Solid Waste Disposal and Management Problems in Ramat Polytechnic Maiduguri, North-East Nigeria

Abstract

This study examined the problems of solid waste disposal and management in Ramat Polytechnic Maiduguri, Borno state, North-east Nigeria. A set of questionnaire was administered on a sample of two hundred and sixty (260) respondents within the study area. The data collected were analyzed descriptively. The results obtained indicated that food wastes, polythene bags and polystyrene food packs constituted the largest component of wastes in the Hostel area. Other forms of solid wastes generated in other locations chosen for the study were paper waste, plastic/rubber bottles, leaves and metal cans. The study revealed that 44.83% of the respondents store their wastes in waste bins/receptacles while 38.36% of the respondents practiced open surface dumping. The results showed that solid waste receptacles provided by the institution were inadequate. The findings also revealed that solid wastes were regularly collected by the polytechnic sanitation workers. Generally, 56.47% of the respondents were satisfied with the performance of the polytechnic sanitation unit in managing solid wastes in the institution. Inadequate personnel, lack of solid waste vehicles and funding were identified as the major challenges in solid waste management. The study recommended among others that the polytechnic administration should recruit more personnel, procure solid waste vehicles and adequately provide funds to the sanitation unit for effective management of solid waste. Furthermore, the institution should embark on awareness campaigns on environmentally friendly approaches to solid waste disposal to check indiscriminate dumping of solid wastes within the polytechnic premises.

Keywords: Solid waste; Urbanization; Disposal; Management; Ramat polytechnic

Research Article

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Introduction

One of the greatest challenges facing most urban centers in Nigeria today is how to cope with the increasing volume of solid wastes being generated daily by its populace. Municipal solid waste tend to be one of the most visible and serious environmental problems in Nigerian cities [1]. This is manifested by large refuse heaps which dot most carriageways, streets and surroundings disfiguring the landscape of the environment. These wastes reduce the aesthetic values of our cities and in most cases tend to take over parts of streets, produce foul odours that are injurious to human health as well as serving as breeding grounds for pathogenic organisms [2]. Uncontrolled or illegally dumped waste can constitute a disaster for human health and can lead to environmental degradation [3]. Abila & Kantola [4] indicated that there has been a continuous increase of municipal solid waste production by households, educational institutions and commercial institutions among others. They observed that indiscriminate disposal of municipal waste is increasingly becoming a prominent habit in most urban cities of Nigeria. According to them, municipal waste generators in Nigeria include household, commercial, industrial, agricultural and institutional establishments among others. Increasing rate of urbanization, rapid economic growth and the rise in community living standards has no doubt been responsible for the large volume of wastes being generated daily in Nigeria's urban centers. Thus, the quantity and rate of solid waste generation in a city is largely a function of population, level of industrialization, socio-economic status and the kinds of commercial activities [5]. According to Ogwueleka [6], Nigeria generates 25 million tonnes of municipal solid waste annually and the waste generation rates ranged from 0.66kg/cap/d in urban areas to 0.44kg/cap/d in rural areas as opposed to 0.7-1.8kg/cap/day in developed countries. Discarded materials generated from domestic and community activities or from industrial, commercial and agricultural operations commonly referred to as solid wastes has remained a major source of concern to government at all levels particularly at this period of dwindling economic resources.

Indiscriminate dumping of solid waste can have serious consequences if left unchecked, particularly in relation to human health and on the ecosystem. The World Health Organization (WHO, 2003) reports that about 5.2 million people including 4 million children die each year from diseases caused by improper disposal of sewage and solid wastes. An obvious way therefore of reducing the problem of environmentally-induced diseases in Nigeria is to manage urban wastes properly. Nigerian cities generate solid waste at an alarming rate such that in most cases, the volume of waste generated is often more than what the city system could absorb or handle [7]. Although it has been argued that solid waste is an unofficial measure of prosperity [8], it would be wrong to conclude that the volume of solid waste visible in our cities today

is an acceptable indicator of prosperity. It should rather be seen as a measure of the extent of the failure of public authorities to cope with the inevitable by-products of development. It is only when a line of distinction is drawn between the volume of solid waste that is actually generated and the rate at which it is evacuated that one can comfortably measure the degree of effectiveness of any solid waste management practice. Abila & Kantola [4] have defined municipal waste management as the collective process of sorting, storage, collection, transportation, processing, resource recovering, recycling and disposal of waste. In Nigeria, several efforts have been made towards the management of solid wastes in most urban centers such as the establishment of waste management and sanitation agencies, provision of waste management vehicles and facilities, yet these efforts have not translated into effective and efficient solid waste management. Indiscriminate dumping of solid wastes in undesignated areas remains a major challenge to wastes management agencies.

Most recent studies on solid waste management problems in Nigeria tend to concentrate more on urban centres [9-11,7]. The very few available studies on solid waste management relating to tertiary institutions of learning were undertaken in south-west Nigeria [12-14]. Very little is therefore known about the peculiar problems of solid waste management in most public tertiary institutions of learning particularly in North-east Nigeria. This study therefore seeks to examine the problems of solid waste disposal and management in Ramat Polytechnic Maiduguri, one of the tertiary institutions in Borno state, north-east Nigeria. Given its increasing growth rate in students' enrolment and staff population, the generation of solid wastes on a daily basis from offices, classrooms, workshops, laboratories, kiosks, hostels etc., has become inevitable. Efficient management of such wastes is therefore important in promoting a healthy environment.

Methodology

The study was basically a descriptive survey designed to examine the problems of solid waste disposal and management in Ramat Polytechnic Maiduguri, Borno State. Primary and secondary sources of data were used for the study. The primary sources involved personal interviews and questionnaire. A structured interview was conducted with members of staff involved in the day-to-day collection, transportation and disposal of solid wastes, while a set of questionnaire was administered on respondents cutting across both staff and students of the institution. A total of 260 questionnaires were administered out of which 232 were returned representing 89.2%. The administration of questionnaire was done as shown in Table 1. The data acquired were then analyzed descriptively. Purposive sampling was used to identify all the locations of the study. Systematic sampling technique was used to select the different buildings within each location, while a simple random sampling technique was used to administer the questionnaire on actual respondents used for the study. The secondary sources of data collection consisted basically of published materials such as textbooks and journals from where relevant literatures were sourced.

Table 1: Administration of questionnaire in Ramat Polytechnic Maiduguri.

Location	Questionnaire Distributed	Questionnaire Returned	Percentage
Hostel Area	50	46	92
Malaysia complex Area	50	42	84
Central Administration Area	40	36	90
Environmental complex Area	40	38	95
Engineering Area	40	34	85
Consultancy Area and N-Block	40	36	90
TOTAL	260	232	89.2

Source: Field work, 2017.

Results and Discussion

The various wastes generated from all locations selected for the study namely Hostel area, Malaysia Complex area, Central Administration area, Environmental complex area, Engineering area, Consultancy and N-Block area were collected individually and analyzed to ascertain the characterization of such wastes from the respective locations. The results show that food wastes, polythene bags and polystyrene food packs constituted the largest components of solid wastes in the Hostel area. This result supports earlier findings by Amori, Fatile, Ihuoma & Omoregbee [12] which found that food wastes constituted the highest proportion of wastes generated from halls of residence in Nigerian tertiary institutions in south-west Nigeria. Others were plastic/rubber bottles, ash waste and metal cans. In all the other locations, paper waste, polythene bags and leaves constituted the largest components of solid wastes while metal cans and plastic/rubber bottles constituted an insignificant proportion. Figure 1 shows some of the solid wastes collected in waste receptacles. The results of the study as shown in Table 2 revealed that 44.83% of the respondents store their wastes in waste bins before onward disposal by the Ramat Polytechnic sanitation staff while 38.36% practiced open surface dumping.

The findings also show that 9.05% of respondents burn their wastes, 2.59% dump their waste on drains while 5.17% bury their wastes. Since a significant number of people within the Institution dump their wastes openly on surfaces (See Figure 2), such surfaces may become breeding grounds to pathogenic organisms and become potent grounds for the spread of diseases. The findings

as shown in Table 3 revealed that 69.83% of the respondents agreed that solid waste receptacles have been provided for solid waste collection within the Polytechnic environment (See Figure 3). However, 76.72% indicated that the distribution of solid waste receptacles was not adequate within the polytechnic. The results also show that solid wastes were collected regularly from all receptacles by the Polytechnic sanitation workers for onward conveyance to waste dump sites. This is represented by 55.6% of the total responses. This result explains why most of the receptacles were empty during field inspection by the researchers (See Figure 4). On the general performance of the polytechnic sanitation unit (PSU) with regard to solid waste management, 56.47% of respondents agreed that the performance of PSU was satisfactory. This finding is in contrast with Ikudayisi & Aribisala [13] which found that the management of solid waste in College of Education, Ikere-Ekiti, South-west Nigeria was grossly inadequate and unsatisfactory. This may be perhaps due to differences in population size which may account for disparity in the volume of wastes generated per day in the respective institutions.

Figure 1: Solid wastes receptacles within the polytechnic surrounding

Source: Field work, 2017.

Table 2: Mode of solid waste disposal habits among respondents.

S/No	Mode of Disposal	Responses	Percentage
1	Burning	21	9.05
2	Storing in waste bins	104	44.83
3	Open surface dumping	89	38.36
4	Dumping in drains	6	2.59
5	Composting (Burying)	12	5.17
TOTAL		232	100

Source: Field work, 2017.

Interviews conducted with some of the sanitation workers revealed that the Polytechnic Sanitation Unit (PSU), which is responsible for the day-to-day cleaning of the Polytechnic environment including the management of solid wastes, was faced with a number of challenges. One of such challenges was inadequate personnel to effectively cope with the increasing volume of wastes generated in the institution. They indicated that the cleaning of all premises of the Polytechnic in addition to waste management was becoming very challenging given the tasks involved and the shortfall in personnel. It was also revealed that the Polytechnic does not have the required vehicles for conveying solid wastes to final dump sites thus making it difficult for the PSU to collect and transport all wastes to disposal dump sites which is at the outskirts of Maiduguri. The respondents disclosed that there was also the challenge of inadequate funding of the PSU to

enable it execute general waste management operations in the institution.

Figure 2: Open surface dumping at the hostel area.

Source: Field work, 2017.

Figure 3: Some solid waste receptacles in different locations within the Polytechnic.

Source: Field work, 2017.

Figure 4: Some solid waste receptacles found not to be over-flooded with solid wastes during field inspection.

Source: Field work, 2017.

Table 3: Solid waste management in Ramat Polytechnic.

S/No	Statement	Responses			
		Yes	%	No	%
1	Solid waste receptacles are provided for waste collection in the Polytechnic.	162	69.83	71	35.78
2	The distribution of solid waste receptacles within the polytechnic environment is adequate	54	23.28	178	76.72
3	Solid wastes are collected regularly for final disposal by the Polytechnic Sanitation Unit (PSU)	129	55.6	103	44.4
4	The performance of the Polytechnic Sanitation Unit in solid waste management within the Polytechnic is satisfactory	131	56.47	101	43.53

Source: Field work, 2017.

Conclusion and Recommendations

Solid wastes management is indeed a major environmental problem that must be tackled for the overall good of man and the environment. The current challenges militating against the effective management of such wastes in tertiary institutions of learning particularly in Ramat Polytechnic have been identified in this study. Adequate personnel to boost the manpower needs of the polytechnic sanitation unit are urgently required. Waste disposal vehicles are required for regular collection and transportation of waste to disposal dump sites. There is also the need for regular and adequate funding of the sanitation unit to enable it procures equipments such as waste receptacles and other equipments for effective solid waste management in the institution. Awareness on environmentally friendly ways of solid waste disposal will also go a long way in checking indiscriminate disposal of solid waste within the polytechnic community.

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Conflict of Interest

The authors declare that they have no competing interests.

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