International Refereed Journal of Engineering and Science (IRJES)
ISSN (Online) 2319-183X, (Print) 2319-1821
Volume 2, Issue 12 (December 2013), PP. 48-54

Solid Waste Management Practices in Kebbi State, Nigeria: Problems and Prospect

Tpl. Abdullah, Rabiu Bena (Mnitp, Rtp,)
Senior Lecturer, Department of Urban & Regional Planning College of Environmental Studies
Waziri Umaru Federal Polytechnic, Birnin Kebbi P.M.B.1034, Birnin Kebbi GPO
Kebbi State, Nigeria

Abstract:- The world is experiencing unprecedented growth and, for many, living standards are increasing too. One of the greatest challenges facing Nigerian cities is the seemingly insurmountable heaps of refuge littered all over the cities. The paradox is how the cities can strike a balance between economic activities and environmental quality. Waste management in Kebbi State is carried out by the Kebbi State Urban Development Authority (KUDA) as elsewhere in the Country. Despite the organisation is solely responsible for collection, transportation and disposal of waste in the town yet the system is ineffective. The volumes of waste cleared from the 89 sites indicate that, the city generates 191 tonnes of solid waste monthly with an average of 0.67kg generated per capita per day. This is lower than the national figure of 0.83kg. The major problems identified are poor solid waste collection system, inadequate equipments and plants, and poor financial support. Moreover the composition of solid wastes generated includes garbage, rubbish, ashes, street wastes, construction waste and abandoned vehicles and parts. The major disposal methods practiced in the state are open dumping, landfill, and incineration. The solutions suggested are effective waste disposal practices should be ensured by acquiring modern plants and equipments; regular repairs and maintenance be ensured. There is the need to establish staff training and development unit for 'on the job training' within the authority. In view of recent quest for private sector involvement, it is imperative for KUDA to go into partnership with the Tipper Lorry Association under the Public-Private Partnership (PPP) arrangement in solid waste disposal in the state. Words Count = 259

Keywords:- Environment, Management, Pollution, Solid Waste,.

I. INTRODUCTION

The world's population is experiencing unprecedented growth and, for many, living standards are increasing too. 'The demands being placed on our environment are relentless – accelerated use of natural resources, increased production, and spreading urbanization – and the result is more waste and pollution.' Umeakuka & Chike [1]. One of the greatest challenges facing Nigerian cities is the seemingly insurmountable heaps of refuge scattered all-over the entire landscape of the cities. This is a sign of improperly managed solid wastes. Solid Waste is one of the most serious environmental problems facing towns and cities today. The paradox is how the cities can strike a balance between economic activities and environmental quality.

Many industrial cities of Lagos, Ibadan, Kaduna, Jos and Onitsha are threatened daily by the increasing heaps of solid wastes. Solid wastes, as defined in this context, include all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris. In some countries, the solid wastes management system also handles human wastes such as night-soil, ashes from incinerators, septic tank sludge and sludge from sewage treatment plants. If these wastes manifest hazardous characteristics they should be treated as hazardous wastes' UNEP [2].

In other words, cities as centre of economic activities needs food and other consumables for the teeming population, but these are associated with waste generation inform of packages, food ruminants, used cans and containers. Moreover, prevalence of pollutants which are '…substances that directly or indirectly harm human health or the environment is increasing day by day. Improperly disposed of toxic substances can build up in living organisms from polluted air or water, or through contaminated food. This can lead to biomagnifications, in which the level of contamination inflicts increasing levels of harm on species – including humans – that are higher up the food chain. As well, new science is showing that both short- and long-term exposure to some chemical contaminants in polluted drinking water can have a serious impact on public health. Pollution also causes acid rain, smog and air pollution which are recognized as significant health hazards' UNEP [3]. It has been established that there is direct relationship between level of development and volume of waste generated.

'The quest for development of cities in terms of urbanisation if ignored can be detrimental to environmental sanitation, health and urban productivity. Cities are engine of economic growth, but environmental implications of such growth need to be assessed and managed better' Onibokun, Adipe, &Sridhar [4]. There is urgent need to address problems of solid waste which if it is not effectively managed will result in reducing quality of the

environment. Therefore, it is the focus of this paper to examine the practices of solid waste management in Kebbi State in order to identify problems faced by the authorities in solid waste management in the state capital, Birnin Kebbi (where it is more serious) with a view to proffer feasible solutions. Waste management in Kebbi State is carried out by the Kebbi State Urban Development Authority. This organisation is solely responsible for collection, transportation and disposal of waste in the Metropolis. Solid waste is collected in public collection points provided by the authority and the points are made up of refuse bunkers and metal skip containers.

II. METHODOLOGY

The research was based on empirical study conducted within Birnin Kebbi, the State Capital in January and February 2013 using 2012 as the base year under study. It involves review of literature and physical investigations conducted by the researcher and 6 assistants. The secondary data were obtained from the head office of Kebbi Urban Development Authority as well as Ministry of Lands Housing and Urban Development. The information gathered includes staff strength, equipments and plants available. The essence is to evaluate the quality of staff and the type and number of equipments and plants that could be analysed to determine the strength and weaknesses of the authority in terms of solid waste management in the State. Beside the state capital, Birnin Kebbi, there is no formally organised refuge collection system in other towns.

Primary data on the other hand are gotten from the residents of the neighbourhoods where the solid waste collection points are situated. All the residences within the service radii were selected on a stratified random sampling technique of selecting the 5^{th} house within the area. Depending on the size of the neighbourhood, a minimum of 5 respondents are contacted from each of the areas where 55 bunkers and 34 skip containers were located respectively. In all, a total of 450 household heads were contacted. Basically the information generated include years of stay within that radius and level of income and type and volume of solid waste generated on daily basis, and the cost if any of transporting the waste to disposal points. Their opinion on suitability or otherwise of the location is sought as well as possible recommendations towards improving the practice.

On the secondary source, the authorities concerned with solid waste management in the state is KUDA-(Kebbi Urban Development authority), Ministry of Housing and Urban Development, and KESEPA (Kebbi State Environmental Protection Agency) were contacted by administration of twenty (25) questionnaires. The data generated from this source includes modus operandi, staff strength, number and type of equipments (plants and machineries) available, volume of waste collected during the period under study, and problems hindering effective solid waste management in the state.

Table 1: Location of Solid Waste Collection Points in Birnin Kebbi

S/No	Name of Neighbourhood	No. of Refuge Bunkers	No. of Skip Containers	Total
1	Takalau	3	-	3^{+}
2	'Yar Yara	3	1	4^{+}
3	Zoramawa	2	-	2^{*}
4	Tudun Wada(includes Baiti)	4	2	6^{*}
5	Makera Gandu	3	2	5^{*}
6	Nassarawa I&II	6	4	10^{+}
7	Rafin Atiku	7	5	12^{+}
8	Badariya	8	4	12^{+}
9	GRA	2	4	6^{*}
10	Gesse I	4	2	6^{*}
11	Gesse II	2	2	4^{*}
12	Gwadangaji Qtrs	2	2	4^{+}
13	Gwadangaji Gari	3	2	5^{*}
14	Adamu Aliero Estate	3	2	5^{+}
15	Bayan Kara	2	1	3^{+}
16	New Prison/FMC	1	1	2^{+}
TOTAL		55	34	89

Sources: Birnin Kebbi Master Plan, 2005-2015* [5]: Author's Fieldwork 2013^{+}

III. RESULTS AND DISCUSSIONS

There is fair distribution of waste collection points throughout the township. Each neighbourhood is allocated facilities based on its population density as well as accessibility to and within the area.

Households waste disposal methods revealed astonishingly that various means are used in disposing the waste as shown in Table 2 below;

Table 2: Solid Waste Disposal Methods by Households.

S/No	Disposal method	Frequency	Percentage
1	Garbage Bags	40	8.9
2	Garbage Heap	50	11.1
3	Indiscriminate Disposal	80	17.8
4	Public Incinerator	5	1.1
5	Dustbins	120	26.7
6	Public Depot	155	34.4
Total		450	100

Sources: Author's Fieldwork 2013

Plate 1: Showing poor urban beatification as an implication of improper collection of solid waste in the study area

Plate 2: Showing encroachment onto roads by improper dumping of refuse/solid waste in Nassarawa Area.

Plate 3: Showing instances abuse of the refuse collection points (Bunkers especially) provided by KUDA

Periodic collection of waste was conducted, though not regularly. Some areas were visited twice a week, while others were visited once a week especially during harmattan and dry season. The reason for such irregular visits is because some residents evacuate such wastes, (which accounted for 35.6%) to their farmland which is used as manure. More visits are made during rainy season because of fear of outbreak of waterborne and airborne diseases, yet there are cases of poor refuse collection in the study area.

The volumes of waste cleared from the 89 sites indicate that on average, the city generates 191 tonnes of solid waste monthly last year with an average of 0.67kg generated per capita per day. This is lower than the national figure of 0.83kg. The analysis revealed further that the volume of waste collection has direct correlation with the number of disposal vehicles available. In essence, the more vehicles the authority has, the more volumes of solid waste are evacuated. Moreover the composition of solid wastes generated (as indicated in the plates above) includes garbage, sweepings, rubber, leather, kitchen trash, sweepings, paper, polythene bags and packages, rubbish, ashes, street wastes, construction waste, commercial wastes from stores, workshops, shops, super markets, departmental stores, kiosks, and abandoned vehicles and parts. The other category of solid waste is the institutional waste mainly from schools, offices, hospitals, hotels and religious buildings. Construction debris such as residual building materials from construction and demolition activities are also part of solid wastes generation in the cities' News2.onlinenigeria [6]. The major disposal methods being practiced in the state includes open dumping, landfill, and incineration.

Plate 4: Showing abuse of solid waste collection point (refuse bunker) Provided by KUDA to reduce indiscriminate disposal

Plate 5: Showing the disposal of solid waste on motorable roads within the study area.

Plate 6: Showing the disposal of solid waste on motorable roads within the study area.

IV. CONSEQUENCES OF SOLID WASTE DISPOSAL

It is established in this study that, indiscriminate disposal of waste leads to among many, the following negative effects in the town as:

a. Poor urban beautification as indicated in plates 1,2,3 above
b. Obstruction of free traffic flow as shown in plates 5 & 6 where solid waste is dumped indiscriminately on the streets.
c. Blockage of drainage channels when refuse is dumped indiscriminately as shown in plates 7&8, which can cause flash flooding.
d. Atmospheric pollution of the air by smoke and smog due to incineration and open burning of wastes as shown in plate 9.
e. Spread of communicable diseases due to proliferation of rats and rodents which can transmit fever and other infectious diseases.
f. Fire hazards
g. Psychological disturbances through the production of noxious and offensive odours when organic wastes decompose anaerobically like eye sore, grit and noxious smell.

Table 3: Volume of Solid Waste cleared, Manpower, Disposal Vehicle &Equipments Available.

Year	Volume of Waste Cleared (tones)	Manpower	Disposal Vehicle Available	Equipments
2008	2,098.84	87	5	Tippers 5
2009	2,110.55	89	5	Refuse collection bans-5
2010	2,120.11	90	5	Skip carriers-100
2011	2,281.12	95	6	Molex 100
2012	2,298.32	103	10	Road Sweeper 1
Total	10,908.94	-	-	Pale Loader 1

Source: KUDA, 2012

V. STAFFING

The solid waste unit of the authority has about one hundred and thirty-five staff members, out of which only 7 have higher relevant qualifications.

There is the need to establish staff training and development unit for 'on the job training' within the authority. This is important because of the dynamic nature of the technology for collection and disposal techniques of solid waste. Moreover, opportunity to acquire higher training in the Polytechnic should be encouraged in order to improve the quality of staff. It is also imperative to implement the new minimum wage (salary structure), this will boost the morale of the staff to work effectively and diligently too.

VI. PLANTS AND EQUIPMENTS

The agency has 12 plants and equipments at its disposal for its operations. Thus effective waste disposal practices can be ensured by adequate and modern plants and working equipments. Regular repairs and maintenance scheduled be strictly adhered to, as a necessity to ensure effective usage.

Therefore it is necessary for the staff of the authority to develop good maintenance culture by learning to mend and re-use such depleted machinery and equipments. There should be a state of the earth workshop for repairs of plants and equipments within the premises to face the increasing challenges of solid waste management in the state.

VII. FUNDING

Funding is very vital to the effective existence of the Agency. The budgetary allocation to the Agency is determined mainly by the State Revenue Allocation Committee under Ministry of Finance. Effort made to secure budgetary provision to the unit responsible for solid waste management was not possible.

Although the amount allocated for solid waste collection is determined by the Authority based on sectoral budgeting. There is no formal release of funds from the authority to enable the writer asses the financial disposition of the authority juxtaposing its operational capabilities.

7.1 Cost Recovery Mechanism

However, there is need to explore internal revenue source such as user charges which will compliment the statutory allocations that are not disbursed regularly. The charges should be based on the quantity of solid waste generated by each household or a minimum amount be levied to each household on flat rate basis.

Disposal Charges on waste disposal can be levied on dumping of wastes (both households, institutional, commercial and industrial waste). The rate to be charged should be based on type of waste and method of treatment before dumping. However, incinerated and composed waste attracts lower charges than land filled waste.

More over product charges is part of user charges in which the high levy is placed on non returnable containers, lubricant oils, plastic bags, fertilizers, pesticides, feedstock, tires and car fuels. Onibokun [7].

Deposit Refund System is also part of cost recovery mechanism. It is special taxes, charges or fees imposed on consumers of mostly beverages bottles and batteries especially vehicles. This is done with a view to encourage recycling and prevent pollution.

Waste to wealth is a new approach that is gaining acceptance in Nigeria. Attempts are made at household level to separate the waste by removing recyclable materials. These are sold at a measurable rate to manufacturer's representatives or dealers as the case may be.

Plate 7: Showing drainage channels blocked with solid waste in the study area.

Plate 8: Showing drainage channels blocked with solid waste in the study area.

Plate 9: Showing animal feeding on the refuse which could lead to many of the negative consequences mentioned above

VIII. PRIVATE SECTOR INVOLVEMENT

In view of recent move towards private sector involvement under the Public-Private Partnership (PPP) arrangement, it is imperative for KUDA to go into partnership with the Tipper Lorry Association in solid waste disposal or indeed any other recognised private organisations. There is no formal arrangement involving private sector in waste management, except the traditional 'annual drainage clean up exercise' which is held at the beginning of every rainy season. There should be good operational arrangement to ensure efficiency and continuity, although some states in the country have privatised solid waste management' Umeakuka, et`al [8]. Such options can be tried in the study area in order to ensure efficiency in solid waste management. There is need to have a well co-ordinated and institutionalised solid waste management in the state that should recognise the following;

i. An examination of settlements structural pattern should be understood in terms of street layouts and house numbering system, although the latter is not properly done. Neighbourhood system of solid waste collection arrangement should be done.
ii. Analysis and classification of waste generated should be done. This helps in sorting and determining the appropriate disposal methods and feasibility of recycling.
iii. Determine the agricultural related input for revenue generation and environmental safety.
iv. Sensitization of the public about the need for taking personal responsibilities in community health and socio-economic welfare as they relate to solid waste generation, disposal and management process.

IX. CONCLUSION

With the above analysis it is obvious that Kebbi State has the opportunity of improving the solid waste collection system to the best possible practices. This is because as a growing state, it can acquire modern plants and equipments as well as go into partnership with the private sector to get the viable economically rewarding solid waste collection system and friendly sanitary environment. This can be achieved through collaborative arrangement.

REFERENCES

[1]. J.M. Umeakuka, & H. Chike Mba, Solid Waste Management Practices: A Case Study of Anambra State, Journal of Nigerian Institute of Town Planners,12, 1999,14-26.
[2]. United Nations Environment Programme, htpp://www.unep.org/Documents no.43. 29/04/2013 Ibid
[3]. A.G. Onibokun, N.O. Adedipe and M. K. C. Sridhar, Affordable Technology and Strategies for Waste Management in Africa: Lessons from Experience, CASSAD Monograph 13, (Centre for African Settlement Studies and Development, Ibadan, 2000)
[4]. CES Development Consortium, Review of Birnin Kebbi Master Plan 2005-2015.(Waziri Umaru Polytechnic, Birnin Kebbi, Nigeria 2006)
[5]. News2onlinenigeria, Lagos Waste…' http://news2onlinenigeria.com 28/12/12
[6]. A. G. Onibokun,et'al Op cit, p25
[7]. J. M. Umeakuka, et'al. Op cit