

Solid Waste Management in Peri-Urban Center of Maiduguri Metropolis; Case Study of Jiddari Polo, Jere Local Government Area of Borno State

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Abstract

This study examines solid waste generation and management in the Jiddari Polo Area of Jere Local Government of Borno State. through identifying the waste generated, methods of disposal, and the socioeconomic characteristics of the residents. In achieving this study, 100 respondents were determined through a systematic random sampling technique. Descriptive statistics were used to analyze the data with the aid of the Statistical Package for Social Sciences (SPSS) tool. The result revealed that 57.73% of the respondents generate plastic waste by-products; 12.37% of the respondent generates food waste products; 7.22% generate bottle wastes; 6.19% generate vegetable wastes; while 6.19% of respondents generate ash waste products. Lastly, the result revealed that 4.12% of the respondents generate rubber waste, 3.09% generate metallic objects and 3.09% of respondents generate other forms of waste. 49.48% resort to burning as a disposal method while the remaining engage in roadside dumping as common waste disposal practice in the study. Therefore, the prevalence of improper disposal of municipal solid waste can lead to unsanitary conditions. They can, in turn, lead to pollution of the environment and by extension outbreaks of vector-borne diseases. However, the study recommends that the government and other relevant stakeholders should provide enough waste bins and proper allocation of such facilities. While also ensuring frequent waste collection in the study area as the rate of waste generation is higher.

Keywords: Solid wastes, Jere Local Government, Waste Generation, Waste Collection, Pollution.

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I. Introduction

The world generates 2.01 billion tonnes of waste annually and it is expected to be 2.2 billion tonnes by 2025, many of this waste comes from urban and peri-urban centers. Municipal waste management in many cities in the developing world is at its lowest ebb; many areas such as city centers or fringes of the urban centers do not benefit from public waste disposal services (Babayemi, 2009). This has over time created a lot of environmental and health challenges. The environment is critical to the existence of every living creature, by supporting life in all ramifications. It also contributes to a large extent to the quality of life of such creatures (Oreyomi, 2005). As such the sustainable management of the environment becomes imperative especially with the emphasis the globe place on a sustainable environment through the sustainable development goal of the United Nations. Waste generation in Nigeria is estimated to be about 0.65 to 0.65 kg/capita/day, in Maiduguri, daily waste generation increased from an estimated 390 tons per day to 570 tons per day (UNDP, 2016).

This means that about 42 million tonnes of waste are generated annually in the country (Ike, *et al.*, 2018) and are therefore buried or burned their waste or dispose of it haphazardly (Fafioye and John-Dewole, 2013). In developing countries like Nigeria, open dumping of solid wastes on the roadway's drains, and borrow pits is a prevalent form of disposal (Arimieariet *al.*, 2014). The practice usually resulted in the littering of highways and drains. This becomes an eyesore and serves as a breeding ground for flies, rats and mosquitoes which are major carriers of diseases (Kagu, 1996). Other effects of improper solid waste management have been reported such as river channels, sewers, and gutters blockage, the overall effect of which resulted in flood events (Sangodoyin, 1993) the disposal of hazardous waste, waste components, and waste management have caused significant health problems (Arimieariet *al.*, 2014). The effects of which are deleterious to both human life and the environment. Solid waste management had been part of human activities right from time.

Several efforts are being made by the Government at all levels (Federal, State, and Local) in managing the collection and disposal of waste generated. In the past, the Borno State Government made an effort on the waste collection by providing evacuation vehicles and skip bins at strategic places across the major cities. However, despite the provision made by the Government, an emerging trend is the dumping of refuse along the

median of some major and collector roads in the State. The lackadaisical act of median dumping of refuse has left the area with persistent flooding during raining season. Thus, city corridors are now breeding places for rodents, insects, and diseases, and inadequate distribution of refuse bins makes it impossible to establish the reason behind the indiscriminate disposal of refuse along the road divide (Popoola *et al.*, 2016). For a sustainable city, therefore, a concerted effort is needed for this complex challenge.

This study, thus, assesses the level and adopted method of solid waste management in the Jiddari Polo area of Jere Local Government Area, while the specific objectives are to: identify the various sources of solid waste in the study area; examine the methods of waste management practices and identify the various challenges of waste management.

II. Materials and Method

2.1 Description of the Study Area

The study was conducted in Jere Local Government Area of Borno State, located in North-Eastern Nigeria. Jere environs are known for dryness, with a semi-arid climate, savannah or tropical grasslands vegetation, light annual rainfall of about 300 to 500 mm, and the average daily temperature ranging from 22 to 35°C, with mean daily maximum temperature exceeding 40°C between March and June before the onset of the rains in July to September (Hauwa *et al.*, 2013). It has mainly sandy and loamy soils (Arkuet *et al.*, 2011). Its headquarters are in the town of Khaddamari. It has an area of 868 km² and a population of 211,204 at the multi-stages. Jiddari located in Jere local government of Borno State which also forms part of the greater Maiduguri metropolis is a heterogenous community. It is a residential area mostly inhabited by low and middle-class families.

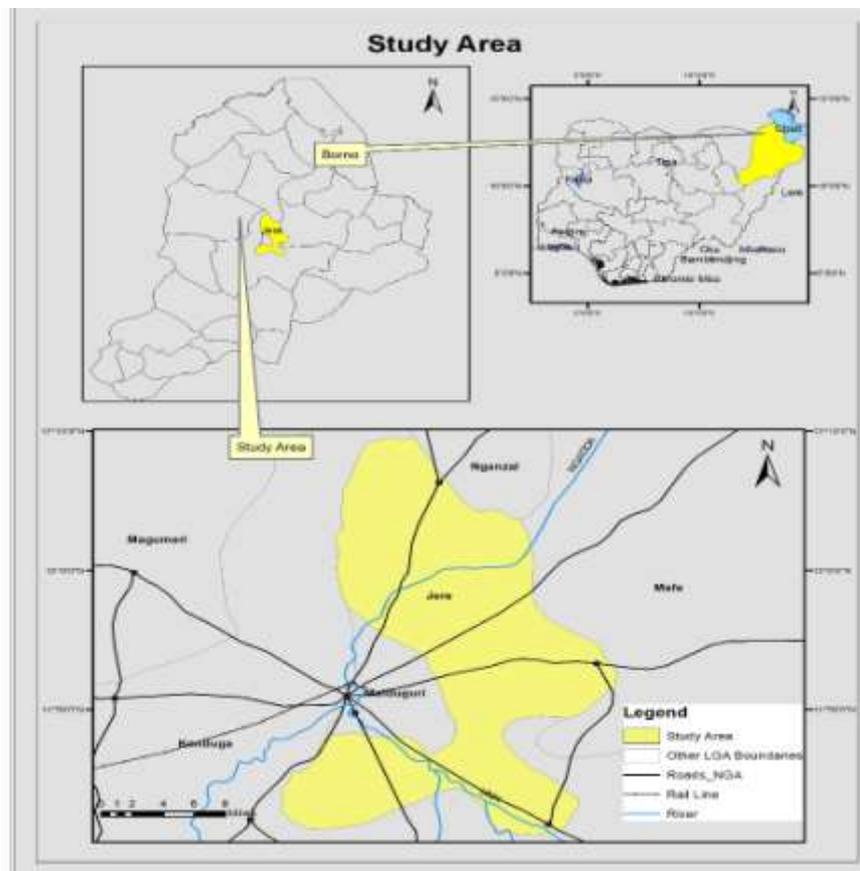


Fig.1: Study Area

Source: Borno Geographical Information Services (BOGIS)

2.2 Methodology

A multi-stage sampling technique was used to elicit information through the structured questionnaire from the study area (JiddariPolo). A total of 100 respondents were used involving 35 respondents from each location. Administration of questionnaires and personal observations were employed in the course of this study. The research was designed to survey households on methods of solid waste generation, and disposal and how these wastes generated in houses were managed. The data required for the study were collected from primary

sources. The data was collected from residents of the Jiddari Polo area of Jere LGA and the households were selected randomly within the study area. The household questionnaires were related to the socio-economic characteristics of respondents, solid waste types, generation, and management. A descriptive analysis was used to analyze data i.e. percentage, frequency, tables, and charts using SPSS 21.0 tool at a 5% significance level.

III. Result and Discussion

The majority of the respondents were male (65.98%) while female respondents were 34.02% with the majority falling within the age range of 31 years old and above. Furthermore, the result has shown that nearly half of the respondents were married (48.45%) and 32.99% were single, the result also reveals that the majority of the respondent has a household size of 1 – 5 (41.24%) and 11- 20 (41.24%) occupants. According to (Ezeah, 2010) the level of education has an influence on the way people manage waste to protect them from an outbreak of diseases, in terms of education the result showed that 34.02% of the respondents are degree holders, 21.65% of the respondents have no formal education, 11.34% had primary education, 14.43% had secondary education while 18.56% had OND/NCE (National Diploma or National Certificate in Education). Assessment of occupation showed that the majority of the respondents are traders (40.21%), while 39.18% are civil servants and artisans 20.62%. The monthly income of the respondents was also verified, the percentage of people earning less than 7,000 is 50.52%, while those earning between 8000-30,000 is 22.68% and those earning between 31,000- 100,000 is 18.56% while respondents earning 100,000 and above are 8.25%. This is in line with the result of an earlier study (Faniran, 2012) that the level of income may determine how and the kind of waste management system that will be adopted in an area.

3.2 Solid Waste Generation in Jiddari

The rapid population, economic growth, and rise in community living standards have been a major contributor to generation rate of municipal solid waste, managing it has been a major challenge worldwide” (Wunuboet *et al*, 2017). Sources of solid waste generation in Nigeria among others are commercial, industrial, household, and agricultural. They are also categorized as degradable and non-degradable. Figure 1 shows the solid waste types generated in Jiddari, Polo area, Jere including 44.33% of the respondents generate nylon waste product, leaves and spoilt worn-out clothes having 20.62% each and 10.31% generates papers.

The information on domestic waste products generated in the study area shows that 12.37% of the respondent generate food waste products, 6.19% generate vegetable wastes, and 6.19% of respondents say they generate ash waste products. Lastly, the result revealed that 57.73% of the respondents generate plastic waste by-products while 4.12% of the respondents generate rubber waste and 3.09% generate metallic objects, 7.22% generate bottle wastes, and 3.09% respondents generate other forms of waste.

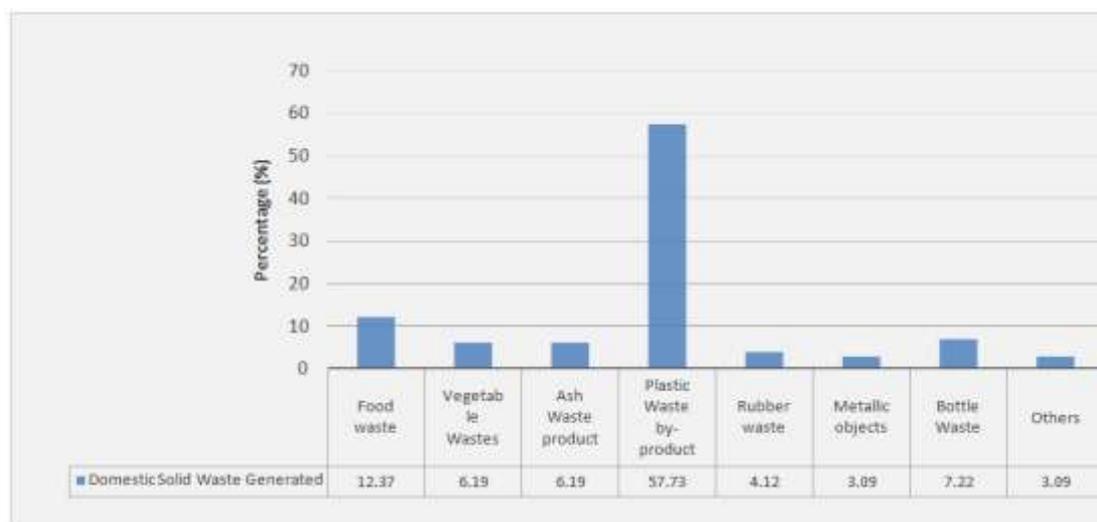


Figure 2: Types of Solid Waste Generated in the Study Area
Field survey, 2021

3.3. Waste management Practices in the Study area:

Seven major disposal methods were identified in the study area as shown in figure 2 below. The result showed that 49.48% of the respondents using waste burning as a disposal method was the most common. The result agreed with Igoni *et al* (2007) that reported similar findings. Many Nigerians have considered burning a cheap way of disposing of their solid wastes by setting the mixed wastes on fire in a little corner in their

backyard or a very open place and causing serious and dangerous air pollution. Effect of which is deleterious to both flora and fauna and ecosystem in general. Dropping of waste by the roadside and drainage receptacles (21.65 %) was common after waste burning (49.48%) in the study area and research has established that the dropping of waste and debris in drainage the result conforms with (Agunwamba, 2003) that severe flooding arising from the blockage of drainages with wastes. It was observed that 16.49% of respondents dropped refuse in the river channels around the area while 12.37% dispose of using other means. The relationships between educational status, age and solid waste management; the result shows that age and education status have no influence on solid waste management in the study area as all the respondents engaged in the same manner of waste disposal notwithstanding their age, level of income, marital and education status. The result agreed with (Babayemi & Dauda, 2009) that reported similar findings in Abeokuta, Ogun State. However, in their study, the authors noted a relationship between gender and waste management as the percentages of those involved in open dumping, dumping in drainages, and burying were higher among males.

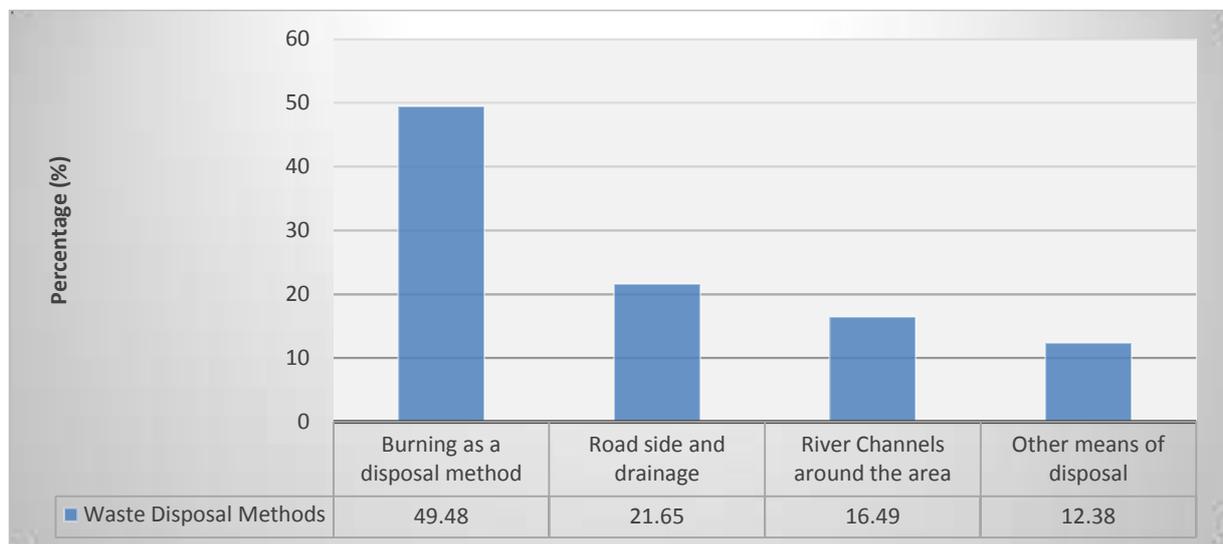


Figure 3: Waste Management Practices in the Study Area.
Source: Authors' Field Survey

3.4. Challenges of Waste Management in the study area:

The result showed that the cost of waste disposal was not a problem in the study area. Similarly, the result shows that some of the occupants of the area are aware of the consequence of indiscriminate disposal of waste but the lack of adequate waste disposal methods is a major challenging factor. (Afon, 2007) reported that the cost paid per household size should be minimal so that they could be effectively collected using the waste bins. Some of the problems identified include a lack of coordinated waste management framework making some of the residents engage in indiscriminate disposal of waste, also it was deduced that government policy has an impact on the disposal methods that will be adopted by the citizenry. Lack of adequate waste bins and dumpsites is another factor contributing to inappropriate waste disposal in the study area. According to (Abel, 2009) and (Folorunso, 2001) opined that proper waste management should be put in place to avoid an outbreak of disease and other environmental pollution which has a deadly effect on both flora and fauna. On the other hand, the Borno State Environmental Protection Agency (BOSEPA), an agency of government responsible for waste and environmental management is faced with a shortage of equipment to adequately manage solid waste in the metropolis (Dauda and Osita, 2000).

IV. Conclusion

Despite the high level of massive awareness of solid waste collection and management in Jiddari, Jere Local Government Area, Borno State, most of the occupants of the area still indulge in indiscriminate disposal of solid waste like open dumping, open burning, and dumping in drainages. These indiscriminate methods of disposal are practiced generally in the study area irrespective of educational status, financial status, or level of exposure of the people, and the adverse effect is nothing but a filthy and unsightly surrounding. Improper disposal of municipal solid waste can create unsanitary conditions and these conditions, in turn, can lead to pollution of the environment and the outbreak of vector-borne diseases (i.e., diseases spread mostly by rodents and insects). It is, therefore, suggested that for proper waste management in the Jiddari Polo area, the Government should provide waste bins and proper allocation should be ensured. Furthermore, waste collection

frequency should be increased in the study area as waste generation is on the high side. A public-private partnership should be encouraged to lessen the burden of waste management on the government and community participation in environmental management should be encouraged. Further research can be conducted on the long-term impact of the high rate of plastic waste generated on the environment.

V. Recommendation

The study recommends that the Government and other relevant stakeholders should provide enough waste bins and proper allocation of such facilities. Waste collection frequency should also be increased in the study area as waste generation is higher.

References

- [1]. Abel, O.A. (2009). An Analysis of Solid Waste Generation in a Traditional African City: The Example of Ogbomoso, Nigeria. *Environment and Urbanization*, SAGE Journals, 19(2): 527- 537.
- [2]. Afon, A.O (2007). "Informal Sector Initiative in the Primary Subsystem of Urban Solid Waste Management in Lagos, Nigeria," *Habitat International*, vol. 31, no. 2, pp. 193–204.
- [3]. Afon, A.O. (2005). *Solid Waste Management in Selected Cities of Oyo State* [Ph.D. dissertation], Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria.
- [4]. Agunwamba, J.C., (2003). Analysis of Scavengers' Activities and Recycling in some Cities of Nigeria. *Environmental Management* 32 (1), 116–127.
- [5]. Arimicari, L.W., Sangodoyin, A.Y. and Joe T. (2014). On the Assessment of Solid Waste Management in Port Harcourt, Nigeria. *Int. Journ. Eng. & research. Tech.* vol 3(8), 238-246.
- [6]. Babayemi, J.O. and Dauda, K.T. (2009). Evaluation of Solid Waste Generation, Categories and Disposal Options in Developing Countries: A Case Study of Nigeria. *J. Appl. Sci. Environ. Manage.*, 13(3): 83 – 88.
- [7]. Dauda, M., and Osita, O.O. (2003). Solid waste management and reuse in Maiduguri, Nigeria. 29th WEDC International Conference towards the Millennium Development Goal, Abuja.
- [8]. Ezeah, C. (2010). Analysis of Barriers and Success Factors Affecting the Adoption of Sustainable Management of Municipal Solid Waste in Abuja, Nigeria [Ph.D. thesis], University of Wolver Hampton, 2010, <http://core.kmi.open.ac.uk/download/pdf/1933162.pdf>.
- [9]. Fafioye O.O. and John-Dewole O.O. (2013). A Critical Assessment of Waste Management Problems in Ibadan South-West Local Government Area, Ibadan, Nigeria. *Greener Journal of Environmental and Management Studies*, Vol. 2 (2), pp. 060-064.
- [10]. Faniran, G.B. (2012). Residents' Perception of the Monthly Environmental Sanitation Exercise in Ibadan Metropolis, Nigeria [M.Sc. thesis], Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria.
- [11]. Folorunso, R and Awosika, L. (2001). Flood Mitigation in Lagos Nigeria through the Wise Management of Solid Waste: The Case of Ikoyi and Victoria Islands. Managing Conflicts over Resources and Values. Results of a Workshop on „Wise Practices for Coastal Conflict Prevention and Resolution“, Maputo, Mozambique, 19-23 November 2001.
- [12]. Ike, C. C.; Ezeibe, C. C.; Anijiofor, S. C.; Daud, N. N. Nik (2018): "Solid Waste Management in Nigeria: Problems, Prospects, and Policies" *The Journal of Solid Waste Technology and Management*, Volume 44, Number 2, May 2018, pp. 163-172(10).
- [13]. Igoni, AH; Ayotamuno, MJ; Ogaji, SOT; Probert, SD (2007). Municipal Solid Waste in Port Harcourt, Nigeria. *Applied Energy*, Elsevier 84(6): 664-670.
- [14]. Kagu A (1996). Refuse generation and disposal in Maiduguri, a paper presented at the 39th conference of the Nigerian Geographical Association at Kashim Ibrahim College of Education (KICOE) Maiduguri.
- [15]. Oreyomi, M.K. (2005). Ecological Sanitation of Water and Environmental Conservation Technology Option: The Case of Slums in Oyo State, Nigeria. *J. African Environmental Issues*. Vol. 3 pp. 12 -15.
- [16]. UNDP (2016), North-East Nigeria waste and debris Assessment, final report January 2016 pp 26-28.
- [17]. Popoola, A.A., Ayangbile, O.A. and Adeleye, B.M. (2016). Assessment of Solid Waste Management System in Ibadan North, Oyo State using Geospatial Techniques. *Ethiopian Journal of Env. Stud. Mgt* 9(6):666-679.
- [18]. Sangodoyin, A.Y. (1993). Domestic Waste Disposal in Southwest Nigeria. *Environmental Management and Health*, vol 4 (3), 20-23.
- [19]. Wunubo B, Biame CC, and Bukar MA (2017) An assessment of waste management activities of Borno State Environmental Protection Agency (BOSEPA). *Journal of Environment and Waste Management* 4(1): 173-180.

Abatcha, I. Uet al. "Solid Waste Management in Peri-Urban Center of Maiduguri Metropolis; Case Study of Jiddari Polo, Jere Local Government Area of Borno State." *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, 16(10), (2022): pp 01-05.