

An Appraisal of Domestic Waste Management Practices and Operations in South Western Nigeria

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Abstract: *The study was carried out to investigate the waste management practices and operations in Southwestern Nigeria with particular reference to Ondo State. A two stage sampling was used to select four Local Government Areas in Ondo State, Southwestern Nigeria as study sites. Semi structured questionnaires and interviews were used to collect data on waste management practices and resources. Out of the 300 respondents interviewed 37% engaged in a wide range of waste disposal methods Educational status of respondents was not associated with the mode of waste disposal ($\chi^2=19.55$ d.f = 3, $P>0.05$) however 45.5% of the respondents with no formal education most often dumped wastes into drainage channels. 51.7% of the respondents disposed waste daily although, the practice of separation of wastewas not popular as only 7.8% of the respondents separated waste before disposal. The use of Government owned Waste Management Agencies for waste collection was equally unpopular because of the irregularity in waste collection and evacuation by the agencies. Recommendations and conclusions drawn on this study is based on the empirical data collected on waste management practices and operations in Ondo State with a view to proposing an effective waste management system for the State.*

Keywords: Environment, Domestic waste, waste disposal practices, Waste management Authority, Southwest Nigeria

1. Introduction

Solid waste management is one of the major global environmental problems facing cities. In Nigeria, Ondo State, like other States in the country, has had its share of massive waste accumulation in city centers. Waste collection, transportation and disposal is one of the essential services of Government and so, the design and approach for municipal waste management is controlled by State and Local governments Waste Management Agencies.

The current approach is to collectively transport and dispose wastes in designated waste dumps which are located outside cities or communities. Waste collection takes place just once a month during mandatory State-wide "clean-up days". Currently this approach has proved to be inefficient due to the waste that litter streets. There is also a subtle aversion by the populace for staff of the Waste Management Agencies because of the seemingly lackadaisical attitude of staff in performing their duties.

There has been an urgent need to understanding the critical factors that mitigate against appropriate waste collection and disposal methods both at household and government levels. The information would help in designing appropriate health education materials and perhaps sensitise government on the need to explore other approaches for waste management.

2. Literature Survey

Management of wastes remains a challenge in many sub Saharan countries primarily because of poor legislation and rapid population growth without commensurate provision of adequate sanitary infrastructures [1, 2]. Of all the wastes generated from fast growing cities, the most critical is municipal waste which includes domestic solid wastes [3] and wastes from public places such as homes, markets, schools, etc. Domestic waste is one of the most difficult to

manage because of its diverse range of composite materials which includes food debris, paper, glass, textiles, cellophane, aerosols and metals [4].

Reports have shown that despite current environmental friendly innovations in waste management, piles of waste continue to litter the environment in both rural and urban cities [5]. Poor waste handling practices and inadequate provision of waste management facilities have been cited as been responsible for the indiscriminate disposal of wastes [6], resulting in abundance of breeding grounds for pathogenic organisms and spread of infectious diseases [7]. A number of health hazards in Nigeria such as helminth infections, dysentery, typhoid, cholera, have been linked to poor solid waste management [8,9,4].

In Nigeria, efforts have been made by the Government since pre-independence era to ensure hygienic environment and this is evidenced in the several legislative controls (the Cantonment proclamation of 1904, Public Health Act of 1909, Township Ordinance of 1917, Building Lines Regulation of 1948 and Public Health Laws of 1957) which were enacted at various times to combat overcrowding, communicable diseases and squalor [10]. Up to the late 70's adequate sanitation was effectively maintained by enforcement of Public Health Laws through house-house inspection and refuse management by Sanitary Inspectors.

However political interference with the statutory role of these inspectors in the early 80's led to the collapse of the house to house inspection programme. In a bid to salvage the deteriorating sanitary conditions of human habitations the military junta at that time embarked on frenzied sanitary activities in all the State capitals [10] and by 1988 the Federal Environmental Protection Agency (FEPA) was established and a policy on environment protection was launched in 1989. The policy under section 24 of decree 58 required states and local Government councils to set up environmental protection bodies for the maintenance of

good environmental hygiene [11]. The national environmental (Sanitation and Waste Control) regulations of 2009 stipulates that every state in the Federation should designate special clean-up days for mandatory sanitation exercise. Mobile courts were established to prosecute offenders [12].

However, despite all these efforts, maintenance of good sanitation seems to elude the Nigerian populace. It is therefore paramount to appraise operations of waste management authorities, document adequacy or inadequacy of waste management resources in relation to population size and understand the attitude of the populace especially rural-urban evolving towns towards proper waste disposal. The paper also proffers solutions to the challenges of waste management.

3. Methodology

Study Location

The survey was carried out in four Local Government Areas (LGAs) of Ondo State in South west Nigeria. The State lies between latitude $55^{\circ} 45'$ and $8^{\circ} 15'$ North and longitude $4^{\circ} 45'$ and 6° East. The State shares boundaries with Ekiti State in the North-West, Osun State by the West-Central, Ogun State by South-East, Delta State by the South-East and in the South by Atlantic Ocean.

The study sites for the survey were Ikare (Akoko North East LGA), Akungba (Akoko South west LGA), Ogbese (Akure North LGA) and Ore (Odigbo LGA). All the sites especially Ikare and Ore are fast growing semi-urban towns which are convergent places for many ethnic groups some of which are: Igbo, Hausa, Fulani, and Ijaw. Akungba and Ogbese are rural towns whose populations are rapidly increasing when comparing 1991 and 2006 census data. [13].

Materials and Methods

A two stage sampling was used to select the sample population. First, all the 18 Local Government Areas of Ondo State were listed and classified into rural and semi urban [14]. Two Local Government Areas were randomly selected from those categorized as rural and semi urban Local Government Areas, then in each selected Local Government Area, five communities within 2km radius to the LGA headquarters were further randomly selected. In each community, semi-structured questionnaire were self-administered in fifteen randomly selected households. In this manner, three hundred individuals were interviewed.

At each of the selected Local Government Areas, the programme managers at the Waste Management Authority boards were also interviewed using interview guides. Focus group discussion guides were also developed and used to collect information on waste management practices from respondents who are charged with the duty of household waste disposal.

Data Analysis

Data was subjected to simple proportions and Chi square test using with SPSS 14.0 software. The Chi-square test was used to assess significance of differences between the various parameters in the different study sites.

Pilot Test

A pilot test was carried out in Oka Akoko of Akoko Ondo State South West. The town was used to assess the acceptability of the data collection tools (questionnaires, focus group discussion guide, time spent on administration and comprehension of terms). The data collected were further used to refine the tools.

Ethical Consideration

The Local Government Councils were approached for ethical consent before the commencement of the study. Permissions were sought and obtained from the community leaders of the various LGAs and heads of households to conduct the survey. Each household that participated in the study was given a plastic waste bin as compensation for their time.

4. Results and Discussion

Generally, a poor level of waste management observed in the study and this is consistent with earlier studies conducted in other parts of Nigeria by Ogboi and Okosun, [15]; Nwachukwu, [5], Ibekweet al, [16] and Efe [17]. Majority (89.67%) of the households visited had at least one form of waste bin (Table 1), however, these waste bins, were inappropriate because these bins were either old torn sacks, broken buckets or plastic containers which had been cut open at the top and baskets made of palm fronds. Consequently, the wastes collected are spread around during conveyance to the dump sites.

A wide range of waste disposal practices were also observed and these included burning, burying, open dumping along road side, dumping into drainage channels and the use of the services of the Waste Management Agency (Table 2). The use of a combination of these methods herein referred to as multiple methods was the most common (37.0%). The practices differed significantly between LGAs ($\chi^2 = 96.08$; d.f = 3, $P < 0.05$) with individuals deciding which method was more convenient for them as revealed in the focused discussions held with adult women:

"We really do not know what to do about the wastes. Every household decides the most convenient method to use" FGD, Women, Idimango, Akoko North East.

In Akure North LGA, 61.33% of the respondents reported using multiple methods in managing wastes from households (Table 2). Educational status of respondents had no significant association with the mode of waste disposal ($\chi^2 = 19.55$ d.f = 3, $P > 0.05$) however respondents with no formal education (45.5%) most often dumped wastes into drainage channels (Table 2) with the expectation that the rain would wash them away. However, these practice only resulted in blocking the drainages.

The various types of waste observed during the survey include tins, plastic products, polythene bags, food debris and paper. More than half (51.7%) of the respondents disposed waste daily (Table 3) although the practice of separating wastes before disposal was not a popular practice (Table 3). Only 7.8% of the entire study population

separated waste before disposal (Table 3) and the practice was more common amongst individuals with diplomas or University degrees (tertiary education). Poor knowledge of sanitation could be responsible for the lack of separation of wastes and the frenzied approach in waste disposal by respondents. For instance wastes generated in households were generally left around or behind the houses in a pile for weeks before final evacuation to communal dump sites. The piled up waste gave off offensive odour arising from fermentation processes of the organic components of the waste and incidentally these sites could also serve as breeding ground for mosquitoes and other vectors.

Waste burning which was the second most popular singular practice (25%) is not healthy as the practice could trigger respiration related health conditions as reported among adults and children in a study elsewhere in Nigeria [4].

Staff of government owned Waste Management Agency avail themselves during monthly environmental sanitation days to collect and evacuate wastes. Interviews with officials of Waste Management Agencies (WMA) at the Local Government level revealed that domestic waste collected from residences were evacuated in open authorised dumps at the outskirts of towns. Findings show that only 1.67% of the respondents in the entire study actually patronized the services of the WMA as they would rather dump wastes indiscriminately in communal unauthorised open sites. The low patronage of WMA by residents could be because the WMA staff focused on collection of wastes from public places such as markets and schools.

The waste collection routine is such that only the waste of residences along the road or in close proximity to the public places were collected. People who are unfortunate to live in the centre or far end side of the communities are left unattended to. Moreover, the environmental sanitation lasts for only three hours on every last Saturday of the month (from 7am to 10am). Once it is 10.00am, the WMA staff will put an end to the waste collection exercise and return to their offices.

Focused discussions with adult women in Ogbese, Akure North LGA, further confirmed the lackadaisical attitude of the WMA staff.

The Government waste collectors do not frequently come to collect waste. They only come on environmental sanitation days which is just once a month and lasts three hours.

When interviewed the WMA staff revealed that the perceived lack of motivation was as a result of poor funding and lack of facilities (Table 4) given the population they were expected to service.

"We have been unable to do our job as expected as a result of absence of funds, inadequate man power, absence of equipment and logistics because even the trailer we use on few environmental days are private ones that we rent from private owners" Interview, Head of Waste Management Authority, Ore, Odigbo LGA.

Only Odigbo LGA had one operational truck and a transfer

loading trailer. The situation was worse in the other LGAs which had to rent private trucks for waste collection and subsequently evacuated waste in open sites where it is left to pile up and only burnt during dry season. These LGAs had a few non-functional moribund receptacles and Dino bins. In a few areas where large Dino bins were provided by the Government, people made concerted efforts to use the facility but unfortunately these bins were not frequently evacuated. Consequently people who reside close to the Dino bins stopped people from further patronage of the Dino bins because the overflowing refuse from the bins gave off offensive odour and littered the environment. This further explains the indiscriminate dumping of refuse in unauthorized sites.

In Akure North the dire paucity of funds had compelled the agency to appeal to communities to pay a sum of N300 for their services so as to augment the little funds they had.

"The community should cooperate and pay a token amount of N300 monthly so as to use it to maintain available equipment and to get few urgent needed equipment such as transfer loading trailer" Interview, Assistant Head of Waste Management Authority, Ogbese, Akure North.

Waste collection and transportation is both labour and capital intensive [18]. It has been estimated that waste transportation, accounts for 70% to 80% of the total cost of solid waste management in Nigeria [19, 20]. The lack of adequate waste collection vehicles in the State could be attributed to poor funding and inadequate maintenance. Only Odigbo Local Government Area which was better equipped and that is with the possession of just one operational truck and transfer loading trailer to service a population of 230,351 persons.

None of the WMAs treated or recycled wastes collected. The only Waste treatment plant in the State is located in the State capital.

5. Conclusion

The practices of collection and disposal of wastes both at household and government level is poor. Inadequate sanitation facilities and funding is largely responsible to the perceived poor performance of the Waste agencies.

6. Future Scope

The Ministry of Environment could collaborate with private sector to help change the current situation. The involvement of waste private collection companies with a strong political will to support and sustain contracts could ensure a more sustainable waste management programme in the State. Government owned waste agencies should rather focus on monitoring and enforcement proper delivery services.

Public attitude to proper waste disposal could be improved by health education programmes on the side effects of improper waste disposal. The use of communal methods of incinerator and sanitary landfills need to be introduced and complemented with new technologies of solid waste management such as waste reduction, recycling and reuse.

The approach will not only reduce the heaps of waste but, will also likely serve as source of income and employment for the people.

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Table 1: Availability of Household Bin in various Communities

Community	Sample size	Household Bin Possession(%)
Agbado	15	86.7
Agunla	15	100
Akua	15	100
Alayere	15	93.3
Bolorunduro	15	100
Eleyeowo	15	80.0
Ibaka	15	93.3
Ibere	15	93.3
Idimango	15	93.3
Igbelu	15	86.7
Ilepa	15	93.3
Malasuru	15	93.3
Okeigbala	15	100
Okela	15	100
Okoja	15	86.7
Okorun	15	100
Okusa	15	93.3
Olupitan	15	100
Sabo	15	93.3
Uloba	15	100
Total	300	269 (89.67)

Table 2: Waste Disposal Practices in the various Study Sites

LGA	Sample Size	Waste Disposal Practices (%)					
		Burning	Burying	Dump	OWMA	Drainage	Multiple Methods
Akoko North East	75	14.67	1.3	26.67	1.3	18.67	37.33
Akoko South West	75	18.67	2.7	34.67	1.3	13.3	29.33
Akure North	75	12.0	0	22.67	4.0	0	61.33
Odigbo	75	54.67	5.3	9.33	0	10.67	20.0
Total	300	25.0	2.33	23.33	1.67	10.67	37.0
Age Group							
>29	46	28.26	4.35	23.91	6.52	4.35	32.61
30-39	94	22.40	1.06	27.66	1.06	13.83	32.98
40-49	93	21.51	4.30	16.13	1.08	13.98	43.01
> 50	67	29.85	0	26.87	0	5.97	37.31
Total	300	25.0	2.33	23.33	1.7	2.33	37.0
Educational Status							
Primary	118	21.2	4.23	25.42	0	24.58	38.14
Secondary	123	26.01	1.63	24.39	2.44	1.63	32.52
Tertiary	48	35.42	0	10.42	4.17	2.08	43.75
None	11	9.09	0	45.45	0	0	45.45
Total	300	25.0	2.33	23.33	1.7	10.7	37.0

OWMA: Ondo State Waste Management Agency

Table 3: Frequency of Waste Disposal and Waste Separation Practices among various Education Level

Education	Sample size	Percentage (%) Frequency of Waste Disposal			Waste Separation	
		Daily	Weekly	Monthly	Yes	No
Primary	118	51.7	48.3	0	4.2	95.8
Secondary	123	54.5	42.3	3.3	3.3	96.7
Tertiary	48	43.8	56.3	0	14.6	85.4
None	11	54.5	45.5	0	9.1	90.9
Total	300	51.1	48.1	0.8	7.8	92.2

Table 4: Resources Available at the various Waste Management Authorities

LGAs	*Popn	Resources				
		Operational Trucks	Receptacles	Open Top Bins	Trailers	M&E
Akure North	131587	1	0	2	1	Absent
AkokoSouthWest	229486	1	1	3	1	Absent
Akoko Northeast	175409	1	2	1	1	Absent
Ore	230351	1	1	10	1	Present

*2006 Population Census;

M&E: Monitoring and Evaluation