MUNICIPAL SOLID WASTE MANAGEMENT AND THE ROLE OF WASTE-PICKERS IN NIGERIA

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ABSTRACT

Waste-pickers are involved in recovering recyclable and reusable materials from the waste stream. Waste-pickers retrieve nearly 35% of recyclable and reusable materials from the solid waste stream in Nigeria. Their work results in waste separation, waste reuse, aiding recycling, and reducing pressure on the environment. Solid waste composition influences the roles and activities of waste-pickers. This study highlights the activities of waste-pickers and the composition of solid wastes in Nigeria, based on a literature review and field survey at Awotan Solid Wastes Dump Site (ASWDS) in South West Nigeria. It is recommended that: (1) waste-pickers and their organizations should be formally integrated into the solid waste management system; (2) landfills should be designed to enable safe rummage by waste-pickers through garbage before it is deposited and buried and (3) basic education should be made accessible and affordable to the children of waste-pickers.

Keywords*: waste-pickers, solid waste management, waste composition, Nigeria, urbanization.*

1. INTRODUCTION

Where human being exists, waste of different types (Solid, Liquid and Gas) both in quantity and quality must be generated. Because of diversity in the waste nature, it requires proper management otherwise it will constitute risk to public health. Solid waste management activities include; waste separation, waste collection, transportation, treatment and disposal. Inability to sustainably maintain these five key activities will result to defective and improper waste management. In Nigeria, government is the major player in solid waste collection, transportation and disposal. Little or no attention is paid to solid waste treatment, the thrust of solid waste management is to maintain aesthetically clean environment. Due to lack of technology and low involvement of private sector in solid waste management, scavenger became the only machinery for recovering recyclable materials from solid waste stream in Nigeria.

Nigeria is the most populous country in Africa and ninth most populous country in the world. With population distributed at 48.3% urban and 57.7% rural and population density at 139 people per square km. The country has GDP per capital of $1,800 and population below poverty line is 60%. Scavengers are driven by poverty and desire to earn a living. In Onisha township Nigeria, 40% of artisans and small-scale industries receive 48% of their raw materials from scavengers (Ogwueleka, 2009). There are over 1,200 waste pickers operating within and around Makurdi metropolis in Benue State, Nigeria

Most developing countries, Nigeria, inclusive have solid waste management problems different from those found in industrialized countries in areas of composition, density, political, and economic framework, waste amount, access to waste for collection, awareness and attitude. In developing countries, local authorities spend 77-95% of their revenue on collection and the balance on disposal (Ogwueleka, 2003), but can only collect almost 50-70% of municipal solid waste.

Waste-pickers, also known as ‘scavengers,’ are men, women and children that make their living by selling or using valuables from materials that households and commerce discard. Sarka (2003) described them as those who make a living by collecting and selling recyclable materials out of municipal solid waste. Scavenging is a widespread and regular activity in nearly all cities in developing countries. “Some waste pickers work at a single site that holds an abundance of waste like dump sites, or transfer stations. Others move from place to place, collecting materials from factories, offices, stores, schools, hospitals and residential areas. Others work at dump sites, canals, and rivers where people dump their refuse” (Janis 2004). In the process, they make a significant contribution to environmental management in different cities and render services to the local economy (Sarka 2003). Waste-pickers play vital roles in solid waste management. In spite of this, they unfortunately have little or no social status. The roles of waste-pickers include: waste collection, separation and reuse, thereby aiding recycling and reducing pressure on the environment.

Wastes-pickers at dump sites and on the streets are generally socially marginalized, they live and work without basic economic and social security, under conditions which are extremely hazardous to health and detrimental to family, social and educational development. Waste-pickers are exposed to many health hazards; for instance, they often rummage through decaying organic waste, including toxic medical waste (Ahmed 2006). Most of them sort with bare hands and feet and thus are very vulnerable to infections due to direct contact. Waste-pickers also frequently suffer injuries in the form of bruises and cuts from glass, metals, broken bottles and other sharp objects. Often

children and the elderly are involved in this work, in Ibadan, one of Nigeria's main cities, many school age children walk around the city streets and dumpsites sorting a wide range of items.

The composition of solid waste influences the roles of waste-pickers, solid waste composition in Nigeria include: paper, metal, glass, textiles, food waste, garden trimmings and plastic/cellophane. Solid wastes that are not composed of articles such as plastic, metal, glasses and other recyclables and reusable are of no interest to waste-pickers. The kind of items or articles discarded can tell us a great deal about the nature of the society that produces them and the availability or otherwise of waste-pickers in that society.

This paper acknowledges the social-economic reasoning for waste-pickers but, whilst poverty exists, the paper examines the compositions of solid wastes and role of waste pickers in solid waste management in Nigeria with a view to outlining their contributions to the management of municipal solid wastes. Suggestions are consequently made for their effective coordination to enhance their performance in solid waste management.
In most Nigerian communities, retrieval of metal, glass, plastic or cellophane and other recyclable and reusable items from solids waste is the main occupation of waste-pickers. Solid waste reuse and recycling are, respectively, second and third in the waste management hierarchy. Reduce, reuse, recycle, compost, incineration and landfill are technologies widely adopted by developed countries. Material recovery facility technology has not been well developed in Nigeria. Even if locally available, the quantity of recyclables and reusable material in that locality can be negligibly small compared with the magnitude of capital outlay required to install an effective recovery facility technology.

Waste pickers suffer many more illness and injuries than the general population. Particularly prevalent are gastrointestinal, respiratory and skin diseases, lead poisoning, and cuts from needles and broken glass (Cointreau, 2000). Working in hazardous conditions has serious consequences for waste keepers. Life expectancy of Mexican waste keepers is 11 years lower than that overall Mexican population (53 versus 64) (World Bank 1994). Infant mortality among the Zabbelin waste collectors in Cairo is much higher than that of other residents of the city with about one in four infants dying before reaching their first birth day (Medina 1997a) Waste-pickers are part of society and waste picking poses substantial health and safety risks to them. Government holds the responsibility of enhancing the quality of life of the waste-pickers, by helping them improve their working and living conditions, increase their incomes, expand their employment options and improve access to education and social services (Janis 2004).

Availability of recyclable items in solid wastes stream in Nigeria influences the activities of waste-pickers. There is a need to examine the solid waste composition in Nigeria, so as to ascertain the quantity of recyclables in the waste stream. This will enable government and non-governmental organizations (NGOs) to take actions to improve the waste-pickers' productivity and working conditions, and ensure safe and effective disposal of solid waste. Most recyclables in the northern countries are supplied by households on a voluntary basis, whereas the main sources of these materials in the south are the waste-pickers and itinerant waste-buyers that collect these materials for a livelihood (Gerlagh *et al*., 1999). The only available means of recovering recyclables materials from the solid wastes stream in Nigeria is through the waste-pickers.

2. STUDY AREA

Nigeria has a total land area of 983,213 km^2 of which 773,783 km^2 are in the savanna zones, 75,707 km^2 are in the derived savanna zones and 133,717 km^2 are in the rain forest zone (Omofonmwan and Osa-Edoh 2008). Nigeria's population exceeds 140 million, thus yielding an average density of >140 persons per square kilometre. Although, this density varies regionally, it is evident that Nigeria has a high population density. For administrative efficiency, Nigeria was divided into six geopolitical zones Figure 1, namely: North-North (NN), North-East (NE), North-Central (NC), South-East (SE), South-West (SW) and South-South (SS) .

3. MATERIALS AND METHODS

To ensure even representation of solid waste composition in Nigeria, solid waste composition data for at least one state each from the six geopolitical zones were obtained from the literature. Further, a field survey of activities of waste pickers at Awotan solid waste dump site (ASWDS) was conducted. The waste generation rate per capita per year in Nigeria was estimated at 20 kg by NEST (1991). It is estimated that Nigeria generates about 2.8 million tones of solid waste per year. The characteristic waste typology and composition in Nigeria is as shown in Table 1and Figure 2 for the six geopolitical zones i.e. NE, NN, SE, NC, SS, SW and Federal Capital Territory FCT.

4. WASTE PICKING ACTIVITIES ON AWOTAN SOLID WASTE DUMP SITE IN IBADAN, NIGERIA

Awotan Solid Waste Dump Site (ASWDS) is one of the solid waste dump sites in Ibadan, Oyo State, Nigeria. The ASWDS is sited on fifty acres of arable land. Residential buildings, petty traders and cement block industries are located within twenty meters away from the dump site. The access road is unpaved and generally bad most especially during the raining season. A two day visit to the ASWDS revealed that there was no record to show the quantity and composition of daily wastes dumped on the dump site. On daily basis, an average of sixty seven trucks and lorries haul solid waste from different parts of Ibadan for dumping at ASWDS (Table 3). Each truck has a driver, a motor boy and two loaders while each lorry has a driver and a loader or motor boy. It was also observed that an average of two truck load of recyclable material most especially iron leaves the dump site for various recycling plant in *Lagos (Plate 2)

Waste picking activities starts as early as 6 am and ends as late as 7 pm or sometime when the visibility is poor. Picking wastes for ten (10) to twelve (12) hours a day was as a result of the fact that the more you pick, the more you earn. Children are not allowed to rummage through the heap of wastes because of their susceptibility to injury as a result of non availability of protective materials such as mouth and nose mask, hand gloves and booth. Most men and women found picking wastes on the dump site fell between age twenty (20) and fifty five (55). None of them have mouth and nose mask, some have hand gloves and booths. Some of the waste pickers interviewed revealed that they have at one time or the other sustained injury from sharp objects on the dump sites. It was also revealed that average daily income of a waste picker on ASWDS is three thousand naira (₦3, 000 ≈ $11.54) which is far more than the monthly minimum wage of eighteen thousand naira (₦18, 000 ≈ $69.23) that has just been approved by the government of federal republic of Nigeria for its worker. In Mexico city, waste pickers earn ¼ to ½ minimum wage for a 40 hour week (the 10^{th} decile of income distribution) World bank 1994a and 1994b. It is interesting to note

that the dumpsite workers, truck and lorry drivers as well as motor boy also pick wastes to complement their monthly salaries.

5. RESULTS AND DISCUSSIONS

These data show the predominance of organic waste over inorganic waste. About 55% of waste generated in Nigeria is organic, while inorganic waste (mainly plastic, paper, metal, glass and textiles) constitute about 37%. The composition of solid waste demands that emphasis be placed on composting and recycling as the most viable options for waste management in Nigeria.

Recycling involves reprocessing discarded materials into new and useful products. Recycling is one of the environmental success stories of the 20th century. Recycling, which includes composting, could potentially divert about 86% of the solid waste stream from landfill. Plastic, paper, metal, glass and textiles, which together constitute about 37% of the waste stream in Nigeria, are retrieved by waste-pickers. The only available means of retrieving this huge percentage of recyclables is through the efforts of waste-pickers. The benefits of recycling include resource conservation, decreased land contamination by pollutants, energy savings and job creation, thus reducing the need for landfills and incinerators.

About 37% of the solid waste stream in Nigeria is made up of recyclable materials. If these materials are not retrieved from the waste stream by waste-pickers, it will be unavailable to the recycling industries as secondary raw materials. Moreover, it will remain in the waste stream as a potential source of environmental pollution. Unavailability of recyclable materials as secondary raw materials will put pressure on rapidly-depleting natural resources used as primary raw materials by industries. Non-biodegradable materials, such as plastic, metal, glass and textiles, would have remained in dump sites or landfills without the activity of waste-pickers, thereby decreasing the life span of landfill sites.

6. CONCLUSIONS AND RECOMMENDATIONS

Proper co-ordination of waste-pickers' activities will enhance the recovery of recyclable materials that form about 37% of the total waste stream in Nigeria. The recyclable percentage of waste stream in Nigeria is notable, therefore any effort channeled towards its recovery is appropriate. The form of organization or group that waste-pickers belong to greatly affect their income and quality of life. Those in unorganized systems earn low and highly variable incomes, depending on their individual efforts. Waste-pickers in more organized systems earn higher incomes. For example, workers in Zabbelin (a waste-picker's organization in Cairo) earn one-to-five times civil servants' salaries (Medina 1997).

There are many ways for government, planners, NGOs and others to address the needs of waste-pickers, while also helping to meet the objective of operating the municipal waste management system effectively and efficiently. These may include technical solutions to raise the productivity of waste-pickers and improve the health and safety conditions under which they work, measures to improve waste-pickers' housing and living conditions, training to enhance their employment options outside the waste-picking business, assistance to help them start and operate small recycling enterprises and assistance from organized co-operative societies. Waste-pickers searching for valuables in waste bins sometimes empty and scatter their contents, contributing to urban litter and significantly increasing collection costs by adding to the time it takes collectors to complete their rounds.

It is recommended that:

(i) Consideration should be given to integrating waste-pickers or their organizations into the formal solid waste management system.
(ii) Solid waste management planners should involve waste-pickers in the collection of recyclables from the households that have already separated their recyclables.
(iii) Design of landfills to provide special areas or infrastructure where waste-pickers can safely rummage through the garbage before it is deposited and buried in landfill.
(iv) Housing and living conditions of waste-pickers should be improved by providing assistance to formalize and upgrade slum communities. These will include water and sanitation facilities.
(v) Enhancement of employment opportunities of waste-pickers and their families should be developed by providing opportunities for vocational training as well as assisting them to start and operate small recycling enterprises.
(vi) Basic education should be made accessible and affordable to the children of waste-pickers.
(vii) The bargaining position of waste-pickers should be improved by providing assistance to help them form co-operatives or associations.
(viii) Sensitization and public awareness should attempt to remove the stigmatization and marginalization that waste-pickers suffer. Municipal policy-makers should organize sensitization and awareness raising campaigns aimed at making municipal populations aware of the useful role waste-pickers perform in the waste cycle.

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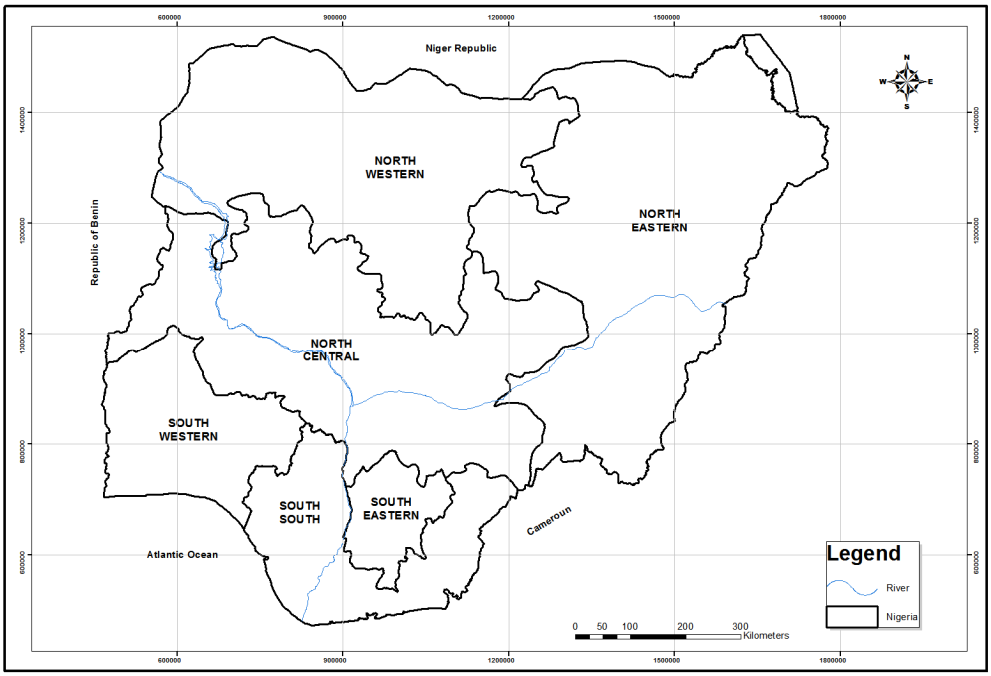


Fig 1. Map of Nigeria Showing Six Geopolitical Zones

Table 1. Solid waste composition (% by weight) before waste picking in the six geopolitical zones and the Federal Capital Territory (FCT) in Nigeria.

Solid waste Composition	Location									
	NE		NN	SE	NC		FTC	SS	SW	
	Borno[e]	Yola[d]	Kebbi[e]	Enugu[e]	Kogi[e]	Makurdi[c]	Abuja[b]	Delta[e]	Osun[e]	Ibadan[a]
Organic	18.6	25.8	85.0	80.0	8.0	39.97	57.77	60.0	58.5	76.19
Plastic	15.0	18.1	35.0	3.0	13.0	7.31	18.1	10.0	17.0	3.14
Paper	10.5	7.5	5.0	8.0	10.0	5.16	11.43	15.0	10.0	10.16
Metal	10.0	9.1	5.0	2.0	20.0	1.77	5.2	5.0	5.0	4.17
Glass	2.5	4.3	2.0	1.2	15.0	1.88	4.68	4.0	2.5	1.34
Textiles	5.0	3.9	5.0	0.8	10.0	2.64	2.53	3.0	1.5	2.16
Ashes, Dust & Stones	28.5	21.5	6.0	1.0	5.0	34.61	-	-	5.0	10.45
Others	10.0	9.8	2.0	4.0	15.0	6.81	1.74	-	0.5	0.44

Sources: [a]Sridha, (1997); [b]Imam *et al.* (2007); [c]Sha'Ato *et al.* (2006); [d]Mohamed and Osita (2003); [e]CASSAD (1998).

Table 2. Solid waste composition (% by weight) before waste picking in the six geopolitical zones and the Federal Capital Territory (FCT) in Nigeria.

Solid waste Composition	Location							
	NE	NN	SE	NC	FTC	SS	SW	Nigeria
	Average Value	Kebbi[e]	Enugu[e]	Average Value	Abuja[b]	Delta[e]	Average Value	Average Value
Organic	10.7	85.0	80.0	23.99	57.77	60.0	67.35	54.97
Plastic	16.55	35.0	3.0	10.16	18.1	10.0	10.07	14.7
Paper	9.0	5.0	8.0	7.58	11.43	15.0	10.08	9.44
Metal	9.55	5.0	2.0	10.89	5.2	5.0	4.59	6.03
Glass	3.4	2.0	1.2	8.44	4.68	4.0	1.92	3.66
Textiles	4.45	5.0	0.8	6.32	2.53	3.0	1.83	3.42
Ashes, Dust & Stones	25	6.0	1.0	19.81	-	-	7.73	8.51
Others	9.9	2.0	4.0	10.91	1.74	-	0.47	4.14

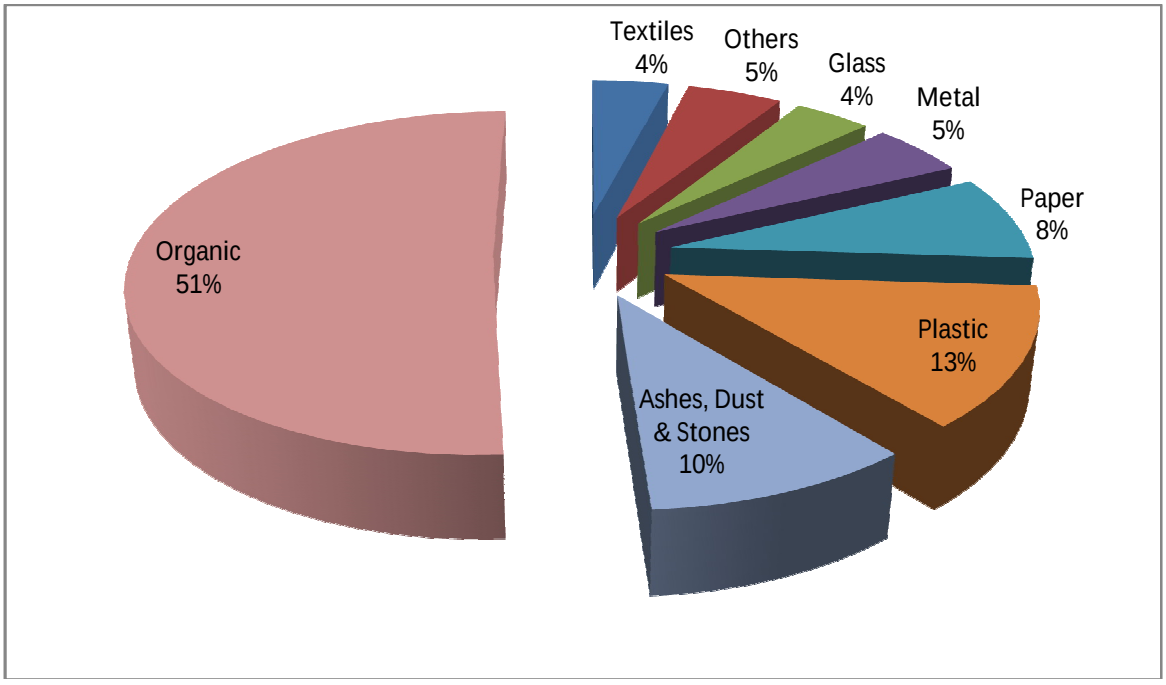
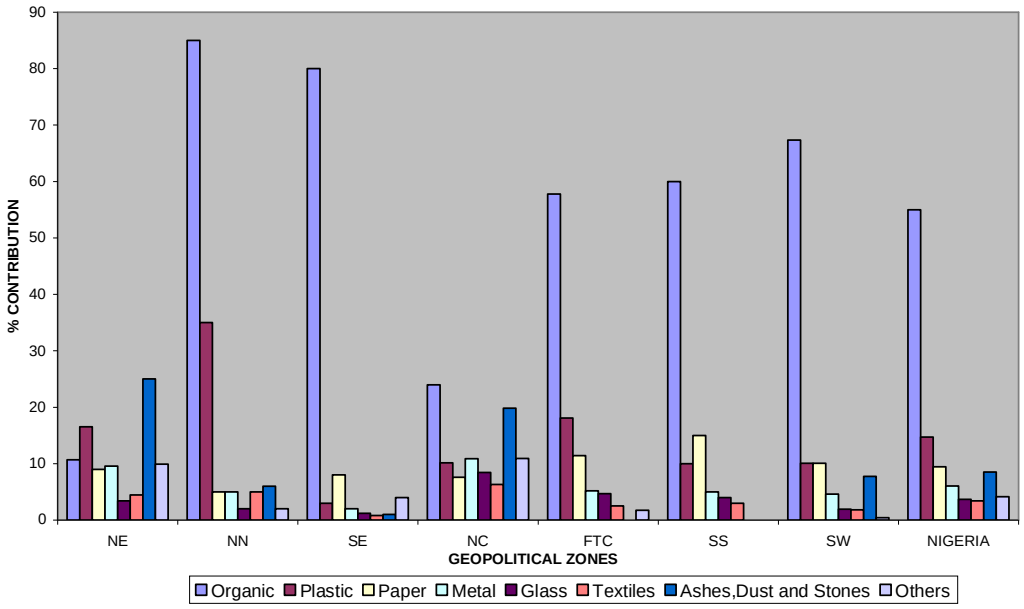
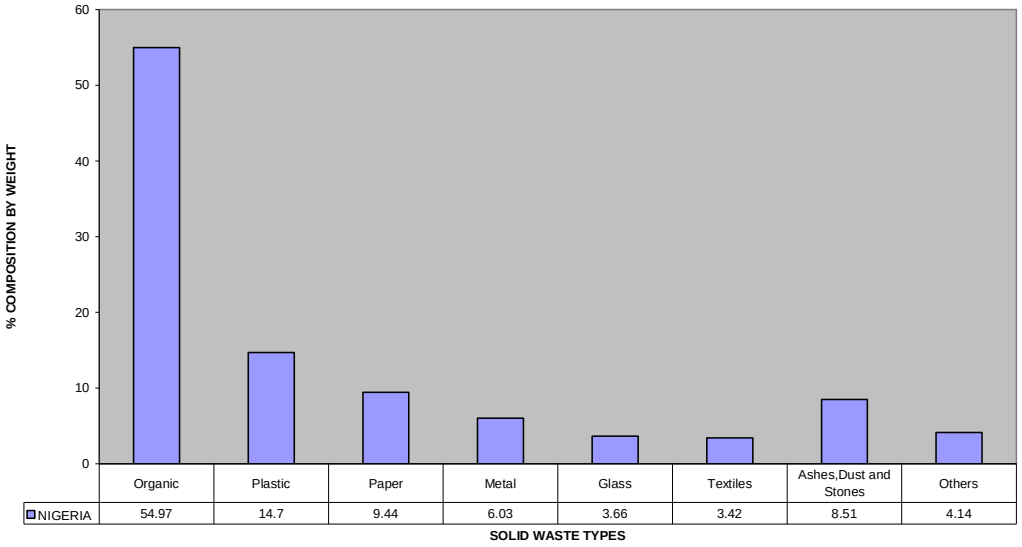


Fig. 2. Mean of waste composition in the six geopolitical zones of Nigeria.



SOLID WASTE COMPOSITION % BY WEIGHT

Fig. 3



SOLID WASTE COMPOSITION % BY WEIGHT FOF NIGERIA

Table 3: Average persons and activities at ASWDS on daily basis

S/N	Activity	Persons Involved	Men	Women
1	Waste picking	Waste pickers	16	2
2	Truck haulage	Truck driver	40	-
3	Truck haulage	Motor boy	40	-
4	Waste haulage	Truck loader	52	-
5	Waste buying	Itinerant waste buyer and suppliers	4	8
6	Dump site guard and monitoring	Dump Site Staff	6	-

Recyclable wastes of about 1,402kg (Table 5) are being picked from the dump site include: Iron, Metal, Brass, Aluminum, Plastic (blow & injection) Beverages can and Bottled water container etc.

Table 4: Price for recyclable items

S/N	Item	Price in Naira per Kilogram ₦/Kg
1	Iron	25 ($ 0.096)
2	Plastic: Blow	15 ($ 0.057)
	Injection	30 ($ 0.115)
3	Aluminium	150 ($ 0.576)
4	Brass	350 ($ 1.346)
5	Beverages can	50 ($ 0.192)
6	Bottled water container	20 ($ 0.077)
7	Cloth	No fixed price, it depends on the quality and bargaining skill

Table 5: Average daily picked items per kilogram

S/N	Item	Kilogram (Kg)
1	Iron	428
2	Plastic: Blow	1
	Injection	71
3	Aluminum	120
4	Brass	166
5	Beverages can	104
6	Bottled water container	119
7	Cloth	180
8	Bottle	143
Total		**1,402**

Plate 1: Reclaimed segregated items from a landfill site by waste scavengers.

Plate 2: Scavengers gathering discarded electronics products into trucks to sell

Plate 3: Waste at a landfill site – typical of many urban areas of Nigeria.