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Public Participation in Solid Waste Disposal and Management in Kwale, Delta State, Nigeria

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ABSTRACT
This work focused on solid waste disposal and management methods in Kwale, Delta State, Nigeria. It utilized structured questionnaire and face to face interviews in generating data in the study. The seven communities that make up the town were sampled. Results revealed that irrespective of respondent's localities, that shops/offices and residential houses lacked approved waste collection bags/bins from waste handlers but used personal packing bags. Collected waste materials were reported to later be disposed off by road sides, gutters, streets, pits, abandoned buildings, undeveloped plots, or directly into rivers/streams. Majority of the respondents were unaware of the government-approved disposal site in the Local Government Area. Although, some of the respondents adopted pit burning method, knowledge of integrated solid waste management (sorting of waste, reducing, reusing and recycling) was observed to be generally very low. Respondents were generally not happy with services of waste handlers in the area. Practically there was no mechanized landfill available for municipal waste management in the area, rather wastes were lifted from collection points and dumped either by road sides of burrow pits at the extremes of the town. This has serious health and environmental concerns as it could engender disease epidemic. Thus, deliberate efforts should be made by the Local Government Authority to seek ways of engaging in waste to wealth strategies that would help sustainable solve the waste generation and disposal problems in the study area.
Keywords: Kwale, Solid wastes, Waste Disposal, Waste Handlers, Landfill, Dumpsites.

INTRODUCTION

Solid Wastes (SW) has posed a great deal of problems in most parts of the world, Nigeria not an exception. Their generation is inevitable as long as man continues to live on planet earth. They are wastes that are generated from with everyday living. This is why they are called trash, garbage or rubbish as the case may be. Its composition and characteristics vary from municipality to municipality (Kumar *et al.*, 2016). Municipal Solid Waste refers to wastes of different aetiological backgrounds which are unwanted materials from a particular process/system and which are meant to be discarded after use. Solid waste management is explained as that discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations and that is also responsive to public attitude (Tchobanoglous *et al*., 1993).

Aguoru & Alu (2015) stated that solid wastes can be classified in a number of ways, on the basis of source, environmental risks, utility and physical property. They quoted Omofonmwan and Eseigbe (2009) as stating that solid wastes can be classified on the basis of source which is commonly used as: municipal solid wastes, industrial solid wastes, agricultural solid wastes, mining and mineral wastes, construction and demolition wastes, healthcare wastes, radioactive (Nuclear) wastes, human and animal wastes. With the evolution of the

new paradigm of waste to wealth initiatives, solid wastes when properly managed becomes a blessing and not curse.

The emphasis now has shifted from wastes being converted into energy and allied sources. However, Nigerian wastes collection, disposal and management authorities have not taken advantage of the huge potentials the large piles of solid wastes dumps present. Rather, Nigeria is still battling with collection and disposal issues, rather than sustainable management. Isu (2005) noted that 87% of Nigerians use unsanitary methods of solid waste disposal which constitute nuisance, ugly sight, produce unpleasant odour, and create a breeding ground for pests and diseases. These have led to attendant negative health and environmental effects. Indiscriminate solid waste disposal is actually a menace and embarrassment to the nation where heaps of refuse litter most parts of the city (Ibid, 2005).

The main object of this work therefore was to assess people's involvement in generation, collection and management of Municipal Solid Waste Wastes materials in Kwale area in Ndokwa West Local Government Area of Delta State, Nigeria. This is with a view to solving the hydra0headed Solid Municipal Waste problem in the area.

MATERIALS AND METHODS

Study Area

Kwale (Utagba-Ogbe) is the Local Government Area Headquarters of Ndokwa West Local Government Area in Delta State. Kwale is situated at 5.71° North of latitude, 6.44° East longitude and 126m above sea level (Anonymous, 2018). Average annual temperature ranges from 68°F to 89°F with rainy periods lasting about 11 months, usually from January 29th to December, 22nd every year (Anonymous, 2016). The population of people residing within Kwale town was estimated to be 20,226 in 2006 with annual growth rate of 2.9% (NBS, 2007). Communities sampled were Umusam, Umuseti, Umusadege, Isumpe, Etua, Ogbe Ani and Umusedeli respectively. A total of Five Hundred and Sixty (560) respondents were sampled in this study and this consisted of Eighty (80) respondents each from the Seven (7) communities. Respondents included staffs of some registered/accredited waste handlers, staffs of the Local Government Authority, Shop owners, business premises owners and private households/residents. This study was done by modifying the structure of the work of Blanche *et al*. (2006). In this process, structured questionnaires, face to face interviews, review of secondary data and personal observations by researchers were used in generating data and analyzing same in this study.

RESULTS AND DISCUSSION

Table 1 below has shown that waste involvement in waste generation, collection and disposal seemed to be gender sensitive as more men were encountered at households (237) and Waste handlers (48) than the female folks while the females were more involved at shops/business premises. This finding was consistent with the work of Aguoru and Alu (2015). Bariweni *et al*. (2002) opined that waste generation increases with population increase. This view was supported by other researchers (Adewole, 2009; Ogwueleka, 2009; Amukali, 2018).

Table 1: Gender Characteristics of the Respondents

Respondent's Sex	Households	Shops/Business Premises	Waste Handlers	Total
Male	237	31	48	316
Female	141	99	4	244
Total	378	130	52	560

Possession of Waste Containers

A cursory look at Table 2 below showed that majority of the respondents in this study, though possessed packing bags, such bags were not from the authorized waste handlers. The findings revealed that a greater proportion of the households, lacked waste containers for solid waste collection except at Isumpe community while the shops seemed to possess waste collection containers except at Umusadege and Ogbe Ani communities respectively.

Table 2: Possession of Waste Containers

Location of Sample Sites		Possession of Waste Containers		
Sample Sites	Parameters	Has Waste Containers	No Waste Containers	Total
Umusam	Households	16	38	54
	Shops/Business	14	12	26
Umuseti	Households	16	43	59
	Shops/Business	13	8	21
Umusadege	Households	18	29	47
	Shops/Business	16	17	33
Isumpe	Households	26	22	48
	Shops/Business	21	11	32
Etua	Households	11	52	63
	Shops/Business	9	8	17
Ogbe Ani	Households	21	48	69
	Shops/Business	3	8	11
Umusedeli	Households	17	27	44
	Shops/Business	20	16	36

This showed that the waste handlers showed more preference for shop and business owners than the residential buildings. This preferential treatment could be responsible for majority of the residential households in the study area expressing concern on the inadequacy of the level of sensitivity of solid waste generation and disposal on the part of the authorized waste handlers. Mukisa (2009) and Aguoru and Alu (2015) reported similar scenarios in Uganda and Benue State, Nigeria, respectively.

Sorting of Wastes

Results in Table 3 below have shown that majority of the respondents were irrespective of sample sites and characteristics did not find it worthy to sort their waste materials, but rather just disposed it off. Other authors have found similar scenarios in similar studies in different towns (Mukisa, 2009; Agbesola, 2013; Aguoru & Alu, 2015). This showed that waste sorting is not of any significance to the disposers and this could be responsible for waste scavengers going to waste dumps in search of waste materials of different aetiological backgrounds. Finally, waste materials that were encountered and sorted were mainly bottles/glass, hard plastics, polyethylene materials, papers, scrap metals and decomposable food wastes. Off all the waste material, decomposable food wastes were the most predominant.

Table 3: Sorting of Wastes

Location of Sample Sites		Waste Sorting		
Sample Sites	Parameters	Wastes were sorted	Wastes not sorted	Total
Umusam	Households	3	51	54
	Shops/Business	4	22	26
Umuseti	Households	3	56	59
	Shops/Business	2	19	21
Umusadege	Households	10	37	47
	Shops/Business	5	28	33
Isumpe	Households	2	46	48
	Shops/Business	1	31	32
Etua	Households	1	62	63
	Shops/Business	3	14	17
Ogbe Ani	Households	12	57	69
	Shops/Business	2	9	11
Umusedeli	Households	1	43	44
	Shops/Business	2	34	36

Waste Reduction Strategies

Waste reduction strategies revolve around strategies like reuse, reduce and recycle. These are strategies that help to minimize the amount of waste being generated and consequently disposed off into the environment.

Tables 4: Waste Recycling Strategies

Location of Sample Sites		Waste Reduction Strategies		
Sample Sites	Parameters	Possible to reduce wastes	Not possible to reduce wastes	Total
Umusam	Households	18	36	54
	Shops/Business	5	21	26
Umuseti	Households	8	51	59
	Shops/Business	7	14	21
Umusadege	Households	9	38	47
	Shops/Business	7	26	33
Isumpe	Households	6	42	48
	Shops/Business	5	27	32
Etua	Households	9	54	63
	Shops/Business	6	11	17
Ogbe Ani	Households	10	59	69
	Shops/Business	7	4	11
Umusedeli	Households	3	41	44
	Shops/Business	10	26	36

However, majority of the respondents in this specific study believed it was not possible for them to reduce the quantity of wastes generated and disposed into the environment. Aguoru and Alu, (2015) had earlier observed this same scenario in Makurdi and environs in Benue State, Nigeria. The only exception was at Ogbe Ani were shop owners and Business owners practiced waste recycling by selling waste papers to tissue paper manufacturing companies. Agbesola (2013) recorded a similar study in Lagos State, Nigeria.

The mentality of majority of the respondents is that waste materials are useless and must be discarded at all cost and as soon as possible. Knowledge about waste to wealth strategies is really low within the study area. Same could be said of waste recycling in this present study. The only exception is the sales of scrap metals to scavengers in the area. As recorded by Ogwueleka (2003), there were no provisions for mechanized waste recycling gadgets in the study area.

Waste Disposal Strategies

With respect to the various avenues and methods that respondents within Kwale disposed off their wastes materials, it was observed from Table 5 that majority of the respondents from households at Umusam, Umusadege and Ogbe Ani preferred disposing their wastes directly onto adjoining pits or valleys within their vicinities. Aguoru and Alu, (2015) observed a similar trend in Makurdi and environs. Many of such pits were results of excavations from where sand was taken from for mainly construction works. Similarly, majority of respondents from households at Umuseti, Isumpe and Umusedeli communities preferred outright combustion in either open fields or make-shift incinerators for burning down their wastes. However, majority of the respondents from shops/Business premises preferred collecting their wastes and keeping same at approved designated points for Waste Handlers to pick up and dispose them.

Table 5: Waste Disposal Strategies

		Disposal Site/Method			
		Incineration	Landfill	Collection Centre	Others
Umusam	Households	9	29	11	5
	Shops/Business	3	2	17	4
Umuseti	Households	42	7	4	6
	Shops/Business	11	8	1	1
Umusadege	Households	2	43	1	1
	Shops/Business	6	18	6	3
Isumpe	Households	42	2	1	3
	Shops/Business	5	2	23	2
Etua	Households	15	16	12	20
	Shops/Business	12	2	1	2
Ogbe Ani	Households	8	53	0	7
	Shops/Business	2	9	0	0
Umusedeli	Households	26	17	0	1
	Shops/Business	14	12	5	5

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Table 6: Frequency of Waste Collection

Sample Site		Daily	Weekly	Every two weeks	Monthly
Umusam	Households	0	54	0	0
	Shops/Business	0	26	0	0
Umuseti	Households	0	59	0	0
	Shops/Business	0	21	0	0
Umusadege	Households	0	47	0	0
	Shops/Business	0	33	0	0
Isumpe	Households	0	48	0	0
	Shops/Business	0	32	0	0
Etua	Households	0	63	0	0
	Shops/Business	0	17	0	0
Ogbe Ani	Households	0	69	0	0
	Shops/Business	0	11	0	0
Umusedeli	Households	0	44	0	0
	Shops/Business	0	36	0	0

It was observed from Table 6 above that the approved and accredited waste collection agencies only visited the collection points just once in a week. This could be held accountable for the huge and disgusting refuse dumps occasionally seen around refuse collection sites in the study area. Ogwueleka (2009), Nkwocha *et al*., (2011) as well as Aguoru and Alu, (2015) all reported weekly refuse collection in some parts of Makurdi and

environs. Practices like these cause dissatisfaction in service delivery. No wonder Ogwueleka, (2003) reported that less than 60% of Municipal Solid Waste generated is collected in developing countries and this is because solid waste generation exceeds collection capacity.

Table 7: Major Method of Municipal Waste Management in Kwale

Waste handler	Burning	Burying	Composting	Reduction	Dumping	Reuse	Injection
A	Yes	No	No	No	Yes	Yes	No
B	Yes	No	No	No	Yes	Yes	No
C	Yes	Yes	No	Yes	Yes	Yes	No

Only Three (3) accredited Waste Handlers were accessibly recognized and sampled in this study. It was observed that all 3 Waste handlers dump collected waste materials upon open dump sites prior to collection. They all said that they never meant to just dump and leave same there but that the intention was to dump and burn. They stated that their inability to burn them out rightly was because many of such wastes are collected very wet, hence non-combustible at dumping time. This means that the period between dumping and waiting for the waste materials to dry up accounts for the huge disgusting and smelly refuse dumps seen dumped at the outskirts of the town. Furthermore, none of the Waste Handlers carries out composting or injection irrespective of the nature and composition of the wastes collected.

CONCLUSION

It has been observed through this work that a lot needs to be done with the waste generation, collection and management systems in Kwale town. It was noticed that many residents though lacked the Government-approved refuse packing containers; they possessed self-made waste containers for collection and disposal of such wastes. The level and methods of solid waste disposal and management in Makurdi and Environs is not ideal. Weekly collection of wastes in the study area is grossly inadequate and the waste materials are collected and dumped at the dump sites irrespective of its composition and nature.

Thus, it could be stated that the current waste management options adopted by relevant bodies are not good enough to address the waste generation, collection and disposal challenges in the study area. Open dumping and burning are not effective means of disposing all classes of waste materials, especially those containing toxic heavy metals in them.

It therefore being advocated that the Waste handlers should be empowered enough and trained to acquire the capacity and expertise to carry execute other strategies like injection, burying, etc, other than just open dumping and burning. They Waste Handlers should be made to be evacuating wastes on daily basis and not weekly as it is being presently practiced. Core Environmentalists should be involved in the waste disposal business in the study area so that they could bring their expertise and technological know-how to bare.

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