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RESEARCH ARTICLE

ASSESSMENT OF SOLID WASTE MANAGEMENT PRACTICES IN JOS METROPOLIS OF PLATEAU STATE, NIGERIA

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ABSTRACT

The purpose of the study was to assess the solid waste management practices in Jos Metropolis of Plateau State, Nigeria. To achieve the purpose of this study, five research questions were formulated A Cross-sectional research design was utilized for the study. The population of the study consisted of all households and commercial centres in Jos Metropolis. The sample size population for the study comprised one hundred and fifty (150) respondents gotten through purposive sampling technique. The instrument used for data collection was questionnaire. Descriptive statistic of frequency counts and percentages were used to analyze the data collected for the study. The findings of the study revealed the types of solid waste generated in Jos Metropolis similar to solid waste in any developing nation of the world. The findings also showed solid waste management practices, materials used for solid waste storage, transportation and methods of disposal as well as the Roles Played by Government Agencies in Solid Waste Management and private sectors. The study recommended among others that public private partnership should be encouraged in the management of solid waste in the State

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INTRODUCTION

Assessment is the process of systematically gathering information as part of an evaluation. Assessment is a systematic collection, review and use of information about educational programme for the purpose of improving learning and development (Yohanis & Genemo, 2015). They further explained assessment as the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what a student knows, understands and can do with their knowledge as a result of their educational experience. Applying it in this study, it means assessment of solid waste. Solid waste management refers to the collection, transfer, treatment, sorting, storage, transportation and disposal of solid waste. In most cases developing countries like Nigeria carry out solid waste management in an unsustainable ways. Solid waste has been one of the early problems of man, and a growing one that is of major concern to every nation of the world (Allende, 2009).

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Though during early pre-industrial times, solid waste generation was not an issue as populations were smaller. Solid waste was disposed of in the ground where it would turn to compost to improve soil fertility. Solid waste management issues are coming to the forefront of the global environmental agenda at an increasing frequency, as population and consumption growth result in increasing quantities of solid waste generation. Solid wastes refer to materials produced by human activities that people no longer need them and intend to get rid of such as tires, scraps of vehicles among others which needs to be managed and disposed of properly. Yohanis and Genemo (2015) explained solid waste as any solid material disposed of as no longer useful or solid materials thrown out by house holders or those materials referred to by engineers as municipal solid waste. They further stated that solid (nonhazardous) waste is any garbage, refuse, sludge from a waste treatment plant, and other discarded materials, including solid from industrial, commercial, mining, and agricultural operations and from community activities, but does not include dissolved material in domestic sewage. While Charles, Seyoum, Mohammed (2017) opined that solid wastes are wastes that arise from human and animal activities, including the heterogeneous mass of garbage from the urban community as well as more homogenous accumulation comprising of

countless different materials such as food wastes, packaging material such as paper, metals, plastic, glass, construction wastes which calls for proper management. About 1.3 billion tons of solid wastes are generated globally; 0.035% is being generated by Nigerian; that about 85.8 % of Nigerian solid waste are generated by households (Adogu, Uwakwe, Egenti. Okwuoha & Nkwocha, 2015, and Igibah & Sadiq, 2018). An average Nigerian generates 0.49kg of solid waste per day (Adogu et al, 2015) which needs to be managed. Solid waste management according to Adogu, Uwakwe, Egenti, Okwuoha and Nkwocha (2015) is the process of collecting, transporting, monitory, processing or disposing of waste materials in such a way that will prevent ill health arising from filth. They further explained that clean environment promotes good health and good health promotes productivity of man. In most cases developing countries like Nigeria carry out solid waste management in an unsustainable ways. Vital (2015); Stanley and Owhor (2018) sees solid waste management as the practices used for the collection, transportation, processing, recycling or disposal of garbage using various methods. Ogboji, Ali, Vivan, Danjuma, Sohotden and Christopher (2015) opined that the various methods use in solid waste management are open dumping, composting, hog feeding, open burning, burying, dumping into the streams/rivers, incineration, sanitary land filing, recycling, reduction and reuse.

The poor state of solid waste management particularly in the developing nations has been a major challenge to human health affecting both rural and urban areas. Poor management of solid waste does lead to the contamination of water and edible products thereby increasing the burden of infection and diseases among community members Suleyman and Henry (2018) stated that before now solid waste management was the prerogative of the public sector in Nigeria via the local government, Ministry of Health, Ministry of Environment and the various State Sanitation Agencies. But these ministries and agencies seem not to cope with waste management as heap of refuse are found in most public places, streets, markets, open spaces, motor parks, became a matter of concern to many citizens and business persons who felt that the private sector would do better than the public sectors. The inappropriate disposal of solid waste by the public was being challenged by the ability to pay waste disposal agents of the private sector. Against the background of these identified problems of solid waste this study became interested in assessing solid waste management practices in Jos Metropolis of Plateau State.

Statement of the problem: Solid waste management practices are essential component of environmental infrastructure in human settlements. These practices encompass all activities undertaken from the point of waste generation up to the final disposal. The management of solid waste stands as the most visible environmental problem facing Jos Metropolis and is attaining a worrisome dimension with urbanization increment rate. This situation is seen in the wide spread of indiscriminate dumping of solid waste across the city known for its tourism potential; in most parts of Jos Metropolis urban centers; on the roads, within the neighborhoods and around residential buildings and in different places of the urban areas. Solid Waste management practices in Jos Metropolis has not reached acceptable standard of orderly collection, transportation, processing, treatment and disposal. Failure in addressing this solid waste management practices lead to numerous social and environmental contaminations.

The aim of this study was to assess the solid waste management practices in Jos metropolis of Plateau State

Purpose of the Study: The purpose of the study was to assess the solid waste management practices in Jos Metropolis of Plateau State, Nigeria.

Research questions

- What types of solid waste are generated in Jos Metropolis?
- How do you rate services related to solid waste management in Jos Metropolis?
- What methods of solid waste management practices are in used in Jos Metropolis?
- What are the roles played by Plateau State Environmental Protection and Sanitation Agency in solid waste management in Jos Metropolis?
- What are the roles of private sectors in solid waste management in Jos Metropolis?

Significant of the Study: The study is going to be significant to the people of Jos Metropolis because open and indiscriminate dumping of refuse (were observed), piles of decaying garbage found in strategic locations in the heart of the city which are obvious sources of air and water pollution, land contamination and environmental degradation will be things of the past.

Scope of the Study: The study covers assessment of solid waste management practices in Jos Metropolis of Plateau State, Nigeria, the study also look at the types of solid waste generated in the study area, methods of solid waste management practices and disposal. It also looks at the solid waste management by private waste agencies in Jos metropolis.

MATERIALS AND METHODS

Research Design: A Cross-sectional survey research design was employed for the study

Study Area: The study was carried out in Jos Metropolis of Plateau State

Study Population. This study involves the population of all household members as well as commercial centres in Jos Metropolis of Plateau State

Sample and sampling procedure for the Study: The Sample size population for the study was 150 gotten through purposive sampling technique.

Instrument used for Data collection: The instrument used for data collection for the study was questionnaire developed by the researchers after thorough reviewed of the literatures.

Method of Data collection: Four research assistants were used for the distribution of the questionnaire to the respondents and retrieving them after filling.

Method of Data Analysis: The Data collected were analyzed using descriptive statistic of frequency counts and percentages and presented in Tables.

RESULTS

Table 1 showed the characteristics of the respondents who participated in the study. The table further revealed the frequency counts and percentages for individual characteristic.

Research question two: What are the solid waste management practices in Jos Metropolis? Data answering this research question is contained in Table 3. The finding in Table 3 showed that all the above stated solid waste management practices are always carried out in Jos metropolis with the exception of reduction and reuse.

Table 1. Characteristics of the respondents (n=150)

s/n	Variable	Group	f	%
1	Age range	18-30	30	20
		31-40	32	21.3
		41-50	45	30
		51-60	35	23.4
		61 and above	8	5.3
2	. Gender	Male	84	56
		Female	66	44
3	Education attainment	None formal education	30	20
		Completed primary education	44	29.3
		Completed secondary education	41	27.3
		Completed tertiary education	35	23.4
		Drop out from school	-	
4	Occupation	civil servant	22	14.7
		Bank Manager	26	17.3
		Facilities officer	22	14.7
		Business person	80	53.3
5	experience in solid waste management	Less than One year	19	12.6
		Two years	10	6.7
		Three years	13	8.7
		Four years	21	14
		Five years and above	87	58

Table 2. Types of Solid waste generated in Jos metropolis

s/n	Item	yes	%	no	%	Decision
1	pieces of paper	137	91	13	9	Types of solid waste
2	vegetable peelings	137	91	13	9	Types of solid waste
3	broken plastic and festal	138	92	12	8	Types of solid waste
4	Polythine bags	136	91	14	9	Types of solid waste
5	animal dung	131	87	19	13	Types of solid waste
6	Broken grasses	134	89	16	11	Types of solid waste
7	used shoes	134	89	16	11	Types of solid waste
8	pieces of cloth	131	87	19	13	Types of solid waste
9	Soot, house sweeping, which is composed of soil and dust, ash swept out from kitchens and chatt remnant (sticks and leaves); food and kitchen waste, green waste, paper1	134	89	16	11	Types of solid waste
10	bottles, metals, batteries, plastic bottles & bags, cardboards and cans	137	91	13	9	Types of solid waste
11	Scraps of vehicles, motorcycle, bicycles	131	87	19	13	Types of solid waste

Table 3. Assessment of Solid waste management practices in Jos metropolis (n=150)

s/n	Item	yes	%	no	%	Decision
1	Solid waste sorting is done in Jos Metropolis	90	86	60	14	SWMP
2	Paid children are involved in Door-Door collection of solid waste in Jos Metropolis	92	61	58	39	SWMP
3	Solid waste are regularly collected in Jos Metropolis	96	64	54	36	SWMP
4	Solid waste are collected from generation to the transfer/storage sites in Jos Metropolis	92	61	58	39	SWMP
5	Curbside collection are used for solid waste in Jos Metropolis	74	49	76	51	SWMP
6	Setout collection system for solid waste is used in Jos Metropolis	84	56	66	44	SWMP
7	Transportation of solid waste is done by private companies	86	57	64	43	SWMP
8	Transportation of solid waste is done using appropriate equipment	79	53	71	47	SWMP
9	Recycling and composting of solid waste is used in Jos Metropolis	56	37	94	63	SWMP
10	Land filing is used in the solid waste management in Jos Metropolis	72	48	78	52	SWMP
11	Solid waste is disposed of twice a week	69	46	81	54	SWMP
12	Reduction	37	25	113	75	Not swmp
13	Reuse	39	26	111	74	Not swmp

This is confirmed by the frequency counts and percentages for individual item.

Research question one: what are the types of solid waste generated in Jos Metropolis? Data answering this research question is contained in Table 2. Data in table 2 showed that majority of the respondents responded that all the items were the types of solid waste generated in Jos Metropolis. This is confirmed by the frequency counts and percentages for individual items.

This is confirmed by the frequency counts and simple percentages for individual statement.

Research question three: What are the materials used for solid waste storage, transportation and methods of disposal in Jos metropolis? Data answering this research question is contained in Table 4. The results of the study in Table 4 revealed that materials stated as well as the methods mentioned are used for the management and disposal of solid waste in Jos Metropolis. This is confirmed by their frequency counts and percentages showed against each individual number.

Table 4. Materials used for solid waste storage, transportation and methods of disposal in Jos metropolis (n = 150)

s/n	Solid waste is collected and stored into:	yes	%	No	%	Decision
1	Containers with covers	110	73	40	27	Materials & methods use
2	Containers without covers	112	75	38	25	Materials & methods use
3	Cartons	105	70	45	30	Materials & methods use
4	Basket	113	75	37	25	Materials & methods use
5	Bucket	110	73	40	27	Materials & methods use
6	Sanitary dust bin	110	73	40	27	Materials & methods use
	Solid waste is transported through:					
7	Hand/head carrying	100	67	50	33	Materials & methods use
8	Wheelbarrow	113	75	37	25	Materials & methods use
9	Open truck	114	76	36	24	Materials & methods use
10	Closed truck	106	71	44	29	Materials & methods use
11	Compacting Tuck	103	67	47	33	Materials & methods use
12	Tipper	109	73	41	27	Materials & methods use
13	Cart	83	55	67	45	Materials & methods use
14	Hand/head carrying	89	59	61	41	Materials & methods use
	Method of solid waste disposal is through					
15	Open dumping	118	79	32	21	Materials & methods use
16	Composting	99	66	51	34	Materials & methods use
17	Hog feeding	86	57	64	43	Materials & methods use
18	Open burning	109	73	41	27	Materials & methods use
19	burying	94	63	56	37	Materials & methods use
20	Dumping into rivers	96	64	54	36	Materials & methods use
21	Incineration	90	60	60	40	Materials & methods use
22	Sanitary land filing	93	62	57	38	Materials & methods use

Table 5. Roles Played by Government Agencies in Solid Waste Management in Jos Metropolis (n = 150)

s/n	Item	yes	%	No	%	Decision
1	Sanitary inspection of institutions and organizations such as schools, prisons, hospitals	122	81	28	19	Roles played
2	inspection of premises (Residential, Commercial and industrial)	142	95	8	5	Roles played
3	house to house sanitation,	148	97	2	3	Roles played
4	street de-congestion,	136	91	14	9	Roles played
5	control of street trading/hawking	134	89	16	11	Roles played
6	control of stray animals	135	90	15	10	Roles played
7	disposal of stray deaths (Human/animal)	135	90	15	10	Roles played
8	Implementing/enforcement of all sanitary legislation	135	90	15	10	Roles played

Table 6. Roles played by private sectors in solid waste management in Jos Metropolis (n = 150)

s/n	Item	Yes	%	No	%	Decision
1	Private solid waste service providers are licensed to operate	132	88	18	12	Licensed
2	Private service providers provide sorting and segregation materials for proper management of solid waste at source	70	47	80	53	Roles not felt
3	Private service providers provide Collection bins at homes for solid waste collection	74	51	76	49	Roles not felt
4	Private service providers collect solid wastes from households and designated point to final disposal sites as at when due	81	54	69	46	Roles felt

Research question four: What are the Roles played by Government Agencies in solid waste management in Jos Metropolis? Data answering this research question is contained in Table 5. The findings of the study in Table 5 showed the roles play by the government agencies in solid waste management in Jos Metropolis. The roles indicate high percentages from the respondents that the agencies are doing their best in the management of solid waste in the City of Jos.

Research question five: What are the Roles played by private sectors in solid waste management in Jos Metropolis? Data answering this research question is contained in Table 6 Data in Table 6 revealed thatprivate sectors in solid waste management in Jos Metropolis are licensed to perform the job but the respondents said that their roles are not felt because heaps of refuse are always seen along major streets and open places in Jos Metropolis.

Discussion of Findings: Findings in Table 1 showed the characteristics of the respondents who participated in the study.

The Table further revealed the frequency counts and percentages for individual characteristic which greed with the findings of Igibah and Sadiq (2018). Results obtained in Table 2 showed that majority of the respondents responded that all the items stated were the types of solid waste generated in Jos Metropolis which was confirmed by the frequency counts and percentages for individual item. These findings are in agreement with the findings of Yohanis and Genemo (2015) and Vital (2015). The findings of the study in Table 3 revealed that all the stated solid waste management practices are always carried out in Jos metropolis with the exception of reduction and reuse. This was confirmed by their frequency counts and simple percentages for individual statement. The results of this study are in line with the findings of Chales, Seyoum and Mohammed (2017) and Stanley and Owhor (2018). The study findings in Table 4 showed that they were the materials use for storage and transportation of solid waste as well as the methods used for the management and disposal of solid waste in Jos Metropolis. These findings are in agreement with the results of the study carried out by Adogu, Uwake, Egenti, Okwuoha and Nkocha (2015), Suleyman and Henry (2018)

and Stanley and Owhor (2018). The findings of the study in Table 5 revealed that all the stated points were the roles play by the government agencies in solid waste management in Jos Metropolis by ensuring sanitary inspection of institutions and organizations such as schools, prisons, hospitals as well as Residential, Commercial and industrial among others. The findings of this study are in line with the findings of Ogboji, Ali, Vivan, Danjuma and Sohotden (2015). The data in Table 6 revealed that Private Sectors involve in solid waste management in Jos Metropolis are licensed to perform the job but their roles are not felt by the community members because heaps of refuse are always seen along major streets and open places in Jos Metropolis. These finding are in agreement with the findings of Ogboji, Ali, Vivan, Danjuma and Sohotden (2015) and Suleyman and Henry (2018)

Conclusion

Based on the study findings, solid waste manage practices in Jos Metropolis was fairly,the government agencies were up to the task in the management of solid waste but the private sector roles were not felt because heaps of refuse were always seen along major streets and open places in Jos Metropolis

Recommendation

Based on findings and conclusion the study recommended the followings:

- The government agencies should continue to sustain the management of solid waste in the area of the study
- The public private partnership should be encouraged in the management of solid waste in the State

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