PERCEIVED KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING WASTE MINIMIZATION AND ENERGY RECOVERY: A STUDY OF IJEBU ODE METROPOLIS

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ABSTRACT

The purpose of this study was to assess the knowledge, attitude and practice of inhabitants of the high and low density areas of Ijebu-ode metropolis with respect to waste minimization and energy recovery. The study used 240 sampled inhabitants (120 in the high and 120 in the low density area) of Ijebu-ode. The instrument used was a validated questionnaire with likert type scale. Descriptive statistics of mean and standard deviation were used and the inferential statistics of "z"-test also used totest the three hypotheses at 0.05 significant level. All the hypotheses were accepted as there were no significant difference in the knowledge, attitude and practice of respondents of the high and low density areas of Ijebu-ode metropolis with respect to waste minimization and energy recovery. It was recommended that government should enact laws and establish policies that engender positive attitudes towards waste minimization at all levels.

Keywords: *Energy Recovery, High Density, Low Density, Waste, Waste Minimization,*

Introduction

Waste is anything that does not add value to the end user and something for which the customer is not willing to pay. The World Health Organization (WHO, 2012) defines Waste as "something which the owner no longer wants at a given time and space and which has no current or perceived market value". This line of thought however represents a broad- based approach towards the classification of what constitutes waste (Pongrácz, Philips & Keiski,2004).

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Every household activity results in solid waste generation and it is becoming more and more acute in the current technology- driven days. Hence, solid waste management is a major priority issue all over the world (Sheeba & Mohd, 2007). National and municipal governments often have insufficient capacity or funding to meet the growing demand for solid-waste management services (Tacoli, 2012). Solid-waste management is the single largest budget item for many cities (World Bank, 2012; UN-HABITAT, 2010). However, simplest and most effective way of dealing with wastes is to ensure that it does not get generated at the first place.

Waste minimization is the process and the policy of reducing the amount of waste produced by a person or a society. Waste minimization involves efforts to minimize resource and energy use during manufacture (Ramani & Muthukumar, 2011). Waste minimization is a process of elimination that involves reducing the amount of waste produced in a society and helps eliminate the generation of harmful and persistent wastes, supporting the efforts to promote a more sustainable society.

Energy recovery from waste is also the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion, and landfill gas (LFG) recovery. This process is often called waste-to-energy (WTE).Technologies for WTE production have been rapidly evolving and changing communities and countries yielding dual benefits for effective solid waste management practices. Not only will WTE deliver useful energy that is needed in many countries, but it will also aid to dispose of Municipal Solid Waste (MSW) effectively and safely (Mokhtar, 2012).

Recycling materials such as paper, glass and plastics, as well as composting and digestion of bio-waste, becomes the obvious next preferable option. Aerobic (with oxygen) composting of MSW avoids the formation of methane associated with anaerobic conditions. The method

is generally less complex and less costly (World Bank, 2012).

The waste hierarchy is now used globally as a communication tool to remind those who generate waste and those who manage it that preventing waste through efficient use of resources and raw materials is the best option. Re-using discarded goods without reprocessing or re-manufacture is assumed to provide greater savings in resource consumption and is given priority over recycling (Wolsink, 2010). Increased scarcity of natural resources and the consequent rise in commodity prices have influenced the demand for recycled products. The resource value of waste has become an important driver in many developing countries today and provides a livelihood for the urban poor (UN-HABITAT, 2010).

Statement of the Problem

Nations are today faced with an overwhelming social problem of processing and disposal of municipal solid waste (MSW). With increasing population growth, rapid urbanization, rising levels of affluence, and resource scarcity, waste-to-energy (WTE) is re-establishing itself as an attractive technology option to promote low carbon growth among other renewable energy technologies. Waste minimization and Energy recovery can address the twin issues of land use and pollution from landfills and the well-established environmental perils of fossil fuels known as greenhouse gas emissions, GHG. (UNDepartment of Economic and Social Affairs, 2012; Babayemi & Dauda, 2009).

Around the world; efforts are being made to make people aware about environmental protection. One of the main causes of environmental degradation is improper management in the disposal of waste generally. It is a major cause of pollution and outbreak of diseases in many parts of the world.

There may not be permanent solution for most environmental health problems especially those that relate to management of wastes in many communities both municipal and urban. However, spent and discarded materials can be salvaged and put back

into the manufacturing stream or be used without reprocessing and thus provide greater savings in resource consumption. Are people aware that wastes whether flowing or non-flowing still have a utility value? What is their attitude to waste minimisation and energy recovery? Are they also aware that waste characterization or sorting is the first step in the waste minimization process?

Objective of Study

This study seeks to assess the knowledge, attitude and practices of inhabitants of Ijebu Ode metropolis on waste minimization and energy recovery.

Research Hypotheses

* There is no perceived difference in knowledge of residents in high and low density areas of Ijebu Ode metropolis in respect of waste minimization and energy recovery.
* There is no perceived difference in attitude of residents in high and low density areas of Ijebu Ode metropolis in respect of waste minimization and energy recovery.
* There is no perceived difference in the practices of residents in high and low density areas of Ijebu Ode metropolis in respect of waste minimization and energy recovery.

Methodology

The descriptive research design was employed for this study to assess the knowledge, attitude and practice among inhabitants of Ijebu Ode metropolis of Ogun State South-west Nigeria. The population of study were inhabitants in Ijebu-ode. The metropolis was first divided into high & low density areas and then into clusters of which one high & low density area were sampled. A total of two hundred and forty (240) respondents were used representing one hundred and twenty (120) each for the high and low density areas of Ijebu Ode metropolis selected by systemic sampling technique. Each area was numbered and the samples werecollected using the K^{th} case after the first house was randomly picked in each area. Aself-structured questionnaire was the major

instrument used for data collection. The respondents were asked eight different question on each variable of the study. Scores 8 – 6 were rated **good**; 5 – 3 were rated **average** and 2 – 0 rated as **poor**.

The reliability of the instrument was established through the test retest method using Ago-Iwoye and Iperu towns in different Local Government Areas in Ogun state as pilot study. The scores from the two sets of responses were correlated using Pearson Product Moment Correlation method with a reliability coefficient of $r = 0.82$.

Data Analysis: The statistical methods used in this research consisted of descriptive statistics of frequency count, percentage, mean and standard deviation. Other statistical methods employed included z-test and Pearson product moment correlation in order to determine the significant difference or relationship between high and low density residents.

Results

Hypothesis 1: There is no perceived difference in knowledge of residents in high and low density areas of Ijebu Ode metropolis with respect to waste minimization and energy recovery.

Table 1: Level of Knowledge of Respondents

AREAS	Good	Average	Poor	TOTAL	Mean ± SD	Z
HIGH	32 (26.7%)	24 (20%)	64 (53.3%)	120	2.27 ± 0.92	1.59
LOW	44 (36.7%)	20 (16.7%)	56 (46.7%)	120	1.90 ± 0.87	
TOTAL	76	44	120	240		

In assessing the level of knowledge about waste minimization and energy recovery, the respondents were asked questions such as if all waste is filthy and hence termed as useless and cannot be reused into other useful form of energy. The respondents were also asked if decisions on choices of food and materials in order to avoid excesses is also an instance of waste minimization.

Table 1 dealt with respondents' knowledge about waste minimization and energy recovery in both areas. Of the 120 respondents for high density area, 32 (26.7%) hada good knowledge about waste management and minimization, 24 (20%) possessed average knowledge about waste management and recovery, while 64 (53.3%) respondents being the majority of the respondents has no or poor knowledge with regards to waste management and recovery. The responses ofthose in low density area was not different as 44(36.7%) hadgood knowledge of waste management and minimization, 20 (16.7%) possessed average knowledge, while 56 (46.7%) respondents being the majority of the respondents had poor or no knowledge with regards to waste management and recovery. This result buttressed the fact that the knowledge about waste minimization and subsequent energy recovery methods in both the high and low density areas of the study community is not differentiated.

The z-value of 1.59 is not significant at 0.05, ($p > 0.05$). It follows therefore that there is no significant difference in respondent's knowledge of waste minimization and energy recovery in both high and low density area. The mean values, 2.27 for high density and 1.90 for low density indicates that the knowledge as regard waste minimization and energy recovery is slightly higher in the high density area than that of the low density area but not significant.

Hypothesis 2:

There is no perceived difference in attitude of residents in high and low density areas of Ijebu Ode metropolis with respect to waste minimization and energy recovery.

Table 2: Assessment of Attitude towards Waste Minimization and Energy Recovery.

AREAS	Positive	Average	Negative	TOTAL	Mean ± SD	Z
HIGH	40.8 (34%)	43.2 (36%)	36 (30%)	120	2.00 ± 0.53	0.37
LOW	56.04 (46.7%)	15.96 (13.3%)	48 (40%)	120	1.87 ± 0.82	
TOTAL	96.84	59.16	84	240		

For attitude towards waste minimization and energy recovery, the respondents were asked if waste minimization can take place only when facilities are put in place by the municipality and hence cannot be undergone at the individual level. Equally, the respondents were also asked if waste minimization and energy recovery are too expensive when compared to other methods of waste disposal. Attitudes were also measured by asking if conservation of resources for future generation and saving of space in landfills is a motivation for waste minimization and energy recovery.

Table 2 dealt with respondent's attitude regarding waste minimization and energy recovery. Of the 120 respondents for high density area, 40.8 (34%) hadpositive attitude about waste management and minimization, 43.2 (36%) had average attitude to waste management and recovery, while 36 (30%) respondents had negative or poor attitude towards waste minimization and energy recovery. Responses of respondents in low density area revealed that 56.04 (46.7%) hadpositive attitude towards waste minimization, and energy recovery, 15.96 (13.3%) had an average attitude, while 48 (40%) respondents had a negative or poor attitude towards waste minimization and energy recovery. This result underscores the fact that the attitude of respondents towards waste minimization and energy recovery in both high and low density areas of the study community were nearly the same.

The z-value 0.37 is not significant at 0.05, ($p > 0.05$). It follows therefore that there is no significant difference in attitude of residents in high and lowdensity areas of Ijebu Ode metropolis with respect to waste minimization and energy recovery.

Hypothesis 3:

There is no perceived difference in practice of residents in low and high density areas of Ijebu Ode metropolis in respect of waste minimization and energy recovery.

Table 3: Practice of respondents towards Waste Minimization and Energy Recovery

AREA	Good	Average	Poor	TOTAL	Mean ± SD	Z
HIGH	42.2 (35.2%)	13.8 (11.5%)	64 (53.3%)	120	2.23 ± 2.62	
LOW	50.9 (42.4%)	2.8 (2.3%)	66.4 (55.3%)	120	2.38 ± 2.87	-0.21
TOTAL	93.1	16.6	130.4	240		

For practice of waste minimization and energy recovery by the respondents, they were asked questions such as; if they practice waste minimization or energy recovery by segregating their waste for onset of its recovery process or if they make use of kitchen waste as compost or manure. They were also asked if they purchase raw materials that are just sufficient and ensure proper storage of material to avoid wastes. Finally, they were asked if they have at any point used their waste as a source of energy.

From Table 3 above shows practices of respondents in relation to waste minimization and energy recovery.Of the 120 respondents in the high density area, 42 (35.2%) had good practice in waste disposal methods involving waste minimization and energy recovery, 13.8 (11.5%) had average practice while

majority of them 64 (53.3%) had poor practice with regards to waste minimization and energy recovery. The situation is not different among respondents in the low density area as 50.9 (42.4%) had good practice in waste disposal methods involving waste minimization and energy recovery, 2.3 (2.8%) had average practice while majority of them 66.4 (55.3%) also had poor practice with regards to waste minimization and energy recovery.

Table 3 also shows a z-value of -0.21 which is not significant at 0.05, ($p > 0.05$). It follows therefore that there is no significant difference in practice of residents high and low density areas of Ijebu Ode metropolis with respect to waste minimization and energy recovery.

Discussion of findings:

It was observed in this study that the z-score of 1.59 is not significant as respondents' knowledgeabout waste minimization and energy recovery is low in both high and low density areas. This finding is consistent with Aljaradin, Persson and Hossam(2011) who studied public awareness and willingness for waste minimization and energy recovery in Jordan and found that that majority (77.3%) of the respondents both in high and low density area have low knowledge on waste minimization. Momoh & Oladebeye, (2010) also analysed the effect of demographic variables on waste minimization and observed that place of residence of respondents has no significant effect on awareness for waste minimization and energy recovery (chi-square test: $p = 0.543$).

When attitude (the extent to which people care about managing their waste) was analysed, the result revealed a z-score of 0.37, the attitude of respondents in the high and low density area of Ijebu Ode is not differentiated. They felt that waste minimization and energy recovery is the duty of local government or the waste disposal board. Aljaradin *et al.*, (2011) equally assessed the willingness and attitude towards waste minimization and energy recovery and observed that majority of the respondents thought waste minimization is not their own

responsibility, putting the responsibility on municipality and not seeing the producer of the goods as responsible for recycling.

The result of hypothesis 3 revealed a z-score of -0.21, the respondents' perception of methods and practices of waste minimization and energy recovery in both high and low density area is not differential.This finding is concordant with Igoni, Ayotamuno, Ogaji and Probert (2007) who observed that indiscriminate dumping of solid waste is a common practice in Nigeria (in both high and low density area).In their work, they observed that in some part of Nigeria, refuse is mostly being buried while several other cheap ways of disposing off their solid wasteis mostly by setting the uncharacterized mixed waste on fire at a little corner of their backyard. In another study, Manyanhaire, Sigauke and Munasirei (2009) in the study of Analysis of Domestic Solid Waste management System observed that there is a growing tendency towards illegal disposal of waste by resident mainly due to the fact that the inherent benefits of waste minimization and energy recovery is not well understood by them. Also, it was observed that residents of both high and low density areas have only one bin where they mix all type of waste and could not afford to buy more than one bin for the separation of waste.

The finding agrees with Ogunyanwo (2011) who observed that most of the municipal solid waste in most developing African countries are often collected and dumped on land, in a more or less uncontrolled manner and noted that Nigeria has no clear cut policy for waste management including waste minimization and energy recovery. The finding agrees with Aibor and Olorunda (2006) who observed that same methods are been employed in the collection of refuse from both low and high density areas which includes, the curb, alley, and the backyard collection with no preference for waste minimization or energy recovery.

Conclusion:

The volume and the rate of solid wastes generation in Nigeria have outgrown

the capacity of nature to naturally absorb them and every individual in the country still has a part to play in proper disposal of these waste generated from human habitation. This study had revealed the paucity of knowledge, attitude and practice with respect to waste minimization and energy recovery of Ijebu Ode metropolis. Lack of knowledge on the importance and benefits of waste minimization and energy recovery on both the health and economic status of individuals and communities is perceived as the measure that most significantly contributes to the respondents poor attitude and practice towards waste minimization and energy recovery. Lack of knowledge of re-use of waste materials and use of low waste recovery technology is perceived as a significant factor that contributes to poor practice of waste minimization and energy recovery in the study area.

Recommendations:

From this study, it was recommended that:

1. That government should enact laws and establish policies that engender positive attitudes towards waste minimization at all levels.
2. That there should be gingles on radio to encourage every house owner to provide different dust bins for the purpose of refuse sorting, with a view to encourage re-use and recycling.
3. The government should use the various media (both print and electronic) at its disposal to create awareness about waste minimization and energy recovery methods.
4. Individuals can form a cooperative scheme, with a view to set up a scavenging club to buy re-useable 'spent' materials.
5. Recycling projects can be undertaken by communities as a means of waste minimization.

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