The Challenges of Waste Disposal in a Secondary City: Calabar Metropolis, Cross River State, Nigeria.

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Abstract
Waste disposal is a major aspect in environmental preservation for healthy living. If neglected could constitute a nuisance and force people to leave rather than live in a city and ultimately despoiling the environment. This paper focuses on the challenges of waste disposal in a secondary city, using Calabar Metropolis as a case study. Data for the study were gathered from field observations and semi-structured interviews (SSI) and reviewed literature of journals, periodicals and other published articles. Findings revealed principally that two major parastatals (CUDA and ESU) currently collaborate in this venture to collate, collect and dispose waste in the metropolis; that although the city is noted nationwide as the cleanest in terms of waste disposal, there are still pockets of the city that are still having problems, such as insufficient refuse dump points and, insufficient transport trucks, bad road network, irregular collection and evacuation of waste materials and lack of funds. It is recommended that the government should upgrade roads for easy access by trucks to these areas, develop a comprehensive taxing system that will make all stakeholders in waste generation to pay for the services of collection and disposal, create more refuse dump points and provide more bins, encourage private agencies to partner in waste disposal, create awareness on waste disposal, institute a body to monitor and punish defaulters who fail to comply with regulations, and provide funds for appropriate agencies for prompt and effective waste disposal in the metropolis. With this in place, the environment will be preserved for posterity.

Key Words: Waste-Disposal, Nuisance, Environment, Secondary city, Awareness, Calabar.

Introduction

Cities represent the spatial agglomeration of people in a size that is not found in the rural areas. It is a relatively large and permanent settlement of heterogonous inhabitants which act as the focal point in the political, social and economic life of each country in which they are found (Wirth, 1938 and O'Connor, 1978 in Sule, 2004). Cities are lively places of mix-populations of interest of economic activities. As observed by Sule (2004), the degree of cities viability and diversification in terms of population, jobs or employment opportunities, social artifacts, education and health programmes. It therefore follows without saying that these diverse activities generate waste materials. These wastes must be properly disposed (managed), otherwise, they may become agents of death, but if properly managed, could become agents of wealth (Obong, 2007). Secondary cities of developing countries are less complex since large-scale industrial activities are lacking. However, nuisance from uncollected waste materials like mind-blighting

stench; eyesore; filth; mosquitoes, flies and rats infestation/harassment, etc, are quite discomforting and health threatening (Obong, 2005). A number of disposal (management) strategies exist in handling wastes in developing cities of the world and include traditional combustion or control burning/open burning (this leads to pollution of community air by release of oxide of sulphur and nitrogen into the air), incineration, composting, recycling, reuse, etc (Sule, 1976; Sule, 1981; Obong, 2005). The focus of this paper is waste disposal in a secondary city: Calabar Metropolis, Nigeria.

Waste generation and management has been part of human activities right from time. The management of urban centers and keeping it clean of wastes has challenged and preoccupied the urban man a great deal. Waste as defined by Sridhar (2007) is "any unavoidable material resulting from domestic activity r industrial operation for which there is no economic demand and which must be disposed of". As given by Obong (2004), waste is "a qualifying adjective by environmentalists to include all unwanted or un-useful biological and material things (solid, liquid or gas) to a living and functional organism or system in the environment". Waste disposal in cities of developing countries has generated and attracted considerable attention of researchers and scholars over the years. This is attributable to the fact of waste being part and parcel of all human activities and that proper waste management could become wealth. The concern of literature has been waste management in urban centers through collection, reuse, recycle, composting, and transportation to final disposal sites. Others have been on participation by public and private sectors in waste management, law enforcement problems, sustainable management, etc (Offiong, 2005; Sridhar, 2007; Obong, 2004), but little attention has been given or not clearly treated on challenges of waste disposal in the city of Calabar.

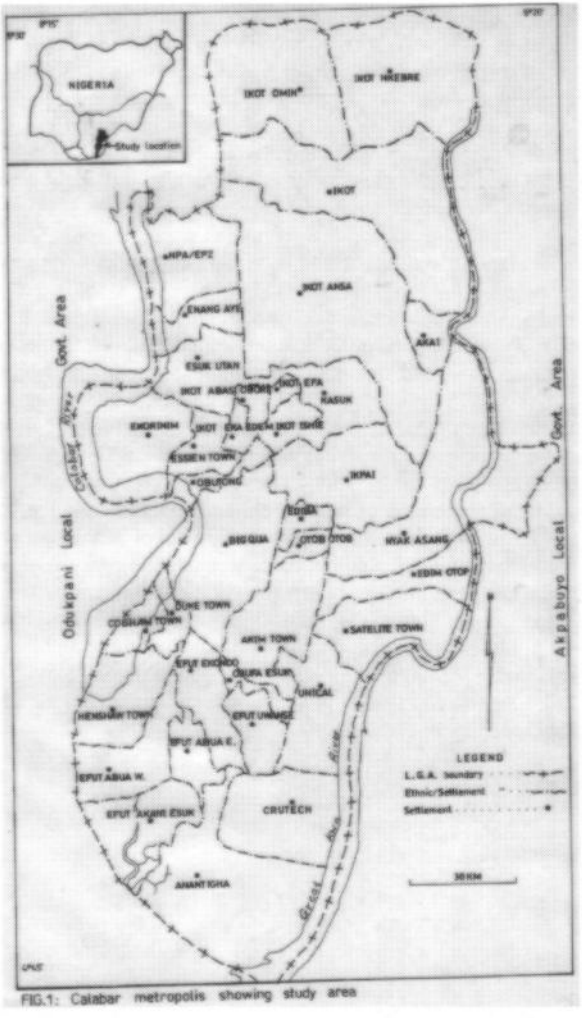

FIG.1: Calabar metropolis showing study area

4°58′N and longitude 8°17′E of the equator (Effiong-Fuller, 1996). IRIN (November 21, 2007) quoted

Study area/history of waste disposal

Calabar Metropolis is located on latitude the Executive Secretary of CUDA saying that Calabar was an important port for slaving and trade but the British never built a proper water and sewage system here and back then it was actually quite dirty. Calabar metropolis though prominent in the history of Nigeria, never had a plan to effectively manage and dispose its wastes. The duty of sanitation, collation, transportation of wastes generated within the city was solely left on the Environmental Sanitation Unit (ESU) of Calabar Municipality.

It was until the time of former governor, Mr. Donald Duke who after examining the limping, suffocating and helplessness of the ESU in this task decided to step in. this crucial and heavy task was:

- Financially tasking
- Materially involving
- Skillfully demanding and
- Technically burgeoning.

This led to pack-up of trucks, filthy, stanching, and mind blighting of the city. It was a serious challenge to a young and dynamic governor who could not fold his hands and let the sleeping dog lay. This was the reasons and subsequent creation of the agency/authority – Calabar City Development Authority (CCDA), and subsequently changed to Calabar Urban Development Authority (CUDA) which now takes over completely the duties and functions of the ESU in environmental management of the city. The Calabar Municipality since then only contributes financial from its monthly allocation at source for the running of both ESU and WDU of the Ministry of Environment.

Today, as reported by IRIN (2007), "Of the many towns and cities on the African continent, Calabar must be one of the cleanest". Although this is true, there are still some nagging problems with pockets of the city challenging this position as shall be considered later.

Objectives of Study and Methodology.

1) To identify the various organizations saddled with the responsibility of waste disposal in Calabar Metropolis
2) To identify the challenges facing the organizations in waste disposal in the city
3) To attempt an impact scoring/rating on the general level of perception on the cleanliness of the city.
4)

Statement of hypotheses

The following hypotheses were formulated to guide the study:

1) There exist no impeding challenges in waste disposal in a secondary city of Calabar Metropolis
2) The challenges of waste disposal do not significantly affect the effectiveness of waste disposal in Calabar Metropolis.

The interest of this study was the challenges of waste disposal in Calabar Metropolis. In accomplishing this, the agencies responsible for the disposal of waste in the city were identified with visits to the State Ministry of Environment to facilitate the identification of agencies for waste disposal in the city. The next action was identification of waste dump points, nature of waste bins, the nature of work done by cleaners, supervisors, evacuators and nature of evacuation to final dumpsites through reconnaissance survey. This was subsequently followed by visits to these agencies committed with the duty of waste disposal on pre-test interviews with subsequent follow up with well-structured open-ended questions. The study employed the participatory research method through field observation for on-the-spot assessments and recording, semi-structured interviews (SSI) with

focused groups via triangulation and appropriate statistical tools used in analyzing the data gathered.

Objective one was achieved with SSI; while for objective two, respondents from the organizations responsible for waste disposal, individual waste collectors that go from compound to compounds, as well as members of the public/residents were requested to score the performance of waste disposal in the metropolis. For impact scoring of waste disposal on level of cleanliness of the city, the scoring guide on table 1 was used.

Table 1: Scoring guide for impact of waste disposal

Very clean	5
Clean	5
Fairly clean	5

The impact-rating guide used is as shown on table 2.

Table 2: Impact rating guide for waste disposal

41-60%	fairly clean
61-69%	clean
70% and above	very clean

For the test of hypotheses one the chi-square (X^2) test distribution developed by Siegel (1956) after Fisher and Yates (1953) was used to test the degree of relationship and consequent effect of the problems on waste disposal; while the Analysis of Variance (ANOVA) with the F-distribution of Alder and Roessler (1964) after Merrington and Thompson (1943) was used to test the second hypothesis in order to determine the degree of association/relationship that exist between various problems and to confirm significant effect on the effectiveness of waste disposal.

Results

Organizations responsible for waste disposal

The first objective was to identify the various organizations saddled with the responsibility of waste disposal in Calabar Metropolis. It was gathered that two agencies are responsible for the collation, collection, and transfer/transportation of wastes to final government designated dump sites. The agencies are the Waste Disposal Unit (WDU) of the Ministry of Environment and the Calabar Urban Development Authority (CUDA), with the Environmental Sanitation Unit (ESU) of the Calabar Municipality contributing only in finance (see table 3 and figure 2).

Table 3: Different Sectors/Organizations in Waste Disposal

S/N	Sector/Organization	Category	Role
1	CUDA	Public	- Waste collection - Waste transportation - Disposal at final designated dumpsite.
2	Ministry of Environment	Public	- Waste collection - Waste reuse - Waste recycling - Transportation and - Waste disposal at final designated dumpsite.
3	Calabar Municipal Council	Public	- Financial contribution
4	AVOT Company	Private	- Beautification of the Metropolis

Source: Authors Fieldwork, 2008.

The two sectors as identified above – the Calabar Urban Development Authority (CUDA), and Waste Disposal Unit (WDU) of the Ministry of Environment (which are government sectors) are responsible for waste disposal in collation, collection, transportation and final government designated dumpsites leaving the metropolis clean and green for healthy living. The Calabar Municipality's major contribution is financial where money is deducted at source by the state government for the running of both CUDA and WDU.

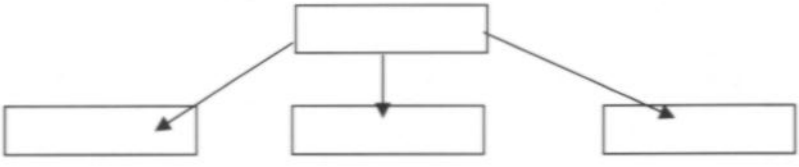

Figure 2: Organization of Waste Disposal in Calabar Metropolis.

It was equally identified that the metropolis during the governor's task force on waste collection and disposal was divided into eleven (11) cells for control and management. The cells were manned with eleven (11) Cell Leaders, 14 boys each whose duty was to scope, rake collate, collect, transfer/transport the wastes to final disposal sites. At the end of the task force, the cells were shared between CUDA (5 cells) and WDU (6 cells) for continuity. The cells are still operative till date.

Challenges of waste disposal

The second objective of this study was to identify the challenges facing the organizations in waste disposal in the city. Waste however is part of all human activities and their disposal is a problem that has come to stay, especially in urban

areas where complex and conflicting activities and lifestyles abound. In separate interviews with CUDA and WDU staff, it was revealed that though the organizations are working hard to keep up with the duty of waste disposal, some challenges act as drawbacks to their work which include lack of funds; insufficient flashpoints (waste dump points); insufficient transport trucks; bad road network; and insufficient waste bins. These problems according to respondents combine to militate against their smooth operations.

Impact of Waste Disposal on the Cleanliness of the City of Calabar.

The third stated objective of the study was to attempt an impact scoring/rating on the general level of perception on the cleanliness of the city. This is an aspect of impact assessment whose end product is impact statement. Environmental impact statement (EIS) represents a summary of the funding of environmental assessment of a particular area. It is a document that accompanies the developer's planning application as obtained in the Nigerian Urban and regional planning law – Decree No. 88 of 1992 as amended in 1997(Agbo, 2006). Impact assessment is an established practice in public-goods investment projects and programmes such as infrastructure, health, education transportation and urban development project: in this case, CUDA and WDU (Gryseels, 1999) and the objective is to justify an activity, obtain funds, control project execution, learn from results etc (Kuby, 1999).

Impact is simply change. This change could be a positive or negative result a project imposes on the environment and it is well emphasized (IAIA, 1998; Kuby, 1999; Obong, 2007). Some examples where impact scoring has been done in the literature exist (Agbo, 2006; Obong, Eja and Ekpei, 2008); while Sule (2003) provided for ratings and scales in measuring housing quality.

The scoring used here provide for items or indicators which are dependent on the of impact in consideration with the highest attainable score of 5 for each identified item and rating within three ranges of acceptable, critical or acceptance (Agbo, 2006). In this study, the impact is on the positive - very clean, clean and fairly clean were used. The general level of perception of the cleanliness of the metropolis was carried out using the procedure determined in the method of study.

Table 4: Impact scoring on waste disposal on the cleanliness of Calabar Metropolis

S/N	Item	Maximum positive impact	Score
1	Very clean	5	2
2	Clean	5	4
3	Fairly clean	5	4
	Total Rating	**15**	**10**

Source: Authors Fieldwork, 2008

Total score attainable = 15

Rating = 10x100/15
= 1000/20
= 66.6%

Therefore the impact of waste disposal on the cleanliness of the city is 66.6%. With this rating, the metropolis is clean having scored 66.6%.

Test of hypotheses

Hypothesis one

It was hypothesized that there exist no impeding challenges in waste disposal in a secondary city of Calabar Metropolis. The Analysis of Variance (ANOVA) was used to test the hypothesis. Respondents were requested to score over ten, five areas identified as important for effective waste disposal and the data gathered are as given:

Observation table 1

	CUDA	WDU	ESU
Waste dump points	4	5	5
Transport trucks	5	6	5
Road network	4	4	5
Regular evacuation of wastes 7	6	5	
Funding	5	4	5
Waste bins	7	8	5
	32/6=5.3	33/6=5.5	30/6=5

$N = 6+6+6$

$= 18$

$X_{GM} = \frac{32+33+30}{18}$

$= 95/18$

$= 5.3$

The mean of each respondent – CUDA, WDU & ESU are:

$X_{CUDA} = 5.3$; $X_{WDU} = 5.5$; $X_{ESU} = 5$.

$\delta^2_B = k\sum_{i=0} \frac{n\,(X-X_{GM})^2}{K-1}$

$\therefore$ CUDA $= (5.3-5.5)^2 \times 6 = 0.24$

WDU $= (5.5-5.5)^2 \times 6 = 0$

ESU $= (5-5.5)^2 \times 6 = 1.5$

$\delta^2_B = \frac{BSS}{K-1}$

$= \frac{0.24+0+1.5}{3-1}$

$= 1.74/2$

$= 0.87$

$\delta^2_W = WSS/W-K$

$= 32+33+30/18-3 = 95/15 = 6.3$

$F = \delta^2_B / \delta^2_W = 0.9/6.3 = 0.4$

Degree of freedom (df) for within group variance = N-K

= 18-3

=15

Confidence level = 0.05

F calculated = 0.14

F tabulated = 4.6

The calculated value 0.14 is less than the table value of 4.6, hence following the decision rule, H_o is rejected and the alternate H_1 is accepted which states that there exist impeding challenges in waste disposal in a secondary city of Calabar Metropolis.

Hypothesis two

It was equally hypothesized that the challenges of waste disposal do not significantly affect the effectiveness of waste disposal in Calabar Metropolis.

Respondents (CUDA, WDU and ESU) were interviewed and the observation table given as: Observation table 2

Variable	Fo	fe	fo-fe	$(fo-fe)^2$	$(fo-fe/fe)^2$
CUDA	7	20	-13	169	8.45
WDU	5	20	-15	225	11.25
ESU	8	20	-12	144	7.2
					$\Sigma = 26.9$

Source: Authors Fieldwork 2008

Degree of freedom (df) = (2-1)(3-1) = 2

Table value of X^2 at 0.05 significant level = 5.99

X^2 calculated = 26.9

Calculated value 26.9 is higher than the table value 5.99, therefore, the H_o is rejected and the alternate accepted which states that the challenges of waste disposal significantly affect the effectiveness of waste disposal in Calabar Metropolis.

Discussion

The field results as statistically examined above revealed that two major public sectors – Calabar Urban Development Authority (CUDA), and the Waste Disposal Unit (WDI) of the Ministry of Environment are saddled with the responsibility of waste disposal in the metropolis. Field interviews also revealed that the Environmental Sanitation Unit (ESU) of the Calabar Municipality contributes financially for the funding of the waste disposal programme handled by the two organizations aforementioned (see table 3), while a private company (AVOT) takes care of the beautification of the metropolis.

The business of waste disposal is not an easy one. This could be seen as gathered from investigation that although reports has it that Calabar is the cleanest city in Nigeria (IRIN, 2007), there are difficulties impeding the activities of CUDA and WDU. These were confirmed from achieving objective two and the stated hypothesis one to guide the study, which was found true that there exist impeding challenges in waste disposal in a secondary city of Calabar Metropolis. These nagging problems were identified to include:

- Lack of funds
- Insufficient flashpoints (waste dump points)
- Insufficient transport trucks
- Bad road network in some areas of the city, and
- Insufficient waste bins.

The second hypothesis was equally statistically tested and results of calculated value of 26.9 was higher than the table value of 5.99, therefore, the H_o was rejected

and the alternate accepted which states that the challenges of waste disposal significantly affect the effectiveness of waste disposal in Calabar Metropolis.
People's perception of the cleanliness of the metropolis was carried out using the procedure determined in the method of study. The intention was to determine the impact of waste disposal agencies on the cleanliness of Calabar. Three items (very clean, clean and fairly clean) were used to rate the perception of the impact of waste disposal in the city environment. The city was rated clean having scored 66.6 per cent.

Conclusion

This paper has examined the challenges of waste disposal in a secondary city, using Calabar metropolis as a case. Three objectives were put forward and two hypotheses formulated to guide the study. Semi-structured interviews (SSI), field observations and recording as well as reviewed literature and appropriate statistical tools were employed to analyse data gathered from the field. Findings shows that two public agencies are responsible for waste disposal in the city and though findings reveled a 66.6 per cent with an impact rating of being clean: nagging problems of bad road network, insufficient waste dump points, insufficient transport trucks, insufficient waste bins and lack of funds are impeding problems. If these problems are bridled, Calabar will become and indeed remain very clean, the cleanest and a place to continue to attract people to live and not to leave: for a waste-litter-free and healthy city environment for fruitful living and sustainable national development.

Recommendations:

The following recommendations are put forward to check the challenges of waste disposal in the city of Calabar:
Government funding on waste disposal should be mainstreamed into the budget plan for each year and the funds for this purpose disbursed on time for procurement of trucks and other materials necessary for waste disposal and payment of workers engaged in the task.

Private agencies (Non-governmental organizations) should be encouraged to participate in funding, provision/donation of materials, personnel and taking up responsibilities of paying for staff who work to keep the city clean. Furthermore, government needs to engage and work with the private sector in this enormous challenge of waste disposal.

There is need for more enlightenment of the citizenry to enhance awareness on the need for better sanitation and the need for a holistic management of waste. Environmental education should be made a priority and regular feature during orientation programmes on television and radio shows. Environmental education should also be introduced in all levels of schooling in the state through appropriate curricula and policy framework.
Government should develop a comprehensive taxing system that will make all stakeholders in waste generation to pay for the services of collection and disposal, create more refuse dump points and provide more bins, create awareness on waste

disposal, institute a body to monitor and punish defaulters who fail to comply with regulations. Finally, government should invest in technology and recruit experts in geology, engineering and environmental management for sustainable waste disposal and management in the metropolis.

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