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An Assessment of Waste Management activities of Plateau Environmental Protection and Sanitation Agency

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Abstract

The research examined the performance of Plateau Environmental Protection and Sanitation Agency (PEPSA) as a waste management agency on the Jos Plateau. The research made use of primary data in the form of structured questionnaires to elucidate required information from respondents. Four wards Naraguta B, Jenta Adamu, Jenta Apata and Tudun Wada Kabong were used as sampling points. The research made used of both descriptive and inferential statistical techniques for data analysis. Results obtain shows that 88% of wastes generated were domestic in nature and that the commonest methods of refuse disposals are the open space (33%) and back yard (28.5%). Respondents assess PEPSA's performance at 20%. The Chi-Square test shows that the current distributions of refuse collection points are adequate in the studied wards. Sadly however, it was observed that they are not cleared frequently. A focus group discussion with PEPSA officials confirmed some of the questionnaire responses. The research concludes that there is a dare need to shift from the policy of waste management to wealth creation through waste recycling.

Keywords; Assessment, Environment, Waste, Management, Refuse, Recycling, Reused.

Introduction

The concept and constituent of Municipal Waste Management (MSW) has been defined by several authors (Simoes and Margues, 2008, Huang *et al*, 2011, Pires *et al*, 2011, Khatib et al, 2010; Afroz *et al*, 2009; Redmond et al, 2008; Fobil *et al*, 2008; Bovea and Powell, 2007 and Massoud *et al*, 2003). They all agreed that municipal solid wastes constitutes man's unwanted materials that needs to be discarded, consisting of substances, materials and objects considered as worthless or defective and of no value for human economic productive activities at a point in time. This means waste is not completely useless, only at a point in time.

In order to buttress the 3R concept (Reduce, Recycle and Reuse) in solid waste management, Dijkema *et al* (2000) argue that a substance is a waste only when it is experience as or labeled as a waste. Waste therefore is a subjective concept, or rather a qualification of a particular substance or object, which does not vanish after disposal. The qualification, however, may change; what is considered waste today can be a resource in the future. The waste of one plant can be the feedstock of another. This new paradigm encourages society to put the highest value on source reduction and extended producer responsibility, he focus on waste conversion process that recover materials and energy from wastes(either directly or via production of biofuels) and /or the production of compost (Rogoff, 2013).

The issue of waste management has been a serious concern   to both developed and developing countries. (Pires *et al*, 2011) stated that in the past few decades, solid waste management systems in Europe have involved complex and multi-faceted trade-offs among a plethora of technological alternatives, economic instruments, and regulatory frameworks. These changes resulted in various environmental, economic, social and regulatory impacts in waste management practices which not only complicate regional policy analysis, but also reshape the paradigm of global sustainable development. Municipal solid waste if not properly managed is capable of aggravating issues

related to health, comfort, climate change as well as de-facing the aesthetic value of urban centres as is the case of Rio de-Jenero in Brazil and Lagos in Nigeria.

In spite of the formulation of Federal Environmental Protection Agencies (FEPA) and a national environmental policy, the environment has not been adequately protected. Interest is mainly on aesthetics, which is rarely achieved. Wastes collection is irregular and restricted to the major cities. Improperly sited open dumps deface several cities, thereby endangering public health by encouraging the spread of odor and diseases, uncontrolled recycling of contaminated goods and pollution of water sources (Adegoke, 1989; Singh, 1998).

Rapid growing population, rapid economic growth, and rise in community living standards have accelerated the generation rate of municipal solid waste, thereby causing its management to be a major worldwide challenge (Al-Khatib *et al*, 2010 and Seo *et al*, 2004). Nigeria in particular, witnessed rapid growth in the nation's economy occasioned by mineral resource exploration and exploitation. As a result, old and new cities that are now state capitals and local government headquarters expand in size and population accompanied by a phenomenal increase in volume and diversity of solid waste generated daily.

The situation is not different in Jos, a rapid growing urban center. The city started as a mining town thereby attracting people from all over the country. It's temperate like climate was an additional pull factor to its rapid urbanization. As the city expands in size, population and economy, its streets eventually became characterized with backlog of un-cleared refuse and garbage existing daily on the streets of Jos. These refuse heaps, apart from constituting eye sore to residents and visitors alike, also threatens the health of the citizens through diseases spreading vectors. It is against this background that this research becomes very necessary and important to assess the performance of Plateau Environmental Protection and Sanitation Agency (PEPSA) as a waste management agency in Jos, the plateau state capital.

Materials and Methods
Study area
Jos Plateau is located in Nigeria's middle belt, with an area of about 26,899 square kilometers, with population of 3.5 million people. It is located between latitude 8° and 10°N, longitude 7°and 11° east. Jos the Plateau state capital is divided into three local government areas for ease of administration. The study adopted Jos north local government area as a sample site for detail analysis. Jos north local government is bounded by Jos east in the North east, Jos South in the south west and Bassa in the north (see figure 1). Jos north has a near temperate climate with an average temperature of between 18 and 22°C. Harmattan winds cause the coldest weather between December and February. The warmest temperatures usually occur in the dry season months of March and April. The mean annual rainfall varies from 131.75 cm (52 in) in the southern part to 146 cm (57 in) on the Plateau (Blench *et al*, 2003). The highest rainfall is recorded during the wet season months of July and August.

Data collection

The population of the study is the aggregate of the total number of people in each of the four selected wards. Hence, a total of 3,344 people formed the sample population of the study (National Population Commission, 2011). The sample size selected is a percentage of the total number of people in Naraguta B, Jenta Adamu, Jenta Apata and Tudun-wada Kabong wards. Jos north is made up of 14 wards and four were selected to ensure spatial coverage of the study area. Tudunwada/Kabong in the southern part of the LGA was selected base on dense population, Naraguta houses institutions and is sparsely populated, while Jenta Apata and Jenta Adamu serve as commercial and residential respectively.

Hence, 10% of the people were selected each from Naraguta B, Jenta Adamu, Jenta Apata and Tudun- Wada Kabong wards using a Simple Random Sampling to get the sample size of the study. A total of Three Hundred and

Thirty Five (335) questionnaires were administered, out of which Two Hundred and Eighty (280) were returned. (See Table 1)

Table 1. Sample Size of Respondents.

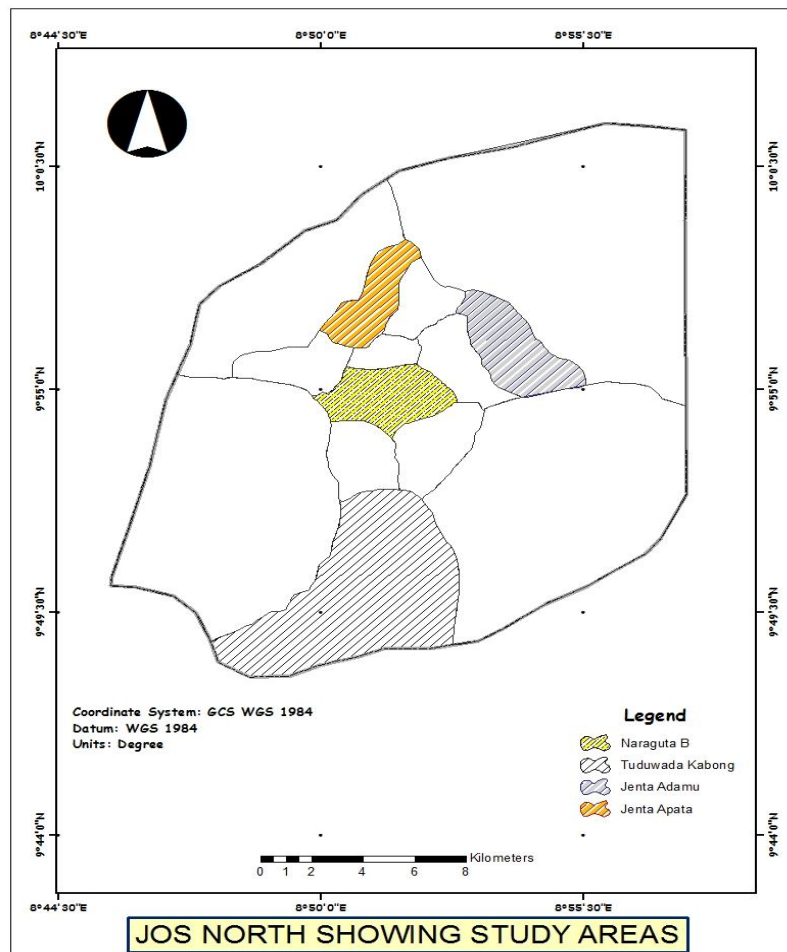| Wards	No. of People	Sample Size (%)	No. of Questionnaire administered	No. of retrieved questionnaire	Percentage of retrieved questionnaire
Naraguta "B"	1,202	10	120	83	30%
Jenta Adamu	707	10	71	68	24%
Jenta Apata	536	10	54	50	18%
Tudun-Wada Kabong	899	10	90	79	28%
Total	(3,344)		335	280	100%

Figure 1. Plateau state showing Jos North Local Government

Data analysis

The study made use of both descriptive and inferential statistical techniques to analyse the questionnaires. Descriptive statistics of mean and percentage scores were used mostly for the questionnaire analysis, while inferential statistical test of Chi-Square was used to see if the observe waste collection points meet the expected standard.

Results and Discussion

Socio – Demographic characteristics of respondents

Result of analysis of socio-demographic characteristics of respondents is presented in table 2. Results from table 2 shows that there were more male respondents involved in the study, constituting about 66.8%. Analysis of age structure of respondents as presented in table 2 also shows that the youth (36-45 years) constituted the highest representation with 47.1% while the next age grade (46-55 years) tends to constitute the lowest group of respondents with about 7.5%. This low percentage response from the strong and virile working class may be attributable to the fact that, at the time of questionnaire administration, this age grade may likely be at their work places. This finding agree with the works of Ngwuluka *et al* (2009) who in a similar research in Lagos found out that the strong and virile usually constitutes the lowest class of respondents in most waste management related research.

On the issue of marital status, table 2 shows that 168 respondents from all the four wards constituting about 60% of respondents were married couples, while the lowest group (1.4%) is made up of divorced respondents. Results of analysis of educational status of respondents include, tertiary (31%), Non formal (21%) and primary (11%) respectively. A close analysis of educational status reveals that majority of the tertiary respondents are from Naraguta (56), while most of the non formal level respondents constitute the majority in Tudun wada ward. This great disparity may arise because of the contrasting background of the two environments. Naraguta ward accommodates the university community while Tudun wada on the other hand is an all comer zone for petit traders and low income earners.

In the same vein, the occupational structure of the respondents as presented in table 2 shows that majority of them are traders (34.3%), other occupation observed in the study area and their percentage representation are: farmers (23.9%), students (23.6%) and civil servants (18.2%). Again a ward by ward analysis shows that majority profession in Naraguta are students. This seems to buttress the research position that it is an academic environment. Jenta Apata and Jenta Adamu both have majority of respondents in the traders' category, while Tudun wada is mostly farmers.

Table 2; Socio – Demographic characteristics of respondents

S/N	VARIABLE	CLASS	SCORE	PERCENTAGE (%)
1	Gender	Male	187	66.8
		Female	93	33.2
2	Age	20 – 35	98	35
		36 – 45	132	47.1
		46 – 55	21	7.5
		56 – 65	29	10.4
3	Marital Status	Single	75	26.8
		Married	168	60

		Divorced	4	1.4
		Widow	33	11.8
4	Educational Level	No formal	60	21
		Primary	32	11
		Secondary	100	36
		Tertiary	96	31
5	Occupation	Civil Servant	51	18.2
		Trading	96	34.3
		Farming	67	23.9
		Student	66	23.6

Author's field work (2013)

Waste Generation

Analysis in table 3 shows that most of the areas were the research was conducted are residential houses constituting about (87.5%) of the respondents while 12% are for commercial purposes. Further analysis also shows that (56%) of the respondents confirmed that they have lived there for about 5 years. Others; 6-10 years (21%), 11-15 years 27% while 16 years and above, (6%).

On the type of waste generated, investigations carried out shows that most of the waste generated are ashes. This could be attributable to the fact that most wastes are burnt. Garbage (31%), rubbish 11% and others such as glass and textile materials (16%). Table 3 also shows that most of the respondents are using plastic containers representing about (23.2%). Metal containers were also found in some areas representing about (33%).

Table 3: Waste Generation Information

S/N	VARIABLE	CLASS	SCORE	PERCENTAGE (%)
6	Type of land use	Residential	45	87.5
		Commercial	33	12
		Industrial	0	0
		Institutional	2	7
7	Living duration	1 – 5 years	157	56
		6 – 10 years	60	21
		11 – 15 years	47	27
		16 and above	16	6
8	Type of waste generated	Ashes	17	42
		Garbage	87	31
		Rubbish	31	11
		Glasses and wood	45	16
9	Kinds of waste containers	Metal	65	23.2
		Bucket	52	18.5
		Plastic Containers	92	33
		Cartons	18	6
		Open dumps	54	19.3
10	Source of waste generation	Farm products	23	8
		Domestic activity.	213	76
		Industrial	44	16
11	Refuse disposal	Open space	92	32.8
		Backyards	79	28.2
		Drainage	38	13.6
		Landfill	71	25.4

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Authors field work (2013)

This could also be attributed to the fact that the activities of PEPSA is more pronounced in Jenta Apata were some of their metal waste bins are found as shown in the ward by ward analysis. The table further shows that most waste generated are from domestic activities with (76%). This high percentage further agrees with the findings that most areas are for residential purposes. This is followed by other activities with (16%), and only (8%) are from farm products. This can also be seen in Jenta and Tudun wada Kabon in the ward by ward analysis. Finally, table 3 shows that most wastes are disposed openly constituting (32.8%) of the respondents. Backyards, (28.2), drainage, (13.6%) and others (25.4%). This indiscriminate dumping of refuse seems to buttress the research position that enough waste bins are not provided at specific points/locations by the agency.

Assessment of Plateau Environmental Protection and Sanitation Agency
Table 4: Assessment of Plateau Environmental Protection and Sanitation Agency (PEPSA)

S/N	VARIABLE	CLASS	SCORE	PERCENTAGE (%)
12	Are you aware of the activities of PEPSA	Yes	147	52.5
		No	133	47.5
13	Are disposed refuse ever collected by the agency	Yes	147	52.5
		No	133	47.5
14	Collection points provided by the agency	Yes	80	25.6
		No	200	71.4
15	Number of collection points recorded	5 points	11	4
		10 points	28	10
		15 points	49	17.5
		20 points	9	3.2
		None	183	65.3
16	Visits recorded by PEPSA	Weekly	5	2
		Monthly	14	5
		Yearly	77	27
		Never	184	66
17	Assessment of PEPSA activities	20%	180	64
		40%	44	16
		60%	36	13
		80%	15	5
		100%	3	2

Authors field work (2013)

Result of the assessment of Plateau Environmental and Sanitation Agency (PEPSA) is presented in table 4. Results from table 4 shows that (52.5%) of the respondents indicates that they are not aware of PEPSA activities. The ward by ward analysis shows that 3 wards namely Naraguta B, Jenta Adamu, and Tudun Wada Kabong have not really felt the impact of PEPSA, except Jenta Apata were some of PEPSA activities are noticeable. The table further shows that (52.5%) admitted that refuse are not collected regularly as expected. This is not far from the reasons why heaps of refuse are noticed in many parts of the city. Investigations carried out in the course of this research work also show that collection points are grossly inadequate as shown in table 4, (71.4%) admitted to this. This inadequacy could be attributable to the fact that most refuse are being disposed through burning in most of the areas.

Irregular visit was also noticed from the study. The table revealed that (66%) of the respondents admitted that refuse are not cleared completely by the agency. Only (2%) of the respondents shows that refuse are collected weekly. This also seems to agree with the findings of (Al-Khatib and Arafat, 2010; Fobil and Atugunba, 2008) showed that waste collections are irregular and is only restricted to the major cities.

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Table 5: Number of Dumpsites in Studied Wards

S/N	Tudun Wada	Jenta Apata	Jenta Adamu	Naraguta B
1.	5	50	11	31

Source: Field work, 2013

Table 5 provide the data for number of dumpsite per ward. This data was subjected to Chi – Square test to determine the adequacy of observe dumpsites and what is really expected to be on ground. Result showed that the sampled four wards have a total of 97 observed dumpsites. Ordinarily, the assumption is that each ward should have 24 dumpsites each, but the reality on ground is not so. Especially when considering the fact that Jenta Apata which has the highest number of dumpsites (50), is the least populated among the four wards (see table 1) and it is more of a residential layout. Tudun Wada on the other hand is an all comers zone, densely populated and characterized with low planning standard is the second largest interms of population but with the least number of dumpsites (5). Disparities of this nature exist in all the four wards covered. Explanation may not be far from the fact that Jenta Apata being a residential layout with much evidence of planning and accessibility got more government attention, hence, the large number of dumpsites. While Tudun Wada on the other hand, with its second largest population and high density, lack access roads. This will make the wide spread distribution of dumpsites difficult. Infact the 5 observed dumpsites in Tudun Wada ward are all sited along the main road that passed through the ward. It is for this reason that the Chi-square statistical technique was used to see if the present distribution for now is adequate or not scientifically. Calculated t value was found to be 46.3, while the critical value is 7.82. Result was accepted at 0.05% confidence level. This shows that dumpsite distribution for the studied wards are okay for now

Focus Group Discussion
In order to validate the questionnaire responses, a focus group discussion (FGD) was held with the management team of PEPSA. It was observe that waste management has become very difficult in these areas. The group attributed these difficulties to the following:
*   Insufficient refuse trucks and cesspool vans for solid and liquid waste evacuation respectively
*   Inadequate utility vehicles for work supervision and other functions
*   Non-provision of officially designated waste dumpsites
*   Inadequate office accommodation for staff of the agency
*   Inadequacy in scope of the existing Plateau Environmental Protection and other matter related thereto law
*   No budgetary cash flow
*   Role conflicts with other agencies and ministries
*   Problem of legal instrument of establishment (Scheduling and Gazetting)
        The focus group discussion therefore, unanimously offers the following suggestions as ways of tackling waste management problems for a healthy living in the study area:
        i.   Organize public awareness programmes.
        ii.   Improve the supply of sanitary facilities.
        iii.   Implementation of policy for eradication of poor waste disposal.
        iv.   Empower people through ways of evacuating wastes.

Sequel to the FGD with officials of PEPSA, it was observed that it was on the basis of insufficient trucks, cesspool and utility vehicles that 47.5% of respondents were of the opinion that waste was never collected in their location. It is therefore very important that PEPSA should acquire more vehicles for waste evacuation and supervision. There is also the need to provide more official designated waste collection points in all the sampled wards as 71.4% of the respondents said PEPSA did not provide collection points. This assertion was verified by the FGD. These and other observed inadequacies might have been responsible for the poor rating (20%) of PEPSA's overall

performance. It is therefore suggested based on findings that effort should be made to solve this problem through the intervention of government and other private organizations.

Conclusion

Solid waste management is increasingly constituting a major problem in both developed and the developing economies. The situation in Jos the plateau state capital is gradually becoming very bad in some wards. Analysis of selected wards in Jos has shown that majority of the waste constituents are domestic waste, and that wastes are generally disposed of in open dumpsite. Presently, PEPSA has a poor assessment from the respondents as they rate its performance at 20%. Even thought findings shows that the present distribution of dumpsites in the studied wards are adequate, respondents says PEPSA officials hardly come round to collect the refuse. A focus group discussion with the agency staff confirm some of the short comings observed by the respondents. The research therefore concludes that in order to reverse the situation, there is the need by government to invest massively in waste management as well as encourage Private Service Providers (PSP). This will engender a paradigm shift from trying to get rid of the waste to that of recycling the waste. That is, from waste management to wealth creation.

References

Al-Khatib, I.A, Arafat, H.A (2010): Trends and Problems of Solid Waste Management in Developing countries: A case study in seven Palestinian districts. *Waste management* 27(12), 1910-1919.

Bovea, M.D and Powell, J.C (2007): The role played by environmental factors in the relegation of a transfer station in a municipal solid waste management system. *Waste Management* 27(4), 45-553

Dijkeme, GPJ, Reuter, MA, Verhoef, EV (2000) a New Paradigm for Waste Management. *Waste Management* (20) 633 – 638.

Fobil, J.N, Atugunba, R.A (2008): Municipal waste Collection and urban Environmental Management in Accra, Ghana. *J Environ Mgt*, **86**(1), 262 - 71

Fiorucci, P; Minciadi, R and Sacile, R (2003): Solid Waste Management in Urban Areas; Development and Application of a Decision Support System. *Resources Conservation and Recycling,* Vol. **37**(4): 301 - 328.

Gohinger, HW (1988) A Computational Model for Solid Waste Management with Application. *European Journal of Operational Research*. Vol 35(3); 350 - 364

Huang, G. and Sal-Lim (2011): Violation Analysis for Solid Waste Management systems. An interval fuzzy programming approach. *Journal of Environment Management* 65(4), 431-446

Kassim, S and Ali, M (2006)): Solid Waste Collection by the Private Sector: Household's perspective, findings from a study in Dar er Salam City, Tanzania. *Habitat international*, **30**, 769 - 780

Massoud, M and El-Fadel, (2002) Public private partnership for solid waste management services. *Environmental Management* **30**(5), 621-628

Pires, A; Martinho, G and Chang, NB (2011) Solid Waste Management in European Countries: A review of system analysis techniques. *Journal of Environmental Management*, **2**,1033-1050.

Simoes, P. and Margues, RC (2009*)* Incentive Regulation and Performance Measurement of the Portuguese solid waste management services. *Waste Manag Res*, **27**, 188 - 196

Rogoff, M (2013) Sustainable Material Management: A new international solid waste paradigm. *Waste Management and Research*, 6(0), 1 – 3.