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Assessment of Effectiveness of Solid Waste Management Strategies of Ekiti State Waste Management Board in Ado-Ekiti, Ekiti State, Nigeria

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Abstract
The issue bothering on solid waste management has become a great environmental challenge in Sub-Sahara Africa with Nigeria being one of the most affected countries. The estimate of waste generation in Nigeria is 0.65 – 0.95 kg/capital/day, which gives an average of 42 million tonnes which is more than half of 62 million tonnes of waste generated in Sub-Sahara Africa annually. Therefore, the management of these wastes in such a way that, minimum damage to public health and the environment is ensured, has become a huge problem in most cities in the country. This study, therefore, investigated the effectiveness of solid waste management strategies in Ado-Ekiti, Ekiti State. A mixed-method of sampling was used to select eighty-seven (87) respondents which constituted the sample size for the study. Primary data were collected through direct observation and the use of the questionnaire. Findings indicate that the largest composition of waste generated in the study area was an agricultural waste product (50.43%). Communal waste containers (52.08%) and roadsides (31.25%) were the major waste collection points identified. Waste recycling, reuse, and sales of metallic wastes were the strategies used. The majority (87.50%) indicated regular waste collection while 52.08% indicated that the services provided by the waste collectors were good. The study, therefore, concluded that the solid waste management strategies in the study area included: recycling of plastic wastes; reuse of agricultural waste products as compost manure, and sales of metallic wastes. The strategies were seen to be effective, although some challenges such as inadequate waste collection bins, vehicles, and inadequate personnel, were identified. These challenges could be addressed by partnering with private organizations that are interested in solid waste management.

Key Words: *Assessment, Effectiveness, Solid waste, Management strategies.*

1. Introduction

Since the creation of mankind, waste generation has been in existence. With the increase in civilization and urbanization, poor planning, and inadequate resources particularly in developing countries waste management has become a global environmental challenging issue (Mwanthi and Nyanbola, 1997). In 2016, the worlds' cities generated 2.01 billion tonnes of solid waste, amounting to a footprint of 0.74 kilograms per person per day and with population growth and urbanization, annual waste generation is expected to increase to 3.40 billion tonnes in 2050 (http://www.worldbank.org/what-a-waste). Solid wastes are the materials generated from various human activities and which are normally disposed of as useless and unwanted which include

polythene papers, used plastic, and rubbers, papers, meal scraps, vegetable peelings, rice and wheat husk, street sweepings, sawdust, animal manure, broken furniture, sewage sludge (Nyoti *et al.,* 2016).

The Federal Ministry of Environment (2012), defined waste as any leftover or useless materials produced from human activities. Nyoti *et al*. (2016) classified solid waste based on their sources into four basic types: domestic/residential, agricultural, institutional/industrial, and commercial. The waste can also be categorized as biodegradable and non-degradable. Due to an increase in population, the waste generated becomes more of a complex nature. After the end of the nineteenth century, the industrial revolution saw the rise of the world of consumers which consequently contribute to the increase of waste generated. Therefore, an increase in population and urbanization increased solid waste (Thanh *et al.,* 2011).

Solid waste management is the application of different methods and approaches to the collection, transfer, processing, treatment and disposal of solid waste (Onu *et al.,* 2001).

2. Materials and methods

Purposive and systematic sampling was used for the study. Data for this study were collected from primary sources. The primary source of data includes survey visits to four (4) waste collection points every week and the administration of questionnaires. The visit to the waste collection points helps to obtain information on the composition of domestic solid waste generated. Two sets of questionnaires were designed for this study

The first set of questionnaires were administered to members of staff of Ekiti State Waste Management Board (ESWMB) while the other set of the questionnaire was administered to members of the public around the dumpsite in the study area to obtain information on the types of waste being generated/ collected, mode of collection of waste, frequency of waste collection, solid waste management strategies employed, the key players in the domestic waste management, the effectiveness of solid waste management strategies employed in the study area.

A total of 120 houses were identified around the study area. Krejcie and Morgan's (1970) method of determining the sample size was used to determine the sample size for this research, they reported that for an area with a population of 110-120, the sample size to be used is 87. The total number of eighty-seven (87) Households were sampled systematically in the study area. The data obtained were analyzed using tables of frequencies, percentages and pie charts.

3. Results and Discussion

3.1. Composition of waste generated

Table 1 shows the distribution of the kind of solid waste generated in the study area. It was observed from the table that over half of all the domestic waste generated in the study area are mainly agricultural waste product, while about half of the domestic solid waste generated is from bottles and plastics, polymer and paper and textile materials respectively

Table 1: Domestic Solid Wastes Generated in the Study Area

Week	Bottles & Plastics (kg)	Polymer & Paper waste (kg)	Agricultural waste (kg)	Others (Can & Textile materials) (kg)
1	0.60	1.30	2.30	0.67
2	1.32	0.42	2.80	0.57
3	0.67	1.80	2.67	0.85
4	1.02	1.05	2.22	0.55
Total	**3.61**	**3.57**	**9.99**	**2.64**
%	**18.22**	**18.02**	**50.43**	**13.33**

This means that a very large percentage of the domestic solid wastes generated in the study area are biodegradable (64%) compared to the non-biodegradable waste generated in the study area (about 36%), this also implies that the biodegradable waste can be decomposed and used for other purposes.

3.2. Methods of domestic solid waste collection in the study area

Table 2 shows that the major domestic solid waste collection points employed in the study area are through the communal container, roadside collection and door to door waste collection. As illustrated in Figure 1, about 52% of the respondents dump their waste in the communal waste container; about 31% dump their waste by the roadsides while about 10% have their waste being collected in front of their houses by the government waste collection agents

Table 2: Methods of Domestic Solid Waste Collection Employed in the Study Area

Method of Collection	Frequencies	Percentages (%)
Roadside collection	15	31.25
Door to Door Collection	05	10.42
Communal Container	25	52.08
Others	03	6.25
Total	48	100

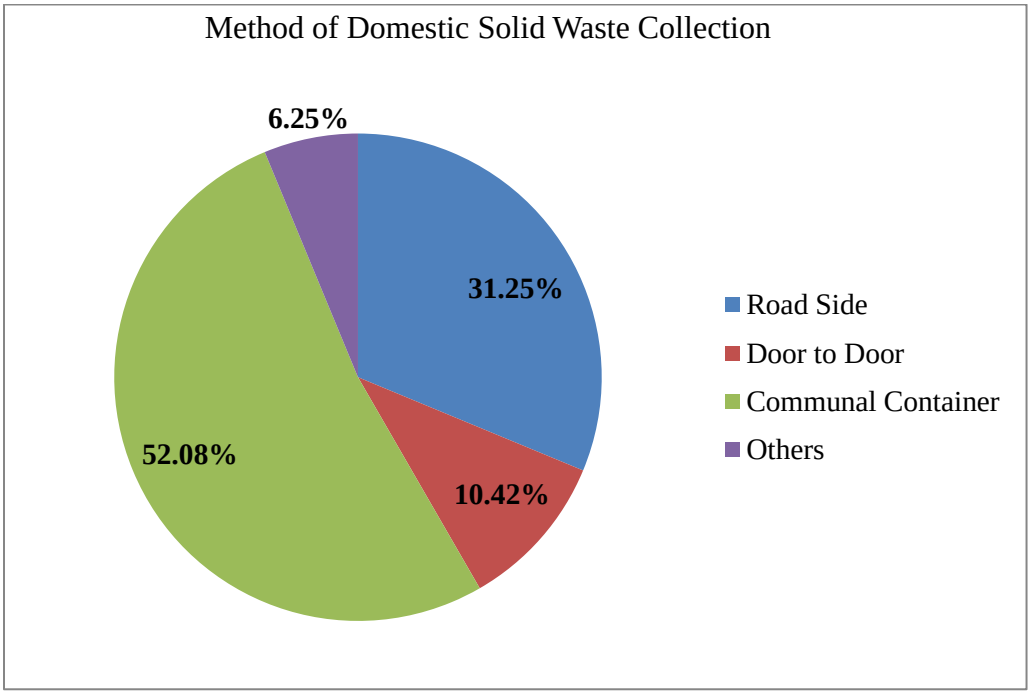

Figure 1: Method of Domestic Solid Waste Collection Employed in the Study Area

3.3. Domestic solid waste management strategies employed in the study area

Table 3 shows that the major domestic solid waste management strategies employed in the study area are to recycle, reuse and resell. All respondents at the Ekiti State waste management Board indicated that waste collected is either Recycle or Reuse and that only metallic waste is Resell. The plastic wastes are being recycled into pellets while Agricultural waste products are reused for composting manure.

Table 3: Domestic Solid Waste Management Strategies Employed in the Study Area

Strategies	Frequencies	Percentage of Responses (%)
Recycle	30	36.59
Reuse	30	36.59
Resell	22	26.83
Total Responses	**82**	**100**

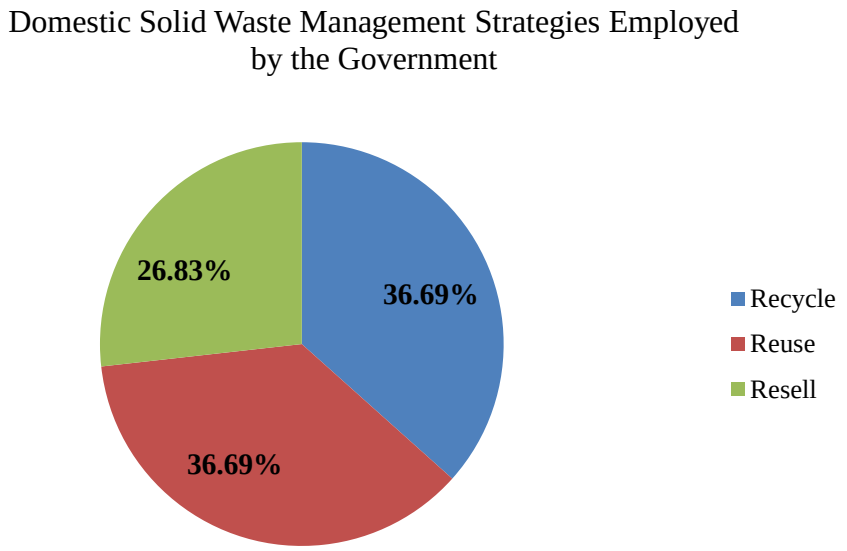

Figure 2: Domestic Solid Waste Management Strategies Employed by the Government

3.4. Regularity in the domestic solid waste collection by government agencies

Figure 3 shows how regular is waste being collected by the government agencies in the study area. The assessment shows that 87.5% of the respondent indicated that the waste collectors do come regularly to collect the waste while 10.42% of the respondent indicated that the waste collector does not come regularly. The result indicates that the solid waste collection agents of the government are up to the task of regular waste collection which is one of the reasons why no outbreak of any disease like cholera in the study area.

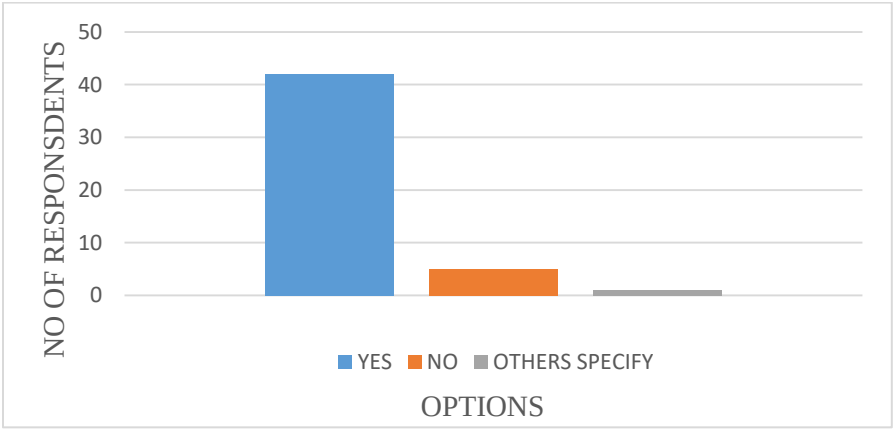

Figure 3: Regularity in Collection of Domestic Solid Waste by Government Agencies

3.5: Effectiveness of existing solid waste management strategies in the study area

Table 4 and Figure 4 show the effectiveness of domestic solid waste management strategies put in place by the government. 31.25% of the respondent indicated that the services provided by the waste collector is very good and 52.08% admitted that the strategies are good. In all, over 83% agreed that the strategies are good. This shows that the strategies put in place by Ekiti State Government are effective even though the worker at the waste management board identifies some areas of need which include waste collection bins, waste collection vehicles, and inadequate personnel.

Table 4: Effectiveness of Domestic Solid Waste Management Strategies in the Study Area

Comments	Frequencies	Percentages %
Very Good	15	31.25
Good	25	52.08
Bad	5	10.42
Very Bad	1	2.08
Others	2	4.17

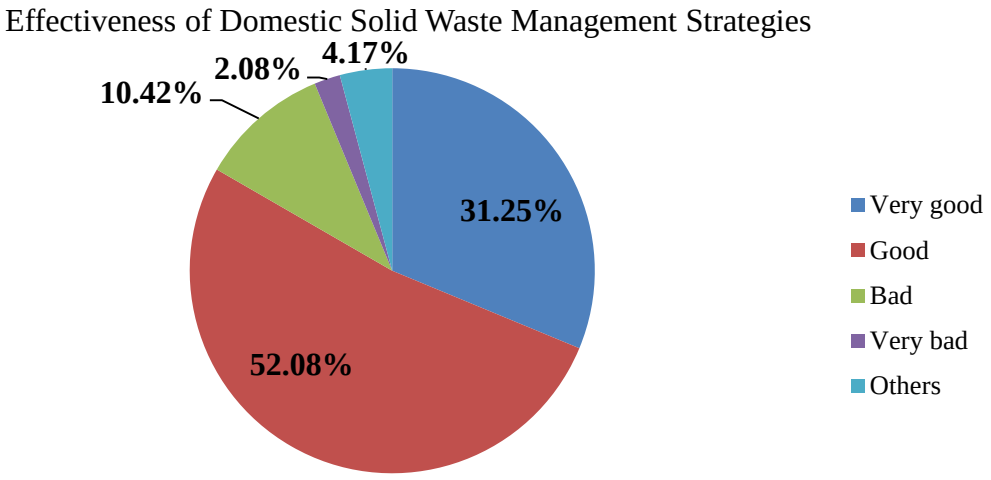

Figure 4: Effectiveness of Domestic Solid Waste Management Strategies in the Study Area

4. Conclusions and Recommendations

The findings in this study revealed that communal waste bin and roadsides collection are the major sources of waste collection by the government in the study areas and that agricultural waste forms the bulk of the waste generated in those areas. The study showed that recycling, reuse and resale are the strategies employed by the government in managing the collected waste. The wastes are segregated after collection, agricultural wastes are used for compost manure, plastic, bottles and metallic waste are resold. It was also revealed from the study that the activities of the waste management authorities are only limited to some areas and there are inadequate waste collection bins and trucks and shortage of personnel

The study recommended the adoption of composting as a method of waste management since the majority of the solid waste generated is agricultural and is biodegradable, the encouragement of private sector participation

in domestic solid waste management, public enlightenment on the importance of creating a healthy environment, recycling of waste materials and increased budgetary allocation of Ekiti State Waste Management Board to enhance effective Domestic Solid Waste Management in the state.

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References

i. *Federal Ministry of Environment, Waste Management Policy and Implementation in Nigeria. In: Ivbijaro, M.F.A. and Akintola, F., Sustainable Environmental Management in Nigeria. (2nd ed.). Book Builders, Ibadan, (2012) 253-259*
ii. *R.V. Krejcie, D.W.Morgan, Determining Sample Size for Research Activities Education and Psychological Measurement. Journal of Education and Psychology. 30. (1970) 607-610*
iii. *M.A.Mwanthi, L.O.Nyanbola, Solid Waste Management in Nairobi City: Knowledge and Altitude Environmental Health, 12: (1997) 23-29*
iv. *Nyoti, S.G.M. Nyoti, D.M. Nyaanga, S.F.O Owido, G.O. Owino, J.M. Muniu, Classification and Characterization of Solid Waste – Case Study of Egerton University and its Environs, Kenya. International Journal of Engineering and Technology. 3(11), (2016) 1-8*
v. *B. Onu, T. Price, S. Surendran, S.Ebie, Solid Waste Management: A Critique of Nigeria's Waste Management Policy. International Journal of Knowledge, Culture and Change Management, 11: (2001) 373-400*
vi. *N.P.Thanh, Y. Matsui, T. Fujiwara, Assessment of Plastic Waste Generation and Its Potential Recycling of Household Solid Waste in Can Tho City, Vietnam. Environ Monit Assess. 175: (2001) 23-35.*
vii. *The World Bank, Solid Waste Management. In: Understanding Poverty and Urban Development. (http://www.world bank.org/). (2019) 1-6.*