



Assessment of Practice of Household Solid Waste Disposal in Eziama, Aba North Local Government Area, (Lga) Abia State, Nigeria

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Abstract

Background: Solid waste can be described as unwanted materials generated from households and municipal services in our daily activities in homes, agricultural, and livestock activities and in industries. They include garbage or kitchen waste, paper, empty cans, broken bottles, glass, iron scraps, plastic, etc. These are dry refuse as opposed to wet or liquid refuse (sewage) constituting of human faeces, urine, effluents from bath and kitchen. If not properly disposed of will lead to offensive conditions such as bad smells, breeding of flies, and spread of infectious diseases, fire outbreak and injuries especially to children playing around. Waste management is the process of collecting, transporting, processing or disposing and monitoring of waste materials.

Objective: Assessment of Practice of Household solid waste disposal in Eziama, Aba North Local Government Area. Abia State, Nigeria.

Materials and Methods: A cross-sectional study performed in Eziama Community in Aba North Local Government Area in ABA, Abia State, Nigeria. Self-administered semi-structured questionnaires were administered to 465 household heads for the study.

Result: A total of 465 household heads were selected by systematic sampling methods with response rate of 450 (97.6%). Mean age was 35 ± 6.421 . Level of good practice on waste management is 206 (45.8%) and is low. The relationship between the sociodemographic variables (age group, marital status and level of education) and level of practice of solid waste management was statistically significant, marital status at p value of <0.05 .

Conclusion: The level of practice was low 45.8%. The association between the level of practice and age group, marital status and level of education of the respondents was statistically significant at 0.001, 0.024 and 0.021 respectively. The major source of information was from the community leader and that was 40%.

Keywords: Assessment; Practice; Household; Solid Waste Disposal; Aba North; Abia State; Nigeria

Introduction

Solid waste, also known as Municipal Solid Waste (MSW) can be described as unwanted materials or substances primarily generated from households and municipal services in our daily activities in homes, agricultural, and livestock activities and in industries. They include garbage or kitchen waste, paper, empty cans, broken bottles, glass, iron scraps, plastic, etc. These are dry refuse as opposed to wet or liquid refuse (sewage) constituting of human faeces, urine, effluents from bath and kitchen. Waste, both solid and liquid must be handled and disposed of with care so that they do not constitute danger to public health [1].

Solid waste, if not properly disposed of will lead to offensive conditions such as bad smells, breeding of flies, and spread of infectious diseases. Indiscriminate disposal of refuse will also lead to fire outbreak and injuries especially to children playing around [1].

MSW can be defined as solid waste which includes all domestic refuse and non-hazardous wastes, street sweepings and construction debris. In some countries the solid waste management system also handles human waste such as night-soil, ashes from incinerators, septic tank sludge and sludge from sewage treatment plants. If these wastes manifest hazardous characteristics they should be treated as hazardous wastes [2].

Waste includes all items that people no longer have any use for, which they either intend to get rid of or have already discarded and these include: packing items, garden waste, old paint containers vegetables, metals [3]. Domestic waste is waste that is generated as a result of the ordinary day to day use of a domestic premise and is either; taken from the premises by or on behalf of the occupier who generated the waste, collected by or on behalf of a local government as part of a waste collection and disposal system [4]. Something can become waste when it is no longer useful to the owner or it is used and fails to fulfil its purpose [5].

Waste management is the process of collecting, transporting, processing or disposing and monitoring of waste materials [6]. The term usually relates to materials produced by human activity and the process is generally undertaken to reduce their effect on health, the environment or for aesthetics [6]. The management of waste is another key element in the protection of public health. Different

types of waste pose different problems but in general failure to manage and dispose waste properly exposes people to increased risk of diseases [7].

The waste management hierarchy is made up of four levels ordered from most preferred to least preferred methods based on their environmental soundness: sources reduction and refuse; recycling or composting; energy recovery; treatment and disposal [2].

The steps involved in waste management include, waste generation, separation and storage, collection, transport, disposal:

- Refuse disposal methods include: Open dumping, sanitary landfill, composting, incineration, mechanical destruction, burning and recycling.
- Open dumping: Refuse is dumped on open land or sea [9]. It is easily done but it is the most unhealthy and unsightly method. Demerits include exposure of waste to flies, malodourous stench, dissemination of light refuse by wind and drainage systems, pollution of surface and underground water. It is common today in Nigeria.
- Sanitary landfill: This method is most favoured when suitable land is available and adequate. Here refuse is deposited in trenches and compacted with earth. The three common methods involved are: trench method, ramp method, area method. It is however imperative to exercise caution in selection of landfill sites since household refuse can be highly polluting.
- Composting: This is best suited in situations where the waste produced is high in organic matter [7]. It is an aerobic, biological process of degradation of biodegradable organic matter [8,9]. Compostable refuse is heaped for months with periodic turning and microorganisms decompose it. It is good for farm manure but has numerous risks to health if poorly managed. Anaerobic degradation of such waste could also lead to release of greenhouse gases such as methane, methyl bromide, chlorofluorocarbon (CFC), hydrofluorocarbon (HCFC) [1].
- Incineration: Refuse is first segregated. Combustible matters are dried up and burnt in incinerators at a temperature of 1000-1200 degree centigrade. Refuse is converted to ash and gaseous products. Burning: is possible where the

moisture content of the waste is low [7]. Generally, one sees burning being carried out at a localized level in the absence of adequate collection service [7]. Burning does have a number of disadvantages in that burning of refuse in close proximity to domestic dwellings creates an additional fire risk in addition to producing atmospheric pollution [7].

- Mechanical destructors: Sorting of refuse is again done. It is fed into the machine or pulveriser and the end product used as manure. It is useful in very large cities where amount of refuse generated daily is high.
- Recycling: Means taking waste materials and transforming them into raw products, results in saving natural resources, saving energy, saving money and creating jobs [10]. One should mention briefly, what practice is with regards to refuse disposal and what happens to refuse disposal in Eziama Urata Aba North LGA.

Indeed, one of the most pressing concerns of urbanization in the developing world has been the problem of solid, liquid, and toxic waste management. Recent events in major urban centers in Africa have shown problem of waste management to be a monster that has aborted efforts of both federal governments and many professionals [11].

It is the enormity of the problem and danger posed by poor household refuse disposal practices that warranted the need for this study especially within the city of Aba, in Aba North LGA of Abia State, Nigeria. The indiscriminate and improper household disposal has led to substantial negative environmental impacts such as pollution of air, soil, and water.

Materials and Methods

Study area

Aba is a city in the southeast of Nigeria and the commercial center of Abia State. Upon the creation of Abia state in 1991, Aba was divided into two local government areas namely; Aba South and Aba North. Aba North is a Local Government Area of Abia State in the city of Aba. The postal code is 450 and the headquarter is Eziama [12]. It lies along the west bank of the Aba River, and is at the intersection of roads leading to Port Harcourt, Owerri, Umuahia, Ikot Ekpene, and Ikot-Abasi. The city became a collecting point for agricultural products and the British made railway ran through it to Port Harcourt. Aba is a major urban

settlement and commercial centre in a region that is surrounded by small villages and towns. The indigenous people of Aba are the Ngwa [12]. Aba is well known for its craftsmanship and also the most populous city in the South Eastern Nigeria. Aba North LGA has a population of 154,083 according to the National Population Census (2006) projected to 234,800 up to March 2019 with annual population change of 2.7% (2006 - 2019) [13].

Study population

The study population comprised of heads of households (2,000) [13] in Aba North LGA.

Inclusion criteria

All Households in the selected villages that consented to participate in the study.

Exclusion criteria

Households outside the study area and those who didn't give consent to participate.

Study design

A descriptive cross-sectional study of household refuse disposal in using pretested semi-structured self-administered questionnaire to obtain information from consenting participants. Information was collected on the practice of household refuse disposal and confidentiality was maintained. This was used to assess the practice of household solid waste disposal in Eziama, Aba North LGA, Abia state, Nigeria.

Sample size determination

Calculation was done using the formula below [14]

$$N = z^2PQ/D^2$$

Where N= minimum sample size

Z= standard normal deviation (1.96)

P= prevalence (0.50 used for sample size)

Q=1-p

$$= 1 - 0.5 = 0.50$$

D= degree of accuracy = 0.05(constant)

$$N = [1.96^2 \times 0.5 \times 0.5] / (0.05)^2$$

$$= 3.8416 \times 0.25 / .0025$$

$$= 0.9604 / 0.0025$$

$$= 384.16$$

Hence to correct for attrition; 20 per cent of sample size will be added to the simple size.

$$20\% \text{ of } 384.16 = 76.832 = 77$$

Therefore, total number of sample size that will be collected is $384.16 + 77 = 461$.

Sampling technique

Multi-stage probability sampling technique was used.

- **First step:** Five wards is randomly selected, out of the ten wards in Aba North LGA. this includes; Ama-asaa, Ama-Asato, Osokwa ward, Umunneise and Uratta.
- **Second step:** three villages are selected in each of the five wards giving a total of 15 villages.
- **Third step:** Each village is taken as a cluster and 31 heads of households were randomly chosen and interviewed. The 15 villages randomly selected gave a total household heads of 465 and 465 questionnaires were produced.

- **Tool for data collection:** Data were collected using a pretested semi-structured questionnaire developed by the researchers and were interviewed by self-administered.
- **Data analysis:** Data collected were analysed using Statistical Package for the Social Sciences (SPSS) software version 26.0. Data were presented in frequency tables. Chi-square was used to test association between categorical variables, P - value of <0.05 was taken to be a statistically significant.
- **Data presentation:** Data generated were summarized using tables and frequency distribution of variables. Descriptive analysis was done by calculating relevant means and standard deviation for quantitative variables, while qualitative variables were analyzed using proportions.
- **Ethical consideration:** Informed consent of the study was obtained from Abia State University Teaching Hospital, Aba, Informed consent was also obtained from the Aba North LGS Chairman, Ward Councilors of the selected wards and 450 heads of the households and they were briefed on the objectives of the study. They were counseled and confidentiality of the information given was assured.

Results

Variables		Frequency	Percentage (%)
Age group	20 - 24	35	7.8
	25 - 29	50	11.1
	30 - 34	55	12.2
	35 - 39	150	33.3
	40 - 44	68	15.1
	45 - 49	58	12.9
	50 - 54	26	5.8
	>55	8	1.8
Total		450	100.0
Gender	Male	285	63.3
	Female	165	36.7
Total		450	100.0
Educational level Of the respondents	Primary education	108	24.0
	Secondary education	150	33.3
	Tertiary education	192	42.7

Total		450	100.0
Marital status	Single	40	8.9
	Married	410	91.1
Total		450	100.0
Tribe	Igbo	420	93.3
	Hausa	9	2.0
	Yoruba	21	4.7
Total		450	100.0
Religion	Christianity	415	92.2%
	Islamic	15	3.3
	African traditional	20	4.5
Total		450	100.0
Occupation	Teaching	68	15.1
	Farming	86	19.1
	Government employee	118	26.2
	Business owners	98	21.8
	General contractors	80	17.8
Total		450	100.0
Types of homes	Village House	86	19.1
	Two bed-room flat	106	23.5
	Three bed-room flat	183	40.7
	Duplex	75	16.7
Total		450	100
Monthly income in Naira	<30,000.00	88	19.6
	30,000.00 - 40,000.00	104	23.1
	41,000.00 - 50,000.00	190	42.2
	>50,000.00	68	15.1
	Naira Mean = 45,000 ± 14,000		
Total		450	100.0
Number of household members	1 - 5	188	41.8
	6 - 8	190	42.2
	>8	72	16
Mean = 4.82 ± 3.16			
Total		450	100.0

Table 1: Socio-demographic Characteristics of the respondents: Mean = 35.59 ± 6.421.

Four hundred and fifty respondents participated in the study giving a response rate of 97.6% and non-response rate of 11 (2.4%).

Table 1 shows that majority of the respondents 150 (33.3%) were in the age group of 35 - 39 while the least number of respondents were in the age group of >55 and above. Male consisted the majority of the gender with 285 (63.3%) while female the least with 165

(36.7%). Respondents with tertiary education 192 (42.7%) were in the majority, those with secondary education 150 (33.3%) and those with primary education 108 (24%) were the least. The respondents who were married 410 (91.1%) were in majority and those who were single 40 (8.9%) were the least. Respondent who were Igbos 420 (93.3%) were in majority followed by Yoruba 21 (4.7%) and Hausa 9 (2.0%). Respondents who were Christians 415 (92.2%) were in the majority followed by African traditional 20 (4.5%) and Islam 15 (3.3%). Respondents who were government employee 118 (26.2%) were in the majority followed by business

owners 98 (21.8%), Farming 86 (19.1%), General contractors 80 (17.8%) and Teaching 68 (15.1%). Respondents who live three bed-room flat 183 (40.7%) were in the majority followed by two bed-room 106 (23.5%), village house 86 (19.1%) and Duplex 75 (16.7%). Respondents with monthly income in Naira 41,000.00 - 50,000.00 were in the majority followed by 30,000 - 40,000.00 88 (19.6%), and >50,000.00 68 (15.1%) with a Naira mean = 45,000 ± 14,000, Respondents with household size of (6 - 8)190 (42.2%) were in the majority followed by household of 1 - 5 size 188 (41.8%) and household >8 72 (16%). Mean of household size = 4.82 ± 3.16.

Variables		Frequency	Percentage (%)
Sources of waste management's information.	No information	20	4.4
	Brochures	55	12.2
	Social media	120	26.7
	Community leader	180	40.0
	Radio % Television	75	16.7
Total		450	100.0

Table 2: Sources of waste management's information.

Table 2 shows the sources of waste management's information, the major source was from the community leader 180 (40.0%) followed by social media 120 (26.7%), brochure 55 (12.2%), 20 (4.4) respondents did not get any information and they participated.

Table 3 shows level of practice on the waste management by the respondents, 206 (45.0%) demonstrated good practice of waste management while 244 (54.2%) had poor practice of waste management.

Variables		Frequency	Percentage (%)
Level of practice on waste management	Good practice	206	45.8
	Poor practice	244	54.2
Total		450	100.0

Table 3: Level of practice on waste management.

Variables	Practice of waste mgt			Total N (%)	χ 2	P - value
	Good Practice N (%)	Poor practice N (%)				
Age group	20 - 24	16 (3.6)	19 (4.2)	35 (7.8)	2.237	0.001*
	25 - 29	23 (5.1)	27 (6.0)	50 (11.1)		
	30 - 34	25 (5.6)	30 (6.6)	55 (12.2)		
	35 - 39	69 (15.2)	81 (18.1)	150 (33.3)		
	40 - 44	31 (6.9)	37 (8.2)	68 (15.1)		
	45 - 49	27 (5.9)	31 (7.0)	58 (12.9)		
	50 - 54	12 (2.7)	14 (3.1)	26 (5.8)		
	>55	4 (0.9)	4 (0.9)	8 (1.8)		
Total	206 (45.8)	244 (54.2)	450 (100.0)			

Marital status	Single	18 (4.1)	22 (4.8)	40 (8.9)	6.969	0.024*
	Married	187 (41.7)	223 (49.4)	410 (91.1)		
Total		206 (45.8)	244 (54.2)	450 (100.0)		
Educational level Of the respondents	Primary education	49 (11.0)	59 (13.0)	108 (24.0)	54.467	0.021*
	Secondary education	69 (13.7)	81 (19.6)	150 (33.3)		
	Tertiary education	88 (19.5)	104 (23.2)	192 (42.7)		
Total		206 (45.8)	244 (54.2)	450 (100.0)		

Table 4: Statistically significant association between socio-demographic characteristics and level of practice on waste management.

Table 4 shows association between level of practice and socio-demographic characteristics and association between level of practice and age group, marital status and level of education of the respondents was statistically significant at a p value of 0.05.

Variables Good Practice N (%)		Practice of waste mgt		Total N (%)	χ ²	P - value
		Poor practice N (%)				
Sources of waste management's information	No information	9 (2.0)	11 (2.4)	20 (4.4)	4.215	0.12
	Brochures	25 (4.7%)	30 (7.5)	55 (12.2)	22.452	0.18
	Social media	55 (12.2)	65 (14.5)	120 (26.7)	2.286	.006*
	Community leader	82 (18.3)	98 (21.7)	180 (40)	21.364	.001*
	Radio and Television	34 (7.6)	41 (9.1)	75 (16.7)	23.435	.018*
Total		206 (45.8)	244 (54.2)	450 (100.0)		

Table 5: Statistically significant association between source of information and level of practice on waste management.

P-value at 0.05.

Table 5 shows association between level of practice and source of information and level of practice between social media, community leader and radio/television were found to be statistically significant with p-values of 0.006, 0.001 and .006 respectively while association between no information and brochure with the level of practice was not statistically significant with p-values of 0.12, 0.18 respectively.

Discussion

The response rate for this study was 450 (97.6%) and mean age of the respondents was 35.59 ± 6.421, majority of the respondents 150 (33.3%) fell in the age group of 35 - 39 and this is in line with a study in Thailand [15] and this is similar to study conducted in Thalang Thailand [16] where the common age range was 20 - 29 years old (36.9%). Male constituted the majority of the gender of

285 (63.3%) while in the study conducted in Thailand [15] female 63.2% constituted the majority and also in Thalang Thailand [16] female constituted majority (87.2%). In this study, respondents with tertiary education was 192 (42.7%) and secondary education 150 (33.3%) while in Thailand [15] 37.5% of the respondents indicated that they had achieved a secondary education and 29.3% of the respondents with no education and also in Thalang in Thailand [16] where most of the respondents held at least bachelor's degree. Married respondents was 410 (91.1%) and higher than that in the study conducted in Thailand [15] in which married respondents accounted for 63.2%. Respondents with government employment were 118 (26.2%) business owners were 98 (21.8%) while in Thailand [15] majority of the respondents were merchants 33.0% followed by private employees (1.6%), respondents who lived in

three bed-room flat were 183 (40.7%) and 86 (19.1%) in village house while in Thailand [15] majority of the respondents 87.4% lived in private house. Majority of the respondents with monthly come in Naira 41,000.00 - 50,000.00(\$54.67 - \$66.67 for local exchange rate of \$1 to N750) were 190 (42.2%) while majority of the respondent in Thailand [15] had monthly income of 15,000 baht, (\$433.78, for exchange rate of \$1 to 34.58 Baht). Respondents with household size of 6 - 8 were 190 (42.2%) while in Thailand more than half of the respondent (51%) had the family size of five to eight persons in its household. The major source of information was from community leader 180 (40%) while in Thailand most of the respondents (42.6%) received information from the community leaders as in our study even theirs was higher. However, in our study 20 (4.4%) did not receive information at all while in Thailand 15 25.1% of the respondents did not receive information at all.

In this study, the level of practice was poor 206 (45.8%) while in Thailand [15], most of the respondents had moderate level of practice on proper MSW management and in Thalang Thailand [17] the level of practice toward municipal solid waste disposal was 90% and very high and in a study in Nigeria [18] by Aluko et al the level of practice was 38% and in Ethiopia [19] where 51.4% participants reported poor practice and this findings were consistent with a study in Pakistan of 52% [20]. This could be due to comparable socio-economic status, developing countries could experience similar waste management practices. The association between the level of practice and age group, marital status and level of education of the respondent was statistically significant at 0.001, 0.024 and 0.021 respectively and this was similar in Thailand where the relationship between socio-demographic characteristics and level of practice was statistically significant at $p < 0.05$. In Thailand [15] in terms of practices, respondents were affected by four variables namely age, marital status, educational level and source of waste management information such as it was in this study. The results of these studies also supported these findings of Arora and Agarwai [17]. These results found that the respondents, who did not receive information, had a low practice level when compared with others. The association between level of practice and source of information and level of practice and social media, community leader and radio/television were found to be statistically significant with p-values of 0.006, 0.001 and .006 respectively.

In line with our study, in a study in Philippine [21] it was also pointed-out there was significant relationships between KAP level and certain socio-demographic aspects of the student-respondents. Findings show that students coming from medium-sized families with parents having good academic background and held stable jobs were more likely to exhibit satisfactory KAP ratings. However, students from families with monthly income ranging from ₱5, 000.00 to ₱10, 000.00 (\$89.80 to \$179.60 for exchange rate of \$1 to 55.68 Philippine peso) were less likely to have satisfactory KAP ratings as compared to the students from families with income below ₱5, 000.00 or above ₱10, 000.00. No similar published findings was encountered to support this result; although, it can be stated that most respondents with unsatisfactory KAP rating came from 5k-10k family-income range.

Conclusion

The mean age of the respondents was 35.59 ± 6.421 and the majority of the respondents 150 (33.3%) were in the age group of 35 - 39. The level of practice was low 45.8%. The association between the level of practice and age group, marital status and level of education of the respondents were statistically significant at 0.001, 0.024 and 0.021 respectively. The major source of information was from the community leader and that was 40%.

Recommendation

Local Government Authorities in the State and Nigeria at large should provide more training and retraining workshops for healthcare workers who are directly involved in medical waste management in hospitals and should also disseminate regular information, which will help solid waste disposal workers to understand the issue and perform their jobs properly in compliance with those regulations. There should be need to focus on the control of medical waste and offsite waste transportation to the final disposal destination.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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