African Research Review

An International Multi-Disciplinary Journal, Ethiopia
Vol. 4 (3b) July, 2010
ISSN 1994-9057 (Print) ISSN 2070-0083 (Online)

Assessment of Environmental Problems and Methods of Waste Management in Ado-Ekiti, Nigeria *(Pp. 331-343)*

***Awosusi, Ajoke Olukemi* -** Department of Educational Foundations and Management, Faculty of Education, University Of Ado-Ekiti, P.M.B. 5363, Ado-Ekiti, Ekiti State
E-mail:jawosusi@yahoo.com / honj23@yahoo.com
Telephone: +2348030707463

Abstract
This study assessed the environmental problems and methods of waste management in Ado-Ekiti, Nigeria. Waste management is the collection, transportation, processing, recycling or disposal of waste materials, usually the one produced by human activities in an effort to reduce their effect on human health or on local aesthetics. Data for this study was collected from the random administration of two hundred (200) questionnaires on categories of respondents in the study area. The simple percentages and frequency table were used in analyzing the data. Results from this study showed that waste management personnel have contributed immensely to the management of waste in the area. However, they are confronted with some problems, which, if given the necessary encouragements, will be great help in the management of waste system in the area. This study will be of great help to environmentalists, planners, researches and policy makers.

Keywords: Environment, Methods, Problems, and Waste Management.

Introduction

The problem of solid waste disposal is one of the most serious environmental problems facing many cities in Nigeria. Waste management plays an integral role in human activities. Various ways of managing solid waste includes disposal by either burying or burning, reduce or reusing, recycling and energy generation. Solid waste management differs in developing countries like Nigeria, and in industrialized countries of the world like Germany. Several factors are responsible for the differences, a good example of these are the types of waste generated in developing countries.

Contreau (1982) submitted that, in developing countries, there is much high proportion of organic and considerably less plastic waste such that the large amount of organic material makes the waste denser with greater moisture and smaller particles. Another factor identified is that the technology in use in industrialized countries are inappropriate in developing countries because of the much heavier, wetter and corrosive nature of generated waste in developing countries. Lastly, developing countries, most cities are unplanned and characterized by haphazard construction of sprawling slums with narrow roads that are inaccessible to collection vehicles, (Daskalopoulos 1998).

Omotoso and Jegede (2009) observed that in recent in years, solid waste generation in metropolitan cities has increased prodigiously. They added that major high-ways have suddenly become the dunghill for many citizens. The state seems to have acquired the unenviable status of being one of the dirtiest cities in world. It is a development that has malevolently aided the environmental problems of the mega-city. Adegoke (1990) defined waste as substance and materials, which are disposed of, or required to be disposed of, according to the provision of national laws. In the same vein, Oxford Dictionary (1980) defined wastes as that which is not or cannot be used, no longer of use. Consequently, of these waste materials were not well managed , they could result to serious health hazards. In Nigeria, solid waste management is constitutionally a local government function. This is not exactly the position in Ekiti State, where the Ekiti State Waste Management Board (EKSWMB) exists as the sole public agency responsible for waste management in the state. Ekiti State Waste Management Board came into being because, it was assumed that individual Local Government Authorities were incapable of performing the function of waste management. Moreover, at the time of its establishment, solid waste management situation in Ado-Ekiti was chaotic and embarrassing to most of her residents.

Solid waste management, in terms of domestic, industrial and commercial wastes, traditionally consists of collection and disposal methods, depending on the type of waste, the area and level of processing required. West Africa Health Examination Board (1991) viewed waste management as the systematic administration of activities, which provide for the collection transportation and processing of waste: It is the handling process of solid waste materials from sources of generation to their final disposal.

However, solid wastes can be managed by open dumping, which requires little planning and involves a land that is designated formally for the purpose. But this method attracts flies, vermin and scavengers; the site is characterized by offensive odours and other health hazards. In a way, the site decreases the aesthetic value of the environment. Another technique is the regular sanitary landfill, which is usually a depressed land area that accommodates wastes and thereafter covered up with soil or other materials by bulldozers or other heavy vehicles. Incineration is the techniques of waste management which involves the combustion of waste at high temperature, that is, the destruction of waste materials by burning (friends of the earth, 2006).

Types of Solid Waste

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

Methods of Managing Waste

The four common methods of managing waste according to Seo (2004) are land filing, incineration, composting and anaerobic digestion. Incineration, composting and anaerobic digestion are volume reducing technologies. Ultimately, residue from these methods must be land filled.

Ayodele(2007) viewed waste management as source reduction, refuse recycling, controlled combustion and controlled landfill. Furthermore, value can be recovered by generating energy from waste (energy recovery) and lastly, solid waste should only be disposed, if the aforementioned do not offer appropriate solution.

- **Source Reduction:** Involves efforts to reduce hazardous waste and other materials by modifying industrial production. This method includes change in manufacturing technology, raw material input and change in product formulation. RE-USE is using an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material.
- **Recycling** offers one means of reducing the impacts of waste disposal on the atmosphere. It involves using waste as material to manufacture a new product. Recycling involves altering the physical form of an object or material and making a new object from the altered material.
- **Energy Recovery** modern incinerators can use waste to generate electricity, thus preventing the energy in waste from being wasted. Nordstrom and Enochsson (2009) see waste disposal as a global problem contributing to the ongoing climate change by large emissions of greenhouse gases. By using waste material as a resource instead of land filling, the greenhouse emissions from landfills would be reduced.

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

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

Composting
Waste decomposes in an enclosed chamber due to activities of bacteria, using the oxygen that combined chemically with waste. Composting is a process of

biological decomposition of waste under aerobic and hemophilic conditions, which breakdown organic materials leaving a humus rich residue.

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

General Objective and Specific Objectives of the Study
The general objective of this study was to examine the methods and management practices of waste disposal in Ado – Ekiti.

The specific objectives of this study were to:

i. Assess the environmental consequences of indiscriminate disposal of waste in Ado – Ekiti.

ii. Examine how solid waste disposal ignorance affects the health status of the people in Ado-Ekiti.

iii. Profer possible remedial measures to improve waste management methods, towards enhancing the health status of Ado-Ekiti residents.

The Study Area
Ado-Ekiti, an ancient city in Nigeria is located between latitudes $7^0$34' and $7^0$41' north of the equator and longitudes $5^0$11' and $5^0$16' east of the Greenwich meridian. The history of Ado-Ekiti dates back to a period before the advent of Ewi dynasty in 1310 AD. It grew to a town of repute about 700years ago, when the 'Oba Ado' otherwise called the 'Elewi' joined the princely adventure instituted by several children of Oduduwa (From Ile-Ife) to establish their own territories (Ebisemiju, 1993). It became the headquarters of Ekiti Divisional council in 1916 and rose to the status of a state capital on October 1, 1996. Ado-Ekiti has a total population of 257, 519 people going by the 2006 population census, with the upsurge in urbanization trend in the region, the estimated population of the city could be put around 300,000.

Geologically, Ado-Ekiti lies entirely within the pre-cambrian basement complex rock group, which underlies much of Nigeria. It falls within koppen's 'a' climatic belt that is tropical wet climate. The city is strategically located in Ekiti land at the convergence of major roads forming a radial

pattern. These roads are Ado-Ekiti- Akure road passing through Ikere-Ekiti, llesa-Aramoko-Iyin-Ado-Ekiti road, Ogotun-Igbaraodo-Ilawe-Ado-Ekiti.Ikare-Aisegba- Ijan-Ado-Ekiti road.

Educationally, Ado-Ekiti is in the forefront. It has about 14 public secondary schools among which are, Christ's school, Mary Immaculate, Ado Grammar School etc. Four notable tertiary institutions are located in the city to give qualitative education to the people; they are University of Ado- Ekiti, the Federal Polytechnic Ado-Ekiti, Ekiti State Technical College and the State School of Nursing.

Economically, Ado-Ekiti is undergoing tremendous transformation. No wonder commercial banks such as Union Bank, First Bank, United Bank For Africa (UBA), Oceanic Bank, Intercontinental Bank, Bank PHB, and Zenith Bank Plc, etc locate in the city to further boost commercial activities.

Hotels and Rest houses such as Pathfinder Hotel, Dave Hotel, After '7' Guest House, Anisulowo Hotel, Spotless Hotel, De Link Motel, Fabian Hotel, OLujoda Hotel etc. locate strategically in the city to offer recreation and tourism opportunities to people.

As a result of economic, social and political transformation that is taking place in Ado-Ekiti in recent time, the city continues to witness physical expansion in terms of buildings, transportation network (roads) duplication of market places, social activities, religious activities and economic activities. The transformation system of the city is operating below average. This is because, vehicular traffic flow problems get to the peak at the city centre, where motorists spend an average working day (Ogunleye and Ibitoye, 2006).The traffic control measure along major roads in the city are not adequate, road network is in a deplorable condition and parking facilities are not adequately provided. All these are attributed to the fact that the upliftment of the city from a Local Government Headquarters Status to a State Capital in October 1996 did not transcend to infrastructural development (transport facilities) provision in the city. This particularly accounted for the vehicular traffic flow problems in the city.

Theoretical Framework/Literature Review

The theoretical framework for this study emanated from different models in geographical studies. The diffusion model by Haggerstrand (1967) and nearest neighbour analysis by Evans and Clark (1954) were employed in this study. It is the hierarchical diffusion which describes transmission through a

regular sequence or order of lease. This process is typified by the diffusion of innovations. For example, new methods of waste management trickle down from advanced societies to less developed societies. The developed countries have efficient waste management policies, which are gradually being adapted, in other countries of the world (expansion diffusion). With the present technological advancement and the trend towards globalization, waste management has improved over time.

The diffusion model could be applied to a non-linear function as "S-shaped" curve that characterized any diffusion process. This could be represented with the equation shown as;

Where:

P = proportion of people accepting a new innovation

T = the time, the process of innovation diffusion started, the two variables are linked by three parameters.

U = the upper limit

a = which determines the values of P, when T is zero.

b = a mathematical constant with a value 2.7183

The conceptual factor, which affects the operations of the PSP scheme mostly, is the distance factor to landfill sites. Its location will determine trip frequency time of haulage and invariably cost of transportation of the waste. Having realized this factor, government had decentralized the location of landfill sites. As at present, there are three landfill sites and PSP operators well encouraged to make use of the nearest landfill sites, so as to reduce time and cost and consequently, enhance efficiency. The mode of operation is in line with the distance decay concept, which according to Ayeni (2000), was based on a straight-line measurement of distance separating a phenomenon and the nearest neighbour space.

Adetokunbo and Herbert (2003) submitted that management of waste is a key element in the protection of public health, because failure to manage waste properly exposes people to increased risk of infectious diseases.

Ayodele (2007) stated that waste management is the selection and application of suitable techniques, technologies and management programmes to achieve specific waste management objectives and goals.

Wikipedia (2009) opined that waste management for non-hazardous residential and institutional waste in metropolitan areas are usually the responsibility of Local Government Authorities, while hazardous commercial and industrial waste is usually the responsibility of the waste generator.

According to Nwankwo (2004), improper disposal of solid waste constitutes 'serious threat to human health and to the achievement of sound environmental sanitation'. Igbanugo (1986) submitted that refuse dumpsites are converted to urinal and defection sites by destitutes, invaded by scavengers and animals, and served as breeding ground for disease vectors (flies, rodents, etc). Also, accumulated garbage and rubbish become eye sore in the community, and pollute the air, and act as breeding grounds for mosquitoes and other harmful insects; they also encourage street folding.

Methodology

Data for this study were collected from primary sources. The primary source of data includes field observation, and the administration of a total number of two hundred (200) interviewer questionnaires. Two sets of questionnaires were designed for this study. The first set of questionnaires were administered on thirty (30) selected members of Ekiti State Waste Management Board (ESWMB) in the study area, to obtain information on the categories of operators, the number of operational staff, the equipments used, their assessment of the performance of Ekiti State Waste Management Board (ESWMB), the Local Government Authority and the problems faced by the operators. On the other hand, a set of questionnaires were randomly administered on one hundred and seventy (170) respondents within the study area. This aimed at gathering information on waste generation, accumulation, and disposal of house hold waste materials, as well as the socio-economic background of waste generators in the study area.

Descriptive method of data analyses using frequency table and percentages were adopted to analyze the data.

Findings and Discussions

The results on how respondents within the study area dispose waste revealed that 70 (35.0%) dump waste in bushes, 50 (25.0%) use waste baskets, while 35 (17.5%) dump refuse in gutters/streams (See table 1). This implies that majority of the residents in the study area dispose their waste unlawfully, a habit which results into health hazards in the area.

Table 2 represents the results on how often waste management personnel come to evacuate refuse in the area. It revealed that 60 (30.0%) of the respondents stated once in two weeks, 50 (25.0%) of the respondents reported once in a week, 55 (27.5%) observed that it was once in a month, while 35 (17.5%) of the respondents have not noticed the presence of waste removing equipments in their area. The implication of this is that untimely evacuation of waste in the study area could be partly responsible for health hazards in the area.

The results on how solid waste disposal sites are managed by waste management personnel showed that 60 (30.0%) observed burning of solid waste materials, 120 (60.0%) stated by burial, while 20 (10.0%) noted abandoned solid waste site (See table 3). This suggested that the waste management personnel were doing their best to ensure that the environment is free from health hazards.

The results on how the public could be involved in waste management showed that 30 (15.0%) of the respondents stated payment for service, 100 (50.%) reported general environmental sanitation, 10 (5.0%) chose voluntary donation of tippers/lorries for use, 40 (20.0%) stated individual cleaning of surroundings, while 20 (10.0%) noted environmental awareness of the danger of improper solid waste disposal. This reflected that majority of the people solely depended on the monthly general environmental sanitation to tidy their surroundings.

The findings on the problems of solid waste management agency in the study area showed that 40 (20.0%) of the respondents noted shortage of vehicles, 20 (10.0%) observed shortage of waste containers, 60 (30.0%) of the respondents observed shortage of personnel, 50 (25.0%) of the respondents stated poor funding/encouragement by Government, while 30 (15.0%) stated lack of dedication to duty (As shown in table 5). This suggested that there is need to increase/improve on the level of facilities and human resources in the Waste Management Board, to ensure their success in their fight against health hazards from solid waste materials in the area.

Conclusion

Waste management plays an integral role in human activity. The overall view of solid waste management is to collect, treat and dispose solid waste by urban dwellers in an environmentally and socially satisfactory manner. Until recently, Nigerians have not been particularly concerned about proper waste management, open dumping and open burning in unapproved locations has

been the norms. The constraints to effective solid waste management are not limited to lack of policy or laws, but poor infrastructure, education, social awareness of problems and solutions, and lack of institution promoting sustainable environmental actions.

Recommendations

To achieve a sustainable solid waste management in Ado-Ekiti, there is need for:

- Strategic environmental planning of waste management practices in the study area.
- There is need to ensure strict adherence to guidance and cost analysis of solid waste options in the area.
- Community participation in collection, selection of sites and design of facilities is inherently essential for sustainability.
- There is need to strengthen the work force, by recruiting more personnel in the Waste Management Authority.
- Government should provide adequate funds for waste management personnel for the purchase of more evacuating vehicles and waste disposal containers.
- There is need for environmental and public health education on the danger of indiscriminate waste disposal in the study area.
- The waste management personnel should be well remunerated to motivate them to be more dedicated to their duty in the area.
- Strict environmental laws should be promulgated, to ensure an appreciable participation in the general environmental sanitation, as well as to bring violators to book in the area.

Table 1: How Respondents Dispose Waste in the Study Area

Issues	Frequency	Percentage
Dumping in bushes	70	35.0
Waste baskets/drum	50	25.0
Controlled dumpsites	45	22.5
Gutters/streams	35	17.5
Total	200	100.0

Source: Author's Fieldwork Report, 2010.

Table 2: How Often Waste Management Personnel Evacuate Refuse in the Area

Issues	Frequency	Percentage
Once in two weeks	60	30.0
Once in a week	50	25.0
Once in a month	55	27.5
Have not noticed their presence	35	17.5
Total	200	100.0

Source: Author's Fieldwork Report, 2010.

Table 3: How the Final Solid Waste Disposal Sites are Managed by Waste Management Personnel

Issues	Frequency	Percentage
Burning of waste materials	60	30.0
By burial	120	60.0
Abandoned	20	10.0
Total	200	100.0

Source: Author's Fieldwork Report, 2010.

Table 4: How Could the Public get Involved in Waste Management

Issues	Frequency	Percentage
Payment for service	30	15.0
General Environmental sanitation	100	50.0
Donation of lorries for use	10	5.0
Individual cleaning of surroundings	40	20.0
Environmental awareness	20	10.0
Total	200	100.0

Source: Author's Fieldwork Report, 2010.

Table 5: Problems of Solid Waste Management Agency in the Study Area

Issues	Frequency	Percentage
Shortage of vehicles	40	20.0
Shortage of containers	20	10.0
Shortage of personnel	60	30.0
Poor funding by government	50	25.0
Lack of dedication to duty	30	15.0

Source: Author's Fieldwork Report, 2010.

References

Adegoke, O.S. (1990): *Waste Management within the Context of Sustainable Development.* Department of Geology, Obafemi Awolowo University, Ile-Ife.

Adetokunbo O. L and Herbert M.G (2003): *Solid Waste Disposal. Short Textbook of Public Health Medicine for the Tropics.* 4th Ed. Kinson Press Lagos.

Adewumi I.K, Ogedengbe M.O, Adepetu J.A and Fabiyi Y.L, (2005): Planning Organic Fertilizer Industries for Municipal Solid Wastes Management: *Journal of Applied Sciences Research* 1(3): 285-291

Adeyemi S, Olorunfemi J.F. and Adewole T.O. (2001): Waste Scavenging in Third World Cities: A Case Study in Ilorin, Nigeria. *The Environmentalist* 21(2) 93-96.

Ayeni, B. (2000): Quantitative Methods for Geography Students, Ibadan, Research Support Services.

Cointreau S.J (1982): *Environmental Management of Urban Solid Wastes in Developing Countries: A Project Guide.* Urban Development Department, World Bank.

Ebisemiju, F.S. (1993): "Ado-Ekiti Region, Location, Extent and Setting". In Ebisemiju, F.S. (ed) Ado-Ekiti Region, Alpha-Print, Pp. 1-2.

Ekiti State Waste Management Regulations (Enforcement and Offences 2000): *A Law to Provide for the Establishment of the Waste Management Board and Waste Management Authority in Ekiti State of Nigeria.*

Federal Republic of Nigeria, (1999): *The Constitution of the Federal Republic of Nigeria.* The Federal Government Press.

Friends of the Earth (2006): Waste Management Methods. London, FOE.

GHT-AHT (2006): Solid Waste Management for LGUs in the Visayas. Social Acceptability of the Proposed Sanitary Landfill. http://www.emb.gov.ph/

Haggerstrand, T. (1967): On the onte Carlo Simulation Diffusion. Garrison and Marble, *Cited in Olatunji, A.J. (2006) On the Introduction to Theoretical Geography.* Akure, B.J productions.

Ogunleye O.S. and Ibitoye, O.A. (2006): The Pattern of Vehicular Traffic Flow in Ado-Ekiti, Nigeria. International *Journal of Social and Policy Issues*, Vol 3, Number 2, pp. 69-75.

Olanipekun J.A. Oyeniyi P. and Konwea P.E. (2007): Assessment of Solid Waste Management Techniques in Ekiti State Urban Areas. *Nigerian School Health Journal. 19(2) 75-82.*

Olarewaju O.O and Ilemobade A.A. (2009). Waste to Wealth: A Case Study of the Ondo State Integrated Waste Recycling and Treatment Project, Nigeria. *European Journal of Social Sciences,* 8(1) 7-16.

Oreyomi M.K, (2005): *Principles and Practice of Environmental Health.* 2nd Ed. Kingson Press.