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Solid Waste Management through Neibhourhood Cooperative Society in Onitsha, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author OCU wrote the draft and the background of the study. Author TAO handled the review of related literatures and the analysis of data while both authors jointly read and approved the final manuscript.

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Case Study

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ABSTRACT

Urban waste management, collection and disposal have always been a universal problem. Extant literatures have documented the importance of solid waste management to the urban environment. Yet the performance of the authorities charged with the responsibility of solid waste management in this respect leaves much to be desired. This paper therefore examined the possibilities of neighborhood cooperatives in urban waste management in Onitsha metropolis of Anambra state. Based on convenience and high concentration of solid waste disposal, the researchers used judgmental method to select sample size clusters of 3-3; Odoakpu; Fegge and Awada, The researchers also used simple random technique to randomly distribute twenty-five (25) questionnaires each to 25 households (One hundred (100) respondents) in the study area. Data were analyzed using simple percentage and mean, under the modified four point likert scale. From the result of the investigation, the following findings are drawn: that the various types of waste produced in Onitsha metropolis include, degradable wastes, non degradable wastes, combustible

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waste as well as non-degradable and non combustible wastes and average of 6146.12 tones of these wastes are produced weekly. That the challenge which such practice pose in waste disposal management in Onitsha stem from location of dumping sites from residential homes; ignorance on the part of the people; poor funding by the government and local authorities. The study therefore recommend among other things that, the Anambra state government should encourage the residents of Onitsha metropolis to form functional neighborhood cooperative societies in charge of waste disposal management in the area and subsequently extend this practice to every other part of the state.

Keywords: Neighborhood cooperative; solid waste management; urban environment.

1. INTRODUCTION

Waste management involves the collection, transportation, processing, disposal, management and monitoring of waste materials. 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 aesthetics. Waste management is a distinct practice from resource recovery which focuses on delaying the rate of consumption of natural resources. All wastes materials, whether they are solid, liquid, gaseous or radioactive fall within the remit of waste management [1]. The statutory definition of solid waste is not based on the physical form of the material (i.e. whether or not it is solid as opposed to a liquid or gas) but on the fact that the material is a waste [2]. The United State Environmental Protection Agency (USEPA) retrieved from google.com [3], define solid waste as any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant or air deed material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial mining and agricultural operations and from community activities.

Waste management practices can differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous waste residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator subject to local, national or international controls. Solid waste can be broadly divided into two: Organic or combustible matter and Inorganic or mineral or non- combustible matter. Organic or combustible matter includes dry animal and vegetable refuse, animal excreta, tree leaves, sticks, rags etc. These wastes are subject to decay with time and evolve highly offensive odour and gas which are highly detrimental to health [2]. The inorganic waste consist of non- organic, non- combustible materials such as grit, dust, mud, metal, plastic, broken glass, tiles, waste building materials etc. It is not subject to decay and therefore stays so long. In order to ensure a healthy environment, both individuals and government often adopt control measures to eradicate all forms of wastes in the society. [4], most communities in Nigeria should form neighborhood cooperatives by pooling funds and information to ensure a waste free clean environment for the overall good of the society at large. Economic growth over the last century has been matched by increases in the amount of wastes that society produces. Current predictions indicate a potential doubling of the generation of certain wastes by 2025. The environmental and the socio-economic impacts of waste management can be significant and wide-ranging; thus waste management is central to the sustainable development agenda.

Domestic waste management; collection and disposal, have always been a universal challenge. The noted hazard caused by wastes to the environment [5], is pollution, characterized by various types of solid wastes which include paper, textile plastic, metals, glass, bone, wood, vegetables .It should be pointed out here that the generation of waste materials is an issue that is not peculiar to any society alone. This problem cuts across the world over. This problem is not peculiar to the third world alone but cuts across nations [5]. On the other hand, the United Nations Conference on Human Settlement (UNCHS) report [6]averred that one third to one-half of solid waste generated within most cities in low and middle income countries (of which Nigeria is not an exception) are not collected. One of the most problematic phenomenons in Nigeria cities today is that of waste disposal, with special reference to solid waste disposal [7]. Industrial wastes have caused considerable

concern to environmental scientists. Despite the importance of solid waste services to urban environment, the performance of many city authorities leaves much to be desired [8]. That is to say that the effort of the government agency charged with the responsibility of waste disposal management is inadequate. The current method and ways of disposal by the various waste management agencies have not been successful, hence the hills of waste around us [9]. Furthermore, unguided and indiscriminate disposal of solid waste(some of which are hazardous) without careful planning presents a danger to human, animal, plant, fish, health and environment [8]. Our problems emanate from solid waste essentially. These are wastes from discarded materials generated from domestic and community activities or from industrial, commercial and agricultural operations. Onitsha metropolis is the focus of this study, where some notable areas are replete with waste of various types and magnitude capable of negatively degrading the environment and affecting the health of the people. It is disheartening to note that Onitsha is one of Nigeria's most recognized commercial City and also an industrial hub, yet, it is ravaged with all forms of solid, liquid and gaseous wastes and the level of neglect which the various government of the state had shown towards ensuring a clean environment in the area has given credence to this study which examines the possibilities of neighborhood cooperatives in waste disposal management in the area. In the light of the foregoing, these questions are found relevant to guide the present research effort:

- What are the various types and quantum of waste produced in Onitsha metropolis?
- What are the measures and the challenges such practices pose in waste disposal management in Onitsha metropolis?
- What extent can it be possible for a functional neighbourhood cooperative society's in-charge of waste disposal management to be established in Onitsha metropolis?
- What are the various waste disposal methods which neighbourhood cooperative societies can adapt in order to perform effectively in Onitsha metropolis?
- What are the challenges which such neighbourhood cooperative societies if established, will face in order to ensure a waste free environment in Onitsha metropolis?
- What are the various deductions to make regarding the possibilities of establishing nieghbourhood cooperative societies in Onitsha metropolis?

The main objective of this study is to examine the possibilities of using neighborhood cooperative societies in ensuring effective waste disposal management in Onitsha metropolis. Specifically, this study is expected to address the followings:

i. Ascertain the type and quantum of waste produced in Onitsha metropolis.
ii. Examine the present measures being used and its challenges in waste disposal management in Onitsha metropolis.
iv. Determine the possibility of establishing functional neighborhood cooperative societies for waste disposal management in Onitsha metropolis.
v. Proffer various waste disposal methods which such neighborhood cooperative societies can adopt to effectively perform in Onitsha metropolis.
vi. Examine challenges which such neighborhood cooperative will face in their bid to ensure a waste free Onitsha metropolis.
vii. Make deductions on the possibilities of establishing neighborhood cooperatives for waste management and its benefits to people in Onitsha metropolis.

2. METHODS OF DATA COLLECTION

This study is a descriptive survey design to access the possibilities of nieghbourhood cooperative society as an approach in waste disposal management in Onitsha metropolis. Onitsha metropolis which is made up of Onitsha North and South Local Government Areas (L.G.As) is surrounded by the following notable LGAs in Anambra State: Ogbaru LGA in the Northern boundary; Oshimili North and South in Delta State in the Eastern boundary, Anambra East LGA in the Southern boundary while Idemili North LGA in the Western boundary. The inhabitants of Onitsha are majorly traders, artisians, civil servants, private firm and industrial workers. Onitsha is known for its distinct social activities which include; new yam festival, Ofala festival, Itogbo for both male and female, Igba-odu for the female, Ozo and Nze title coronation ceremonies. Information obtained from the National Population Commission (NPC) shows that Onitsha is made up of nine (9) major neighborhoods which include Fegge, Awada,

Woliwo, Housing, GRA (Government Reserved Area), Inland town, 3.3, Omagba phase 1, Odoakpu. These neighbourhoods are currently responsible for carrying out waste disposal in Onitsha metropolis and they are referred to as 'clusters' and form the population of the study. Based on the population, the researchers used judgmental method and purposively select four (3-3, Fegge, Awada, Odoakpu) of the clusters to cover Onitsha metropolis. This judgemental method was used based on convenience and high concentration of waste disposal in these areas with tendency of forming cooperative society. As such, the researchers used simple random sampling technique to randomly select 25 respondents from 25 households in each cluster. Therefore, the researchers randomly distribute 25 (twenty-five) questionnaires each to the sample clusters. The questionnaire was sent direct to households through local council authorities officials in the study area. The data of this research work was collected from two (2) main sources of data collection namely primary (with the use questionnaire) and secondary data collection. The questionnaires were analyzed using simple percentage under a four-point Likert scale. The following values were assigned to the responses: Strongly agree -4 points; agree -3 points; disagree -2 points; and, strongly disagree – 1 point. Mean (x) response of 2.5 was used as the threshold. Therefore, mean response ≥ 2.5, was taken as positive, while response ≤ 2.5 was regarded as negative.

3. RESULTS AND DISCUSSION

3.1 Personal Characteristics of the Households

Table 1 describes the socio economic characteristics of the inhabitants of the households in Onitsha metropolis. The sex disposition of the respondents showed that number of males (73%), far exceeds that of females (27%). The average ($\bar{x}$) age of the respondents is 39 years which indicates that the inhabitants are still in their active age, as in this case are more likely to be productive. This implied that wastes disposal management stands to be more effective with most of the inhabitants of Onitsha metropolis in their active age. Most of the residence had either primary or secondary education with 11.3years ($\bar{x}$) average years of formal education. This revealed that, they are at least literate and can participate in a cooperative activity. The occupational status of the inhabitants indicates that they are mainly traders (87%) and partly civil servants (13%). This was expected, considering the high commercial nature of Onitsha metropolis. In this part of the world, the assumptions are that married people tended to be more serious and responsible than single. Therefore, with most (78%) of the inhabitants being married, the society, if established has potentials and possibility to succeed. Also, the study sorts to find out whether many of the inhabitants are members of cooperative societies. The result (Table 1) showed that only fifteen (15%) of them are currently members of cooperative societies. The study furthered obtained information on their knowledge of cooperative society. The outcome is that almost all (90%) of the inhabitants have good knowledge about cooperatives. This portrays a positive sign on the possibility of establishing waste management cooperative societies in the Onitsha metropolis of Anambra state.

3.2 Health Consciousness of the Inhabitant of Onitsha Metropolis

There is a saying that health is wealth. The extent to which people are conscious about the cleanliness of their surrounding goes a long way in affecting their health, either positively or negatively. As shown in Table 2, on 4 point likert scale with thresholds (≥ 2.5 is positive while < 2.5 is negative), the respondents strongly disagreed (1.38) that people in the Onitsha metropolis are health conscious. On the other hand, they affirmed (3.54) that the inhabitants of Onitsha have very poor health consciousness. In all with a grand mean (2.48) it implies that, the health consciousness of the inhabitants of Onitsha metropolis is poor.

3.3 Types of Waste Produced in Onitsha Metropolis

Table 3 above reflects the respondents reaction to the types of wastes (degradable, non-degradable, combustible, non-degradable and non-combustible waste) produced in Onitsha metropolis. Based on the grand mean ($\bar{x}$) of 3.52, they indicated that the four different types of wastes are largely produced by the residents of Onitsha metropolis.

3.4 The Quantum of Waste Produced

From Table 4, the estimated quantum of wastes produced weekly in Onitsha metropolis, based on the data is between 3000 tones to 4999 tones

(53%). The average ($\bar{x}$) deduced also shows that inhabitants produce about 6146.12 tones of wastes weekly.

3.5 Existing Measures Adopted to Ensure a Waste Free Environment in Onitsha Metropolis

The study examined the present measures adopted to ensure a waste free environment in Onitsha metropolis. As shown in Table 5, the respondents were asked to react to the measures being applied. Based on a mean (x) threshold of 2.5, they agreed to such measures as: awareness (3.75); provision of waste bins (3.75); and, coercion of inmates (2.55). But disagree to effective penalty for defaulters (2.46). The grand mean (3.12) implied that indeed, there are existing measures put in place to ensure a waste free environment in Onitsha metropolis.

3.6 The Challenge of Waste Disposal Management in Onitsha Metropolis

Table 6 revealed the challenges currently being faced in waste disposal management in Onitsha metropolis. Four (4) key challenges were posed to the respondents to react to. The results indicate that the challenges include: ignorance (3.02) on part of the people on waste hazards; funding (3.32) from government to facilitate waste management; inadequate waste bin (2.81) as an important infrastructure; and, the distance of dumping sites (3.18).

Table 1. Distribution of respondents socioeconomic characteristics

Socioeconomic characteristics	Frequency (n = 100)	Percentage (%)	Minimum	Maximum	Mean ($\bar{x}$)
Sex					
Male	73	73	-	-	-
Female	27	27	-	-	-
Age: (Years)	**-**	**-**	**20yrs**	**>51yrs**	**39yrs**
Occupation					
Trader	87	87	-	-	-
Civil Servant	13	13	-	-	-
Years of Formal Education	-	-	6yrs	16yrs	11.3yrs
Marital Status					
Single	22	22	-	-	-
Married	78	78	-	-	-
Membership of any Cooperative					
Yes	15	15	-	-	-
No	85	85	-	-	-
Knowledge About Cooperative					
Yes	90	90	-	-	-
No	10	10	-	-	-

Source: Field Survey, June 2012

Table 2. Distribution of respondents according to health consciousness of Onitsha inhabitants

Variables	FX	Mean ($\bar{X}$)	Decision
Very good	138	1.38	Disagree
Good	138	1.38	Disagree
Poor	360	3.6	Agree
Very poor	354	3.54	Agree
Grand Mean ($\bar{X}$)	9.9	2.48	Disagree

Source: Field Survey, June 2012

Table 3. Distribution of respondents according to the types of waste produced

Waste type	FX	Mean ($\bar{X}$)	Decision
Degradable waste	380	3.8	Agree
Non-degradable waste	353	3.53	Agree
Combustible waste	360	3.6	Agree
Non degradable and non combustible waste	316	3.16	Agree
Grand Mean ($\bar{X}$)	14.09	3.52	Agree

Source: Field Survey June, 2012

Table 4. Distribution of respondents according to weekly estimate of quantum of waste produced in Onitsha metropolis (per ton)

Tones per week	Frequency (n=100)	Percentage (%)
< 500 tones	-	-
501 – 999 tones	7	7
1000 – 2999 tones	17	17
3000 – 4999 tones	53	53
≥ 5,000 tones	23	23

Source: Field survey June, 2012
** Average ($\bar{x}$) = 6146.12 tones weekly*

Table 5. Distribution of respondents according to the measures adopted to ensure a waste free environment in Onitsha metropolis

S/N	Adopted measures	FX	Mean ($\bar{X}$)	Decision
i.	Proper awareness	375	3.75	Agree
ii.	Provision of waste bin and sites	375	3.75	Agree
iii.	Coercion	255	2.55	Agree
iv.	Effective penalty for defaulters	246	2.46	Disagree
	Grand mean ($\bar{X}$)	12.51	3.12	Agree

Source: Field Survey, June 2012

Table 6. Distribution of respondents according to the challenges of waste disposal management in Onitsha metropolis

S/N	Challenges	FX	Mean ($\bar{X}$)	Decision
i.	Distance of dumping sites	293	2.93	Agree
ii.	Ignorance	302	3.02	Agree
iii.	Funding	332	3.32	Agree
iv.	Inadequate waste bin	281	2.81	Agree
	Grand mean ($\bar{X}$)	12.08	3.02	Agree

Source: Field Survey June, 2012

3.7 The Possibility of Establishing a Functional Neighbourhood Cooperative Society for Waste Disposal Management

In Table 7 the researchers used four (4) point likert measure with thresholds (< 2.5 as negative, while ≥ 2.5 as positive), the inhabitants of Onitsha metropolis were asked to react to the possibility of establishing a functional neighbourhood cooperative society for waste disposal. The result on Table 7 revealed that, it is highly possible (3.35). Also, the grand mean (2.76), positively implied the possibility of establishing neighbourhood cooperatives in Onitsha metropolis.

3.8 The Various Waste Disposal Methods Neighborhood Cooperatives Can Adopt in Onitsha Metropolis

Table 8 revealed the various waste disposal methods which nieghbourhood co-operatives can adopt in order to perform effectively in Onitsha metropolis, they include landfill, resource recovery, evacuation and burning of refuse.

From Table 8, with mean rating of 3.18 the respondents agree to the effectiveness of landfill as a waste disposal method that should be adopted in Onitsha metropolis, while with mean rating of 2.25 they disagreed to resource recovery. Mean ratings of 3.05 and 3.32, showed the respondents agreeing to the use of evacuation and burning respectively. This result agree with Sorojini (2000) that "waste management methods vary widely between areas for many reasons such as type of waste materials, land uses and the area available for such waste disposal. Hence one can conclude from the available data that the burning method, land filling and evaluation are the preferred waste disposal methods in Onitsha Metropolis.

3.9 The Challenges Neighbourhood Cooperatives may face in Onitsha Metropolis

Result from Table 9 above deduced from 4 point likert scale with threshold of 2.5 (i.e ≥ 2.5 is agree while < 2.5 is disagree) revealed the challenges which neighborhood cooperative may face in waste disposal management in Onitsha metropolis. The grand mean of 2.73 showed that most of the respondents agreed that, they may encounter most of these challenges which include inadequate funding (3.2), lack of cooperation (2.7), and lack of government support (3.2), technical knowhow (2.7), training (3.0) and logistic problem (2.8).

Table 7. Response on the possibility of establishing a functional cooperative

Level of possibility	FX	Mean ($\bar{X}$)	Decision
Highly possible	335	3.35	Agree
Possible	290	2.90	Agree
Maybe possible	305	3.05	Agree
Not possible	175	1.75	Disagree
Grand mean ($\bar{X}$)	11.05	2.76	Agree

Source: Field Survey June, 2012

Table 8. Response on the various waste disposal methods which neighborhood cooperatives can adopt

Waste disposal methods	FX	Mean ($\bar{X}$)	Decision
Landfill	318	3.18	Agree
Resource recovery	225	2.25	Disagree
Evacuation	305	3.05	Agree
Burning	332	3.32	Agree
Grand Mean ($\bar{X}$)	11.8	2.95	Agree

Source: Field Survey June, 2012

Table 9. Response on challenges neighbourhood cooperatives may face

Challenges	FX	Mean ($\bar{X}$)	Decision
Inadequate funding	318	3.2	Agree
Lack of cooperation by the residents	274	2.7	Agree
Inadequate personnel	230	2.3	Disagree
Lack of information	197	1.9	Disagree
Lack of government support	320	3.2	Agree
Technical knowhow	279	2.7	Agree
Training	308	3.0	Agree
Logistics	286	2.8	Agree
Grand Mean ($\bar{X}$)	21.82	2.73	Agree

Source: Field Survey June, 2012

4. CONCLUSION AND RECOMMENDATIONS

From the result of this study, it is observed that the common types of waste produced in Onitsha metropolis include degradable waste, non-degradable waste, combustible and non-combustible wastes. Also, the key preventable practices aimed at proper waste disposal management in Onitsha metropolis are; effective penalty for defaulters, proper enlightenment of the residents of the area and provision of adequate waste collection bins and so on. The researchers noted that the challenges which these practices pose in waste disposal management in Onitsha stem from location of dumping sites far from residential homes, ignorance on the part of the people, poor funding by the government and local authorities. The study established that it is very much possible to establish a functional co-operative society in charge of waste disposal management in Onitsha metropolis and that Land fill, resource recovery, evacuation and burning are the various waste disposal methods which neighborhood co-operatives can adopt in order to perform effectively in the metropolis. Equally, Inadequate funding, lack of co-operation by the residents, inadequate personnel and lack of information have been seen as some of the challenges which neighborhood co-operatives could face. That notwithstanding, it is still much possible to establish functional neighborhood co-operatives that will create a waste free Onitsha metropolis. Towards its realization, it is recommended that:

- The Anambra State government should encourage the residents of Onitsha metropolis to form functional neighborhood co-operatives societies in charge of waste disposal management in their area and subsequently extend this practice to every other part of the State.
- The government at the state and local levels should financially support such co-operative societies to acquire all the needed human, material and logistic needed to ensure effectiveness in its performance.
- The management of such co-operative societies must ensure that the members of the community are properly mobilized to embrace the positive contributions which the activities of the co-operative would exert in ensuring a waste free Onitsha metropolis.
- The personnel employed by the cooperatives to carry out waste disposal should be qualified, properly trained and experienced.
- The neighborhoods cooperatives should collaborate with the Anambra state Environmental Protection Agency to avoid conflict.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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