

Policies, Practices and Challenges of Municipal Solid Waste Management in Nigeria

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Abstract: Municipal solid waste management in Nigeria has evolved from the need to protect public health and the environment. This paper examines the legislations, management activities and obstacles faced by municipal solid waste managers in Nigeria. Local and international statutes transform to a number of policies at national, state and local government level to enhance solid waste management. However, most urban centres experience low levels of collection service, moderate level of resource recovery and underdeveloped disposal method. Though the integrated solid waste management approach which focuses on treatment, composting, and recycling is proliferating in Nigeria, other challenges faced by municipal solid waste management authorities are enormous. A comprehensive solid management plan is needed in Nigeria which should be geared towards reducing the amount of solid wastes generated, optimization of collection operation, intensification of material and energy recovery from solid wastes, and environmentally sound disposal technique.

Keywords: Municipal solid waste, Management, Policy, Challenge, Nigeria

Introduction

Solid waste is generated primarily as a result of productive and consumptive activities from households, commercial establishments, institutions and industries. Over the years, increases in population and urbanization have led to a very large increase in solid waste generation. The pace of population growth and urbanization in most developing countries has been such that increasing environmental concerns for solid waste could not be properly addressed by many municipal governments. The result has been the increasing deterioration of urban centres in form of sanitation and environmental problems. On the other hand, majority of developed countries are able to cope with the financial commitment and technology required for the management of municipal solid wastes. Hence, health and environmental nuisance of solid waste is uncommon.

The concept of municipal solid waste management is essentially the engagement of various multidisciplinary activities to manage solid wastes from the point of waste generation to ultimate disposal point. The activities associated with the management of solid wastes consist of six functional elements (Tchobanoglous et. al., 1993): (1) waste generation; (2) waste handling and separation, storage and processing at the source; (3) collection; (4) separation, processing and transformation of solid wastes; (5) transfer and transport; and (6) disposal. However, the management of municipal solid waste takes different forms across the continent based on demographics, available economic resources and technology. Planning, design and implementation of solid waste management schemes vary from country to country and from city to city though the overall goal is to

reduce, store, collect, and process or dispose solid wastes safely.

Technological and economic advancement in Nigeria has led to the emergence of cities and urban centers which are continuously growing in size and population. Increasing environmental concerns for solid waste resulting from this advancement could not be properly addressed by many municipal governments. The consequence is an upsurge of sanitation and environmental problems. Over the years several strategies for solid waste management in urban centers within Nigeria have evolved. These strategies involved the active participation of households, public, private, non-governmental and community based organizations, and federal, state and local government agencies. The strategies include enactment of solid waste related policies, launching of monthly environmental sanitation, institutional reforms, and financial and infrastructural support to states. This paper presents in detail municipal solid waste generation, characteristics, policies and management strategies in Nigeria. The challenges faced by municipal solid waste managers are also presented.

Municipal Solid Waste Generation and Characteristics

Nigerians, like other people in different parts of the world generate solid wastes from various human activities. The increase in the volume of solid waste generated in Nigeria is attributable to population increase, urbanization and higher level of socio-economic activities (Yusuf et al., 2007). The population of Nigeria after 1991 and 2006 census was approximately 89 million and 140 million respectively. The figures represent an average annual population growth rate of 3.2% over the 15 year period. Nigeria equally has one of the fastest growing rate of urbanization in the

world. Cities such as Kano, Zaria, Sokoto, Maiduguri, Ibadan, Osogbo, Abeokuta, Oyo, Ilorin, Ile-Ife, Ijebu-Ode, Benin, Onitsha and Calabar emerged before the colonial era, while new urban centres such as Kaduna, Minna, Jos, Makurdi, Enugu, Aba, Owerri, and Port Harcourt emerged during the colonial era (Oluwasola, 2007). The post colonial era witnessed increased population, densification, commercialization, industrialization and political reforms leading to the creation of six states in 1967, ten more states and Abuja (FCT) in 1976, two additional states in 1987, twelve new states in 1991, and six other states in 1996. Against the background of these developments, the economic base of Nigeria has considerably changed. In fact Nigeria is regarded as the second largest economy in Sub Sahara Africa and accounts for 41% of the region's GDP.

Consequently, the output of solid wastes per day in Nigeria is about 69,000 tons based on generation rate of 0.49kg/capita/day (Solomon, 2009) and 2006 census figures. If Nigeria's GDP is correlated with municipal solid waste output, the output of solid waste in 2006 is about 72,827 tons per day. Both figures have given a similar estimate of the output of solid wastes in Nigeria and such amounts require efficient management strategies.

Municipal solid waste in Nigeria contains both biodegradable and non-biodegradable substances such as food residues, ferrous and nonferrous metals, wood, rubber, textiles, paper, plastic, and glass. The density of these wastes ranges from 250kg/m³ to 370kg/m³ (Ogwueleka, 2009). The average percentage composition of solid wastes from 20 states and the FCT is shown in the Figure 1. The result shows that approximately 59% of the wastes are organic, 30% are inorganic and 11% are miscellaneous wastes.

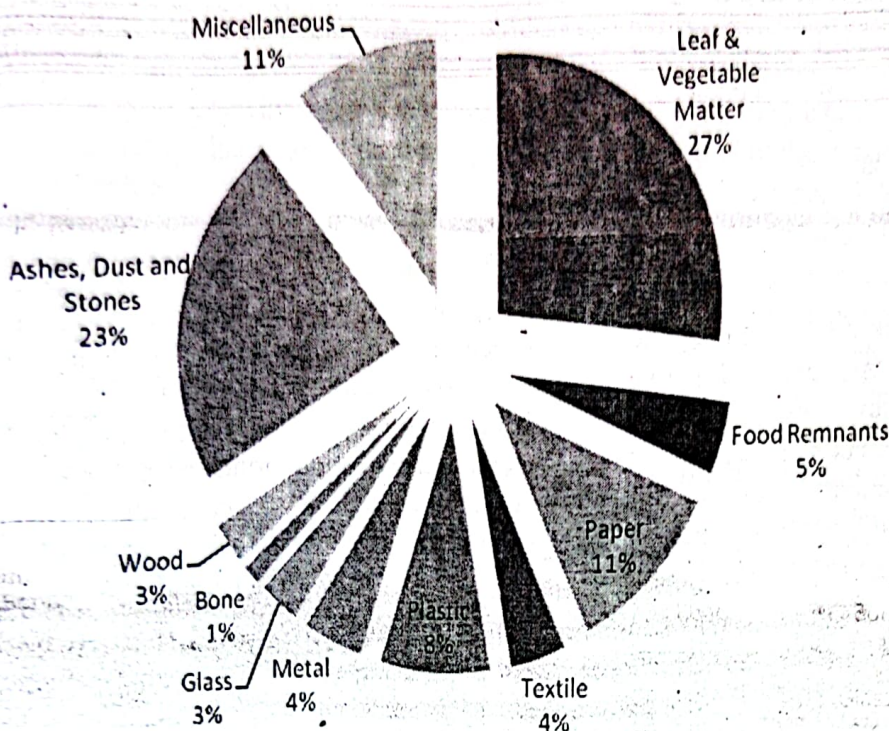


Figure 1. Composition of solid waste in Nigeria

Source: Adapted from Oyinlola (2001)

Government Policies on Municipal Solid Waste Management

The two major sources of solid waste management policies in Nigeria are local and international statutes. Local statutes are decrees or constitution of the Federal Republic of Nigeria containing laws and acts of the government relating to environmental protection which also address solid waste management problems. Local statutes include acts, decrees, edicts and laws passed during the pre-colonial era, during the colonial era and after independence by successive Nigerian government. International statutes are agreements, protocols, and conventions such as the Basel convention on the control of transboundary movement of hazardous wastes (1989), Bamako convention (1991), Rio Declaration of 1992 and Millennium Development Goals (MDGs) ratified by Nigerian government.

The pre-colonial era had organized indigenous decision making institutions under kingdoms, chiefdoms and elders to deal with refuse accumulation, sewage disposal and environmental sanitation (Adedayo, 2000). The colonial era witnessed the enactment of laws and acts which includes statutes such as Public Health Act of 1917 and Water Works Act of 1915 (Atsegbua et al., 2004). Nigeria has a history of military government (1966-1979; 1983-1999) and during these periods, the Federal Military Government could make laws on any matter in form of Decrees. Examples are the FEPA Act of 1988, Harmful Waste (Special criminal provisions) Act of 1988, and various state environmental sanitation edicts. Under the civilian administration, the Federal Government can make laws on matters contained in the exclusive legislative list, or any incidental or supplementary

matter while both Federal and State Governments have the power to legislate on matters contained in the concurrent legislative list (Atsegbua et al., 2004). It therefore means that solid waste management policies could fall under incidental or residual matters which are under the jurisdiction of the Federal Government. More specifically, among the fundamental objectives and directive principles of state policy contained in the 1999 Constitution of the Federal Republic of Nigeria, is Environmental Objectives. Chapter II, Article 20 of the Constitution of Nigeria states that: *the state shall protect and improve the environment and safeguard the water, air and land, forest and wild life of Nigeria.*

Consequently, the first tier of government (Federal Government) is responsible for guarding and enhancing the Nigerian ecosystem. In the last decade, the establishment of the Ministry of Environment in 1999 and signing into law the Act which established the National Environmental Standards and Regulations Enforcement Agency (NESREA) in 2007, are examples of the exercise of executive and legislative powers by the Federal Government. In like manner, the responsibility of sewage and refuse disposal is vested on the Local Government which is the third tier of government as contained in the Fourth Schedule, Section 1h of the 1999 Constitution.

The illegal dumping of toxic wastes of Italian origin at Koko, Delta State prompted the Federal Government to pass the Federal Environmental Protection Agency (FEPA) Decree in December, 1988. Previously, the management of the environment was dispersed over several ministries but the Decree mandated FEPA to work out rules to handle the nation's environment. Hitherto, FEPA became the

apex organization charged with the responsibility of protecting the Nigerian environment. FEPA was made an integral part of the presidency in 1992 and in 1999, it was upgraded to Ministry of Environment. With regard to municipal solid waste management, FEPA's responsibility is that of regulation, prescription of guidelines and standards, advising industry on the technology for solid waste disposal, formulating policy strategies for compliance promotion and monitoring the enforcement of environmental laws. The 36 states of the federation, the Federal Capital Territory, and the 774 Local Government Areas of the country were encouraged by Section 24 of the FEPA Act to establish environmental protection bodies. Therefore, state and local governments can enact solid waste management edicts, prescribe and enforce environmental standards, and issue fines for the violation of enacted laws.

The responsibility for the enforcement of federal environmental laws which was previously vested on FEPA, was later transferred to the Ministry of Environment. This responsibility is now being taken over by the National Environmental Standards and Regulations Enforcement Agency (NESREA) which is a parastatal under the supervision of the Federal Ministry of Environment. In the states, solid waste management board, state environmental protection agency, the Ministry of Environment, special task force, mobile / special court or committee is responsible for prosecution, compliance or monitoring of state edicts. Local governments equally have sanitary inspectors whose roles and functions are essentially to monitor local government bye-laws on sanitation, health and the environment.

Municipal Solid Waste Management Practices

Storage and collection of solid waste

Solid waste storage is the first step in the management process once it has been generated and it represents a temporary confinement to prevent environmental and health impact. The containers used for storage of solid wastes are plastic containers, galvanized steel drums, baskets, buckets, communal bins, and waste depots. Communal bins and waste depots are used for storage of bins where the generation rate is high such as markets, commercial roads, and public places. In Ilorin, 30ton tipper trailers are stationed at markets for onsite storage and collection of wastes; refuse dumps are located near some major markets in Benin, Kano and Lagos State. The use of 0.4m^3 (dust bins); less than 1m^3 (large bins); 1 to 40m^3 (big metallic containers) and 16m^3 built-up dumps is prominent in Nigeria for storage of wastes prior to collection (Agunwamba, 2003) while the use of 120litres and 240litres plastic bins, and 1.1m^3 metal bins is common in the nation's capital city (Imam, et al., 2008).

Collection of solid waste represents the movement of solid waste from the point of storage to a treatment or disposal site and it accounts for the highest cost involved in solid waste management. Solid waste collection is relayed through private, public, or private-public partnership system. As a public system, it is regarded as a social service to low-income parts of the city. State or local governments provide municipal waste bins at designated service points for the storage of solid wastes from commercial, institutional and residential areas. As a private system, it is a contractual arrangement between individual(s) and a firm. The operation of this system is prevalent in middle income and high income neighbourhood of urban areas. The method of

operation by contractors is the curbside or house-to-house collection especially for high income areas and well planned areas like Bodija in Ibadan, Ikoyi in Lagos, Ihama in Benin, New Haven in Enugu, Rumu Ogba in Port Harcourt, Sharada in Kano, Eastern Bye Pass in Kaduna, Dutse Kura in Minna, Asakoro and Wuse districts in Abuja, and all Government Reservation Areas (GRA) across the country.

Cities like Uyo, Aba, Awka, Kaduna, Sokoto, Lagos, Port Harcourt, Owerri, Ilorin, Ibadan, Niger, Ado-Ekiti, and Akure have adopted Public Private Partnership (PPP) in solid waste collection. The contractual arrangement and operation varies from city to city, but it shows a significant shift from entirely public or private system of solid waste collection. The most prevalent arrangement is one which the state, local government, or parastatal or ministry perform oversight functions while the private waste manager collects solid wastes with no user fee from waste generators. The Federal Government of Nigeria is presently experimenting with privatization as it has instituted the National Integrated Municipal Solid Waste Management Intervention programme in Maiduguri, Kano, Kaduna, Anambra, Uyo, Ogun, and Lagos State (Ogwueleka, 2009). The vehicle used for collection of solid wastes include side loaders, open tippers, container trucks or compactor trucks (Agunwamba, 2003). Other means of conveying solid wastes (mainly by the informal sector) are the use of wheel barrows, push carts, and tricycles (Imam et al., 2008).

Resource recovery from solid wastes

Resource recovery is the conversion of solid waste components to energy, fuels and other valuable products, as well as the recovery or salvage of existing materials (Oyinlola, 2001). Nigeria has no policy on

waste reduction, recycling and composting, and no organized solid waste disposal system (Agunwamba, 1998). Therefore, most recycling, re-use, and composting operations are not practiced as a solid waste management strategy but for economic gains by the informal sector. An average waste picker in Enugu could earn ₦500 - ₦700 daily, ₦3000-₦4200 over a six-day workweek and about ₦12,000- ₦16,800 monthly which is almost twice the minimum wage of some cities in Nigeria (Nzeadibe, 2009).

The Federal and State Governments have equally initiated efforts to build formal resource recovery facilities throughout the nation. These facilities include the composting and plastic recycling plants in Ibadan, the abattoir waste recycling plant in Port Harcourt, the organic waste recycling plant in Kaduna, the integrated waste management facilities in Aba and Ibadan

(Solomon, 2009), the material recovery, recycling, composting and sanitary landfill facility in Lagos, and the Integrated Waste Recycling and Treatment Project (OSIWRTP) in Ondo State.

Reuse of materials in Nigeria is mostly practiced at house hold level though it is absolutely an informal technique. Items reused are bottles, cans, plastic bags and containers, worn out clothes and tyres. Scavengers either separate the salvageable wastes at storage points or dumpsites or buy them from households. The scavengers and "waste buyers" sell to middle men who in turn sell to industries. The report of the Urban Development Bank of Nigeria (UDBN, 1997) presented in Table 1 shows some items recovered from solid wastes and the corresponding recycled products in Nigeria.

Table 1 Some items recovered from solid wastes in Nigeria and the new products

Item	New/ recycled products
Used newspapers, magazines and waste paper	Toilet paper and packing materials
Plastics	Water containers, shoes, plates and pipes
Aluminum	Cooking pots, kettles, ladles and spoons
Scrap iron	Foundry products
Kerosene and vegetable oil tins	Funnel, containers, lamps
Bottles and glasses	Ash trays, cups and bottles
Rubber	Sandals, swings and boat bumpers
Bone	Bone ornaments and feeds

Source: UDBN (1997)

Composting is a means of recycling biodegradable materials found in municipal solid waste. These biodegradables improve the overall soil fertility through the addition of organic matter and plant nutrients. In the past, composting as a form of solid waste management or enterprise has scarcely been practiced in Nigeria, although a greater portion of solid wastes contain compostable materials. At present, composting facilities

can be found in some cities such as Lagos, Ibadan, Akure and Kaduna. Composting is the preferred method of recycling organic waste in Akure and these wastes are turned into organo-mineral fertilizer for agricultural use by semi-mechanical windrow, curing and milling operations (Olanrewaju and Ilemobade, 2009). Composts have also been used as feed for fish by fish farmers in some parts of Nigeria.

Disposal of solid wastes

Household waste burning is widely practiced in Nigeria especially in the dry season as a form of reducing the volume of combustibles in solid wastes. Incineration reduces the weight of solid wastes to between 50-80%, the volume to between 70-80%, and the residual ashes are used for landfilling (Ologhobo, 1997). Previous formal efforts to develop incineration as a method of waste management in Nigeria have not been successful. For example the three incinerators built in Lagos in 1979 were never used, two were dismantled in 1989 and the third was converted to a civic centre (Ogwueleka, 2009). However, recent incinerators provided by the Federal Government could be found in the National Hospital Abuja, and National Orthopedic Hospitals in Kano, Enugu and Lagos State (Solomon, 2009). Land filling and open dumping are the most common forms of solid waste disposal in all urban centers of Nigeria. Official or approved disposal sites in Nigeria are conceived to be unsanitary and uncontrolled dump sites. These disposal sites are sources of leachate, smoke and odour which pollute the environment. Scavengers are also found salvaging useful items from the comingled wastes thereby exposing themselves to health hazards.

Challenges of Managing Municipal Solid Waste

Most urban centers in Nigeria are witnessing environmental degradation and the burden of diseases associated directly or indirectly with solid waste because of the inability of municipal authorities to cope with enormous amount of generated wastes. Though several instruments of intervention have been put in place by government especially in unplanned and high density areas where the generation rate is high, the management of solid waste is persistently

presenting challenges to the government of Nigeria and the populace. The primary reason is the weak regulatory framework and curtailed legislative provision for the management of solid wastes in Nigeria. More so, the existing policies are inadequately formulated and the implementation has been unsuccessful because the economic, social, psychological, political and cultural life of Nigerians was neglected in the formulation stage (Agunwamba, 1998).

The major challenge faced by state and local government waste management authorities is the lack of necessary logistics and financial backing to collect and dispose wastes generated from different parts of the city. Municipal solid waste collection and disposal is regarded as a social service; in many cases no fee is paid by solid waste generators and waste management authorities rely solely on government subvention. Also there is no resource recovery effort by the government to offset the cost of solid waste management. These authorities are faced with the financial demand to pay wages of workers, procure or maintain collection vehicles and other equipment. In order to meet solid waste generation demands, collection vehicles are often strained and about 60% of these vehicles are out service at one time due to harsh road conditions and overuse (Ogwueleka, 2009). When the level of municipal solid waste collection fails, it is common to find uncollected solid wastes along the shoulders of streets and highways. The heap of uncollected solid wastes becomes a nuisance to human health and the environment. These wastes decompose to create offensive odors, provide breeding places for rodents, flies, and some wastes are blown around by wind. Waste pickers and stray animals contribute to scattering of wastes when searching for sellable materials

and food respectively. The displaced wastes block drains, and contaminate both surface and ground water thereby degrading the environment.

Lack of adequate data on demographics, solid waste generation rates, and waste composition are equally obstacles when planning for sustainable solid waste management. There have been scanty and contradictory reports on these decision data in Nigeria. Therefore, most municipal solid waste management systems are designed and operated without a clear knowledge of these data. Hence, inefficient and ineffective strategies are applied to municipal solid waste management in some areas in Nigeria. The environmental set up of Nigerian cities is a challenge to municipal solid waste managers. Most cities in Nigeria are known to have developed before the emergence of land use districting. Therefore, the older parts of most of these cities are densely populated, unplanned and have narrow or no arrangements for roads. This makes it impossible for collection vehicles to gain access to waste generation points within these areas. To solve this problem, most cities authorities now place large moveable containers at designated service points along the shoulders of accessible roads for the storage of municipal solid waste. The collection of the moveable type of waste bin requires a round trip to the disposal site for each collection operation. This poses a greater economic and environmental challenge because more funds are required to purchase fuel (diesel) and more exhaust gases are released to the environment during diesel combustion. These exhaust gases contribute to the development of cancer, cardiovascular and respiratory health effects; pollution of air, water, and soil; soiling; reductions in visibility; and global climate change (Lloyd and Cackette, 2001).

Generally, solid waste disposal practice in Nigeria is actually the transfer from the urban area to the outskirts of the town where there is space for dumping of the wastes and the environmental nuisance level is minimal. Most disposal sites are open dumps which are uncontrolled, environmentally unacceptable and collection vehicles have to travel long distances to these sites. Inadequate infrastructure such as motorable road, air and water pollution control devices at the disposal site are challenges to municipal solid waste managers. The road is usually unmotorable or marshy during the rainy season. Accidental or intentional burning of wastes at the dumps cause air pollution while organic wastes generate greenhouse gases and untreated leachates pollutes surrounding soil and water bodies (McLeod et. al., 2006).

Conclusion

Municipal solid waste management in Nigeria is regarded as an economic, environmental or sanitation issue. Hence policies which are derived from local and international statutes have been put in place by successive governments in Nigeria to enhance solid waste management. Yet, these policies are incomprehensive and the institutional framework is ever changing. State and local government agencies and the informal and private sector provide solid waste management services to the public. However, they are faced with several challenges which are responsible for the present low levels of collection service, moderate level of resource recovery and underdeveloped disposal method. A comprehensive solid management plan is proposed which should be geared towards reducing the amount of solid wastes generated, optimizing collection operation and resource recovery from solid wastes, and sanitary landfilling as the last resort.

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