, the environmental awareness among the Christians can be viewed and related with the belief of Christianity. It not only focuses on the aspect of intellect, but also the need for better and healthy living. It states that beliefs and morals cannot be separated as both aspects are based on the Bible, which include the quality of moral and human behaviour. For instance, the axiology of Christianity states that the moralistic individual is the balanced individual from the aspect of manner and act, such as the awareness towards environment as the person is able to manage his emotion and action from spoiling the nature. Cleanliness is next to godliness.

Based on the aspect of epistemology, knowledge is a process of discovering a thing and new phenomena, and the process should relate with the physical object that exist within the actual life, which should be examined through the human senses. Epistemology is a philosophical science which deals with knowledge and truth. It tells us what we can know and the justification of knowledge. This philosophy presumes that knowledge can be acquired from the relationship between human and nature, as both elements are interconnected. Knowledge about the environment justifies why we should protect the environment.

Perceptions of the bond between people and places (environment) have also been studied by Smaldone (2007). He used the term 'place attainment' or sense of place (SOP) to explain one's emotional or affective ties to a place. This was generally thought to be the result of a long-term connection with a certain environment. As it were, one can have an emotional response (thoughts, feelings, memories and interpretations) towards his environment but the degree of liking it depends on his behaviour to the environment. Environmental psychologist explored how one's perception or attitude to the environment

or 'place identity' as he called it, affects his behaviour to the same environment. The analogy is that; with one's biological, social, psychological and cultural experience with the environment, one's attitudes, values, feelings, beliefs and perceptions of the environment are formed. That is, by reason of perceptions, a person's environmental behaviour is formed.

Macawile and Sia Su (2009) study examined local government officials' perceptions and attitudes towards their community's solid waste management and detect whether gender differences exist on the perceptions and attitudes of local government officials.

To them, men and women or local government officials' perceptions and attitudes towards solid waste management are not significantly different from each other. Men and women have equal roles, responsibilities, perceptions and attitudes towards their community's solid waste management. Their study revealed that respondents recognised that attaining sustainable waste management is a joint responsibility of the government and its community members. A study has shown the connection between waste management processes and climate change (Enete, 2010). Climate change is a serious international environmental concern and the subject of much research.

Moreover, in international scientific circles, a consensus is growing that the build-up of Carbon dioxide (CO₂) and other Green House Gases(GHGs) in the atmosphere will lead to major environmental changes such as (1) rising sea levels that may flood coastal and river delta communities; (2) shrinking mountain glaciers and reduce snow cover that may diminish fresh water resources; (3) the spread of infectious diseases and increased heat-related mortality;(4) possible loss in biological diversity and other impacts on ecosystems; and (5) agricultural shifts such as impacts on crop yields and productivity (Enete, 2010). Climate change could result in changes in temperatures, cloud cover, rainfall patterns,

wind speeds, and storms. All these factors could impact future waste management facilities' development and operation. The time scales for climate change and waste management are similar. For instance, landfill sites can be operational for decades and still remain active for decades following their closure. Agarwal (2005) believes that solid waste is threat to the climate if it remains in one place for a relatively longer period without management. There is, therefore, a need to consider potential changes in waste management over significant timescales and respond appropriately.

In most developed and developing countries with increasing population, prosperity and urbanization, it remains a major challenge for municipalities to collect, recycle, treat and dispose of increasing quantities of solid waste, especially in a changing climate. Before a material or product becomes a solid waste, it goes through a long cycle that involves removing and processing raw materials, manufacturing the product, transporting the materials and products to markets, and using energy to transform the product. Each of these activities has the potential to generate greenhouse gas emissions through one or more of the following means: energy consumption, methane emissions, carbon storage. A cornerstone of sustainable development is the establishment of affordable, effective and truly sustainable waste management practices in developing countries. It must be further emphasised that multiple public health, safety and environmental co-benefits accrue from effective waste management practices which concurrently reduce GHG emissions and improve the quality of life, promote public health, prevent water and soil contamination, conserve natural resources and provide renewable energy benefits (Enete, 2010).

2.1.4 Impact of waste disposal on the environment

Environmental concern or consciousness is believed to be one of the first steps towards environmental management. It incorporates multiple dimensions in the sense that attitude reflects different aspects regarding humans and nature, such as awareness of ecological problems, support for environmental regulation, green movement, and exhibition of eco-conscious behaviour (Bao, 2009). Fundamentally, environmental concern has to do with one's attitude towards the environment or the relationship between humans and the ecosystem. Bao (2009) views environmental concern as a proactive attitude towards the ecosystem and one's behaviour regarding environmental preservation and protection. Research on environmental concern has been examined. For instance, previous results showed that those who tended to be environmental conscious were likely to be young and well educated. Later, evidence started to imply that demographic variables alone may not be sufficient in explaining environmental consciousness and eco-friendly behaviour but also the willingness to adopt a responsible environmental behaviour.

Invariably, environmental consciousness is the first step towards solid waste management. There also exists research asserting that environmental consciousness is necessary and essential to pro-environmental behavioural changes (Haytko & Matuliich, 2009). A study has suggested that personal attachment to the environment can motivate pro-environmental behaviours, ranging from environmental activism, such as ecological relevant petition for pro-environmental laws and regulations, membership in antipollution organisations, to energy conservation and responsible use of resources (Bao, 2009); the late Ken Saro-Wiwa would ever be remembered as Nigeria's foremost environmentalist who was martyred for environmental course). Environmental concern is likely to have a bearing on an individual's propensity to behave in favour of the environment like solid waste management.



Figure 2.2: A Street covered with solid waste along Minna metropolis

Environmental concern has been related to product purchase decision by consumers. In a study about environmentally-responsible consumerism, Post (2007) found that general concern for the environment, in addition to social factors and more specific concerns about the effect of the product on human and animal life might be related to purchase decisions and other waste reduction behaviours. He believed that environmental concern and attitudes towards the environment are still significant in relation to source reduction, specifically in relation to environmentally-responsible consumerism. Post (2007) investigated whether general environmental attitudes and concern are strong predictors of behaviour when the amount of effort required for the behaviour is high.

The research showed that environmental concern predicted recycling behaviour only when the amount of effort required for action was high. Instead, behaviours have proven to be more significantly influenced by specific attitudes about recycling, like knowledge of waste reduction methods, access to programmes, time, effort, and convenience. Understanding how environmental concern is related to ecologically conscious consumption would help, for example, marketers develop strategies to expand their reach

into the green consumer. Hence, the need to look into green advertising and responsible environmental consumer behaviour for waste management is important.

2.1.5 Public health implications of ineffective management of solid waste The adoption of open dumpsites as means of managing solid waste in many urban cities especially in the developing countries had resulted in indiscriminate disposal of solid waste in such cities. The fact that these dump sites are not properly controlled makes them major health threats to people living near those areas (Sankoh *et al.*, 2013). The United Nations Environment Program Agency (UNEP) (2006) stated that wastes that are not managed properly, especially solid wastes from households and communities constitute a serious health hazard which can lead to the spread of diseases. The report further stated that unattended wastes lying around attract flies, rats, and other creatures that, in turn spread diseases. Normally, it is the wet waste that decomposes and releases a bad odour. The bad odour affects the people settled next to the dumpsite, which shows that the dumpsites have serious effects to people settled around or next to them. The groups that are at risk following the unscientific disposal of solid waste include; the population in areas where there is no proper waste disposal method, especially the preschool children, waste workers and workers in facilities producing toxic and infectious materials (Sankoh *et al.*, 2013).

Other high-risk groups include population living close to the waste dump (Aatamila *et al.*, 2010) as well as workers engaged in management of wastes. When those who directly work on the waste dumpsites and landfills are not provided with sufficient protective materials, they are exposed to health hazards. The incidence of occupational accidents in waste collection workers has been found to be higher than the general workforce. This is as a result of the fact that those categories of workers come in direct contact with the

waste and are more likely to be affected by contaminated waste than other category of workers who are not engaged in such responsibilities. Although, results that provide links between exposure to gases from indiscriminate disposal of waste to mortality and morbidity have been inconsistent between cities and studies, it is certain that there are risks of health hazards from such exposure (Zanobetti *et al.*, 2000). Studies have also shown that direct handling of solid waste can lead to contracting different types of infectious and chronic diseases by unsuspecting residents with the waste management workers directly involved in the collection of these wastes and dump site scavengers being the most vulnerable.



Figure 2.3: A drainage blocked with solid wastes as a result of indiscriminate waste disposal

A study conducted by Yongsu *et al.* (2008) showed that exposure to hazardous waste in dumpsites can affect human health, and most often, it is the children who are the most vulnerable to these pollutants. Direct exposure to these harmful substances at the open dump sites can lead to diseases through chemical exposure to unsuspecting members of the public. Open dumpsites are a major problem to the environment especially to the air being inhaled. Dumpsites emit obnoxious odours and smoke that cause illness to people living in, around, or closer to them. According to Kola-Olusanya, & Fagbohun (2011),

there are other health implications of improper management of solid waste which includes contracting water-borne diseases, such as typhoid, cholera, meningitis, polio, hepatitis. These are diseases that result from water that has been contaminated by human, animal or other form of wastes.

The poorly managed dumpsites can also serve as breeding ground for such vectors like mosquitoes, tsetse flies and others that infect humans with malaria, yellow fever, dengue fever, sleeping sickness and some other related diseases. Adewole (2009) hold similar view on the vectors and possible diseases that could be contracted through exposure as a result of improper management of solid waste: flies which carry germs on their bodies and legs and also excrete them; mosquitoes breed in stagnant water in blocked drains in favourable location in cans, tyres etc. that collects rain water; Rats: rat's spreads typhoid, salmonella, leptospirosis and other diseases they cause injuries by biting and spoil millions of tons of food. The refuse workers also face some hazards which includes: parasite infection and infected cuts resulting from skin contact with refuse, other includes hazards on disposal sites; are injuries from glass, razor blades, syringes, tissue damage or infection through respiration, ingestion or skin contact.

There are certain volatile compounds (example are ammonia, hydrogen sulphide and similar derivatives, acids of lower molecular weight, esters and other detectable oxides and oxygen) that are found in industrial solid wastes and these are very dangerous as they are hazardous components. Domestic wastes which can come from cattle farm house and agro farmhouse wastes contribute gases similar to that of biogas and are also dangerous.

Open dumpsite approach as solid waste disposal method is a primitive stage of solid waste management in many parts of the world. It is one of the most poorly rendered services by municipal authorities in developing countries as the systems applied are unscientific,

outdated and in- efficient. Solid waste disposal sites are found both within and on the outskirts of developing urban cities. With increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household (Foday *et al.*, 2013).

This waste is ultimately thrown into municipal disposal sites and due to poor and ineffective management, the dumpsites turn to sources of environmental and health hazards to people living in the vicinity of such dumps. One of the main aspects of concern is the pollution caused to the earth; be it land, air and water. According to Nguyen *et al.* (2011) many cities in developing countries face serious environmental degradation and health risks due to the weakly developed municipal solid waste management system. Several studies have been conducted in order to examine the health and environmental effects arising from waste dumps. Such studies showed that a link exists between the two (Aatamila *et al.*, 2010; Nwanta & Ezenduka, 2010; and Yongsiet *et al.*, 2008). The conclusion from this and other studies has led to an increasing interest of researchers in the study relating to environmental pollution as well as its effects on plants and animals.

Few of these studies examined the environmental and health implications of solid waste disposal to people living in close proximity of wastes dumpsites (Nabegu, 2010). The ever-increasing consumption of resources results in huge amounts of solid wastes from industrial and domestic activities, which pose significant threats to human health (Foday *et al.*, 2013). However, the ills of inappropriately disposed municipal solid wastes are quite numerous to be mentioned. Health deterioration, accidents, flood occurrences, and environmental pressures are just a few of the negative effects. In many developing countries, solid waste disposal sites are found on the outskirts of urban areas. These areas

become children's sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents. They, in turn, are disease transmitters that affect population's health, which has its organic defenses in a formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic, and several other kinds of infectious diseases (Foday *et al.*, 2013; Salam, 2010).

Open dumpsites in developing urban cities involve indiscriminate disposal of waste. They are uncontrolled and therefore pose major health threats which affect the landscape of urban cities (Sood, 2004). The UNEPA (2006) stated that wastes that are not managed properly, especially solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases.

The report further stated that unattended wastes lying around attract flies, rats, and other creatures that, in turn, spread diseases. Normally, it is the wet waste that decomposes and releases a bad odour. The bad odour affects the people settled next to the dumpsite, which shows that the dumpsites have serious effects to people settled around or next to them.



Figure 2.4. Transporting Waste from a dumpsite by a Solid Waste Management Vehicle

The group at risk from this un- scientific disposal of solid waste includes-the population in areas where there is no proper waste disposal method, especially the pre-school children, waste workers and workers in facilities producing toxic and infectious materials.

Other high-risk group includes population living close to the waste dump

(Aatamila *et al.*, 2010; Foday *et al.*, 2013).

In particular, organic domestic waste poses a serious threat, since they ferment creating conditions favourable to the survival and growth of microbial pathogens. Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and rag pickers being the most vulnerable (Foday *et al.*, 2013; Nwanta & Ezenduka, 2010). Studies conducted by Yongsiet *al.* (2008) show that exposure to hazardous waste in dumpsites can affect human health, children being the most vulnerable to these pollutants. Direct exposure can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Rushton (2003) in his studies to establish a connection between health and hazardous waste showed that waste from agriculture and industries can also cause serious health risks.

Other than this, co-disposal of industrial waste with municipal waste can expose people to chemical and radioactive hazards. Health care waste and other medical waste disposed in dumpsites, mixed with domestic waste, increasing the risk of infection with Hepatitis B and HIV, and other related diseases (World Bank, 2005). Open dumpsites are a major problem to the environment especially to the air that we inhale. Dumpsites emit obnoxious odours and smoke that cause illness to people living in, around, or closer to them. According to Medina (2002), pollution, a major environmental effect of dumpsites, is not

directly transferred from land to people, except in the case of dusts and direct contact with toxic materials. Pollutants deposited on land usually enter the human body through the medium of contaminated crops, animals, food products, or water. Also, the dumpsite has smelly and unsightly conditions. These conditions are worse in the summer because of extreme temperatures, which speed up the rate of bacterial action on biodegradable organic material. Disposal sites can also create health hazards for the neighbourhood (Boardi & Kuitunen, 2005; Fodayet *et al.*, 2013). Gouveia and Ruscitto (2009) highlighted that in a number of health surveys a wide range of health problems, including respiratory systems, irritation of the skin, eyes and nose, gastrointestinal problems, psychological disorders, and allergies, have been discovered. In addition, dumpsites closer to residential areas are always feeding places for dogs and cats. These pets, together with rodents, carry diseases with them to nearby homesteads.

2.1.6 Challenges of solid waste disposal in Nigeria

It is widely accepted that the management of solid waste is a global problem. This problem is even more pronounced in developing countries such as Nigeria where solid waste management is a major concern. Solid waste constitutes a major problem in most developing countries. Adeyemi *et al.* (2001) added that waste management is one of the most intractable problems facing city administrators and environmental agencies. Ogwueleka (2009) reported that solid waste management is by far one of the greatest challenges facing environmental bodies in the country. As a result of the management challenges, Adefemi and Awokunmi (2009) reported a breakdown of law and order in relation to waste management. They observed that urban centres are experiencing an increased rate of environmental deterioration as a result of indiscriminate dumping of solid waste. Some of these challenges are listed below:

a. Inadequate Environmental Policies and Legislation

There is a loop hole in the government policies on solid waste management that, although the public are urged to partake in the monthly exercise to clean up the city, the efforts of the residence have not been complemented through the provision of disposal sites. This problem persists throughout the country. For example, Nzeadibe and Anyadike (2012) reported that no articulate piece of legislation deals with solid waste management in the city of Aba. They argued that due to weak institutional framework and enforcement of policies Solid waste management is not considered a priority by the state government (Ayotamuno & Gobo, 2004). Ezeah and Robert (2014) noted that the legal framework on waste management is weak. Their view is that the waste policies in place do not have strategies for realisation. Hence, they suggested a review of the legislative aspects of solid waste management in other to work towards achieving the objectives of waste hierarchy. In addition, they suggested a management approach which should incorporate re-use and recycling, composting and energy generation and waste prevention.

In some instances, where good policies are in place, their implementation remains a problem. For example, environmental impact assessments are meant to be tendered during the planning of a project before they can be approved. However, this regulation is often ignored. Adewole (2009) criticised the enforcement and implementation of environmental laws in Nigeria. He argues that, generally the enforcement of environmental laws in the country has been a source of concern. He added that the management and regulation of environmental laws have had very little success. His view is that some of the enforcement problems in Nigeria have political, social and economic undertones. Similarly, Imam *et al.* (2008) argues that for there to be sustainability in waste management, proper policy and planning in addition to an aggressive enforcement of waste management legislation must be implemented.

In industrialised countries, the main role of the state government in waste management is to control the management system, while the waste management service is left to the local government. They cited the mode of operation in Britain where residence pays a monthly fee to the council to enable good service delivery. However, in Nigeria, the inability of the municipal government to perform this duty effectively. Another major barrier in terms of solid waste management policies and legislation is the lack of continuity and implementation of government policies. To this end, laws should be developed and implemented to reduce at source (Kofoworola, 2007; Solomon, 2009).

Similarly, Ezeah and Roberts (2014) reported that political interference in Abuja results in instability in waste governance and lack of continuity in policies. They argue that policies are often set aside due to changes in administration of waste management bodies.

It is therefore clear that the current policies and waste management legislations in place are not sustainable. Hence, Adewole (2009) in order to achieve a successful waste management, laws must be formulated to rid the system of ambiguity and avoid overlap of environmental laws.

b. Low Level of Environmental Awareness and Enlightened Public

One of the most important factors in solid waste management is the cooperation of the public. In Nigeria the level of environmental awareness is low. Rahji and Oloruntoba (2009) argue that there is a need for government to engage in environmental campaign in order to enlighten the public on best environmental practice. Rahji and Oloruntoba (2009) suggested that increasing the awareness of the people may have a positive impact on their attitude towards the environment. Imam et al. (2008) pointed out that there is a wide spread lack of environmental awareness and concern on environmental issues. Nabegu (2010) observed that, in Kano, wastes were dumped indiscriminately on the streets and in

public places and water bodies. His study shows that householders are only interested in their immediate vicinity. Only 11% of the people interviewed as part of the study express concern for environmentally sound and safe waste disposal.

Imam *et al.* (2008) concluded that the level of awareness and the attitude of the people can greatly affect solid waste management process. They observed that the level of awareness can impact on domestic waste storage, segregation, littering and fly tipping, recycling, collection frequency among others. Furthermore, Nabegu (2010) pointed out that the level of environmental awareness will influence the effectiveness and sustainability of municipal waste management system.

Furthermore, in his study he explains that improvements can be observed if the public is carried along during the planning and implementation of solid waste management programs. He suggests that community leaders should be engaged in the policy making process. He reckons that successful integration of the people may improve cooperation.

Adewole (2009) reported that the negative waste disposal habit of most people in Lagos is fuelled by ignorance and poverty. He added that the manner in which people discharge garbage into drains or highways seems to suggest that Nigerians are permanently accustomed to dirt. Kofoworola (2007) suggested that government should use all media resources available to them to enlighten the people on the need to dispose their wastes at designated drop off points. He pointed out that indiscriminate dumping should be penalised. He added that educational programs should be aimed at developing skills for the prevention of environmental degradation. He added that school curricula should also ensure proper environmental habits.

However, Nabegu (2010) argues that it is not enough to enlighten the public; his view is that efforts to build awareness should be backed up by improvement in waste collection services. He suggests that programs should be geared towards encouraging a reuse and recycle. He added that the impact of not recycling on the environment, economy and health should be explained properly.

c. Poor Funding

To a large extent inadequate funding has been identified by several researchers as one of the most predominant factors affecting solid waste management in Nigeria, (Ayotamuno & Gobo, 2004; Ezeah & Roberts, 2014; Izugbara & Umoh, 2004; Ogu, 2000; Ogwueleka, 2009). It has been suggested that the financial strength of environmental agencies in the country has not been able to parallel the rate at which solid waste is being generated. Ogwueleka (2009) argues that environmental agencies do not have the capacity to perform their duties effectively due to limited budgets. He suggested that the low morale among waste management agencies personnel resulting from poor remuneration, affect solid waste management. In Port Harcourt for instance, like most states in the country, the state government is the sole financier of solid waste management (Ayotamuno & Gobo, 2004). They argued that this system of funding is not sustainable. Hence, Imam et al. (2008) suggested that some form of user charge might help reduce the burden of funding on the government.

A study of waste management in Benin (Ogu, 2000), Nigeria showed that waste management is capital intensive. The study added that despite the financial implication of waste management, there was no concrete plan being made for the recovery of some of the cost from residence. This was attributed to the fact that people are not used to paying for municipal waste management. Furthermore, he explains that as much as 30% of the

locally generated revenue by the Benin local council is spent on solid waste management. He suggested that at least 5% of the country's revenue should be earmarked for solid waste management. In addition, he advised that a fee should be charged for the service. However, such fees should take the low level of income into consideration.

Similarly, Afon and Okewole (2007) noted that solid waste management is not regarded as important in the scheme of things by the three tiers of government in the country. Hence, there are some occasional long periods of financial neglect of the solid waste management agencies. Moreover, Ezeah and Roberts (2014) argues that since waste management agencies are not involved in budgetary allocations. Waste management departments are overlooked and underfunded. Hence, it is difficult them to employ and retain experts in waste management.

Ezeah and Roberts (2014) pointed out that as a result of shortage of funds waste management agencies are unable to purchase equipment needed for efficient service delivery. The low level of funding seriously hinders the operations of the waste management agencies. He commented that collection operations are sometimes cancelled or delayed due to lack of fuel for collection vehicles. Furthermore, Ezeah and Roberts (2014) criticised the poor funding of waste management bodies. They observed that shortage of funds often leads the agencies to purchase old/used machineries from Europe.

d. Inappropriate Technology and Inadequate Facilities

From the literature it is clear that, in Nigeria, local conditions are not taken into consideration before the adoption of a waste management strategy. Ogwueleka (2009) revealed that irrespective of the local conditions most cities in Nigeria adopt open dumping or uncontrolled landfills as their disposal route. This may be attributed to the fact that in most cases state environmental bodies are headed by politicians and their

associates. The management system in place is usually haphazard since the people in charge have very little or no training on solid waste management.

A good example of this, was illustrated by a study (Leton & Omotosho, 2004) which found that, although the principle of land filling is widely used in most open dumps across Nigerian cities, the geologic assessment conducted in the course of the study revealed that open dumps and land filling are not suitable for some states in The Niger Delta. This is particularly true in Bayelsa state due to the fact that the area is overwhelmed with water. That is, highly waterlogged all year round. The same study suggested that Yenagoa and Bayelsa state as a whole should adopt alternative disposal or treatment method rather than landfill.

The challenges faced by solid waste management agencies in Nigeria differs significantly from those in most industrialised nations mainly in terms of the waste composition, volume of waste, the economic conditions, area of collection coverage, density and politics. Solid wastes in Nigeria are more corrosive, weighty and are saturated with water than those in industrialised nations (Ogwueleka, 2009). Hence, a different solid waste management approach is required. For example, Imam et al. (2008) argues that since the waste composition in Abuja shows that a large percentage of the waste generated are organic in nature, compaction trucks may not be appropriate. Yet about half of the collection vehicles owned by the state solid waste management agency are compaction trucks. Furthermore, Nabegu, (2010) reveals that the compaction trucks used in developed countries achieve just a little compression rate in Nigeria, due to the high density of solid waste. The study further revealed that compactor trucks will not be effective in some Nigerian cities.

Similarly, Ezeah and Roberts (2014) observed that some of the old solid waste collection vehicles brought into the country from developed countries are quickly abandoned due to unavailability of spare parts. It was also concluded that equipment that cannot be serviced or maintained locally will amount to a waste of resources in the long term. Solomon (2009) observed that the incineration plants in Lagos are not currently operational. Ogwueleka (2009) suggest that incineration plants are an expensive waste management technology. His view is that their operation requires a proper disposal for their residual ash and an efficient monitoring of gaseous emission. Solomon (2009) added that incineration of waste will achieve a better result in countries with less than 20% water content in their waste. He observed that the water contents of solid waste in Lagos are about 30-40% liquid. Hence, these incinerators were never used. Some of them were decommissioned while one was converted to a recreational facility.

Hence, it is fairly obvious that incineration plants for Nigerian cities as the heavy moisture contents in the waste will make combustion difficult (Ogwueleka, 2009). He suggested that in order to achieve a sustainable level of solid waste management, institutional, political, social, financial, economic and technical aspect of solid waste management should be studied.

e. Politics and Corruption

It has been observed by Ezeah and Roberts (2014) that the political class regularly interfere with solid waste management in Abuja, particularly in the area of appointments of managers to waste management agencies. Officials tasked with enforcing environmental laws can always be bribed and prevent people from taking environmental laws seriously. Adewole (2009) also argued that the inability of previous Lagos state

waste management authority to deliver a sustainable waste management service may be due to corruption. He stated that waste management officials are known to have demanded money before collecting waste from markets. He added that, in some other cases, informal waste operators have been asked for bribes before they can dispose of their waste on the dump sites thus leading to illegal dumping.

f. Unplanned Developments and Population Increase

This is perhaps one of the greatest challenges facing solid waste management in the country. Ogbazi, (2013) concluded that urban planning has failed in Nigeria due to several factors such as weak policies and laws, designs that are similar and based on foreign cultures. Hence, it was concluded that this lack of planning and adequate development makes solid waste collection a difficult task. He observed that this led to settlements without street planning and accessible roads. He argues that overregulation on the part of the government in allocating cheap land to prospective developers give rise to illegal settlements. He also observed that only about 20-40% of developments have government approvals. He went on to add that although there is a law on urban and regional planning, efforts have not been made to implement the law by the government agencies responsible for the implementation.

The findings of a survey in Kano (Nabegu, 2010) reveals that about 69% of respondents believes that only a small fraction of the state has access to waste collection service. The survey noted that this is mainly due to the inaccessibility of most parts of the city. This reveals that this haphazard planning by the government result in the type of development observed in Kano where residential areas are inaccessible to waste management agencies. He added that the increase in informal settlements is mainly due to the fact that the informal sector has been at the forefront of urban housing. Similarly,

Ayotamuno and Gobo (2004) pointed out that as the neighbouring villages around Port Harcourt began to develop with little or no government approval and planning. Urban planning with good road network was not put into consideration.

Ogbazi (2013) stated that most government bodies on urban planning have approached planning development haphazardly. In the long term, this lack of planning impacts negatively on solid waste management. The researcher observed that in Nigeria, the drainage systems have open drains, in form of trenches with little width and depth. These drainages are usually blocked with industrial and domestic materials and other rubbish carried by flood water.

Imam *et al.* (2008) pointed out that, in some cases where there are roads in Abuja for instance, heavy traffic often impedes the collection process. The waste management agency tried a system whereby wastes are collected at night. However, it was found to be problematic due to security concerns. The difficulties of coping with the rapid urbanisation have completely overwhelmed African cities, Nigeria inclusive (Ogbazi, 2013). Rapid population growth and urbanisation have been closely linked with unplanned development and informal settlements. Ogbonna (2007) suggested that after hydrocarbons were found in the city, Port Harcourt began to witness a boom in population which quickly led to uncontrolled development and inaccessible settlements. Similarly, it was noted that the problems of solid waste management in Nigeria have been exacerbated by increased urbanisation and population growth. This is because they not only increase the volume of waste generated, they also increase the challenge of effective supervision of waste management program.

In addition, Afon and Okewole (2007) pointed out that as the growth in population continues more land will be needed to cater for the extra waste that will be generated. He

argues that Oyo Township will need an additional 1.3 acres of land annually to accommodate the projected annual growth rate of 3%. He noted that about 39.5 acres of land was acquired to cater for the waste arising of the 394,632 inhabitants of the town in 2005. He therefore projected that in the next 20-30 years an additional 26.9-48.7 acres will be needed for the dumping of waste in the town going by the annual population growth. Ogbonna *et al.* (2007) noted that the population of an area is a major factor that determines the volume of waste generation in the area. He added that there was an increase of about 25.4% in the volume of waste generated in Port Harcourt between 2000 and 2001. He concluded that solid waste management agencies should adopt an approach which charges residents according to the volume of waste they generate. He suggested that such an approach will enforce a healthy environment.

2.2 Theoretical Framework

2.2.1 Theory of planned behaviour

The Theory of Planned Behaviour (TPB) specifies the nature of relationships between beliefs and attitudes. This theory as propounded by Ifegbesan (2009) is based on the assumption that individual behavioural intentions are directly related to their attitudes. For example, a person who believes that performing a given behaviour will lead to most positive outcomes will hold a favourable attitude towards performing the behaviour. The theory also states that what an individual does is determined by personal motivation which is determined by attitude, beliefs, social support and perceived behavioural control.

Application of the theory of planned behaviour can be found in the field of environmental psychology. Generally speaking, actions that are environmentally friendly carry a positive

normative belief. That is to say, sustainable behaviours are widely promoted as positive behaviours.

However, although there may be a behavioural intention to practice such behaviours, perceived behavioural control can be hindered by constraints such as a belief that one's behaviour will not have any impact. For example, if one intends to behave in an environmentally responsible way but there is a lack of accessible recycling infrastructure, perceived behavioural control is low, and constraints are high, so the behaviour may not occur. Applying the theory of planned behaviour in these situations helps explain contradictions between sustainable attitudes and unsustainable behaviour. The theory of planned behaviour is thus a very powerful and predictive model for explaining human behaviour. People's evaluations of, or attitudes towards behaviour are determined by their accessible beliefs about the behaviour, where a belief is defined as the subjective probability that the behaviour will produce a certain outcome.

Specifically, the evaluation of each outcome contributes to the attitude in direct proportion to the person's subjective possibility that the behaviour produces the outcome in question. Studies have used the theory of planned behaviour framework as not only good for understanding, explaining and predicting behaviours, but also to provide a useful guide for designing intervention strategies to change or maintain behaviour (Kadafa *et al.*, 2013). The theory of planned behaviour has been widely used in environmental behaviour research to predict a person's intent to participate in a specified behaviour (Ifegbesan, 2009). It explains that people's perceptions of the environment are related to their actions. Attitude towards the environment can be influenced by environmental news.

In all, the application of this theory to the study is that attitude or change in behaviour is predicated on a person's intent to participate in a specified behaviour that is friendly with

the environment. It points to responsible environmental behaviour, which means actions taken by an individual or a group of individuals to do what is right in order to protect the environment. The broadcast media are expected to enlighten the inhabitants on positive attitudes towards the environment. With consistent campaigns on SWM, one's beliefs and attitudes can be planned or changed in such a way that wastes can be reduced. The broadcast media campaigns can awaken individuals' interest to adopt a responsible behaviour towards SWM. For example, whenever the media inform us of the effects of not managing our wastes properly, they are equally educating us to take decisive steps on waste management. However, to bring out the right environmental behaviour, there is need for consistent campaigns on solid waste management.

2.2.2 Value change theory

This theory employs the technique of 'comparative feedback' to induce attitudinal and behavioural change (Folarin, 2005). It states that rather than simply inform people about the harmful or beneficial effects of certain kinds of behaviour, methods based on value change theory challenge the people to test their own values against others, which are presumed to be socially more acceptable. The postulation is that since values underlie attitudes, which in turn underlie behaviour, it is assumed that a change in value will lead to corresponding changes in attitude and behaviour.

Importantly, the individual has to have clear information on the ranking of his present value. This is where the functions of the broadcast media in terms of information and education are imperative. The broadcast media for example, are expected to inform or educate the general public of their behaviours that may be harmful to the environment. Harmful attitudes of individual to the environment are seen as value-action gap. It is a

term used to describe the gap that occurs when the values or attitudes of an individual do not correlate to their actions.

Generally, it is the difference between what people say and what they do, in this case, environmental management. The application of this theory to the study is that attitudinal change and value for the worth of the environment will definitely lead to a better environmental behaviour. Inhabitants should adopt actions and values that are in conformity with environmental values, and avoid actions that are harmful to the environment. In other words, self-consciousness for the worth of the environment is the first step towards environmental management. Enlightenment campaigns on solid waste management of the broadcast media can help to change people's values or promote environmental values.

The concept of attitude and associated relationship with human behaviour has been a topic of interest among researchers for years. A study has used the Theory of Reasoned Action (TRA) in determining individual attitude towards an intention. The TRA views a person's intention to perform (or not to perform) as the immediate determinant of the action. This behavioural intention, in turn, has two determinants. One is the attitude towards the behaviour: a person who believes that performing a given behaviour will lead to mostly positive outcomes will hold a favourable attitude toward performing the behaviour. The other is the subjective norm: a person believes that most referents with whom she is motivated to comply think she should perform the behaviour will perceive the social pressure to do so. The beliefs that underlie a person's attitude toward the behaviour are termed behavioural beliefs, and those that underlie the subjective norm are termed normative beliefs.

Apart from the TRA/TPB theories, the expectancy-value theory has also been identified in literature as capable of serving as framework for attitude-behaviour study of this nature (Ifegbesan, 2009). The expectancy-value theory is similar with Stern's Value Belief Norm (VBN) theory. The theory explains that, individual choice about proenvironmental actions can be driven by personal norms - an internalized sense of obligation to act in a certain way. Norms are activated when an individual believes that violating them would have adverse effects on things they value and that by taking action, they would bear significant responsibility for those consequences. Personal values (e.g., altruistic values, egoistic values) are antecedents of environmental beliefs.

Waste Management Theory (WMT) has been introduced into environmental sciences. This theory (WMT) formulated by Pongrácz *et al.* (2004), is a unified body of knowledge about waste and waste management. It is founded on the expectation that waste management is to prevent waste to cause harm to human health and the environment and promote resource use optimisation. It is an effort to organise the diverse variables of the waste management system as it stands today. WMT is considered within the paradigm of Industrial Ecology, and built side-by-side with other relevant theories, most notably Design Theory. Design Theory is a relatively new discipline, still under development. The goal of WMT is to incorporate waste minimisation and/or resource use optimisation goals and values.

In the light of this study, all theories imply that attitudes towards the environment are contingent upon the value we attach to the environment. Both theories point to responsible environmental behaviour, which means actions taken by an individual or a group of individuals to do what is right in order to protect the environment. The broadcast media, for example, have the responsibility to inform and educate the public of the behaviours

that may be harmful to the environment, and enlighten them on behavioural change or beneficial effects. Broadcast media campaigns on SWM for public behaviour change can come in the forms of radio jingles, television commercials, in the main news bulletin, radio commentary, special report and so on. For example, a specific period can be devoted as advocacy campaign on SWM. The point is that we should change our value towards the environment. We should have the right environmental values.

The essence of environmental communication is for behavioural or attitudinal change. A positive change in value of the environment will lead to corresponding changes in attitude and behaviour. This can be done through media enlightenment campaigns on solid waste management. Positive attitude to waste management is still lacking in many cities in the south-south. Ignorance coupled with lack of self-consciousness of the environment may be adduced to the habit of most people in the south-south region especially in the densely populated areas. Individual attitude to waste disposal leaves more to be desired. A situation whereby a landfill that has been closed to the public is still being used as a dumpsite calls for questioning. Also, where waste is placed on the road side, gutter side, inside gutter and roadside does not augur well for effective waste management.

Despite the facts that illegal communal waste dumps indiscriminately located in public places have been officially cancelled yet several illegal refuse collection points, were indiscriminately created by residents which pose health hazard and loss of environment aesthetics. Positive attitude towards solid waste management is low due to certain factors including sociological factor, which is felt in the manifested lack of a sense of belonging in an individual, and the tendency by inhabitants to perceive their collective roles towards the environment is a problem.

Waste management is seemed as another person or government business. This attribute to waste management has negatively impacted on the waste management efforts of the state government. Positive attitude remains the best method to solid waste management. Arising from a review of related literature, it has been established that the concepts of awareness and attitude have been associated with environmental behaviour. Attitude towards a concept can be defined as an individual or group of individuals' general feeling of favourableness and unfavourableness towards a concept. Public awareness and attitude towards waste management are critical in the effort to respond to waste management challenge. Communication is important in influencing people's view on the environment. There is also indication that the propensity for waste management practice is tied to perception of the environment. This is because perception is a component of attitude. That is, individual perception of the environment could affect one's attitudes towards it. One's attitudes towards the environment can be guided by planned behaviour and value change postulations. Aggressive enlightenment campaigns on the broadcast media may influence one's value and attitude towards right environmental behaviour. It has been demonstrated that communication can help to preserve, protect and promote or sustain man's environment. The broadcast media, for example, can create a lasting impression in the minds of the audience because of images, sounds and words about solid waste issues. They can reach diverse people simultaneously and provide opportunity for a message to be demonstrated for all levels of persons. While communication does not solve structural problems, it does, however, provide a necessary tool with which answers or solutions can be identified and agreed upon.

On the whole, individual exposure to a greater amount of environmental news, as a result of enlightenment campaign by the media, is more likely to show concern with

environmental behavioural change. Many studies have looked at solid waste management from different angles. However, one area that these studies have not looked at in the literature reviewed, is the application of the broadcast media in influencing a positive change in the behaviour of the public towards solid waste management. It is important to note that communication plays a central role in our lives. Every day, we are influenced by communication.

Communication is the only means through which we can live together and integrate with the environment. The broadcast media for example, are very potent forces for social change because of the features of sound, voice and images. There is emotional attachment between the medium and the audience. This emotional attachment makes the broadcast media unique. The broadcast media are capable of influencing public behaviour change through the influence of their opinions, beliefs, ideas and attitudes. Over the years, the broadcast media have been used for social mobilization and participation in community projects. In the same way, regular enlightenment campaigns on solid waste management by the broadcast media are capable of inculcating the right environmental attitude. Therefore, the distinction of this study from other studies on solid waste management is the application of enlightenment campaigns by the broadcast media to influence public behaviour change towards solid waste management. It is assumed that this study will add to the existing body of knowledge in solid waste management.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

Survey and content analysis research methods was adopted for this study. Survey research describes variables like attitudes, opinion, values, beliefs, which leads to gathering of information about a group of people. Also, survey method allows the gathering of data from a large target population through the instrumentality of questionnaire and personal interviews. The survey method will enable the researcher to measure respondents' opinions, feelings and attitudes to questions asked through a questionnaire. Content analysis is a study of printed materials in a systematic and quantitative way for the purpose of measuring variables. The results obtained from the questionnaire, interviews and programmes schedule will be analysed as part of discussion of findings.

3.2 Population of the Study

The total population of the study comprises 150 environmental health workers selected from four (4) departments that are made up of: waste management department, environmental monitoring, conservation department and environmental health. The breakdown of the population is given in Table 3.1

Table 3.1: Population of the Study

S/N	Department	Total Number
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1	Waste Management	45
2	Environmental Monitoring	27
3	Conservation	33
4	Environmental Health	45
	Total	150

Source: NISEPA Record Office (2021)

3.3 Sample Size and Sampling Technique

The researcher adopted the entire population of the environmental health workers in Minna, Niger State. This is called total or complete enumeration or census. This is because the population size is manageable. Popoola (2011) maintained that a researcher can study or adopt the entire population when the population size is not too large.

3.4 Instruments for Data Collection

Questionnaire was adopted and designed as a survey instrument for data collection. The questions were made clear and simple so that the respondents can easily understand them. The questionnaire has two main parts. First, was the bio-data/personal information like department and level of education, and the second part focused on knowledge or responses on solid waste management.

3.5 Validity of the Instrument

The face and content validity of the research instruments was done with the help of the researcher's supervisor and an expert from the Department of Measurement and evaluation, College of Education, Zuba, Abuja. The experts were each given a copy of the questionnaire to validate in terms of its appropriateness for the research. Validity is a measure that ensures that constructs used in a research instrument are adequately measuring what they are meant to measure. It is a measure of relevance and adequacy of

content of research instrument. Quantitative research instruments like questionnaire are often subjected to validity test. Therefore, the research instrument was validated by the researcher's supervisor.

3.6 Reliability of the Instrument

The reliability of the instrument was determined through a pilot study conducted at Abuja Environmental Protection Board, FCT, Abuja. The study administered 40 copies of the questionnaire to the respondents. The reliability of the instrument was determined using Cronbach Alpha value. The Cronbach Alpha value of the research instrument was 0.83. The instrument is therefore considered to be reliable and usable. This agrees with Emaikwu (2012) who asserts that the reliability of 0.60 and above is considered adequate to use an instrument for field study.

$$\text{Cronbach Alpha Value: } \frac{0.725 + 0.755 + 0.90 + 0.89 + 0.910}{5} = 0.83$$

3.7 Method of Data Analysis

The data from this study was organised and analysed using descriptive statistical tools involving frequency tables, percentages, mean and standard deviation. All the null hypotheses were tested using Pearson Product Moment Correlation (PPMC) at 0.05 level of significance.

CHAPTER FOUR

4.0

RESULTS AND DISCUSSION

4.1 Response Rate

A total of one hundred and fifty (150) copies of the questionnaire were administered to environmental health workers which were selected from four (4) departments that are made up of: waste management department, environmental monitoring, conservation department and environmental health, of which 72 copies of the administered questionnaires were returned and found usable.

Table 4.1 shows the breakdown of the response rate.

Table 4.1 Response Rate

S/No	Name of Department	No of copies of Administered Questionnaire	No of copies of Returned Questionnaire	Percentages (%) of Returned Questionnaire
1	Waste Management Department	45	22	30.5
2	Environmental Monitoring	30	15	20.8
3	Conservation Department	35	16	22.2
4	Environmental Health	40	19	26.4
	Total	150	72	99.9

Table 4.1 reveals that 150 copies of questionnaire were administered to environmental health workers of Niger State Environmental Protection Agency selected from 4 departments, 72 copies of questionnaires were retrieved from the respondents.

Table 4.2: Years of Work Experience

S/N	Years of Work Experience	Frequency	Percentage (%)
1	1 – 5	39	26
2	6 – 10	51	34
3	11 – 15	42	28
4	15 – 20	18	12
5	20 and above	-	-
	TOTAL	150	100

Table 4.2 indicated that 39 (26%) of the respondents have spent 5 years with the agency, 51 (34%) indicated that they have spent 10 years, and 42 (28%) indicated they have spent 15 years with the agency while 18 (12%) responded that they have spent almost 20 years with the agency.

Table 4.3 Distribution of Respondents Educational Qualification

S/N	Educational Qualification	Frequency	Percentage
1	SSCE	14	9.3
2	Diploma	42	28
3	OND/ND/HND	66	44
4	BSC	28	18.6
5	MLS/PhD	-	-
	TOTAL	150	99.9

Table 4.3 revealed that majority of the respondents representing 66 (44%) have OND/ND and HND.

Research Question 1: What is the level of awareness by environmental health workers on the use of media channels for disseminating environmental information on waste disposal for hygienic lifestyle in Minna, Nigeria?

Table 4.4: Level of Awareness of Information Channels

S/N	Items	Options				N	\bar{X}	StD	Decision
		Very high	High	Low	Very low				
1	Radio	10(13.9)	39(54.2)	12(16.7)	11(15.3)	72	2.67	0.90	Accepted
2	Television	6(8.3)	49(68.1)	11(15.3)	6(8.3)	72	2.76	0.72	Accepted
3	Posters	9(12.5)	48(66.7)	5(6.9)	10(13.9)	72	2.78	0.84	Accepted
4	Newspapers	7(9.7)	38(52.8)	21(29.2)	6(8.3)	72	2.64	0.78	Accepted
5	Magazines	6(8.3)	39(54.2)	20(27.8)	7(9.7)	72	2.61	0.78	Accepted
6	Newsletters	6(8.3)	41(56.9)	14(19.4)	11(15.3)	72	2.58	0.85	Accepted
7	Books	6(8.3)	29(40.3)	23(31.9)	14(19.4)	72	2.38	0.89	Rejected
8	Libraries	10(13.9)	39(54.2)	12(16.7)	11(15.3)	72	2.67	0.90	Accepted
9	Colleagues	6(8.3)	49(68.1)	11(15.3)	6(8.3)	72	2.76	0.72	Accepted
10	Facebook	6(8.3)	39(54.2)	20(27.8)	7(9.7)	72	2.61	0.78	Accepted
11	WhatsApp	6(8.3)	41(56.9)	14(19.4)	11(15.3)	72	2.58	0.85	Accepted
12	Twitter	6(8.3)	29(40.3)	23(31.9)	14(19.4)	72	2.38	0.89	Rejected
13	You Tube	7(9.7)	38(52.8)	21(29.2)	6(8.3)	72	2.64	0.78	Accepted

Table 4.4 revealed that all the thirteen items (13) listed have a mean score greater than the benchmark mean of 2.50. This shows that environmental health workers are highly aware of the following information channels: radio, television, posters, newspapers, magazines, libraries and social media platforms as a means of information dissemination.

Research Question 2: What are the various media channels used for disseminating environmental information for effective waste disposal in Minna, Nigeria?

Table 4.5: Media channels used for disseminating environmental information for effective waste disposal in Minna, Nigeria.

S/No	Media channels used for disseminating environmental information for effective waste disposal	SA	A	D	SD	n	\bar{X}	StD	Decision
1	Radio is being used to disseminate environmental information for effective waste disposal	14(19.4)	39(54.2)	14(19.4)	5(6.9)	72	2.86	0.81	Accepted
2	Television is being used to disseminate environmental information for effective waste disposal	6(8.3)	49(68.1)	11(15.3)	6(8.3)	72	2.76	0.72	Accepted
3	Posters are being used to disseminate environmental information for effective waste disposal	9(12.5)	48(66.7)	5(6.9)	10(13.9)	72	2.78	0.84	Accepted
4	Newspapers are being used to disseminate environmental information for effective waste disposal	7(9.7)	38(52.8)	21(29.2)	6(8.3)	72	2.64	0.78	Accepted
5	Magazines are being used to disseminate environmental information for effective waste disposal	10(13.9)	33(45.8)	23(31.9)	8(8.3)	72	2.65	0.83	Accepted
6	Newsletters are being used to disseminate environmental information for effective waste disposal	10(13.9)	39(54.2)	17(23.6)	6(8.3)	72	2.74	0.81	Accepted
7	Books are being used to disseminate environmental information for effective waste disposal	13(18.1)	33(45.8)	21(29.2)	5(6.9)	72	2.75	0.84	Accepted
8	Libraries are being used to disseminate environmental information for effective waste disposal	13(18.1)	43(59.7)	16(22.2)	0	72	2.96	0.64	Accepted
9	Colleagues are being used to disseminate environmental information for effective waste disposal	19(26.4)	34(47.2)	13(18.1)	6(8.3)	72	2.92	0.88	Accepted
10	Facebook is being used to disseminate environmental information for effective waste disposal	20(27.8)	29(40.3)	19(26.4)	4(5.6)	72	2.90	0.87	Accepted

11	Whatsapp is being used to disseminate environmental information for effective waste disposal	6(8.3)	51(70.8)	7(9.7)	8(11.1)	72	2.90	0.87	Accepted
12	Twitter is being used to disseminate environmental information for effective waste disposal	17(23.6)	44(61.1)	6(8.3)	5(6.9)	72	2.76	0.76	Accepted
13	You Tube is being used to disseminate environmental information for effective waste disposal	9(12.5)	28(38.9)	23(31.9)	12(16.7)	72	2.49	0.92	Rejected

Table 4.5 revealed that all 13 items (13) listed have a mean score greater than the benchmark mean of 2.50. This means that the various media channels are used for disseminating environmental information for effective waste disposal in Minna, Nigeria.

Research Question 3: What are the effects of the use of information by environmental health workers on the hygienic lifestyle of the populace in Minna, Nigeria?

Table 4.6: Effects of the use of information by environmental health workers on the hygienic lifestyle of the populace in Minna, Nigeria

S/No	Effect	SA	A	D	SD	N	X	StD	Decision
1	Allocation of dumpsite has greatly led to scarcity of land for socio-economic activities	6(8.3)	41(56.9)	20(27.8)	5(6.9)	72	2.60	0.82	Accepted
2	It has improved the hygienic lifestyle of the populace	22(30.6)	28(38.9)	16(22.2)	6(8.3)	72	2.67	0.73	Accepted
3	It has improved the overall quality of the environment	12(16.7)	29(40.3)	18(25.0)	13(18.1)	72	2.92	0.93	Accepted
4	It has helped to reduce the outburst of flood close to residential areas	8(11.1)	34(47.2)	16(22.2)	14(19.4)	72	2.56	0.97	Accepted
5	It has led to the provision of street trash cans	14(19.4)	26(36.1)	19(26.4)	13(18.1)	72	2.50	0.93	Accepted
6	It has reduced the odour emanating from surroundings with dumpsites	5(6.9)	40(55.6)	16(22.2)	11(15.3)	72	2.57	0.05	Accepted

7	It has improved how waste is being disposed by the populace in the city	6(8.3)	36(50)	13(18.1)	17(23.6)	72	2.54	0.84	Accepted
8	It has led to the use of street trash can by the populace	8(11.1)	37(51.4)	16(22.2)	11(15.3)	72	2.43	0.95	Rejected

Table 4.6 revealed that seven (7) items listed have a mean score greater than the benchmark mean of 2.50. This means that the use of information by environmental health workers on the hygienic lifestyle of the populace has improved the hygienic lifestyle of the populace, improved the overall quality of the environment, improved how waste is being disposed by the populace in the city but has not led to the use of street trash can by the populace.

Research Question 4: What is the impact of information dissemination on waste disposal on the health of the populace?

Table 4.7: Impact of information dissemination on waste disposal on the health of the populace

S/No	Impact of information dissemination on waste disposal on the health of the populace	SA	A	D	SD	n	X	StD	Decision
1	It has increase the outbreak of diseases among the populace	6(8.3)	29(40.3)	23(31.9)	14(19.4)	72	2.38	0.89	Rejected
2	It has reduce the quality of the environment as a breeding site for disease vectors.	10(13.9)	43(59.7)	16(22.2)	3(4.2)	72	2.83	0.71	Accepted
3	It has reduce the rise of malaria among the populace	6(8.3)	37(51.4)	22(30.6)	7(9.7)	72	2.58	0.78	Accepted

4	It is responsible for the reduction of typhoid among the populace	Accepted	10(13.9)	47(65.3)	15(20.8)	0(0%)	72	2.93	0.59
5	It has reduce the outbreak of cholera among the populace	Accepted	25(34.5)	25(34.5)	14(19.4)	8(11.1)	72	2.58	0.69
6	The siting of dumpsite close to residential areas has greatly reduced the outbreak of diseases.	Rejected	9(12.5)	28(38.9)	23(31.9)	12(16.7)	72	2.49	0.92
7	The once-a-month sanitary check has greatly improved the health of the citizens	Accepted	7(9.7)	36(50.0)	20(27.8)	9(12.5)	72	2.57	0.84
8	The routine check of the environmental health workers has no impact on the quality of health of the populace	Accepted	8(11.1)	5(6.9)	18(25.0)	41(56.9)	72	2.72	0.76
9	It has positively impacted the reduction of skin infection among the populace	Accepted	8(11.1)	34(47.2)	16(22.2)	14(19.4)	72	2.56	0.97
10	It has influenced the drastic reduction of the outbreak of diarrhea among the populace	Accepted	9(12.5)	40(55.6)	15(20.8)	8(11.1)	72	2.69	0.83

Table 4.7 revealed that eight (8) listed items have a mean score greater than the benchmark mean of 2.50. This means that Impact of information dissemination on waste disposal on

the health of the populace has positively impacted the reduction of typhoid among the populace, it has influenced the once-a-month sanitary check which has greatly improved the health of the citizens, It has influenced the drastic reduction of the outbreak of diarrhea among the populace and it has influenced the routine check of the environmental health workers which has greatly impacted on the quality of health of the populace.

Research Question 5: What are the constraints of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna, Nigeria?

Table 4.8 Constraints of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna, Nigeria

S/No	Constraints of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna	SA	A	D	SD	n	X	StD	Decision
1	Poor information searching skill affects me in accessing environmental information	36(50)	11(15.3)	13(18.1)	12(16.7)	72	2.64	0.94	Accepted
2	Inadequate ICT infrastructure does not affect me in accessing environmental health information	12(16.7)	11(15.3)	18(25.0)	31(43.1)	72	2.15	1.16	Rejected
3	Language barrier affects me in accessing environmental information	8(11.1)	34(47.2)	16(22.2)	14(19.4)	72	2.56	0.97	Accepted
4	Poor ICT skills affects me in accessing environmental health information	8(11.1)	34(47.2)	16(22.2)	14(19.4)	72	2.56	0.97	Accepted
5	Poor documentation, record keeping and archival processes affects me in accessing environmental health information	26(36.1)	19(26.4)	18(25.0)	9(12.5)	72	2.86	0.05	Accepted
6	Poor funding of information providing institutions affects me in accessing environmental health information	9(12.5)	40(55.6)	15(20.8)	8(11.1)	72	2.69	0.83	Accepted

Table 4.8 revealed that five (5) listed items have a mean score greater than the benchmark mean of 2.50. This means that the following constraints are germane to the access of environmental information by health workers on the hygienic lifestyle of the populace.

From the results it can be deduced that poor information searching skill affects environmental health workers in accessing environmental information, inadequate ICT infrastructure does affect environmental health workers in accessing environmental health information and poor documentation, record keeping and archival processes equally affects environmental health workers in accessing environmental health information for improved hygienic lifestyle of the populace.

4.2 Hypotheses Testing

H₀₁: There is no significant relationship between access to information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna.

Table 4.9: Relationship between access to information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna.

Correlations						
Variable	N	df	Mean	SD	R	P
Information on waste disposal	72		83.15	8.11		
		70			0.035**	0.05
Use of information for hygienic lifestyle	72		62.48	13.24		

*. * Correlation is significant at 0.05 level.

Table 4.9 shows that the correlation coefficient = 0.035 $P < 0.05$ i.e., Critical value R 0.035 is lesser than P 0.05. Therefore, the null hypothesis which states that there is no significant relationship between access to information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna, Nigeria is accepted.

H02: There is no significant relationship between access to information by environmental health workers on waste disposal and dissemination of information for the hygienic lifestyle of the populace of Minna.

Table 4.10: Relationship between access to information by environmental health workers on waste disposal and dissemination of information for the hygienic lifestyle of the populace of Minna.

Correlations						
Variable	N	df	Mean	SD	R	P
Access to information	72		53.07	17.49		
		70			0.015**	0.05
Dissemination of information	72		46.18	13.12		

. Correlation is significant at 0.05 level.

Table 4.10 shows that the correlation coefficient = 0.015 $P < 0.05$ i.e. Critical value R 0.015 is lesser than P 0.05. Therefore, the null hypothesis which states that there is no significant relationship between access to information by environmental health workers on waste disposal and dissemination of information for the hygienic lifestyle of the populace of Minna, Nigeria is accepted.

H03: There is no significant relationship between awareness of environmental information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna.

Table 4.11: Relationship between awareness of environmental information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna.

Correlations						
Variable	N	df	Mean	SD	R	P
Awareness of environmental information	72		91.51	9.77		
		70			0.062**	0.05
Use of environmental information	72		78.33	15.52		

** Correlation is significant at 0.05 level.

Table 4.11 shows that the correlation coefficient = 0.062 $P > 0.05$ i.e. Critical value R 0.062 is greater than P 0.05. Therefore, the null hypothesis which states that there is no significant relationship between awareness of environmental information by environmental health workers on waste disposal and the use of information for the hygienic lifestyle of the populace of Minna is rejected. This depicts that the awareness of environmental information influences the use of information for the hygienic lifestyle of the populace.

H₀₄: There is no significant composite relationship among: access, use and dissemination of information by environmental health workers and hygienic lifestyle of Minna dwellers

Table 4.12: Relationship among: access, use and dissemination of information by environmental health workers and hygienic lifestyle of Minna dwellers

Correlations						
Variable	N	df	Mean	SD	R	P

Access, use and dissemination of information	72	83.15	8.11		
		70		0.035**	0.05
For hygienic lifestyle of Minna dwellers	72	62.48	13.24		

*, * Correlation is significant at 0.05 level.

Table 4.12 shows that the correlation coefficient = 0.035 $P < 0.05$ i.e. Critical value R 0.035 is lesser than P 0.05. Therefore, the null hypothesis which states that there is no significant composite relationship among: access, use and dissemination of information by environmental health workers and hygienic lifestyle of Minna populace is accepted.

4.3 Summary of Findings

The following are the summary of findings:

1. The level of awareness by environmental health workers on the use of media channels for disseminating environmental information on waste disposal is high.
2. The various media channels used for disseminating environmental information for effective waste disposal in Minna are: radio, television, posters, newspapers, libraries and social media platforms.
3. The effect of the use of information by environmental health workers on the hygienic lifestyle of the populace has improved the hygienic lifestyle of the populace, the overall quality of the environment, improved how waste is being disposed by the populace in the city but has not led to the use of street trash can by the populace.
4. The impact of information dissemination on waste disposal on the health of the populace has positively impacted the reduction of typhoid among the populace, it has influenced the once-a-month sanitary check which has greatly improved the health of

the citizen, it has equally influenced the drastic reduction of the outbreak of diarrhea among the populace and it has influenced the routine check of the environmental health workers which has improve the quality of health of the populace.

5. The constraints of access to environmental information by environmental health workers are: poor information searching skill, inadequate ICT infrastructure and poor documentation, record keeping and archival processes.

4.4 Discussion of Findings

Level of awareness by environmental health workers on the use of media channels for disseminating environmental information on waste disposal for hygienic lifestyle

From research question one and hypothesis one, 42% of the respondents were in the affirmative that they are aware that radio, television, posters, newspapers and libraries are used for disseminating information on waste management. It is an established fact that the broadcast media in Minna are used for disseminating information on public awareness campaigns on solid waste management. This explains that communication is important for solid waste management. In the same vein, Banjo *et al.* (2009) results revealed that radio and television were the most available, easily accessed and the most effective sources of environmental information. Majority of the respondents received enlightenment campaigns on solid waste management through the government television stations and a higher number of the respondents received it through the government radio stations. This result also confirms the findings reached in other studies. Macawile and Sia Su (2009) noted that a conscious effort through communication is required to incorporate interests in environmental management. Similarly, Kalantari and Asadi (2010) believe that a proper focused information campaign is necessary to raise the level of people's

knowledge about the environment and form the consciousness that could motivate people to act in favour of environmental management.

Media channels used for disseminating environmental information for effective waste disposal in Minna, Nigeria

From responses obtained from the research, media channels such as radio, television, posters, newspapers, magazines, social media platforms are widely used for disseminating environmental information for effective waste disposal. The populace of Minna rely on these media channels for most of the information they consume and it is an indication that these are the media channels that is being used for disseminating environmental information.

Effects of the use of information by environmental health workers on the hygienic lifestyle of the populace

Studies have revealed that although, awareness and knowledge on environmental issues may be high, attitude towards waste management may be poor (Raudsepp, 2001; Babayemi & Dauda, 2009; Ifegbesan, 2009). This also implies that awareness and knowledge are not the only prerequisites for responsible environmental attitude but also motivation, age factor, education and environmental commitment (Kalantari & Asadi, 2010). Other studies (Babayemi & Dauda, 2009; Ifegbesan, 2009) have found a high level of awareness on solid waste.

In this wise, environmental news is a potent force for responsible environmental behaviour. Individual exposure to a greater amount of environmental news is more likely to show concern with environmental management. Taken from above, much of contemporary environmental studies are predicated on the belief that human and

nonhuman welfare are threatened by a growing array of human-induced environmental problems namely pollution, over-population, consumption of non-renewable biodiversity loss, ozone depletion, greenhouse warming and others.

It is universally agreed that human behaviour has been and will continue to be, of central importance in identifying, understanding and dealing with such problems. Therefore, it can be taken that environmental behaviour is affected by the level of public awareness created by the mass media on environmental issues.

Impact of information dissemination on waste disposal on the health of the populace

Studies have shown that information has helped to promote environmental behaviour. Relevant information can help individuals to understand the interaction between resources (natural) and the environment. It is observed that greater knowledge of environmental principles, attitudes and theories of waste reduction through access and use of information can enhance individual's ability to participate in solid waste management. Information is an integral part of environmental management because it is central to every human activity and as such, would be used in coordinating the resources for a 'synergistic' approach to management of the environment. Therefore, environment information consists of all forms of information to keep the public enlightened about and aware of environmental issues and trends.

With access to environmental information, people would have full knowledge of the implication of their activities on the environment and are able to participate more effectively in decision making processes that affect the environment. Attitude to waste disposal practice is an important indicator and component of environmental behaviour. Even if an individual possesses a high level of environmental awareness and knowledge,

behaviour or attitude to waste management still remains the centre of waste disposal practice. The study revealed that respondents used various methods to manage waste such as burying and burning them. Although many of the respondents believe in engaging the services of private waste collector to dispose of waste, however, some dispose waste at places not approved by the local authorities. Invariably, inhabitants do not have specific or professional ways to store waste before disposing of them. This leads to indiscriminate disposal of waste.

Studies have attested to the indiscriminate disposal or dumping of waste as a common practice in Nigeria. For example, Medina (2010) noted that 87% of Nigerians use unsanitary methods of waste disposal which constitute nuisance, ugly sight and create a breeding ground for pests, rodents and diseases.

Indiscriminate solid waste disposal is actually a menace and embarrassment to the nation where heaps of refuse litter most parts of the city (Medina, 2010). Failure by the local authorities to provide adequate waste disposal facilities as well as collection of solid waste on time could be the reason why respondents would pay for private waste collection service. Medina (2010) had observed lack of funds and manpower among other reasons, why the local authorities on waste management cannot provide adequate waste disposal facilities. The results obtained from this study showed that 47% would pay for waste collection service while 53% would not. This corresponds with the findings of Kadafa *et al.* (2013) that 51.1% of their respondents in Gboko, Benue State, believe that solid waste management is a social service and hence, the unwillingness to pay for disposal charges. However, in a study of Onitsha Metropolis, Ezeah and Roberts (2014) observed poor waste disposal operations from collection to transportation and disposal in Nigeria.

Also, in a study of solid waste in Kaduna metropolis, Enete (2010) found that 93.3% of the respondents were not satisfied with the existing waste collection service by state waste agency and, 73.3% of the respondents were willing to pay for private waste collection service. Nabegu (2010) in his study found that more than two third of the residents in Kano metropolis do not use authorised dumpsite for their waste. For this, Enete (2010) argue that there was need to mount health education campaign at the local government areas on self-methods of refuse collection and disposal and other positive health habits such as waste reduction, reuse and waste separation at the grassroots level. It is the duty of the state and local environmental authorities or agencies to educate the public on method(s) of waste management. One of the reasons for the establishment of state's environmental agencies was to educate inhabitants on appropriate waste method or recommendation methods of waste management.

As part of waste management practice, it is expedient to know the types of containers respondents use to store waste before disposing of them. From the different sizes and types of waste containers listed such as large waste bins, small waste bins, metal or plastic cans and polythene bags, the result revealed that (18.4%) of the respondents use large waste dump-bins provided by the local authorities. One of the problems of using large dump bins provided by the local authorities was that they are not provided with covers to reduce or prevent smell, and the wastes are not collected or cleared on time. Waste management experts believe that one of the most appropriate ways of storing waste before disposing of them is to put them into a big polythene bag attached to a plastic or metal container. But this has not been the case in many homes and places in Nigeria.

Waste collection and disposal had been a problem and challenge to local government authorities in Minna, Niger State, Nigeria. Nabegu (2010) investigated the operations of

the state agency responsible for waste management in some towns in Nigeria, and reported that a significant portion of the population (80%), does not have access to waste collection services, only 20% of the waste generated is actually collected and majority of the users of the service, that is, 92% consider the service very poor. Increasing the knowledge of waste reduction through recycling for the target population has been seen as a necessary method of increasing public participation in waste reduction (Niegaard, 2013).

Recycling of wastes is a part of waste reduction practice. This study showed that 50.8% of the respondents recycled waste materials. Waste recycling is waste management. But waste recycling knowledge and practices have not been given serious attention. This implies that, as Post (2007) observes, “inadequate knowledge on waste recycling can be a barrier to waste reduction behaviour”. Waste recycling still remains a huge challenge to the government of Nigeria. Many states in Nigeria have not established recycling industry. Willingness to pay for waste collection service is increasing among inhabitants. Some studies have showed that respondents are willing to pay for waste collection service through a private sector partnership (Nabegu, 2010; Niegaard, 2013).

The above results confirm our result, as a considerable number of the respondents (47 %) were willing to pay for waste collection service while 53% of the respondents were not willing to pay for waste collection service.

The study also provides a platform for respondents to identify the things they have done out of concern for the environment. Interest or willingness to change ways or attitudes in order to reduce the amount of waste generated took a large proportion or percentage among other options. This was at 51.4%. By implication, attitudinal and behavioural changes are imperative for waste reduction, reuse, recycling and general management. It

is obvious that the positive attitude was needed to manage solid waste. Inhabitants' attitudes towards solid waste management were not good enough for sustainable environmental development. Many still dispose waste indiscriminately. Many of the respondents still see the management of solid waste as largely the responsibilities of the local authorities rather than the adopting right attitude.

In a report on climate change carried out by the British Broadcasting Service (BBC) on ten Africa countries, the result showed that 69.2% of the respondents see climate change and other environmental issues as something that is distant and not urgent and, that which belongs to the government (Harrison, 2010). Poor attitude to environmental issues and management was observed in Africa by the BBC report. This corresponds with the results obtained from the broadcasters interviewed and from the results in the study that there were poor public attitudes towards solid waste management in Nigeria; that law enforcement and regular enlightenment campaigns were required to change people's attitude towards waste management. Age and levels of education are believed to be indicators for solid waste management (Babayemi & Dauda, 2009). Where $p < 0.05$ was obtained from results in respect of the levels of education and age, it was concluded that influence of the broadcast media enlightenment campaigns on solid waste management depended on the respondents' age and levels of education. There was therefore, a relationship between age and education to waste management.

However, it depends on the individual perception and attitude. Babayemi and Dauda, (2009) believe that the factors responsible for the level of awareness and practice were educational status, age, gender and social status.

Invariably, there is a significant relationship between solid waste management and the attitude of the populace towards waste disposal. In all, a positive change in the behaviour

of the public towards solid waste management depends on not only regular enlightenment campaigns by the broadcast media but serious personal effort. The media may influence people's beliefs, opinions and perceptions but attitude and behaviour towards waste management are determined by people's ability and willingness to accept change or new things. Individuals are the agent of change. Changes only come when the willingness is there.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Solid waste management is one of the greatest environmental challenges facing Nigeria. In order to inculcate positive attitude towards inhabitants, there is need to adopt enlightenment campaigns by environmental health workers. It is pertinent to conclude as follows: the access, use and dissemination of environmental information by health workers for hygienic lifestyle of the populace has great impact on the overall wellbeing of the people. However, there is still more work to be done by the environmental health

workers. It was observed in the study there were inadequate and insufficient information dissemination by the environmental health workers on environmental issues in general and solid waste in particular. Attitudes towards solid waste management were poor and insufficient for sustainable environmental development. This is because many Nigerians still see the management of solid waste as largely the responsibilities of the local authorities. There is, therefore, the need for intensive enlightenment campaigns on solid waste management by environmental health workers for public behavioural change.

5.2 Recommendations

The following recommendations are hereby made in accordance with the findings of the study:

1. There should be regular campaigns by environmental health workers in Minna on the environment which is essential for environmental management. This is because they help to shape social norms and values, influence people's decision in ways that promote a more environmentally sustainable society.
2. Niger state government with private firms could go into partnership in converting wastes into useful and marketable value.
3. Solid waste management policies and enforcement of sanitation laws in Minna should be energised, and various environmental organisations should do more until the dream of a clean environment in Minna becomes a reality.
4. The government of Niger state and its environmental agency should enforce and strengthen the "once a month clean-up" campaign as this will better ensure an environment that will be free from indiscriminate disposal of waste.
5. Regular use of media channels to disseminate information on environment and health should be encouraged.

5.3 Contribution to Knowledge

There are many studies on solid waste management in Nigeria. Many of these studies have looked at solid waste management from different perspectives. For instance, Nabegu (2010) carried out a study on waste management in contemporary Nigeria. He used Kano as a case. There is also a study by Kofoworola (2007) on characterisation of solid waste in Lagos state. Also, Ana *et al.* (2011) researched into solid waste management problems in secondary schools in Ibadan. There are many studies on solid waste management. However, the researcher as at the time of the study could not find any study applying the access, use and dissemination of information on waste disposal by environmental health workers for hygienic lifestyle.

Basically, the uniqueness and distinction of this study from other studies in the field of solid waste management, is the application of environmental health information to solid waste management for responsible environmental behaviour. But specifically, this study has added to the body of knowledge on solid waste management in the following ways:

- i. It has been shown in the study that public participation in solid waste management can be facilitated by the media. It has been shown in the literature by various authors that communication is important for attitudinal change. Regular enlightenment campaigns by using the media can bring about positive change. The media are agents of social mobilisation and change. Effects of improper disposal of waste to the environment and human health can be shown on television, and this can bring about positive change of attitude towards the environment.
- ii. Studies have not been carried out on the medium or means through which the public can be reached and mobilised towards adopting the attitude for solid waste management. This study however, has shown that the media are the most effective

means to reach every one even those in the rural areas. Programmes in local languages and Pidgin English can be done to promote public attitude towards solid waste management.

- iii. Researchers such as Ifegbesan (2009), Niegaard, (2013) have adopted the theory of planned behaviour to the study of solid waste management; however, they have not applied the theory of value-change to solid waste management. The theory of valuechange postulates that it is only when our values and attitudes towards the environment changed, it is only then we can have a sustainable environmental development. This is a distinction from other studies in the field of solid waste management.
- iv. Invariably, the study has added to other studies on environmental communication in general, and specifically, solid waste management. The need for public attitude towards the environment or solid waste management can be achieved with regular enlightenment campaigns by the broadcast media. From the various findings in this study, self-consciousness towards the environment is the first step towards environmental management. This is the heart of this study. In all, attitude is everything.

5.4 Suggestion for further Studies

In view of the limitation to the study, similar research should be carried out putting into consideration the sample size and instrumentation in further researches as follows:

- a. Influence of Broadcast Media Enlightenment Campaigns on Solid Waste Management in Minna, Nigeria.
- b. Environmental health implication of urban waste management in Minna.
- c. The accessibility to environmental services in the urban centres in North central,

Nigeria.

- d. Analysis of the impact of mass media in urban public health awareness in selected urban areas in North central, Nigeria.

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Appendix I

Department of Library and Information Technology
School of Information and Communication Technology
Federal University of Technology, Minna
P.M.B 65
Minna, Niger State. 26th
April, 2021.

Dear Respondent,

**A QUESTIONNAIRE ON ACCESS, USE AND DISSEMINATION OF
INFORMATION ON WASTE DISPOSAL BY ENVIRONMENTAL HEALTH
WORKERS FOR HYGIENIC LIFESTYLE. A STUDY OF MINNA, NIGERIA.**

I am a postgraduate student of the Department of Library and Information Technology of the Federal University of Technology, Minna carrying out a research on the topic

“Access, Use and Dissemination of Information on Waste Disposal by

Environmental Health Workers for Hygienic Lifestyle. A Study of Minna,

Nigeria.” and you have been selected to participate in the study. Your response on the above study will be highly appreciated. It will be treated strictly as confidential and only for academic purpose only.

Thank you for your kind cooperation.

Yours sincerely,

AKOBE, Oluwatosin Daniel MTECH/SICT/2018/8252

Researcher

SECTION A: RESPONDENTS BIO DATA

INSTRUCTION: Please fill in the blank spaces and tick in the boxes where applicable.

DEPARTMENTS:

Waste Management	<input type="checkbox"/>
Environmental	<input type="checkbox"/>
Monitoring	<input type="checkbox"/>
Conservation	<input type="checkbox"/>
Environmental Health	

YEARS OF WORK EXPERIENCE

1 – 5 Year	<input type="checkbox"/>
6 – 10 Year	<input type="checkbox"/>
11 – 15 Year	<input type="checkbox"/>
16 – 20 Year	<input type="checkbox"/>
20 and above	<input type="checkbox"/>

WHAT IS YOUR HIGHEST QUALIFICATION?

SSCE

Diploma

OND/ND/HND

BSC

MLS/PhD

Others, specify.....

SECTION B (please tick appropriately)

1. Research Question 1

What is the level of awareness by environmental health workers on the use of following channels for disseminating environmental information on waste disposal for hygienic lifestyle in Minna, Nigeria?

S/N	Items	Options			
		Very high	High	low	Very low
1	Radio				
2	Television				
3	Posters				
4	Newspapers				
5	Magazines				
6	Newsletters				
7	Books				

8	Libraries				
9	Colleagues				
10	Facebook				
11	WhatsApp				
12	Twitter				
13	You Tube				

2. Research Question 2

What are the various media (sources) of information used for disseminating environmental information for effective waste disposal in Minna, Nigeria?

S/N	Items	Options			
		Strongly Agree	Agree	Disagree	Strongly Disagree
1	Radio is been used to disseminate environmental information for effective waste disposal				
2	Television is been used to disseminate environmental information for effective waste disposal				
3	Posters are been used to disseminate environmental information for effective waste disposal				
4	Newspapers are been used to disseminate environmental information for effective waste disposal				
5	Magazines are been used to disseminate environmental information for effective waste disposal				
6	Newsletters are been used to disseminate environmental information for effective waste disposal				
7	Books are been used to disseminate environmental information for effective waste disposal				

8	Libraries are been used to disseminate environmental information for effective waste disposal				
9	Colleagues are been used to disseminate environmental information for effective waste disposal				
10	Facebook is been used to disseminate environmental information for effective waste disposal				
11	Whatsapp is been used to disseminate environmental information for effective waste disposal				
12	Twitter is been used to disseminate environmental information for effective waste disposal				
13	You Tube is been used to disseminate environmental information for effective waste disposal				

3. Research Question 3

What are the effects of the use of information by environmental health workers on the hygienic lifestyle of the populace in Minna, Nigeria?

S/N	Items	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Allocation of dumpsite has greatly led to scarcity of land for socioeconomic activities				
2	It has improved the hygienic lifestyle of the populace				
3	It has improved the overall quality of the environment				
4	It has helped to reduce the outburst of flood close to residential areas				
5	It has led to the provision of street trash cans				
6	It has reduced the odour emanating from surroundings with dumpsites				

7	It has improved how waste is been disposed by the populace in the city				
8	It has led to the use of street trash can by the populace				

4. Research Question 4

What is the impact of information dissemination on waste disposal on the health of the populace?

S/N	Items	Strongly Agree	Agree	Disagree	Strongly Disagree
1	It has greatly increased the outbreak of diseases among the populace				
2	It has greatly reduced the quality of the environment as a breeding site for disease vectors				
3	It has negatively impacted the rise of malaria among the populace				
4	It has positively impacted the reduction of typhoid among the populace				
5	it has greatly impacted the outbreak of cholera among the populace				
6	The siting of dumpsite has close to residential areas has greatly reduced the outbreak of diseases.				
7	The once-a-month sanitary check has greatly improved the health of the citizen				
8	The routine check of the environmental health workers has no impact on the quality of health of the populace				
9	It has positively impacted the reduction of skin infection among the populace				
10	It has influenced the drastic reduction of the outbreak of diarrhea among the populace				

5. Research Question 5

What are the constraints of access to environmental information by health workers on the hygienic lifestyle of the populace in Minna, Nigeria?

S/N	Items	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Poor information searching skill affects me in accessing environmental information				
2	Inadequate ICT infrastructure does not affect me in accessing environmental health information				
3	Language barrier affects me in accessing environmental information				
4	Poor ICT skills affects me in accessing environmental health information				
5	Poor documentation, record keeping and archival processes affects me in accessing environmental health information				
6	Poor funding of information providing institutions affects me in accessing environmental health information				

Appendix II

Reliability

Notes

Output Created		17-APR-2021 15:09:11
Comments		DataSet0
	Active Dataset	<none>
	Filter	<none>
	Weight	<none>
Input	Split File	
	N of Rows in Working Data File	40
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=VAR00001 VAR00002 VAR00003 VAR00004 VAR00005 VAR00006 VAR00007 VAR00008 VAR00009 VAR00010 VAR00011 VAR00012 VAR00013 /SCALE('research question 1') ALL /MODEL=ALPHA. 00:00:00.00
Resources	Processor Time	
	Elapsed Time	00:00:00.02

[DataSet0]

Scale: research question 1

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded ^a	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.725	13

Scale: research question 2

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded ^a	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.755	13

Scale: research question 3

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded ^a	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.90	8

Scale: research question 4

Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded ^a	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.89	10

Scale: research question 5 Case Processing Summary

		N	%
Cases	Valid	40	100.0
	Excluded ^a	0	.0
	Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.910	6