International Journal of Mechanical Engineering and Technology (IJMET)
Volume 9, Issue 10, October 2018, pp. 181–189, Article ID: IJMET_09_10_017
Available online at http://iaeme.com/Home/issue/IJMET?Volume=9&Issue=10
ISSN Print: 0976-6340 and ISSN Online: 0976-6359

ASSESSMENT OF MUNICIPAL SOLID WASTE GENERATION AND MANAGEMENT IN OTA, OGUN STATE, NIGERIA

Ayedun, Caleb Abiodun, Oloyede, Samuel Adesiyan, Durodola, Daniel Olufemi, Oluwumi, Adedamola Olufunke, Oloke, Clement Olayinka and Akinjare, Omolade Adedoyin

Department of Estate Management, Covenant University, Ota; Ogun State, Nigeria

Ogunde, O. Ayodeji

Department of Building Technology, Covenant University, Ota; Ogun State, Nigeria

ABSTRACT

Developing countries such as Nigeria are faced with the challenges associated with municipal solid waste management which of recent has become more pronounced and phenomenon as a result of increase rate urbanization which is not matched with adequate and effective management strategies. This paper assesses the prevailing solid waste management practices in Ota, Ado-Odo Local Government area of Ogun State, Nigeria. Data for the study were collected with the aid of questionnaire administration, personal observation, field trips coupled with interviews. Three neighborhoods within the study area were chosen for the purpose of the study and they include Oju-Ore, Iyana-Iyesi and Koro-Otun areas of Ota City. The Estate Surveying and Valuation firms having offices in the town, officials of Ado-Odo Local Government Area, residents were sampled for the study while the major dump sites within the study area were visited for the purpose of collecting first-hand information for the study. The study revealed that solid waste management is mainly being handled by the Local Government, private companies, residents and other informal stakeholders such as scavengers, local collectors, etc. The study further revealed that the mini-landfill sites located at Kurata near State High Premises and Koro-Otun long Itele Road constitute the main means of waste management being used in the study area from where the refuses and wastes are subsequently burnt openly. The study suggests introduction of better method of waste management to the current method of solid waste managements in the city which are considered to be outdated.

Keywords: Solid Waste Management, Waste Generation, Waste Disposal, Ota, Ogun State, Nigeria

Cite this Article: Ayedun, Caleb Abiodun, Oloyede, Samuel Adesiyan, Durodola, Daniel Olufemi, Oluwumi, Adedamola Olufunke, Oloke, Clement Olayinka, Akinjare, Omolade Adedoyin1 and Ogunde, O. Ayodeji, Assessment of Municipal Solid Waste Generation and Management in Ota, Ogun State, Nigeria, International Journal of Mechanical Engineering and Technology, 9(10), 2018, pp. 181–189.
http://iaeme.com/Home/issue/IJMET?Volume=9&Issue=10

1. INTRODUCTION

Nigeria towns and cities, particularly those that have attained the status of either state or local government capitals and other emerging urban centres in the country have since the early 1970s especially since discovery of petroleum in commercial quantity in the country have expanded in size and population, with the attendant need for similar expansion in infrastructural facilities to sustain the growing economy and for social services. These changes, particularly in demographic expansion, in the activities and in new consumption styles and patterns have brought about phenomenal increases in the volume and diversity of solid waste generation in Nigeria. Unfortunately, this trend has not been matched by waste management efforts of the cities and urban centre managers/administrators. The country is currently being faced with the problem relating to solid waste generation and management most especially in cities and urban centres as a result of inadequate/inappropriate waste management operations and practices.

In Nigeria, the issue of waste management has turn to matter of serious concern in the physical environment which as a result of urbanization and industrialization of the country has resulted into massive solid waste generation which has become rampant and eyesore in most part of public palaces such along the major roads and parks in most cities of the country resulting from intensive industrial, commercial, domestic and agricultural activities being engaged by the populace in attempt at meeting the unlimited needs of the citizens. The consumption of various products, ranging from food stuff, clothing and household materials used in the residential areas, raw materials such as wood, iron rods, sheets and various machines used in the industrial areas, office equipment and machines, stationeries, files, printers, land cables utilized in the commercial areas, academic/educational institutions, restaurants, banks and workshops as well as hospitals. All these operations and uses constitute the sources of solid waste generation which the facilities provided for their care cannot effectively cope with.

Overtime, authorities responsible for solid waste management have been engaging in certain practices in an attempt at solving the menace of solid waste management problem such as disposal, collection and removal and use of recycling centres. However, the various management means being employed by the authorities saddled with handling the management of solid waste in most cities in the country has unfortunately not been able to balance the rate at which solid wastes are being generated with the rate of their removal.

Ota, just like other towns and cities in the Nigeria, is a fast urbanizing area and a common characteristic associated with such areas is the increase in population which is due mainly to the numerous opportunities abounding in urban areas such as educational employment, trading etc opportunities. And as the population increases, the level of consumption by the people also increases and this eventually lead to higher solid waste generation. Hence, to meet the challenge resulting from the precedent population increase leading to solid waste increase call for solid waste management practices need to be given proper support and encouragement from the government and members of the community within Ota municipal to be functional in creating a healthy environment for the residents, maintaining existing businesses by providing a conducive environment for suppliers and consumers in such a way that everything will work

harmoniously. Thus, it is in view of the above highlighted issues that this study set out to assesses the current solid waste management issues and practices being employed in Ota area of Ado-Odo Local Government Area of Ogun State with a view to proffering solution to the issue of solid waste management in the city.

2. REVIEW OF RELEVANT LITERATURE

As cities or any settlement grow, so does the quantum of solid waste they generate. Changing human consumption patterns and the changing structure of economic activities tend to generate various types of waste which need to appropriately handled and managed with a view to ensuring sustainable environmental aesthetic and development which will encourage the achievement of decent standard of living by the urban residents. Even though, urbanization possess the potential of driving or acting as engine of economic growth and human development, it is nevertheless associated with the challenge on how to manage the solid wastes being generated due to the attainment of urbanized cities (ACP-EC Joint Parliamentary Assembly, 2014).

When the solid wastes being generated by the increasing populace is not properly and promptly being removed, the accumulation of the wastes will set in thus resulting heaps of wastes along the major roads and in public places. It is imperative to note that as the population increases in any settlement and cities through natural birth and migration of people, there is always the need for the waste management system being engaged in such city or urban setting to be improved upon to meet the increase level of wastes being generated and accumulated by the populace as the waste management practice being adopted earlier may be ineffective to cope with the increasing population in such city or urban settlements.

It is in realization of the above fact that Sha'Ato, Oketunde,Eneji, Unazi and Agwa (2007) in their study on waste generation and management in Markurdi city, Nigeria recommended making projections of future waste quantity generation on the basis of prevailing city population, population growth rates and per capita waste generation so as to be able to effectively plan for waste management.

Kumar and Nandini (2013) in a study carried out on solid waste management in Bangalore City, India suggested the active involvement of households and citizens in waste management efforts and activities of government in the city and that without active involvement of households in waste management, that the 'waste-to-wealth' efforts of government in the country cannot be achieved. Also, Squires (2006) in his study on the role of public participation in solid waste management in Caribbean Island showed that the populace could not participate effectively in solid waste management effort of government of the country due to poor dissemination of information with regard to new projects, weak policy, lack of adequate legislation and poor institutional capacity which did not provide meaningful basis for public environmental education and awareness and went ahead to suggest the need by the concern authorities in the country to involve the public in all their programmes toward addressing municipal waste treatment and management issues in the country.

Gotame (2012) in his study on community participation in solid waste management in Kathmandu which is one of the largest community in Nepal and found out that even though government were to be responsible for its waste management, but that citizens depended mainly on non-government organizations and agencies for the collection of their wastes, but that the citizens were responsible for separating the wastes before collection. This suggests the need for the involvement and participation of the citizens in all waste management initiatives of government.

Ojo (2014) in his study of the problems associated with municipal waste management in Obantoko in Abeokuta, Nigeria in the face of increasing urbanization and inadequate disposal

of wastes identified the use of open dumps to be the most possible alternative method of solid waste management due to lack of relevant technology to meeting modern waste management in Obantoko area. He however, maintained that the open dump sites researched into was not adequately being taken care of and recommended upgrading the dump sites to what is in vogue in developed countries of the world to forestall possible accidents in the neighborhood and lessen permeation of leachate and ultimate underground water infection in the area which can be harmful to the residents.

Schubeler (1996) in his research work on solid waste management in some developing countries of the world such as Nigeria opined that waste management entail complete processes of waste collection up to disposal/re-use of the wastes. He went further by identifying the main objectives which municipal waste management is meant to achieve as including:

i. To guard against the health of the populace in most of our cities, most with special emphasis on the poorly paid citizens which often bear the brunt of the challenges emanating from poor waste management;
ii. To encourage environmental conditions by controlling pollution and guaranteeing the sustainability of ecosystems in our urban areas; and

Ogwuleka (2009) in a study carried out on municipal solid waste management in some of Nigerian cities such as Onitsha, Lagos, etc and concluded that the collection of solid waste in these cities were being undertaking mainly by the local and state governments while informal waste collection activities were being undertaking on parallel level by some registered agencies with view to complementing the government efforts in ensuring the cleanliness of the cities and environment. The informal waste collectors provide the collection service for which they receive payment from various households from which they collect wastes.

Olukanni, Akinyinka, Ede, Akinwunmi and Ajanaku (2014) in their research work on municipal waste management practices in Ota, Nigeria concluded the mode of waste collection systems in the city to be inefficient due to the issue of inadequate collection vehicle to carry out the waste collection operations. The inadequacy of vehicles for collection operation thus rendered rate of collection of wastes which was meant to be on weekly basis unattainable, thereby causing the wastes to litter everywhere including major roads and public places.

Meanwhile, Agbesola (2013) in his study on sustainability on municipal waste treatment and management in Nigeria suggested ways and means of disposing and treating municipal solid waste in the country's urban areas to include waste prevention/reduction, waste re-use, recycling, composting, energy recovery, incineration and landfilling all in an attempt to achieving sustainable improvement of the physical environment.

Also, Adewole (2009) in his review of the waste management practices in Lagos, Nigeria identified the challenge confronting solid waste management by the authorities concern to include poor waste disposal habit of the people, attitude of waste management workers to their work, lack of adequate equipment to cope with the volume of waste generation, inadequate plant and tools required for handling waste management by the agency saddled with waste management, corruption on the part of staff and officials of waste management agency, overlap of function regarding waste control enforcement and increasing population effect.

3. THE STUDY AREA

Ota, a predominantly residential and growing urban center going by 2006 census which put the population of the city at 526,565 (2006 Census), make to be of the major city in Ogun State which is one of the six States constituting the South-western geo-political zone of Nigeria. The town is situated in-between latitude 60 30'N-60 50'N and longitude 30 02'E-30 25'E. Numerous rivers such as Illo, Abesan, Ogun, Imojiba and Iju Rivers amongst others traverse the town. The town hosts two private Universities, one private Polytechnic, many primary and secondary schools and several industries and residential cum industrial estates. It is the aggregation of the above highlighted factors which have increased the rate of expansion of the town in all directions within the past few decades and all these has been acting as stimulus in increasing the rate at which solid wastes are being generated in the town.

4. RESEARCH METHODS

Data for this study were obtained from primary and secondary sources Three groups of respondents were identified as sources of primary data collection for the study: viz- the registered estate surveying and valuation firms having their offices within Ota town, the residents of the town and officials of Local Government Waste Management Agency which the agency responsible for solid waste management within the city. Primary data were sourced from some randomly selected 100 residents out of which 64 (64%) were retrieved while in-depth interviews were conducted with the top officials of the Local Government Waste Management Agency and three estate surveying and valuation firms operating within the city with the aid structured interview guide with a view to extracting from them relevant data which are considered germane to the study. Data obtained from the questionnaires were analyzed using descriptive statistics.

5. DATA ANALYSES AND DISCUSSION

5.1. Preamble: Local Government Waste Management Agency and Estate Surveying and Valuation Perspectives on Solid Waste Management Issues

As stated above, in-depth interviews and discussions were carried out with top officials of the Ado-Odo Local Government Waste Management Agency and senior officials of the estate surveying and valuation firms with offices in Ota with the aim of sourcing their opinions on municipal waste treatment and management practices in the town and ascertain how effective are the methods being employed. The officials of the Local Government Waste Management Agency highlighted the constraints being encountered by the agency to include:

i. inadequate budgetary allocation earmarked for solid waste management;
ii. inadequate vehicles and other equipment earmarked for refuse collection and treatment for increasing solid waste generation within the Local Government;
iii. inadequacy of personnel for the purpose of collection and disposal of the wastes; amongst other challenges being encountered by the agency.

However, in-spite of the numerous challenges enumerated by the officials as being encountered by the agency, the officials were still of the opinion that the Agency was still living up to its expectation. On the other hand, the officials of estate surveying and valuation firms interviewed were of the contrary opinion. Their conclusion was that the Agency was not doing enough in area of solid waste collection and disposal in the town by citing instances when major roads such as Lagos-Abeokuta road which traverse the town, Ota-Idiroko road and Ota-Ijoko road were littered with heaps refuse thereby making the town unsightly and susceptible to outbreak of epidemics.

5.2. Resident's Perspective Regarding Solid Waste Management Issue in Ota

The view of the residents of Ota being the people directly affected by the issue of municipal waste management in the town were sought and presented herein below. As earlier stated, 100 questionnaires were administered on the residents out of which 64 (64%) were filled and returned by the respondent residents.

5.2.1. Respondent Resident's Profile

The basic profile or bio-data of the respondent residents are as presented in Table 1 below. The table contains the demographic information of the respondents such as their gender, age group and period which they have been residing within the study area.

Table 1 Demographic Information of Respondents

Category	Sub-Division	Frequency	Percentage (%)
Gender	Male	28	44
	Female	36	56
Age Group	20 – 29 years	10	16
	30 – 39 years	28	44
	40 – 49 years	15	23
	50 years and above	11	17
Residence Period	Less than a year	8	13
	1 – 5 years	22	34
	6 – 10 years	16	25
	11 – 20 years	16	25
	21 years and above	2	3

Table 1 above shows that more female responded to the administered questionnaires as 56% of the respondents were constituted by female while only 44% male responded. This is not unexpected as females are always more concern with issue of solid waste collection and management since they are the one responsible for taking care of their immediate environment. The analysis also revealed residents within 30 to 39 years age bracket constituted the largest set of respondents with 44%, which was followed by those within 40 to 49 years age bracket with 23% response rate. With regard to the extent of residency period of the respondent within the study are, the analysis showed that more than 80% of the respondents had been residing in the study for more than one year, hence their responses on the subject of study can be conserved reliable.

5.2.2. Residents Perception of the Effectiveness of Solid Waste Management in Ota

In the questionnaire administered to the residents, they required providing information on regularity of refuse trucks and vans in coming to remove sold waste deposits as well as the rate at which solid waste take to pile up within their community. The essence of this to be able to compare the rate at which the wastes pile up and how the agency responsible for their removal respond with a view to ascertaining the effectiveness of solid waste management in the city. The response of the respondent residents is as presented in Table 2 below.

Table 2 Residents Rating of Regularity of Removing Accumulated Wastes and Rate of Accumulation of Wastes

Indicators	Regularity	Frequency	Percentage (%)
Truck Arrival/Waste Removal Regularity	Daily	0	0
	Weekly	28	44
	Bi-weekly	23	36
	Monthly	13	20
Rate of Waste Accumulation	Daily	7	11
	Weekly	30	47
	Bi-Weekly	17	27
	Monthly	10	16
Total		64	100

Table 2 above revealed that 28 (44%) of the respondents indicated that the trucks of the solid waste management agency come on weekly basis to remove wastes from the points where wastes are being deposited by the residents while 23 (36%) claimed that the trucks visit their areas bi-weekly to remove their wastes. With regard to the rate waste accumulation, 30 (47%) confirmed that they accumulate wastes on weekly at the points wherein they deposit their wastes while 17 (27%) indicated that they accumulate wastes within waste deposit point on bi-weekly basis. The conclusion which can be drawn from the above is the solid waste collection system within the study area was effective to an extent but can still be improve on. This is further buttressed with the response of the respondent residents as to how effective was the performance of Local Government Solid Waste Management Agency as presented in the Table 3 below.

Table 3 Respondent Resident's Rating of the Performance of Solid Waste Collectors

S/N	Performance Rating	Frequency	Percentage (%)	Mean
1	Very Effective	13	20	
2	Effective	27	42	16
3	Undecided	2	3	
4	Not Effective	22	34	
Total		64	100	

The analysis in Table 3 above shows that majority 62% of the respondent's confirmed the effectiveness of the solid waste collection agency in the city as 13 (20%) and 27 (40%) stated that the performance of the waste collectors was very effective and effective respectively which is in tandem with the analysis in Table 2 above.

5.3. Waste Treatment/Disposal Being Employed in Ota

The interview with the Co-Ordinator of Ado-Odo Local Government Waste Management Agency and the physical visit to the landfill sites at Kurata near the State high Court and Koro-Otun along Itele road, Ota revealed that the main method of waste treatment being employed in Ota was landfill where the wastes are subsequently set on fire after some scavengers must have picked what they considered to be valuable from the landfill sites. The visit to the sites revealed that there was no engineering installation for the treatment of the wastes.

5.4. Challenges Associated with Solid Waste Management in Ota

The visits to the solid waste dump sites and interviews with the officials of estate surveying and valuation firms, Local Government Waste Management Agency and residents revealed some of the challenges being encountered in solid waste management in Ota.

The residents in the course interview identified lateness and irregularity of service by waste collectors whereby solid wastes generated accumulate for longer period of time before

they are removed leading to air and land pollution, which could result to serious health hazard for residents to be one of the most serious challenges of waste management in the town. Other challenge mentioned by the residents has to do with inadequacy of trucks for wastes collection thereby causing delay in removing the wastes.

From personal observation during the visit to the landfill sites, it was discovered that the dumpsites were very close to residential houses which is considered unhealthy for the residents living close to them.

6. RECOMMENDATIONS AND CONCLUSION

The issue of solid waste management constitutes one of the indices for the rating of government performance worldwide as it plays significant part on how healthy the citizens a nation will be. When an environment is dirty and littered with solid wastes, such environment is prone or susceptible to outbreak of epidemics. Hence, governments of any serious country need to take the issue of solid waste very serious by paying attention to any issue that can hamper effective solid waste collection, disposal and management.

In the light of the above, this study is recommending serious investment in the management of solid waste management in Ota in term of financial and personnel resources to cope with the rate of urbanization and waste generation being the city is undergoing to forestall outbreak of epidemics and encourage more commercial and industrial to the town. As the city is currently enjoying influx people and investment, there is need by the authorities concerned with the management of solid wastes in the town to match increase with their performance so as not to caught lacking.

In conclusion, to achieve sustainable and effective management of municipal solid waste in Ota, there is need to harmonize the political, institutional, social and economic prevalent in the neighborhood with a view to achieving neat and healthy environment.

REFERENCES

[1] ACP-EC Joint Parliamentary Assembly (2014). Urbanization Challenges, Waste Management And Development; February 12-14. World Urbanization Prospects (2011), (1-4

[2] Adewolae, A.T. (2009). Waste Management Towards Sustainable Development in Nigeria: A Case Study of Lagos State. Int. NGO Journal, 4(4), 173-179

[3] Agbesola, Y. (2013). Sustainability of Municipal Solid Waste Management in Nigeria: A Case Study of Lagos State. Being an M.Sc Thesis Submitted to Water and Environmental Studies; Department of Thematic Studies, Linköping University, Linköping, Sweden

[4] Ayedun, C.A, Durodola, O.D., Oni, A.S., Oluwatobi. A.O. and Ikotun, O.T. (2018). The Flooding Effect on Residential Property Values: A Case Study of Shogunro Residential Estate, Agege, Lagos State, Nigeria. International Journal of Civil Engineering and Technology IJCIET- Scopus Indexed. Volume 9 Issue 6 pp 489-496

[5] Awolesi, J.A,B. & Ayedun, C.A, (2012). An Assessment of the Effect of Remuneration on the Construction Performances of the Professionals in the Nigerian Building Industry. Mediterranean Journal of Social Sciences. 3(1), 401-412

[6] Gotame, M. (2012). Community Participation in Solid Waste Management, Kathmandu. Being an M.Sc Thesis Submitted to the Department of Geography, University of Bergen, Norway

[7] Kumar, M. & Nandini, N. (2013). Community Attitude, Perception and Willingness Towards Solid Waste Management in Bangalore City, Kamataka, India. International Journal of Environmental sciences, 4(1), 87-95.

[8] Ogunde, A.O., Isaac, E., Nduka, D., Ayedun, C.A. and Ogunde, A. (2018) Assessment of Integration of Building Automation Systems in Residential Buildings in Developing Countries: Professionals' Perspectives. International Journal of Civil Engineering and Technology (IJCIET)- Scopus Indexed. Volume 9 Issue 6 Pp 577-585

[9] Ogwueleka, T.C. (2009). Municipal Solid Waste Characteristics and Management in Nigeria. Iranian Journal of Environmental Health Science & Engineering, 6(3), 173-180

[10] Olukanni, D.O., Akinyinka, O.O., Ede, A.N. & Akinwunmi, I.I. (2014). Appraisal of Municipal Solid Waste Management; Its Effect and Resource Potential in A Semi-Urban City: A Case Study. Journal of South African Business Research. 2014(2014), 1-13

[11] Schubeler, P., Christen, J. & Wehrle, K. (1996). Conceptual Framework for Municipal Solid Waste Management in Low-Income Countries. SKAT (Swiss Center for Development Cooperation), Vol 9., 9-55

[12] Sha'Ato, R., Aboho, S.Y., Oketunde, F.O., Eneji, I.S., Unasi, G. & Agwa, S. (2007). Survey of Solid Waste Generation and Composition in a Rapidly Growing Urban Area in Central Nigeria. Waste Management, 27(3), 352-358.

[13] Squires C.O. (2006). Public Participation in Solid Waste Management in Small Developing States, Caribbean Development Bank, Barbados