



Solid waste generation and storage practice in selected banks in Abeokuta, Ogun State, Nigeria

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ABSTRACT

Background: Studies on solid waste management in commercial areas especially banks in most towns or cities of developing countries is scanty in literature. As part of the commercial area of a city, information on the quantity and composition of solid waste (SW) generation and storage practice in banks is of utmost importance, if the vision of creating sustainable cities would be achieved.

Objectives: The study assessed solid waste generation and storage practice in the selected banks in Abeokuta Metropolis, Ogun State.

Methods: Data for the study were obtained through the measurement of SW components generated. Questionnaire was administered to the cleaners in charge of SW. Information obtained were: quantity and composition of SW generated, storage practice and socio-economic characteristics of the cleaners. Systematic sampling was used to select 11 banks out of 23 banks in the selected local governments. Data collected were analysed using descriptive and inferential statistics.

Results: The study showed that the total quantity of SW generated by the banks was 336.4 kg per week. The quantity was produced by 2,318 people. The highest quantity (14.5%) of SW was produced in the Guarantee Trust bank. The least quantity (24.27 kg) was generated in the Sterling bank. The proportion (22.8%) of SW generated on Monday was the highest, while the least (16.7%) was recorded on Wednesday. The highest waste per capita was obtained in the Polaris bank (0.034 kg). The least (0.014 kg) was estimated in the First bank. Metal/plastic drum was commonly used as a storage receptacle in most (54.5%) of the banks.

Conclusions: It was concluded that banks located close to the heart of the central business district generated more waste.

Keywords: Waste per capita; solid waste; waste generation; storage receptacle in banks

INTRODUCTION

Solid waste is non-liquid materials meant to be discarded, emanating from sources such as residential, industrial, commercial, institutional, construction and demolition, municipal services, process and agriculture (US EPA, 2018). It consists of assorted components such as dust, food wastes, packaging in the form of paper, metal, plastic or glass, discarded clothing, garden wastes, pathological waste, hazardous and radioactive waste (US EPA, 2018). In particular, the commercial area of a city is one of the main sources of solid waste generation, contributing about 20% of total municipal solid waste generation (Klunbut, et al., 2017). Thus, it is the second largest solid waste generator after households (Christensen, 2011). Despite the quantity of

waste generated in the area, less attention has been given to empirical investigation components and quantity of waste produced in commercial area especially banks. However, information on the quantity and composition of waste generation in all sectors of a city is germane to ensuring its sustainable management. Beside, Afon (2007) observed in a study conducted in two local government areas of Lagos State that residents stored solid waste in small containers. Some of the containers include plastic and metal; unused buckets, bowls; and plastic bags. The study pointed out that the use of such small storage containers helps residents' to get a good bargain by paying less to informal waste collectors for the disposal of their waste. He added that this storage system

Table 1: Banks in Abeokuta South and North

S/N	Abeokuta South (AS)	Selected	Abeokuta North (AN)	Selected
1.	Guaranty Trust Bank	√	Polaris Bank	
2.	Sterling Bank	√	Wema Bank	
3.	Polaris Bank		United Bank for Africa	√
4.	Diamond Bank	√	First Bank	√
5.	Access Bank		Zenith Bank	√
6.	Zenith Bank		Polaris Bank	√
7.	First City Monument Bank	√	Access Bank	√
8.	Fidelity Bank	√	Astra Polaris Bank	
9.	First Bank		Trust Bank	
10.	Fidelity Bank		United Bank for Africa	
11.	Access Bank		Union Bank	
12.	Keystone Bank	√		

attracts disease-carrying vectors such as flies and rats.

Improper solid waste management (SWM) results in dirtiness and environmental nuisances causing odours, and attracting flies, thus becoming an eye-sore. In the long-term effects, solid waste may pollute the air, water and soil, and pose human/environmental health problems. The dumpsites for solid waste are the places where insects and small rodents feed or nest. In this way, these vectors carry pathogens that are found in solid waste to human habitats (Christensen, 2011). This may cause infectious diseases in humans such as diarrhea, tetanus, eye infection and other illnesses. Besides, solid waste also poses a negative impact on economy and resources from the cost of disposal (Shukor et al., 2011).

To develop an effective SWM strategy, information on the quantity of waste generation, composition, and the waste stream is of utmost importance. Furthermore, per capita waste generation rate is essential for the prediction of waste generation and to evaluate the waste generation trends (Bandara et al., 2007). Data on waste composition is required for the planning of collection, transportation, and treatment of solid waste. It is noted that adequate data is the foundation of effective integrated waste management systems (Forbes et al., 2001). This study therefore assessed solid waste generation and storage practices in the selected banks in Abeokuta metropolis, Ogun State, Nigeria.

MATERIALS AND METHODS

Abeokuta is the capital of Ogun State, south-

western Nigeria. Abeokuta metropolis, the study location, consists of four local government areas. For this study, two local governments were purposively selected. There were twelve (12) banks located in Abeokuta South, while Abeokuta North has eleven (11) banks (see Table 1). Using systematic techniques, 50% of banks in each of the local government were selected. In case of banks with two branches, only a branch was considered. Thus, sample sizes were six (6) and five (5) banks in the South and the North respectively. This translated to eleven (11) banks in the local governments.

Primary data were obtained through questionnaire administration and waste quantification. A questionnaire was administered to two cleaners in each of the banks, to ensure the representativeness of the sample size. Altogether, 22 cleaners were sampled. Information obtained includes cleaners' social and economic attributes, type of storage receptacle used, and segregation of waste and location of storage receptacle. Data on the quantity and composition of waste generated in each bank were obtained. This was done through weighting of solid waste generated each working day of the week (Monday – Friday) through the use of electronic portable scale. Data collected were analyzed using descriptive statistics such as percentage, mean, and frequency distribution. Unless otherwise stated, all the Tables in the study emanated from the survey of 2018.

Table 2: Socioeconomic characteristic of the cleaners

Bank	Gender		Age		Marital Status		Monthly Income		Educational Status	
	Female (%)	Male (%)	18-27yrs (%)	28-37yr (%)	Single (%)	Married (%)	< #18,000 (%)	#18,000-37,000 (%)	Secondary (%)	NCE/OND (%)
Guaranty Trust	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (50.0)	2 (100.0)	0 (0.0)
Zenith	0 (0.0)	2 (100.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
Stanbic	0 (0.0)	2 (100.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	0 (0.0)	2 (100.0)	1 (50.0)	1 (50.0)
FCMB	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	1 (50.0)	1 (50.0)
Diamond	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)	0 (0.0)
First Bank	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)	0 (0.0)
Sterling	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)	0 (0.0)
Keystone	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
Fidelity	1 (50.0)	2 (100.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
UBA	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)	2 (100.0)	0 (0.0)
Polaris	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	11 (50.0)	11 (50.0)	20 (90.9)	2 (9.1)	20 (90.9)	2 (9.1)	6 (27.3)	16 (72.7)	13 (59.1)	9 (40.9)

RESULTS AND DISCUSSION

Socioeconomic characteristics of the cleaners

Cleaners' socioeconomic attributes discussed under this section include: gender, age, marital status, average monthly income and educational status. Information on the socioeconomic attributes of cleaners in the selected banks would be useful tools at gaining insight into the existing solid waste management practices in the study area.

Generally, findings on the gender of cleaners show that an equal number of male and female was engaged as cleaners in the surveyed banks. However, there was variation in the number of male and female cleaners in each of the bank. For instance, Guaranty Trust bank had one female and one male, while the two cleaners employed in Zenith were male. The same situation of two male cleaners was recorded in Stanbic, while FCMB had a female and male cleaner. In Diamond and Polaris banks the two cleaners were female. All other banks had a female and male cleaner. The results show that majority (90.9%) of the cleaners were within the age bracket of 18 – 27 years. It implies that they were within the active population. Expectedly, they should be productive in waste management activities. The remaining percentage (9.1%) was within the age group of 28 – 37 years. This shows that cleaners sampled were matured enough to give reliable information concerning waste management practices in their respective banks.

The results on the marital status of the cleaners show that over 90% of the cleaners were

single, while the remaining 9.1% were married. Cleaners are expected to be committed to work, because there was no serious family commitment. Except for Stanbic and United Bank of Africa all other banks had cleaners that were single. As revealed in Table 2, 72.7% of the cleaners earned between #18,000 and #37,000 per month. The remaining percentage received less than #18,000 per month. This implies that the majority of the cleaners received less than or a little bit above minimum wage (#18,000) in Nigeria.

Cleaners in Guaranty Trust, Zenith, Stanbic, Diamond, First, Sterling and United Bank for Africa earned #18,000 and above, while cleaners in the other banks received below #18,000. Thus, it could be inferred that all the cleaners were low-income earners.

Findings on the educational qualification of the cleaners show that most of them were of low educational status. Generally, the percentage of the cleaners with secondary school certificates was 59.1%, while the remaining percentage had either a national certificate in education (NCE) or an ordinary national diploma (OND). It could be seen that the cleaners in Zenith, Fidelity and Polaris banks had either NCE or OND certificate. In other banks, it was a mixture of secondary school certificate and NCE/OND certificate. This to a large extent accounts for variation in the monthly salary of the cleaners.

Table 3: Quantity of waste generation in the selected banks

Waste Component	A	B	C	D	E	F	G	H	I	J	K	Total (kg)	%	Daily Average (kg)
Monday	8.195	6.080	5.525	7.570	11.27	6.940	5.992	5.760	6.040	8.535	4.760	76.7	22.8	6.97
Tuesday	3.505	5.625	4.330	5.572	9.590	6.115	4.296	4.690	4.130	7.310	7.540	62.7	18.6	5.70
Wednesday	3.500	5.200	5.425	4.071	8.200	7.310	4.482	5.215	4.480	3.320	4.985	56.2	16.7	5.11
Thursday	7.935	5.275	5.690	14.15	8.45	6.640	5.680	4.740	4.815	6.125	4.925	74.4	22.1	6.76
Friday	5.805	6.210	4.940	8.756	11.22	7.190	6.240	5.925	6.110	3.840	5.060	71.3	21.2	6.48
Total (kg)	28.94	28.40	25.91	38.22	48.72	34.20	26.68	26.33	25.58	29.13	24.27	336.4	-----	30.58
%	8.6	8.4	7.7	11.4	14.5	10.2	7.9	7.8	7.6	8.7	7.2	-----	100	-----
Weekly Average (kg)	5.788	5.68	5.18	7.64	9.74	6.84	5.34	5.27	5.12	5.83	4.85	67.3	-----	-----
No. of Generator	1,264	906	759	1,843	2,318	2,526	1,335	939	823	1,305	867	14,885	-----	1,353
%	8.5	6.1	5.1	12.4	15.6	17.0	9.0	6.3	5.5	8.8	5.8	-----	100	100
Per capita (kg)	0.023	0.031	0.034	0.021	0.021	0.014	0.020	0.028	0.031	0.022	0.028	-----	-----	-----

A – Stanbic; B – Keystone; C – Polaris; D – First City Monument; E – Guaranty Trust; F – First Bank; G – Fidelity; H – Diamond; I – Zenith; J – United Bank for Africa; K – Sterling;

Table 4: Waste components generation in the different days of the week in the selected banks

Waste Component	Monday	Tuesday	Wednesday	Thursday	Friday	Total (kg)	%	Weekly Average (kg)	Daily Average (kg)	Per capita (kg)
Paper	49.02	40.71	33.41	47.74	46.02	216.9	64.5	3.94	0.79	0.015
Nylon, polythene & plastics	19.78	17.41	17.37	17.37	17.82	89.75	26.7	1.63	0.33	0.006
Metal & cans	3.50	1.42	1.95	5.31	2.80	14.98	4.5	0.27	0.06	0.001
Food waste	3.35	2.35	2.54	2.63	2.52	13.39	4.0	0.24	0.05	0.001
Rag & textile	1.77	0.64	0.64	0.60	1.85	5.50	1.6	0.10	0.02	0.0004
Leaf	0.28	0.17	0.29	0.46	0.29	1.49	0.4	0.03	0.005	0.0001
Broken bottles	0.00	0.00	0.00	0.33	0.00	0.33	0.1	0.006	0.001	0.00001
Total	76.7	62.7	56.2	74.40	71.30	336.4	-----	6.12	1.22	0.023
%	22.8	18.6	16.7	22.1	21.2	-----	100	-----	-----	-----
Daily average (kg)	6.97	5.70	5.10	6.76	6.48	30.58	-----	-----	-----	-----
No. of Generator	3,411	2,749	2,616	3,008	3,101	14,885	-----	-----	-----	-----
%	22.9	18.5	17.6	20.2	20.8	-----	100	-----	-----	-----
Per capita (kg)	0.023	0.023	0.022	0.025	0.023	-----	-----	-----	-----	-----

Aggregate quantity of solid waste generation in the selected banks

Presented in Table 3 are the findings on the quantity of solid waste generation in the selected banks in Abeokuta metropolis. The total weekly quantity produced in all the surveyed banks was 336.4 kg. The quantity was produced by 14,885 people, consisting of staff members and customers. Analyses of weekly quantity generated in the different banks show that the highest quantity was produced in the Guaranty Trust Bank. The weekly quantity generated in the bank was 48.72 kg, representing

14.5% of the total. The quantity was generated by 2,318 people. The reason for the highest quantity recorded in the bank could be attributed to the number of customers the bank received daily due to its centrality. The weekly quantity produced in the First City Monument and First banks ranked second and third. The weekly quantities generated in the banks were 38.22 kg (11.4%) and 34.20 kg (10.2%) respectively. The least weekly quantity was produced in the Sterling bank. The quantity generated in the bank was 24.27 kg (7.2%).

Table 5: Solid waste storage

Bank	Storage Receptacle			Total (%)
	Metal/Plastic Drum (%)	Perforated Dustbin (%)	Wheel Dustbin (%)	
Guaranty Trust	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Zenith	1 (50.0)	1 (50.0)	0 (0.0)	2 (100.0)
Stanbic	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
FCMB	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Diamond	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
First Bank	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Sterling	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Keystone	1 (50.0)	0 (0.0)	1 (50.0)	2 (100.0)
Fidelity	0 (0.0)	2 (100.0)	0 (0.0)	2 (100.0)
UBA	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Polaris	2 (100.0)	0 (0.0)	0 (0.0)	2 (100.0)
Total	12 (54.5)	3 (13.6)	7 (31.8)	22 (100.0)

Results of daily waste generation in the different week reveal that the highest quantity was produced on Monday. The percentage contribution of the day to total waste generation was 22.8%. This might be attributed to the fact that Monday is the first working day, as a result people might visit banks more on this day to withdraw money for the expenses to be incurred during the week. In order of magnitude, the quantity generated on Thursday, Friday, Tuesday and Wednesday were 74.4 kg (22.1%), 71.3 kg (21.2%), 62.7 kg (18.6%) and 56.2 kg (16.7%) respectively.

Further analyses on daily per capita (kg/day) waste generation in the surveyed banks shows that the highest waste per capita was generated in the Polaris bank (0.034 kg). The waste per capita generated in the Keystone and Zenith banks was similar. Diamond and Sterling recorded equal waste per capita. Their respective waste per capita was 0.031 kg and 0.028 kg, which ranked second and third respectively. The least waste per capita was produced in the First bank (0.014 kg).

Results of the quantity of waste components generated in the different day of the week shows that paper had the highest quantity. The percentage of quantity of paper produced was 64.5% of the total. This might be attributable to the nature of bank operation that consumes paper than any other materials. Quantity of nylon, polythene and plastics generated (26.7%) ranked second. Metal and cans, food waste, rag and textile; and leaf accounted for 4.5%, 4.0%, 1.6% and 0.4% respectively. The least (0.1%) component generated was broken bottles.

Solid Waste Storage

The study found that the surveyed banks mostly use three types of storage receptacles. The storage receptacles are metal/plastic drum, perforated dustbin and wheel dustbin (see Plate 1). In aggregate metal/plastic drum was mostly (54.5%) used. Next in rank is the use of wheel dustbin. The percentage contribution of the receptacle is 31.8%, while the least, which is the perforated dustbin, has a proportion of 13.6% of the total. However, most of the storage receptacles had no lid, making them accessible to rodents and insects. Offensive odour from the receptacles is another defect of using such waste bins. A similar study carried out by Afon (2007) established that storage receptacles in use by the residents attract disease-carrying vectors such as flies and rats.

Analyses based on each bank show that the usage of metal/plastic drum was completely adopted in Stanbic, First City Monument, Sterling, United Bank for Africa and Polaris banks. Fidelity was the only bank that made use of perforated dustbin completely, while Guaranty Trust, Diamond and First banks relied solely on the usage of wheel dustbin. As shown in Plate 2, other storage receptacles observed to be in use were polythene, carton and sack.

It was noted that some of the banks engage in in-discriminate storage of waste around the bank area. Though the area was used as temporarily for storage of waste, however the method is considered environmental-unfriendly. This has been



Plate 1: Waste storage receptacle in use in most of the banks



Plate 2: Plastic drum, carton and sack used as a storage receptacle

established in literature to be a source of breeding place for rodents and vectors. This might be harmful to human health and the environment.

CONCLUSION

Sustainable management of solid waste especially in urban area would be a mirage, if effort is not geared towards proper documentation of quantity, composition and storage methods of waste generated in every section of urban area. Unarguably, findings of this study would be a basis for formulation of an informed strategy on management of waste emanating from banks, particularly in the study area. It could therefore be concluded that information on solid waste generation in different land-uses of urban areas is essential to proper waste management that would in

turn, enhance a sustainable urban environment that is good for human habitation.

It is recommended that before any municipal solid waste management strategy is put in place to enhance sustainable urban waste management, there is need to conduct empirical studies into different activity areas of urban land-uses to determine quantity and composition of waste generated; per capita waste generation and storage receptacle among others. This would not only inform policy formulation and implementation on environment-friendly waste management practices, but it would also help in forecasting future quantity and composition of solid waste generation.



Plate 3: Temporary storage area in some of the banks

Specifically, banks in the study area need to take a drastic measure at improving the existing storage practice, to eliminate or reduce the harmful effects of inadequate solid waste storage practice.

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