

An Assessment Of Plateau Environmental Protection And Sanitation Agency (Pepsa) As A Waste Management Institution In Jos City, Nigeria.

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Abstract: Municipal solid waste constitutes man's unwanted materials that need to be discarded. It is 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. Apart from constituting an eye sore to urban environment it constitute health hazards and threatens the health of man and animals in the city. This research attempts an assessment of the performance of Plateau Environmental agency, the research made use of both primary and secondary data. Data generated was analyzed using descriptive statistics, while inferential technique of chi-square was used to test the research hypothesis. Results obtained shows that majority of the respondents were traders (34.3%) with secondary education (36%). Forty-five percent (45%) of landuse type responsible for waste generation is residential that 42% of waste generated is mostly ashes. Majority of waste containers used are plastic (33%) and that 52% of respondents are aware of PEPSA activities in their locations. A focus group discussion (FGD) shed more light on the prospect and limitations of PEPSA. The research concludes that there is the need to overhaul methods of municipal solid waste collection and disposal in metropolitan Jos. Relevant recommendations were made in respect of the study area.

Index Terms: PEPSA, Solid waste, Dumpsites, Disposal, Municipal, Human health, Waste collection.

1 INTRODUCTION

Plateau Environmental Protection and Sanitation Agency (PEPSA) was established in the year 2000 by act of the Plateau state parliament. It is saddled with the responsibilities of house to house sanitation, inspection of premises (Residential, Commercial and industrial), street de-congestion, control of street trading/hawking, disposal of stray deaths (Human/animal) and control of stray animals. Other responsibilities of the organization include:

- Solid waste management and pest control
- Control of illegal motor parks and street begging,
- Sanitary inspection of institutions and organizations such as schools, prisons, hospitals etc.
- Implementing/enforcement of all sanitary legislations.

The concept and constituent of municipal waste management (MSW) has been defined by several authors (Simoes and Margues, 2008, Haung *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 Powel, 2007 and Massoud *et al*, 2003) as materials that are used and made nearly useless by process of use at a point in time.

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 does not mean that wastes are completely useless, but can be useful for other needs and purposes once converted or transformed to other states. 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 technology 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 reshapes the paradigm of global sustainable development. Municipal solid wastes that are improperly managed are capable of defacing the aesthetic value of urban centres as is the case of Rio de-Jenero in Brazil and Lagos in Nigeria. In spite of the establishment of Federal Environmental Protection Agency (FEPA) and the formulation of the national environmental policy, the environment has not been adequately protected as interest and efforts are mainly channeled on aesthetics, which is rarely achieved (Agunwanba, 1998). Wastes collection is irregular and restricted to the major cities, thereby endangering public health by encouraging the spread of odours 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 wastes, thereby causing its management to be a major worldwide challenge (Al-Khatib *et al*, 2010 and Seo *et al*, 2004). Nigeria in particular has 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 the populations accompanied by a phenomenal increase in volume and diversity of solid waste generation on a daily basis. The

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situation is not different in Jos which is one of the rapidly growing urban centres in Nigeria. The city started as a mining town thereby attracting people from all over the country. Its temperate-like climate was an additional pull force to its rapid urbanization. As the city expands in size, population and economy, its streets eventually became characterized with backlog of un-cleared refuse heaps, apart from constituting eye sore to residents and visitors alike, it 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.

erosion) from the middle of rounded hills with sheer rock faces. The phases of volcanic activities involved in the formation of the Plateau have made it one of the mineral rich states in the country. Tin is still mined and processed on the plateau. The drainage pattern of the Jos Plateau is radial and is said to be the hydrological centre of Nigeria as many rivers flow away from the Jos Plateau to other areas.

2 AIM AND OBJECTIVES OF THE STUDY

The main aim of this research is to appraise the performance of plateau environment protection and sanitation agency (PEPSA) as a waste management agency in Jos city. While its objectives include:

- i. To identify the agency's mode of collecting waste material
- ii. To determine the agency's mode of waste disposal
- iii. To identify problems inhibiting the agency's optimal performance

3 THE STUDY AREA

The Jos city is located in Nigeria's middle belt, with an area of about 26,899 square kilometers, with population of about 850,000 people based on the result of 2006 Nigerian census figures. It is located between latitude 8° and 10°N, Longitude 7° and 11° east, Barkin-Ladi in the south east, Jos South and Riyom in the south west and Bassa in the north (Plateau State Ministry for lands, survey and town planning). The State is named after the picturesque Jos Plateau, a mountainous area in the north of the state with captivating rock formations. Bare rocks are scattered across the grasslands, which cover the plateau. The altitude ranges from around 1,200 meters to peak of 1,829 metres above sea level. Years of mining have also left the area strewn with deep gorges and tales (Blench et al, 2003). Though situated in the tropical zone, a higher altitude means that plateau state 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 131.75cm (52 in) in the southern part to 146cm (57 in) on the plateau (Bench et al, 2003). The highest rainfall is recorded during the wet season months of July and August. The low temperature of Plateau state has led to a reduced incidence of some tropical diseases such as malaria. Jos Plateau where the city is situated is the source of many rivers in northern Nigeria including the Kaduna, Hadejia, Gongola and Yobe rivers (Daniel and Hassan, 2003). Jos Plateau is an area made up of young granite which was intruded through an area of older granite rock, making to be about 160 million years old. This creates the unusual scenery of the Jos Plateau. There are numerous hillocks with gentle slopes emerging from the ground like mushrooms scattered with huge boulders. Also, volcanic activity 50 million years ago created numerous volcanoes and vast basaltic plateau created from lava flows. This also produces regions of mainly narrow and deep valleys and pediments (surfaces made smooth by

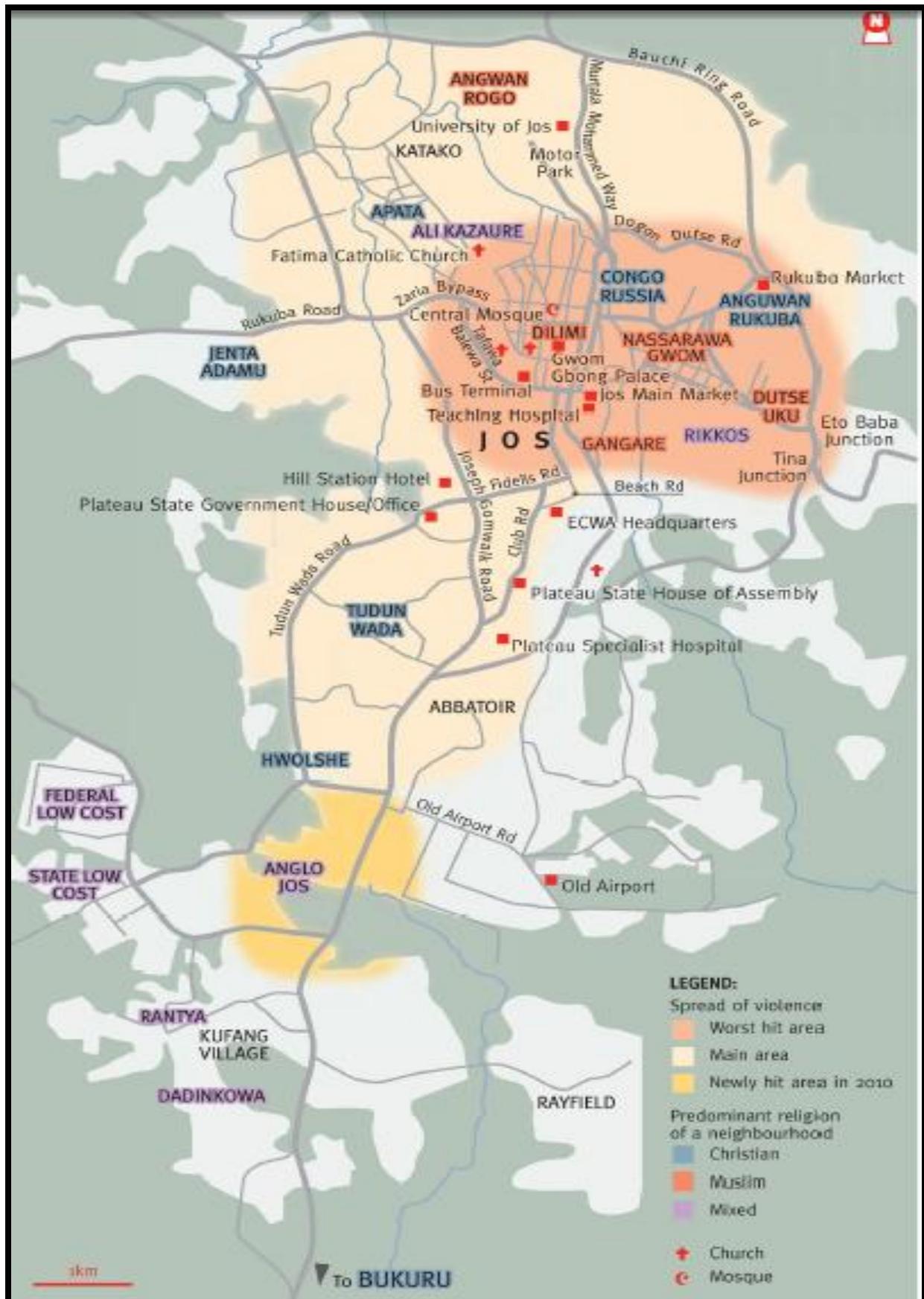


Figure 1: Jos Metropolis

4 MATERIALS AND METHODS

A reconnaissance study was undertaken to map out strategies for field work and to identify various dumpsites. The aim of which is to identify possible sampling techniques best suited for the research work, the data for this study were obtained directly from the field through observation, field surveys and use of well structured questionnaire. The population of the study is the aggregate of the total number of the 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, JentaAdamu, JentaApata and Tudun-Wada Kabong Wards. 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, as shown in table 1 below. The data collected were analyzed and summarized in tables and percentages for clear interpretation. The percentages were calculated using the following formula:-

$$\text{Percentage} = \frac{\text{frequency of response} \times 100}{\text{Total number of response}}$$

Table 1. sample size of respondents.

Wards	No. of people	Sample Size (%)	No. of Questionnaire Administered	No. of Retrieved Questionnaire	Percentage (%)
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

Source: Field Survey (2014)

RESULTS AND DISCUSSION

Table 2: Socio-demographic status of respondents.

S/N	VARIABLE	CLASS	SCORE	PERCENTAGE (%)
1	Gender	Male	187	66.8
		Female	93	33.2
2	Age	20 – 30	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
		Widowed	33	11.8
4	Educational Level	Non 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

Source: Field Work, 2014

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 constitute the

lowest class of respondents in most waste management related research. Further analysis of age grade representation on ward basis however shows that Naraguta ward has its highest group of respondents aged 20 – 35 years. 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 reveal 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 backgrounds of the environments. Naraguta ward accommodated the university community while Tudun-Wada on the other hand is an all comer zone for petty 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 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
		Others	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	Types of waste generated	Ashes	17	42
		Garbage	87	31
		Rubbish	31	11
		Others	45	16
9	Kinds of waste containers	Metal	65	23.2
		Bucket	52	18.5
		Plastic	92	33
		Containers	18	6
		Cartoons	54	19.3
10	Source of waste generation	Farm products	23	8
		DomesticActivity.	213	76
		Others	44	16
11	Refuse disposal	Open space	92	32.8
		Backyards	79	28.2
		Drainage	38	13.6
		Others	71	25.4

Source: Field Work, 2014

Analysis in table 3 shows that most of the areas where 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 are (6%). On the type of waste generated, investigations carried out shows that most of the waste generated are ashes. This could be attributed to the fact that most wastes are burnt garbage (31%), rubbish 11% and other s (16%). Table 4 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%). This could also be attributed to the fact that the activities of PEPSA is more pronounced in Jenta Apata where some of their metal waste bins are found as shown in the ward by ward analysis. The table further shows that most wastes 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 farm products. This can also be seen in Jenta and Tudun-Wada Kabong 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%). The indiscriminate dumping of this refuse seems to buttress the research position that enough waste bins are not provided at specific points/ locations by the 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

Source: Field Work, 2014

Result of the analysis of Plateau Environmental and Sanitation Agency (PEPSA) is presented in table 4. Results from table 4 shows that (25.5%) of the respondents indicate that they are not aware of PEPSA activities. The ward by ward analysis also shows that all the 3 wards namely Naraguta B, Jenta Adamu and Tudun-Wada Kabong have not really felt the impact of PEPSA, except Jenta Apata where some 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 shows that collected points are grossly inadequate as shown in the table 4, (71.4%) attested to this. This inadequacy could be attributed to the fact that most refuse are being disposed through burning in most 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 show that refuse are collected weekly. This also seems to agree with the findings of (Adegoke, 1989, Singh, 1988) in the previous review, where he discovered that waste collection is irregular and is only restricted to the major cities their areas of attraction.

5 CONCLUSION AND RECOMMENDATIONS

The analysis of the survey carried out in the study areas have shown that most areas of the Jos Metropolitan environment is dirty due to open dumping and burning of refuse which makes it possible for many potential vector breeding places, eye-sore to public, odor in the immediate environment and environmental degradation. The issue of reduction of solid wastes from our cities has remained a major challenge to urban beautification and safety of the entire urban landscape. There must be put in place a concerted approach to waste avoidance, minimization and reduction through modern methods of waste management and disposal using the right mix of strategies to enhance sustainability of a clean environment, better living conditions through awareness campaigns, public lectures to ensure a better way to live. Any sanitation or beautification exercise should ensure the removal

of refuse heaps and reduction of their offensive odour emanating from un-cleared solid wastes. Invoking the Clean Air and Health Acts of 1964-68 are crucial in terms of making waste reduction a daily routine in our societies.

6 RECOMMENDATIONS.

- The efforts of the government agencies like Plateau Environmental Protection and Sanitation Agency (PEPSA), Ministry of Environment, and all those in charge of waste management should focus on how to improve the prevailing conditions and sharing decision making process, with individuals, neighborhood group and organizations at the grass roots level in Jos city.
- Greater participation of individuals, families and the populace should be achieved through mobilization and education. They should be involved in all deliberation and activities connected with all aspects of solid waste management within their environments.
- Privatization and/or combination of both privatization and commercialization must be embarked upon. Also levies must be imposed on all residential polluters towards meeting the cost of wastes generated, collected, transferred and disposed. The actual collection, processing and management should be handled by licensed private firms rather than by only quasi-public agencies.
- The attitudes of individuals and the general public needs to be changed to accept the fact that good waste management practices and clean environment guarantee the quality of life for all towards ensuring sustainable development including the quality of the environment than sticking to the belief that government can provide everything even when the resources are not available.
- Plateau Environmental Protection and Sanitation Agency (PEPSA) should be as a matter of urgency encourage individual, public and private partnership in solid waste collection, transfer and disposal in Jos city. Also roads should be constructed and rehabilitated particularly in high populated areas.

- vi. The promotion of formalized recycling or use of solid waste materials by such modern devices as composting and generation of methane through anaerobic decomposition should be encouraged. Incinerators should be built or constructed at every collection point to minimize open dumping and burning of solid wastes. In addition, promotion of segregation of waste materials at the source and streamlining the operations of the waste pickers (scavengers) through proper training, upgrading of techniques and the requisites health protection should be embarked upon.
- vii. in addition, effective penalties must be invoked and culprits punished, so that the enforcement of proper practices are not left to area wide waste management authorities alone. An effective chain in the cycle of timely clearance to designated landfills, dump sites, for incineration, compacting and composting should be integrated into energy and the land reclamation schemes envisioned in the future.
- viii. Finally, it is recommended that further research should be conducted covering areas that were not covered during the survey due to time and security reasons in order to validate this very study. There is the need to explore in more detail and widely too, methods and techniques to improve the solid waste management situation in Jos and in Nigerian cities as a whole. This has the promise of tackling the increasing scale of solid waste management in Jos city and in Nigeria as a country.

REFERENCES

- [1] Abumere, S.I. and Filani, M.O. (1998) forecasting solid magnitude for Nigerian cities, paper presented at the national conference on Development and environment, NISER Ibadan.
- [2] Adesina, H.O. (1983): Urban environmental and epidemic diseases. Proceedings of National Conference on Development, Ibadan.
- [3] Adejoke, D.S. (1989) Waste management within the context of sustainable development. Proceedings of National Conference on Development and Environment Ibadan.
- [4] Afro J.T (2009): A Computational model for solid waste management with Application. European journal of operational research.6(1):23-31
- [5] Al-Khatib, I.A. and Arafat, H.A (2010): Trends and problems of solid management in developing Countries: A case study in seven Palestinian districts. Waste management 27(12):1910-1919.
- [6] Batool, S.A.(2009) Municipal solid waste management in Lahore city district, Pakistan. Waste management 29(1):1971-1981.
- [7] Bovea, M.D and Powell, J.C (2007): The role played by environmental factors in a municipal solid waste management system. Waste management 27 (4):545-553
- [8] Bovea, M.D (2008) Alternative scenarios to meet the demands of sustainable waste management. Journal of environmental management 79(2):115-132
- [9] Burton, E. and Mpinga, O. (2000): Consequences of refuse disposal in the tropical world, Nairobi. Macmillan publishers.
- [10] Cofrey M. (2004): Towards Sustainable solid waste management systems in developing countries. MCA-Manus Coffery associates Ltd.
- [11] Contreau S. (1994) Environmental management of urban solid waste management in developing countries. The world bank
- [12] Egunjobi, T.O, (1983): problems of solid waste management in Nigeria
- [13] Urban Cities. A paper presented at the National Conference on Development and Environment Lagos, Nigeria.
- [14] Egunjobi, T.O (1993): problems of solid waste management in Nigerian urban centres. Development and the environment. Proceedings of a Nigerian Conference, Institutes of Social Economic Research, Ibadan
- [15] Falade, J.B (1999): Tacking waste disposal problems in developing countries. New Nigerian Newspaper, Friday, June 6th.
- [16] Falade, J.B. (2001): Problems and prospects of waste management in developing countries New Nigeria newspaper. Wednesday April 8th.
- [17] Federal Ministry of Environment (2000): Blue print on municipal solid waste management in Nigeria, Abuja, Nigeria.
- [18] FEPA 1998 (Federal environment protection agency, 1998 National Policy on the Environment. Nigeria.
- [19] Hanks, T. (1997): Solid waste disease relationship. U.S Dept. of Health Education and Welfare, Washington DC.
- [20] 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
- [21] Khatib A. B, Alhassan M.U (2010): Solid waste collection by the private sector: household Perspective, findings from a study in Dar er Salam City, Tanzania. Kunitoshi S. (2000): improvement of solid waste: problems and solutions. CRC Press.
- [22] Landetti, R.E, Rebers, P.A (1997): municipal solid waste: problems and solutions. CRC Press.
- [23] Massoud, M and El-Fadel, (2002): Public private

partnership for solid waste management services.
Environmental management 30(5): 621-630.

- [24] Michael S. (2002): Solid waste management practices in developing countries vanguard, July 16 p. 27
- [25] Miller, G.T. (1985): living in the investment: concepts problems and alternatives. 4th edition. Wads worth publishing company inc. bamout California.
- [26] Okechukwu, E. and Nwosu, O.C (2000): Towards effective abatement of indiscriminate solid waste disposal in Imo State. A paper presented at the workshop on Environmental Sanitation and Proper Waste Management in Imo State.
- [27] Okechukwu, G.C (1995): Urban waste in Nigeria. Significance and management. A key note address presented at the 1995 Biennial conference of ecologist of Nigeria, held at the university of Jos.
- [28] Olaore, G.O. (1983): Urban cultural basis of our environmental crisis in Nigeria. Nigeria Institute of Social and Economic Research, Ibadan, Oyo state
- [29] Onokerhoraye, A.G (1997): Public involvement in urban development planning: The population Census of the federal republic of Nigeria analytical Report at the national level Abuja.
- [30] Rushton, L. (2003): Health hazards and waste management. British medical Bulletin 68(2):187-197.
- [31] Sharholy, M. (2008): Municipal solid waste in Indian cities: A review. Waste management 28(2): 459 – 467.
- [32] Simoes, P. and Margues (2008): Measuring performance of urban Portuguese solid waste services. In performance assessment of urban infrastructure services. IWA publishing, London UK
- [33] Plateau State Environmental action plan (PSEAP) 2003: finding Report prepared for Federal Environmental Protection Agency: The Presidency, Abuja.
- [34] Thone, K. (1996): Waste management in developing countries. Proceeding of Fifth International Recycling Congress, Belin
- [35] Williams, P. (2005) Waste Treatment and disposal. Chichester. John Wiley and sons.