

EDUCATIONAL INSTITUTIONS AND AWARENESS OF WASTE MANAGEMENT IN CROSS RIVER AND AKWA IBOM STATE, NIGERIA

DARLINGTON EGBE EGBONYI

&

UDOM, IMO COSMAS

Department of environmental education

Faculty of education

University of Calabar

Abstract

The study sought to assess the difference among educational institutions and awareness of waste management in Cross River and Akwa Ibom State Nigeria. The objective of the study was converted research question and corresponding hypothesis. Research design adopted for the study was survey design. The sampling techniques were simple random sampling and accidental sampling techniques. Questionnaire was used to collect primary data for the study. The population of the study comprised 3,976 academic staff of the four universities studied. The sample size for the study was 363. Descriptive statistics (mean score and standard deviation) and inferential statistic (ANOVA) was adopted for data analysis. In analyzing the research hypothesis, the result shows that there is significant difference among educational institutions and waste management awareness in Cross River and Akwa Ibom States. Based on these result, it is therefore recommended that there is need for educational institutions to provide more modern receptacle bins for storing of waste before final disposal, trucks for transportation of wastes and waste baskets to all offices and classrooms to enhanced proper handling of waste and educational institutions should employ more skilled manpower to ensure effective waste management.

Key words: Educational Institutions, Awareness and Waste Management.

Introduction

Generally, waste can be said to be anything whether in form of solid, liquid or gas that is generated from useful substance and at the end “discharged”, “emitted” or “deposited” in the environment by a primary user in such a volume or manner that can cause an alteration in the environment. After use or when found unusable or unacceptable or surplus, some substances are known to be rejected, abandoned or discarded. Such unwanted substances are referred to as wastes and are disposed of by households, commercial and industrial establishments because they have no economic value to the owner (Tsega, 2013). Several factors influence the level of waste management awareness in the educational institutions. Among those factors, people’s attitude based on education level, religion and income level which define their socio-demographic status have been recognized as the most effective in influencing awareness and knowledge of people towards waste management. However, nowadays inverse relationships are reported between academic institutions (that are supposed to create awareness on waste management issues) and indiscriminate waste disposal/ineffective waste management. Institutions are now reported for uncontrolled disposal of waste on the streets, waterways, back of offices and classrooms causing aesthetic damage and environmental degradation.

Poor waste management practices in institutions such as schools are rampant in underdeveloped countries, mainly within the urban communities and some educational institutions. Poor attitude towards waste generation and management contribute major

setback to environmental health conditions. More serious but often unrecognized or overlooked, is the transfer of noxious substances to surface water and groundwater. Research have reported the high association between “inappropriate handling and disposal of institutional waste” and ill health of vulnerable groups such as sanitary workers, children and scavengers who are constantly exposed as well as those living near open dump sites. These open dumps constitute nuisance to the environment and health hazard to humans. During rains, some materials from the dumpsites are drifted through waterways penetrating aquifers and consequently polluting water supplies. Also disease pathogens such as rodents, insects, and microorganisms reside in dumpsites making them a potential source of sickness to people in the educational institutions who may become exposed to infectious wastes. It is therefore pertinent that this study seeks to assess the difference educational institutions and awareness of waste management in Cross River and Akwa Ibom State.

Generally, uncontrolled birthrate with attendant recent increase in population growth and diet habits as well as consumers demand and choices have triggered worldwide generation of waste (Karak, Bhagat & Bhattacharyya, 2012). The sources of solid waste are primarily classified into residential, institutional and commercial waste (Yousuf & Rahman, 2007). According to Kalanatarifard and Yang (2012), “the characteristics and composition of solid waste depends on the topography of the area, seasons, food habits and commercial status of the city etc.” According to Thitame, Pondhe & Meshran (2010) “solid waste needs to be characterized for source, generation rates, type of wastes produced and composition, in order to monitor, control and to improve prevailing waste management systems. All the important information related to sources, quantity and composition are very important for the design and operation of the functional elements related to waste management. The functional elements include waste generation, on-site handling and storage, collection, transfer and transport, processing and recovery, recycling and reuse, treatment and final disposal. The reliable estimates of solid waste generation are vital for effective waste management planning and help taking better financial, regulatory and institutional decisions”.

According to Coker, Achi, Sridhar and Donnett (2016), “wastes can be generated in industries, markets, schools, churches, hospitals and other communities where human beings reside or gather for a period of time”. Wastes generated from each of these sources differ in terms of composition and volume, based on the prevailing activities and the demography of individuals in each location. Among the many sources of waste previously mentioned, schools (including universities) contribute a very large portion in municipal waste stream (Coker *et al.*, 2016). According to Longe and Balogun (2010), institutions like schools manage their wastes through “their institutional self-owned waste disposal systems that use delivery trucks to deliver the wastes to municipal landfill sites, the known waste management employed for municipal solid wastes in developing nations. However, that these wastes are never characterized portend improper waste management and planning which could present danger to health and environment”. For instance, Longe and Balogun (2010) reported that “human solid wastes could be made up of non-conservative or biodegradable constituents and conservative or non-biodegradable components. Stabilisation of biodegradable components could produce greenhouse gases such as methane and carbon dioxide. Leachate containing soluble components and degradation products contaminate surface water and groundwater resources”. These have profound harmful effect on the environment and animal health including humans (Okeniyi & Anwan, 2012).

However, Hwang, Kim and Jeng (2000) opined that “a proper and effective waste management is the requisite step towards curtailing negative environmental impact of wastes. Beside this, benefits that could be derived from wastes, including material and energy recovery, are by-products of developments of sustainable waste management system. A good waste management is usually initiated from data acquisition of waste constituents obtained from waste characterisation. This is the reason the dearth of waste characteristic data of generated solid wastes is one of the factors militating against sustainable waste management practices in developing countries” (Hwang *et al.*, 2000).

There are studies that have examined institutional wastes management methods and their effectiveness in proper handling of wastes (e.g. Meyers, Glen & Anbarci 2006; Ssenyondo, 2008). Basse, Benka-Coker and Aluyi (2006) used both “qualitative and quantitative methods to examine the types of waste, waste disposal techniques employed, and effectiveness level of solid medical wastes in five selected hospitals in the Federal Capital Territory, Abuja and reported that an average of 2.78kg of solid waste were generated per bed/daily. In addition, 26.5% of the total waste was found to be hazardous in nature. No separation of waste was practiced by any of the hospitals surveyed. Similarly, 18.3% of the hospitals incinerated waste was traced to a locally built brick incinerator; 9.1% buried; 36.3% burnt waste in open pits while 36.3% disposed waste in municipal dumpsites”. The study also reported poor and ineffective management system in the investigated hospitals as 95% of the interviewed staff indicated improper and ineffective waste management in the hospital setting.

Senzige, Makinde, Njau and Nkansah-Gyeke, (2014) would put it that “effective waste management system should include administrative, financial, legal, planning and engineering functions which are geared towards solutions to all problem of solid waste. The solutions may involve complex interdisciplinary relationships among such fields as political science, city and regional planning, geography, economics, public health, sociology, demography, communications and conservation, as well as engineering and material science”. However, Chandrappa and Das (2012) were of the opinion that “the nature and operation of solid waste management varies significantly from nation to nation. Ogwueleka, (2008) identified “inefficient collection methods, insufficient coverage of collection system and improper disposal as factors contributing to poor waste management in Nigeria”. Institutions of higher learning (universities), being autonomous by nature (Armijo de Vega, Ojeda & Ramírez, 2008) should be given utmost attention as regards waste management. Since they have the capacity to accommodate innovative waste management practices which would trickle to other communities after being properly institutionalized, these institutions are usually held in high esteem and are often seen by the communities as model in terms of adopting best practices. Adewole (2009) recorded “poor attitude among academics and other stakeholders towards waste management. The schools, local and state government responsible for raising awareness on solid waste management issues often adopt seminars, conferences, workshops, training sessions as the most common techniques in creating awareness observed in the course of the survey in addition to environmental management topics included within junior secondary schools syllabus”.

In his study, Imam (2008) holds that “creation of illegal communal dumps for convenience of residents is also a widespread practice in developing countries. Transporting household waste in Nigeria is normally regarded as the duty of children and people who handle the waste are often regarded as dirty and poor. In addition to negative attitude, lack of facilities also prompts improper disposal of waste. A protective

orientation and custodial attitude toward the environment has been identified among the critically missing components in current waste management initiatives in urban Nigeria” (Imam, 2008).

In recent time when there is high increase in the rate of waste generation cost of processing, and reduced space for landfills, the 3R's representing “reduce, reuse, and recycle” should be adopted in an effort to manage waste sustainably (Suttibak & Nitivattananon, 2008; Tudor, 2011). According to United States Environmental Protection Agency, “the concept of waste reduction, or waste minimization, involves redesigning products or changing societal patterns of consumption, use, and waste generation to prevent the creation of waste and minimize the toxicity of waste that is produced. Common examples of waste reduction include using a reusable coffee mug instead of a disposable one, reducing product packaging, and buying durable products which can be repaired rather than replaced. Reduction can also be achieved in many cases through reducing consumption of products, goods, and services. The most effective way to reduce waste is by not creating it in the first place, and so reduction is placed at the top of waste hierarchies” (USEPA, 2010). From the foregoing, waste reduction can also be possible when products are reused. Another aspect of waste management though seems to be a very new concept is pre-cycling where efforts are geared towards the reduction of wastes even before they are produced or generated. (Hazardous Waste Recycling Managers United State, 2010).

In another study, Kim (2002) holds that, “it is inevitable that waste will be created as a by-product of daily human living, but in many cases it is possible for this waste to be diverted and recycled into valuable new materials. Glass, plastic and paper products are commonly collected and reformed into new materials and products. Recycling products offer many of the benefits of waste reduction efforts (displacing new material usage, reducing waste generated and the costs associated with disposal) but recycling requires energy and the input of some new materials, thus placing it lower on the waste hierarchy than reduction and reuse. Many waste management frameworks seek to incorporate the three R's in some capacity. In the UK, North America, throughout Europe and in parts of Asia, waste hierarchies are being incorporated which promote the adoption and use of reduce, reuse and recycle initiatives”. Hierarchies of waste management are maintained topmost-down from waste prevention, reuse, to waste recovery. However, of all the options in the waste management matrix, waste disposal in municipal landfills is the least choice (Economics of Waste Management technology, 2000).

The First Nations of Quebec and Labrador Sustainable Development Institute (FNQLSDI, 2008) posited that “in some instances, additional R's can be added to the basic three. Some organizations have chosen to add a fourth R. The fourth R can represent different words including rebuy, rethink, and recover”. According to Davis (2008), “the concept of rebuy refers to consumer purchasing decisions. Consumers have the ability to take steps to improve waste management by helping to close the loop in waste management systems by purchasing products which have been recycled or used. Rethink is added to the three R's by some because changing our behaviour and our actions can lead to improvements in waste management. Changing consumption patterns and considering the impacts of our actions can lead to decreased production of waste and even a reduction in waste management and waste minimization efforts”. As cite in FNQLSDI (2008), “recover can refer to methods which use and process waste so that it is used rather than disposed of (which would include reuse and recycling); however, it can also include recovering energy form waste before it is disposed. Waste can be processed

into a fuel and used to produce a usable form of energy” (FNQLSDI, 2008). Such usable form of energy can be in form of electricity or biogas generated from the breaking down of waste materials at high temperature or in the presence of anaerobic microorganisms.

The additional concepts of waste management may not necessarily be limited to 4R’s as the case may be. That is one of the reasons why El-Haggar (2007) recommended that “to achieve sustainable waste management, a 7R methodology should be adopted: Reduce, Reuse, Recycle, Recover, Rethinking, Renovation, and Regulation. Renovation refers to taking action to develop innovative ways to process waste, while regulation is added in recognition that it is a driving force behind ensuring the implementation of responsible waste management practices” (El-Haggar, 2007).

In developing countries like Nigeria and others in the sub-Saharan region of the world, mismanagement of waste has been noticed to be a perennial problem. Although the developed countries of the world such as America and Europe have been able to manage their waste successfully through a system of waste disposal that ensures adequate sorting at the source of generation before disposing them at final landfill sites or treatment unit, the case is different in developing or under-developed countries. For example, in Nigeria wastes are not sorted, all kinds of wastes are mixed up in one disposal bin, and are transported in that manner to disposal sites. This could be due to lack of infrastructure, resources or poor awareness/wherewithal to handle waste the proper way. Worse still, if academics themselves that were supposed to transfer knowledge on the proper handling and disposal of waste lack awareness on proper waste management, then there is a serious problem that needs urgent attention. In some educational institutions open dumping of solid wastes into wetlands, watercourses, drains and burrow pit is a prevalent form of disposal. This practice has sometimes resulted in the littering of the surroundings, creates eyesore and odour nuisance”. It is against this premise that this study seeks to assess the difference among educational institutions and awareness of waste management in Cross River and Akwa Ibom State.

Purpose of the study

The study is aimed to assess the difference among educational institutions and awareness of waste management in Cross River and Akwa Ibom State.

Research questions

Following the objectives of this study, some research question was posed which include:

1. What is the difference among educational institutions and waste management awareness?

Statement of hypotheses

To answer the research questions, the following null hypothesis was formulated:

1. There is no significant difference among educational institutions and waste management awareness.

Methodology

The survey research design was adopted for the study with the used of a structured questionnaire. The population of this study comprised 3,976 academic staff in University of Calabar and Cross River University of Technology in Cross River and University of Uyo and Akwa Ibom State University in Akwa Ibom State. From this target population, a sample of 363 respondents was drawn from academic staff and the proportionate sample size for each of the four universities were 153 for University of Calabar, 116 for

University of Uyo, 54 for Cross River University of technology and 40 for Akwa Ibom State University. Simple and accidental random sampling techniques were adopted for this study. Simple random sampling was employed to give all the departments the equal and independent opportunity of being selected. While accidental sampling technique was employed to select respondents for the study. In accidental sampling technique, there is no provision for the estimation of the representativeness of the sample. This means that the instruments were administered on any staff found at the time of sampling. The instrument used for data collection was questionnaire titled: Educational Institutions and Awareness of Waste Management in Cross River and Akwa Ibom State Nigeria (EIAWMCRAIS) designed by the researchers. The instrument had two sections A and B. Section A had respondents' demographic information while section B had 11-item questionnaire, in the form of modified rating scale of Very Adequate (VA), Adequate (A), Fairly Adequate (FA) and Not Adequate (NA) was designed to elicit information from the respondents. The instrument was duly validated and its reliability estimate established at 0.85 to 0.88 using Cronbach Alpha reliability method. This reliability coefficient was considered high enough to justify the use of the instrument for the study. The copies of the questionnaire were administered personally by the researcher. At the end of the exercise, all the copies of the questionnaire were collected back by the researchers. For ease of data preparation, codes were designed to each item and a coding schedule was prepared by developing a key for each of the constructs of the instrument. The data collected for the study were analyzed using simple percentages and bar charts.

Result

Hypothesis one: There is no significant difference among educational institutions and waste management awareness. The independent variable in this hypothesis is educational institutions (University of Calabar, University of Uyo, Cross River University of Technology and Akwa Ibom State University) while the dependent variable in this hypothesis is waste management awareness. One-Way Analysis of Variance (ANOVA) was used to test the hypothesis and presented in Table 1 while Scheffe Post Hoc test for multiple comparison and graphical illustration for statistical significant difference among the groups is presented in Tables 1 and 3 and Figure 1. Table 2 shows the result of One-Way analysis of variance of educational institutions (University of Calabar, University of Uyo, Cross River University of Technology and Akwa Ibom State University) on waste management awareness.

Table 1: ANOVA of educational institutions and waste management awareness

Category	N	Mean	SD		
UNICAL	149	15.51	8.50		
UNIUYO	98	15.17	8.73		
CRUTECH	37	18.72	5.26		
AKSU	33	12.06	9.98		
Total	315	15.42	8.54		
Source of variance	Sum of Squares	Df	Mean Square	F-value	Sig.
Between Groups	784.883	3	261.628	3.673	.013
Within Groups	22153.962	311	71.235		
Total	22938.844	314			

*significant at 0.05 level; df = 3, 311; critical F. =3.00

Table 2: Scheffe Post Hoc test

(I) Educational institutions	(J) Educational institutions	Mean Difference (I-J)	Std. Error	Sig.
UNICAL	UNIUYO	0.33	1.10	.993
	CRUTECH	3.21	1.55	.233
	AKSU	3.44	1.62	.214
UNIUYO	UNICAL	0.33	1.10	.993
	CRUTECH	3.55	1.62	.192
	AKSU	3.11	1.69	.341
CRUTECH	UNICAL	3.21	1.55	.233
	UNIUYO	3.55	1.62	.192
	AKSU	6.66*	2.02	.013
AKSU	UNICAL	3.44	1.62	.214
	UNIUYO	3.11	1.69	.341
	CRUTECH	6.66*	2.02	.013

*the mean difference is significant at the 0.05 level.

There was statistical significant difference among educational institutions on waste management awareness $F(3, 311) = 3.673; p < 0.05$. By this result, the null hypothesis which states that, there is no significant difference among educational institutions and waste management awareness is rejected, while the alternate hypothesis is retained. Since there was statistical considerable difference among educational institutions on waste management awareness, Scheffe Post Hoc test was performed to establish which of the educational institutions (University of Calabar, University of Uyo, Cross River University of Technology and Akwa Ibom State University) are more awareness in waste management and the result is presented in Table 3 above, homogeneous subsets shows the categories and graphical illustration in Figure 1.

Table 3 above shows that, CRUTECH significantly differ from AKSU in their awareness of waste management ($MD = 6.66; p < .05$). There was no statistical significant difference between UNICAL, UNIUYO and CRUTECH in awareness of waste management. Educational institutions (UNICAL, UNIUYO and CRUTECH) do not differ in awareness of waste management. There difference observed between CRUTECH and AKSU in the awareness of waste management could be due to the low population density of CRUTECH Calabar campus and the indigenous culture of the people which is hygienic, as the state is known to be one of the cleanness states in the country.

Results as displayed in Table 3 imply that, educational institutions (AKSU, UNIUYO and UNICAL) were similar in their awareness of waste management. While UNIUYO, UNICAL and CRUTECH were similar in their awareness of waste management and were in a different subset. This could be due to some factors not considered in this study.

Table 3: Homogeneous subsets

	Educational institutions	N	Subset for alpha 0.05	
			1	2
Scheffe ^{a,b}	AKSU	33	12.06	
	UNIUYO	98	15.17	15.17
	UNICAL	147	15.51	15.51
	CRUTECH	37		18.72
	Sig.		.215	.191

Source: Researcher’s Field Study (2017)

The graphical illustration as shown in Figure 1 above implies that CRUTECH awareness of waste management was significantly higher than UNICAL, UNIUYO and AKSU. As illustrated in the graph, AKSU awareness of waste management was the least among the group. By implication we can conclude that, the population size of an educational institution could be a factor of awareness of waste management and the internal lifestyle of the inhabitant.

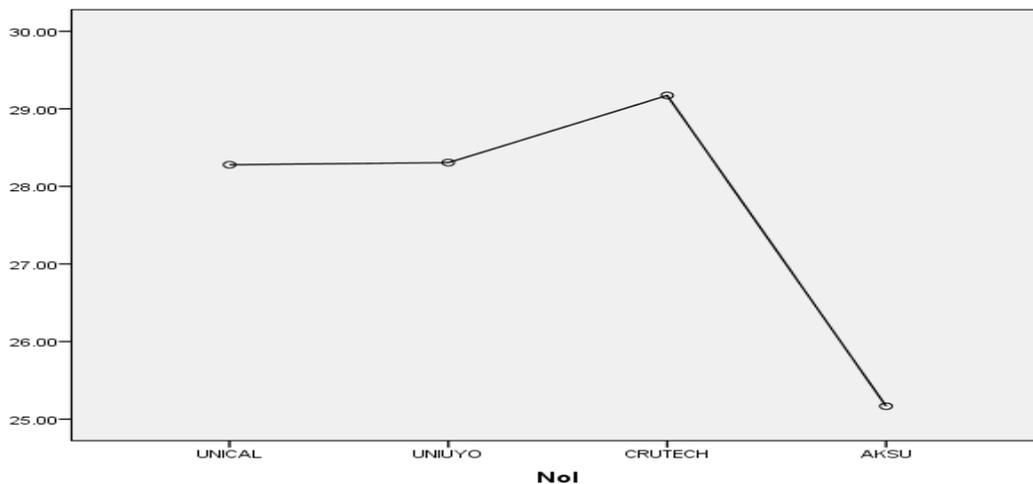


Figure 1: Educational institutions and awareness of waste management

Discussion of findings

The present finding shows that there is significant difference among educational institutions and waste management awareness. It revealed that, CRUTECH significantly differ from AKSU in waste management awareness (MD = 6.66; $p < .05$) and no statistical significant difference was observed between UNICAL, UNIUYO and CRUTECH in waste management awareness. Therefore, Educational institutions studied (UNICAL, UNIUYO and CRUTECH) do not differ in waste management awareness. The difference observed between CRUTECH and AKSU in the waste management awareness could be due to the low population density of CRUTECH Calabar campus and the indigenous culture of the people which is hygienic, as the state is known to be one of the cleanness states in the country.

This is in line with other studies that have examined institutional waste management awareness and their effectiveness in proper handling of wastes (e.g. Meyers, Glen & Anbarci 2006; Senyondo, 2008). Bassey, Benka-Coker and Aluyi (2006) who used both “qualitative and quantitative methods to examine the types of waste, waste disposal techniques employed, and effectiveness level of solid medical wastes

in five selected hospitals in the Federal Capital Territory, Abuja". The study reported that "an average of 2.78kg of solid waste were generated per bed/daily. In addition, 26.5% of the total waste was found to be hazardous in nature. No separation of waste was practiced by any of the hospitals surveyed. They reported poor and ineffective awareness of waste management system in the investigated hospitals as 95% of the interviewed staff indicated improper and ineffective waste management awareness in the hospital setting" (Bassey *et al.*, 2006).

Also, Senzige *et al.* (2014) put it that "effective awareness of waste management system should include administrative, financial, legal, planning and engineering functions which are geared towards solutions to all problem of solid waste. The solutions may involve complex interdisciplinary relationships among such fields as political science, city and regional planning, geography, economics, public health, sociology, demography, communications and conservation, as well as engineering and material science".

Conclusion

Based on the findings the result shows that there is significant difference among educational institutions and waste management awareness.

Recommendations

Based on the findings from the research study, the following recommendations were proffered to increase awareness on effective management of waste in educational institutions:

1. There is need for educational institutions to provide more modern receptacle bins for storing of waste before final disposal, trucks for transportation of wastes and waste baskets to all offices and classrooms to enhanced proper handling of waste.
2. Educational institutions should employ more skilled manpower to ensure effective waste management.
3. Educational institution's waste management policies and strategies should be reviewed to meet the contemporary waste management needs.

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