

## Full Length Research Paper

# Management and Disposal of Municipal Solid Wastes in Abakaliki Metropolis, Ebonyi State, Nigeria

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**Abstract.** Proper waste management is a fundamental key to environmental sustainability. In this study, the municipal solid waste management and disposal methods in Abakaliki Metropolis, Ebonyi State, Nigeria is presented. The characteristics and composition of these wastes and the environmental issues associated with its management are also investigated. Structured questionnaires were used to obtain primary data from a random size of population in the areas that have the highest accumulation of heaps of solid wastes in the Government designated waste dumping sites and open spaces on the major streets within the metropolis. Environmental and health issues arising from the unsustainable management of the wastes were assessed from oral interviews and field observations in the study areas. The results indicates that the waste dump sites (designated and non-designated) on the major streets and several open spaces are left unattended for long periods such that the rubbish heaps; encroach on the roads thereby limiting the road users access, generate serious air pollution issues, constitute significant nuisance when blown over by winds, and distorts the aesthetic view of the metropolis. The results also show that the composition of the wastes in the metropolis is heterogeneous because it contains both biodegradable and non-biodegradable materials such as e-wastes, plastic, polythene materials, hospital wastes, and hair designers wastes amongst others. The study strongly recommend that Ebonyi State Environmental Protection Agency (EBSEPA) be made to sit up on their functions while Government should strongly consider introducing “waste to energy” as a way of curbing the menace of waste management and simultaneously solving the energy needs of the State.

**Keywords:** Ebonyi State, Environment, Municipal solid waste, Waste management

## 1. INTRODUCTION

Municipal solid waste disposal is a common problem in most third world countries. In Nigeria, the problem of municipal solid waste disposal has been a persistent battle over the years, with successive Governments applying different approaches in a bid to eradicate the scourge. However, effective waste to energy has not been holistically embraced by the Federal, State and Local governments as a way of putting these wastes to sustainable use in all the state capitals and local government headquarters. Several scholars have reported on the indiscriminate nature of waste disposal and unsustainable waste management in Nigeria (Ogwueleka, 2009; Anikwe and Nwobodo, 2002; Amoo and Fangbale, 2013; Olurutunde et al 2013; Ohakwe, 2011) with limited reports on municipal solid waste management and disposal in Ebonyi State (Nwofe, 2013, 2014; Akanmu and Shridah, 2002, Elom, 2013). Sustainable management of solid waste is critical to the health and well-being of the urban residents, the environment, and in

revenue and power generation. The negative health effect on the waste pickers that depends on these wastes as a major source of living (the less-privileged peoples in the society) has been highlighted by several research groups (Nzeadibe et al, 2012; Moughalu and Okoye, 2010; Nzeadiba, 2009; Coker et al, 2009; Kofoworola, 2007). Kadafa et al., (2013) noted that solid waste management is a global issue and that it is a growing source of concern in developed and developing countries due to the increase in urbanization, changes in consumer pattern, and industrialization which all directly translates to an increase in solid waste generation.

Abakaliki metropolis just like most cities in the developing economies, generates several tons of municipal solid waste which are left uncollected at the designated and in the undesignated waste dumping sites in each day. These unattended heaps of waste leads to; clogging of drains and gutters, creating feeding ground for pests that spread disease thereby generating a myriad of related health and infrastructural problems, the solid wastes in most

cases are being blown around by winds or rainstorm making the environment dirty, and air pollution arising from the decay of these waste to emit poisonous gases to the environment. This could also increase the volume of greenhouse gases (GHGs) in the atmosphere and consequently increase the risk of climate change.

Planning and management of solid waste in developing countries has remained a herculean task due to the unchecked exponential growth of urban population, unplanned urbanisation, lack of training in modern solid waste management practices, lack of awareness on the dangers of unsustainable waste management practices, poverty, illiteracy, and poor Government support amongst other factors. Also lack of data on waste management and little or no research on waste management is another factor militating on planning and management of wastes. Other authors have highlighted relative/similar concepts (Nabegu, 2008, 2010; Nabegu and Wudil, 2008; Imam et al, 2008; Uwadiogwu and Iyi, 2014; Nwoke, 2013).

### 1.1. Institutional framework for waste management in Abakaliki Metropolis

Abakaliki metropolis is the capital city of Ebonyi State. Ebonyi State is located at longitude 6°25'N and latitude 8°08'E ([www.distancefrom.com/ng/Ebonyi-State](http://www.distancefrom.com/ng/Ebonyi-State)). It has a population of 2,176,947 based on the 2006 census (National Population Commission, 2006, National Bureau of Statistics, 2010) and a land mass of 5533 km<sup>2</sup> (Wikipedia.org). Figure 1 shows the location of Ebonyi State in Nigeria. The institution responsible for waste management in Ebonyi State is the Ebonyi State Environmental Protection Agency (EBSEPA). It is a state parastatal attached to the office of the Executive Governor, charged with the responsibility of ensuring a safe and sustainable environment in the State. The agency has six departments; (i) engineering, ecology and natural

resources conservation, (ii) pollution control and waste management, (iii) research and development (R&D), (iv) personnel management/administration, (v) finance and supply, and (vi) planning, research and statistics. One of the major functions of EBSEPA is solid waste management and disposal. Several waste dump sites were designated by Government within the metropolis while regular check and evacuation of these wastes from such sites is expected to be done by EBSEPA staff on a monthly basis. However, it is sad to note that these wastes are either evacuated on random basis after a very long time or left unattended to, depending on the area that it is located. Lack of proper town planning in Abakaliki metropolis by Abakaliki Capital Territory Development Board is another significant factor. The bill passed in 2007 stipulates that areas that fall within 50 km radius of Abakaliki, falls within the new capital city, as the amended law 002 of 2014 expanded the radius to 1,625 km ([www.dailyindependentnig.com](http://www.dailyindependentnig.com)). The Board was vested with the responsibility of ensuring that new streets and buildings are carefully planned in way that will ensure sustainable development.

However, a substantial part of the urban residents in the old and new Kpiri-Kpiri areas, and suburban informal settlements of Abakaliki metropolis (Amike-Aba, Ntezi, Oroke-Onuha, Off Mile 50 Layout, Agbaja Unuphu, Nkwagu, Onu-ebonyi, and Nkaleke-Unuphu) have limited access to solid waste collection services. This is due to lack of proper land use/town planning by the appropriate authorities. This has resulted in the proliferation of informal settlements that are characterised by random buildings with narrow streets and blind alleys which makes it difficult for collection trucks to reach many areas. The consequence is that a large proportion of the population is left without access to solid waste management services, thus making them particularly vulnerable to the negative effect of such practice.

**Table 1:** Composition of Municipal Solid Wastes in Abakaliki Metropolis

Biodegradables	Non-biodegradables
Food scraps	Polythene bags
Worn-out clothes	Sachet water bags
Ash	Rubber items
Vegetables	Plastics
Sawdust	Bottles
Charcoal	Can
Leaves	e-wastes
Wood	Worn-out footwears
Used cartons/cardboard boxes	Worn-out tyres
Metallic materials	Tile debris

Source: Fieldwork 2014.



Fig. 1: Map of Nigeria indicating Ebonyi State. ([www.ebonyionline.com](http://www.ebonyionline.com))

The nonchalant attitude of the EBSEPA staff towards monitoring and evacuation of municipal solid wastes within Abakaliki metropolis has attracted the attention of the national dailies in Nigeria (<http://www.vanguardngr.com/2014/08/fear-epidemic-refuse-takes-abakaliki-metropolis/>).

## 2. MATERIALS AND METHODS

### 2.1. Site description

In this study, oral interviews from selected residents of some major streets in Abakaliki metropolis where these solid wastes dump sites are commonly seen unattended for very long periods were used as primary source of data.

### 2.2. Sampling preparation

In particular, one hundred people were randomly selected and interviewed on the critical aspects of municipal solid waste management and disposal such as; evacuation of the waste from the dump sites, composition, disposal methods, environmental impacts and management of the municipal solid waste in Abakaliki metropolis. Other relevant primary source of data used in the study were extracted from the field observations of the municipal solid waste in the waste dumping sites where the composition, dump sites, and typical environmental issues in Abakaliki metropolis where photographed. Some heads of departments in EBSEPA were also interviewed especially on issues of waste evacuation from the dump waste sites, legislation and enforcement of existing laws, data analysis and Government support. Due to limited

research work in the literature on municipal solid waste management and disposal in the study area, very few secondary data was used in the analysis. Some relevant data on solid waste disposal was also obtained from the monthly reports of the Ebonyi State Environmental Protection Agency.

### 2.3. Analytic methods

Microsoft excel was used to analyse the data, thus the sources of the municipal solid waste in Abakaliki Metropolis is shown in Figure 2. The composition of municipal solid wastes in Abakaliki Metropolis is shown in Table 1 while Table 2 gives the response of residents on the disposal method.

## 3. RESULTS AND DISCUSSIONS

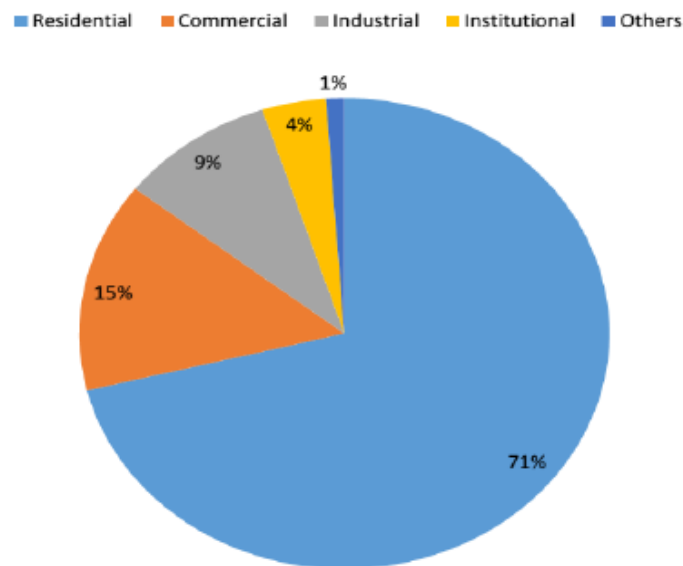
### 3.1. Sources of Municipal Solid Wastes in Abakaliki Metropolis

The sources of municipal solid waste in the metropolis were obtained from the analysis of the physical observation of the composition of the wastes in each waste dump site. The analysis revealed that a greater percentage of the wastes emanate from the residential sector (71%), followed by the commercial sector (15%), industrial (9%), institutional (4%) while other miscellaneous sectors account for (1%). This is illustrated in Figure 2. Ebonyi State is an agricultural town popularly known for rice production hence the popular “Abakaliki rice”. The State is also known as the “salt of the nation” owing to the large deposit of salt in “Enyigba” in Abakaliki Local Government area and the “Uburu salt lakes” in Okposhi. The debris from these mines and agricultural wastes from the

various rice mill industries are not contained in the wastes in all the waste dump sites used in this study because the metropolis is far from these areas. However, there are large mountains of rice husk waste in Abakaliki rice mill industry within the metropolis. A typical example of such rice husk hills is shown on Figure 3. The State has very few industries and

within the metropolis, only food processing industries such as sachets water, fast food, abattoirs, cassava, beans and maize processing plants are some of the major industries. Waste from the commercial sector is also significant because the metropolis currently has many motor parks as only automobile constitutes the transport sector.

**Sources of Municipal Solid waste in Abakaliki Metropolis**



**Fig. 2:** Sources of Municipal Solid Wastes in Abakaliki Metropolis  
 Source: Fieldwork 2014.

**Table 2:** Response of residents on disposal method

Site	%
Authorised waste dump site	39.5%
Unauthorised waste dump site	54.5%
Open burning	4.75%
Land fill	1.25%

Source: Fieldwork 2014.

### 3.2. Composition of Municipal Solid Wastes in Abakaliki Metropolis

Physical observation of the municipal solid waste in the waste dump sites indicates that the wastes are mostly composed of biodegradable and non-biodegradable materials. Figure 4 gives a typical picture of the wastes in one of the waste dump sites. The biodegradable and non-biodegradable material that constitutes the wastes are shown in Table 1. The biodegradable contents can be harnessed to more useful avenues by introducing appropriate technologies for processing them into bio-fertilizers or as a source of green energy through landfill technology or other waste to energy routes. This will also serve as a potential source of job creation and revenue generation for the State. The need for

conversion of waste to more useful forms to ensure sustainability in Nigeria have been widely discussed in the literature (Nwulu and Agboola, 2011; Nwofe, 2014; Taiwo, 2011; Abah and Ohimain, 2011; Ezeah and Roberts, 2012, Nnaji et al, 2012). The non-biodegradables could be recycled after being assembled by the waste pickers. However, it is unfortunate to note that the waste pickers are not currently recognised by Government and there is no on-going recycling programme in Ebonyi State. The observations in this study are in agreement with the reports of other authors in the literature. Nabegu (2010) reported that analysis of municipal solid waste in Kano metropolis indicates that they are made up of organic and other biodegradable matter (43%) and the 57% non-biodegradable made up of substantially dirt, ash and other household trash.





**Fig. 3:** Mountain of rice husk in Abakaliki rice mill



**Fig. 4:** Solid waste dump sites in Goddy Ogbaga Avenue, Abakaliki Metropolis

### **3.3. Impact of Unsustainable management of Solid Wastes in the Metropolis**

The negative effect of unsustainable waste management in Abakaliki metropolis is manifested in; environment pollution, road encroachment, air

pollution, health, and in residential land encroachment.

#### **3.3.1. Environment pollution**

Public display and dumping of any type of waste in an open space is a big threat to the environment. This is

because the wastes creates a sore sight within the vicinity, pollute the air, and the environment in that the solid waste may decompose to emit greenhouse gases which contributes to climate change. Moreover, most of the non-decomposable solid wastes may contain harmful chemical elements which have severe health implications for humans. These heaps of solid wastes also serve as good breeding grounds and hideouts for reptiles, rodents, and other dangerous insects such as mosquitoes and flies.

### **3.3.2. Road encroachment**

Roads are designated routes that are created or designed intentionally for the purpose of travel by

humans either with foot, bicycle, motorcycle, motor vehicle or other mechanical devices. Roads should be clear of any obstructing materials for increased access and visibility in order to reduce the risks of accidents or other physical harm to the road users. However in most developing countries, the scenario is different. In Abakaliki metropolis, municipal solid waste do encroach the roads even in the major streets with the consequence that a very narrow part is left for pedestrians and motorists to use. A typical picture of such case is shown on Figure 5. This will surely put the road users to more risks of accidents or injuries.



**Fig. 5:** Waste encroached road in Abakaliki Metropolis.

### **3.3.3. Air pollution**

Air pollution simply refers to when air is made unfit for human consumption. This could be due to emission of toxic substances, decay of waste materials, burning or by other factors. Waste disposal in Abakaliki metropolis is mostly done by primitive methods with little technological approach by few institutions (hospitals). Open burning of waste is commonly seen within the city and these generate serious greenhouse gases and other hazardous gases that pollute the air within the vicinity. Some research

groups has reported on this ugly trend in the literature (Elom, 2013; Nwofe, 2014; Nnorom and Osibanjo, 2008; Ogwueleka, 2009; Adedigba et al 2010; Ogbonna, 2011; Okeh et al, 2014). Waste dump sites are not supposed to be located very near to residential areas and waste dump bins should be covered. In Abakaliki metropolis, waste dump sites are randomly scattered very close to residential homes and public buildings. Figure 6 gives a typical picture of such waste dump sites in Amagu Street in one of the government reserved areas within the metropolis.





Fig. 6: Waste dump site in Amagu Street, Abakaliki metropolis



Fig. 7: Waste dump site near New Layout Primary School, Abakaliki metropolis.

#### 3.3.4. Residential land encroachment

Lands are used for different purposes with the objective of deriving maximum benefit from it. In the urban areas, land is always more expensive to acquire compared to the rural areas hence the need to maximise the space available for residential or other purposes. However in Abakaliki metropolis, large area of land has been lost to solid waste dump sites. A

typical example is the waste dump sites near New Layout Primary School shown on Figure 7. Such large space of land could be utilised for residential purpose if a sustainable method of waste management is put in place. Different capital cities in Nigeria are not devoid of such practice. Recent work by Butu and Msheila (2014) indicate that municipal solid waste has deeply encroached on residential land in Kano metropolis. Other research groups have also reported similar



observations for other States in Nigeria (Hilkiah Igoni et al, 2008; Ogundiran and Afolabi, 2008; Longe and Balogun, 2010; Osueke and Ezeugwu, 2011) and in other West African countries (Asase et al., 2009; Baodi and Kutinen, 2003; Post et al., 2003, Gogra et al, 2010; Gbanie et al., 2013; Kapepula et al., 2007; Soumare, 2003; Mensah, 2006).

### 3.4. Recycling

Recycling simply means re-using already used or discarded materials. Waste management can be improved in developing countries if recycling is practiced effectively. Enforcing a recycling culture in Abakaliki metropolis will definitely reduce the volume of solid wastes and also reduce the cost of raw materials used in producing such items. Recycled materials from these waste is only possible (on a low scale) because of the waste pickers who pick these items and then display them in any open space within the metropolis so that people that need them could come and buy. Figure 8 gives a picture of yet-to-be recycled items picked from the debris by waste pickers.

### 3.5. Waste disposal practice in Abakaliki Metropolis

As indicated earlier, the agency responsible for waste and refuse management, and sanitation in Abakaliki metropolis is EBSEPA. The agency amongst other contributions, established that solid waste in Abakaliki metropolis is to be dumped by the public at designated waste dump sites for collection by EBSEPA staff. The State Government through the

agency, established a law that a regular sanitation exercise be carried out on the last Saturday of every month in Ebonyi State. Despite these measures, it was observed in this study that wastes were dumped in the open space, on the street, and at close proximity to the residential houses and even public places within the metropolis. In the suburban informal settlements of Abakaliki metropolis (Amike-Aba, Ntezi, Oroke-Onuha, Off Mile 50 Layout, Agbaja Unuphu, Nkwagu, Onu-ebonyi, and Nkaleke-Unuphu), EBSEPA collection containers are hardly seen in these areas and wastes are dumped indiscriminately at strategic corners. Table 2 gives the perception of the residents interviewed on the extent of coverage in the provision of waste collection services in Abakaliki metropolis. Physical observation from the field work indicates that despite the availability of EBSEPA collection containers in some of the designated waste dump sites, the waste are thrown in a random manner and these heaps of waste then blocks free access to the actual waste points/ EBSEPA collection containers. In the undesignated waste dump sites, the waste are just piled up and open burning is used to reduce its volume periodically. According to the respondents, the landfills are mostly done using scraps from demolished buildings and other associated solid wastes. They also noted that the wastes are not evacuated from the waste dump sites by EBSEPA staff on a regular basis and that EBSEPA collection containers are too high thereby making it difficult to put those wastes inside the containers. The current waste disposal method could deteriorate as more illegal waste dumping sites is expected to emerge due to unchecked urbanisation, population explosion, and illiteracy among other factors.



**Fig. 8:** Picture of yet-to-be recycled items at Nnorom Street, Abakaliki metropolis.



#### 4. RECOMMENDATIONS

Ebonyi state government has taken strong steps through her support on the agency responsible for municipal solid waste management and environmental sanitation of the State. However since the situation has not improved, more work still need to be done hence the following steps are recommended;

(a) Government should embark on widespread enlightenment campaign on the dangers of unsustainable waste management to the environment, residents, and the general public.

(b) Government should introduce tough recycling policy and ensure that the law is strictly adhered to by all. This will reduce the volume of wastes in the waste dump sites, make it easier for the waste materials to be feed back in the production chain, and also reduce the cost of production of the materials involved due to reduced raw materials need.

(c) The state agency responsible for waste management and sanitation should wake up to the challenges and ensure regular evacuation of the wastes in those dumps sites.

(d) Government should invest in waste management for energy and revenue generation. Ebonyi State government should emulate from Lagos State where wastes are currently being used to generate significant amount of energy (Tobore, 2012). This will save the state from environmental degradation and help to create more jobs, generate income and power.

(e) Government should assist the agency (EBSEPA) by equipping her with more advanced facilities such as combustor which could be cited at different locations of the dump sites. Combustors are utilised in the burning of municipal solid waste at extremely high temperatures to reduce the waste volume, control bacteria, and sometimes lessen the burden of waste transport. The agency should be equipped with modern waste evacuation trucks, increase the workforce, and also add more interest in R&D.

(f) Provision of more friendly EBSEPA collection containers will help to reduce random build up of waste in the waste dump centres.

(g) Involvement of non-governmental organisation (NGO) to boost more financial access to residents interested in sustainable waste management projects such as in biogas production for domestic use.

#### 5. CONCLUSIONS

Management and disposal of solid waste in Abakaliki metropolis has been investigated and the findings show that the municipal solid wastes are mostly composed of the biodegradables and non-

biodegradable materials. The study further revealed that the agency responsible for the evacuation of these waste do not do that on a regular basis. It was also observed that the present waste disposal situation is expected to worsen due to rapid urbanisation in the state, increase in unplanned settlements and housing, and lack of sustainable waste management technologies in Abakaliki metropolis. The major proportion of the wastes emanates from the residential sectors and recycling are not currently practiced formally in the metropolis. The consequences of the poor waste management are manifested in environmental degradation, road encroachment, air pollution, residential land encroachment and loss of aesthetic view of the metropolis. The findings and suggestion presented in this work will serve as useful guide for improved waste management services within the metropolis and regions with similar waste challenges in Nigeria and other developing countries.

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**Management and Disposal of Municipal Solid Wastes in Abakaliki Metropolis, Ebonyi State, Nigeria**



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