



Assessment of Students' Knowledge and Attitudes towards Solid Waste Management in Federal Colleges of Education in North-West, Nigeria

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ABSTRACT

The study focused on the assessment of students' knowledge and attitudes towards solid waste management on Federal Colleges of Education in North-West, Nigeria. Three research objectives, three research questions, and two hypotheses guided the study. Descriptive survey design was adopted for the study. The sample for the study comprised of three hundred and twelve (312) biology students drawn from the population of study using random sampling techniques. The instruments for data collection in this study was a questionnaire titled, "Biology Students Attitude to Waste Management Questionnaire (BISAWAMAQ)" and data was analyzed using mean, standard deviation for the research questions while t-test was used to test the null hypotheses. The results revealed that The study revealed that there is significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria, and there is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria. Based on the findings, the researcher recommends that the importance of waste management should be emphasized in the community, especially among students, among others.

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INTRODUCTION

Provision of basic sanitary service such as dustbins, toilets, incinerators etc has been a continuing challenge in most of tertiary institutions of learning in Nigeria. Many research findings indicate that waste management is a critical component of providing basic sanitation services and reducing environmental health threats to communities (Hernandez, Rawlings and Schwartz, 2010). The rapid urbanization in the developing countries of Africa, uncontrolled and unplanned towns and cities has brought a serious environmental degradation. One of its most pressing matters is the management of solid, liquid and hazardous waste. (Emmal, 2013) Management of solid waste is an enormous challenge in developing countries all over the world due to some factors such as poverty, population explosion and urbanisation. The management is also ineffective and underfunded

by governments (Adewale, 2011). Sankoro (2003) argued that waste management is the second most pressing matter after the problem of inadequate water quality within all developing nations.

'Waste' means any substance or object which the holder discards or intends to discard or is required to discard (Emma, 2013). Waste management means the collection, transport, recovery and disposal of waste including the supervision of such operations and the after-care of disposal sites and including actions as dealer or broker (Emma, 2013).

Waste management seems to be one of the priorities of every higher institution in Nigeria for it gives the environment good and hygienic atmosphere of learning.



Statement of the Problem

Little efforts have been made towards finding out the attitude and awareness of students to wastes management. Factors contributing to poor waste management in most of our schools especially higher institutions include high concentration of student's population, changes in eating habits and the wide use of disposable containers and packages resulting in accumulation of huge amount of waste.

The World Bank (1999) argued that education equips people with knowledge, skills and attitudes to tackle any crisis. Jatau (2013) stressed that sufficient knowledge of the impact of waste management on health may help people to protect themselves from diarrhea, typhoid fever, cholera, hepatitis, malaria and other infections. Adequate education of the negative impact of poor refuse disposal may encourage people to adopt positive waste management practices which in turn may also promote personal hygiene and a healthy environment.

According to Hogan (2002), environmentally engaging education activities provide a platform on which a community begins to exercise the knowledge needed to improve its environment. Political and social changes across the continent, including the rise of NGOs, have fostered an increased awareness of environmental issues among the public. Urban populations have become more involved in the issues surrounding municipal Solid Waste Management (SWM) (UNEP, 2000).

Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria are excellent context for this study because of the challenges in reducing the ever-increasing flow of waste and poor knowledge of recycling of organic waste such as papers, glass, metals etc in these colleges.

Objectives

The following objectives were set for the study to:

- i. Assess the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria.
- ii. Determine the effect of awareness on the attitudes of Biology students to

waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria

- iii. Determine the influence of gender on awareness and attitudes to waste management among biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria.

Research questions

- i. What is the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria?
- ii. What are the effects of awareness on the attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria?
- iii. What are the influence of gender on awareness and attitudes to waste management among biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria?

Research Hypotheses

- Ho₁:** There is no significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria
- Ho₂:** There is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria.

METHODOLOGY

The paper adopted a descriptive survey design. A descriptive survey design is a design of collecting information by interviewing or administering a questionnaire to a sample of individuals. The population of the study comprises of all NCE II biology students from Federal Colleges of Education in the North West Nigeria. These colleges were FCEK, FCE Zaria, FCE



Technical Gusau, FCE Technical Bichi. To select the colleges for the study, the five colleges in the zone were arranged in alphabetical order ABCDE and numbered 1-5. Thereafter, all the odd numbers were picked for the study using Systematic Random Sampling Technique. To determine the sample size for the study, the total population of the study was divided by 100 and multiply by approximate sample. According to Mesa et al. (2014), if a population is in few thousands, 10% or less could be used. Therefore, 312 was used as sample of the study representing the population of the study which is 3427. The instrument for data collection in this study was Biology Students Attitude to Waste Management Questionnaire (BISAWAMAQ), BISAWAMAQ is a 30 items questionnaire developed by the researchers, BISAWAMAQ is made up of three sections tagged section A, B and C. A is on the general information of the respondents, it seeks to

find the background information of the respondents. Section B is on Awareness Level of the Respondents about College Solid Waste Management and section C is on the Attitudes of the Respondents about College Solid Waste Management. The instrument was face validated by a panel of experts that included two chief lecturers in the department of Biology, Federal College of Education, Zaria. After the validation of the instrument, it was administered to the respondent therein. All the 312 questionnaires distributed by the researchers were returned and used for analysis.

RESULTS AND DISCUSSION

Research Question One: What is the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria?

Table 5: Level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria

Statement	SA	A	UN	D	SD	\bar{X}	St. dev.	Remark
I am always worried about waste around our school/ college premises	63	123	68	35	23	3.54	0.540	Agree
How worried are you about wastes around your college premise?	123	88	43	45	13	3.84	0.572	Agree
I appreciate the way students dispose wastes in my college	37	33	23	108	111	2.29	0.588	Disagree
To me the way wastes are handled by our College management is satisfactory	31	12	5	122	142	1.94	0.516	Disagree
Do you know the most effective strategy for house hold waste management?	15	40	58	78	121	2.20	0.650	Disagree
I know the complications of improper waste management	33	109	23	79	68	2.87	0.598	Disagree
I am aware of e-waste	103	107	41	49	12	3.77	0.658	Agree
You have environmental topics in your curriculum	133	141	6	23	9	4.17	0.962	Agree
I am eager to know about environmental problems of our college	21	34	7	116	134	2.01	0.914	Disagree
Dumping waste improperly can cause flooding	143	132	14	11	12	4.23	0.676	Agree
Improper disposal of waste cause diseases such as diarrhea, typhoid, cholera etc	110	167	23	9	3	4.19	0.797	Agree
I think waste can be sorted out and recycled	145	137	23	4	3	4.34	0.852	Agree
Average Response Mean	80	94	28	57	54	3.28	0.69	Agree

Decision Rule: Mean ≥ 3.00 – Agreed, Mean < 3.00 - Disagreed



Table 5 shows the respondents' opinions on Level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria. The cumulative mean responses of all the items were 3.289 which is greater than the decision mean of 3.00 with the standard deviation value of 0.69 implying that their responses were significant. Specifically, majority were of the opinion that they always worried about waste around our school/ college premises with mean rate of 3.54. They do not appreciate the way students dispose wastes in my college with mean rate of 2.29. The way wastes are handled by their College management is unsatisfactory with mean rate of 1.94. Most respondents do not know the most effective strategy for household waste management with mean rate of 2.20. They

are unaware with complications of improper waste management with mean rate of 2.87. Awareness of e-waste has mean rate of 3.77. They agree that they have environmental topics in their curriculum with mean rate of 4.17. Respondents are not eager to know about environmental problems of our college with mean rate of 2.01. They agree that dumping waste improperly can cause flooding with mean rate of 4.23. Improper disposal of waste causes diseases such as diarrhea, typhoid, cholera etc with mean rate of 4.19. Waste can be sorted out and recycled with mean rate of 4.34

Research Question Two: What are the effects of awareness on the attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria?

Table 6: The effects of awareness on the attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria

Statement	SA	A	UN	D	SD	\bar{X}	St. dev.	Remark
Improper waste disposal is a threat to the college environment	114	122	23	32	21	3.88	0.15	Agree
Institutional waste management is the sole responsibility of my lecturers.	125	123	22	31	11	4.03	0.789	Agree
Institutional waste disposal is the sole responsibility of the college management	79	178	15	28	12	3.91	0.887	Agree
I am also responsible for the generation of our college waste.	51	189	13	36	23	3.67	0.683	Agree
I also have a role to play in minimizing the college waste	125	132	13	20	22	4.02	0.688	Agree
I do change my method of disposing waste in order to reduce the volume of waste generated in school	152	111	21	8	20	4.18	0.564	Agree
I participate in wastes collection and management activities in your school	45	44	14	101	108	2.41	0.676	Disagree
I prefer to reuse or recycle waste than throwing it away	23	34	17	140	98	2.18	0.767	Agree
Picking waste to sell for recycling can help to manage waste	62	156	32	43	19	3.64	0.432	Agree
To me reusing plastic bags for shopping is good for reducing waste	160	112	23	2	15	4.28	0.684	Agree
Average Response Mean	94	120	19	44	35	3.62	0.63	Agree

Decision Rule: Mean ≥ 3.00 – Agreed, Mean < 3.00 – Disagreed

Table 6 shows the respondents' attitudes of Biology students to waste management in Federal Colleges Education in the

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North- West Geo-Political Zone, Nigeria. The cumulative mean responses of all the items were 3.62 which is greater than the decision mean of 3.00 with the standard deviation value of 0.63 implying that their responses were also significant. Specifically, majority were of the opinion that reusing plastic bags for shopping is good for reducing waste and this item attracted the highest mean response of 4.28 and standard deviation of 0.684 with details showing that 272 were in agreement while only 17 respondents disagreed to this view. Other variable shows that improper waste disposal is a threat to the college environment has mean rate of 3.88. Institutional waste management is the sole responsibility of my lecturers has mean rate of 4.03. Institutional waste disposal is the sole responsibility of the college management has mean rate of 3.91. Respondent were of the opinion that they are also responsible for the generation of college waste with mean rate of 3.67. They have roles to play in minimizing the

college waste with mean rate of 4.02. Respondents do change their method of disposing waste in order to reduce the volume of waste generated in school with mean rate of 4.18. The respondents do not participate in wastes collection and management activities in their school with rating mean of 2.41. They do not preferred throwing waste rather than reuse or recycle waste with mean rate of 2.18. They also agreed that picking waste to sell for recycling can help to manage waste with rating mean of 3.64. they respondent were of the opinion that reusing plastic bags for shopping is good for reducing waste with rating mean of 4.28.

Research Question Three: What are the influence of gender on awareness and attitudes to waste management among biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria?

Table 7: The influence of gender on awareness and attitudes to waste management among biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria

Statement	SA	A	UN	D	SD	\bar{X}	St. dev.	Remark
I am highly committed in minimizing wastes around the college premises	43	43	13	123	90	2.44	0.897	Disagree
I sort out wastes before disposing them in the college?	54	34	14	123	87	2.50	0.656	Disagree
I do use kitchen waste as compost	56	23	12	123	98	2.41	0.765	Disagree
I do not throw household wastes outside my classroom	55	18	22	145	71	2.48	0.876	Disagree
I observed refuse heaps by roadside and around classes while coming to lectures	30	12	10	109	151	1.91	0.455	Disagree
I always dispose of my waste into dust bins/ garbage bins	56	48	12	98	98	2.57	0.890	Disagree
I dump my waste in an unauthorized open place	23	41	4	78	166	1.96	0.789	Disagree
I often advise people to manage their waste properly	46	54	12	123	77	2.58	0.678	Disagree
Average Response Mean	45	34	12	115	105	2.36	0.75	Disagree

Decision Rule: Mean ≥ 3.00 – Agreed, Mean < 3.00 - Disagreed

Table 7 shows the respondents' opinions on the influence of gender on awareness and attitudes to waste management among biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria. The cumulative mean responses of all the items

were 2.36 which is less than the decision mean of 3.00 with the standard deviation value of 0.75 implying that their responses were not significant. Specifically, majority were of the opinion that they were not highly committed in minimizing wastes around the college premises with mean rate of



2.44. They do not sort out wastes before disposing them in the college with mean rate of 2.50. They do not use kitchen waste as compost with mean rate of 2.41. They do not throw household wastes outside my classroom with mean rate of 2.48. They do observe refuse heaps by roadside and around classes while coming to lectures with mean rate of 1.91. They do not dispose of my waste into dust bins/ garbage bins with mean rate of 2.57. They do not dump their waste in an unauthorized open place with mean rate of 1.96. They do not often advise people to manage their waste properly with mean rate of 2.58

Testing of Null Hypotheses

Null Hypothesis One: There is no significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria

The hypothesis was carried out in order to test whether there is significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria. The Pearson's Product Moment Correlation was used to analyze the data as presented in Table 4.8 at $p \geq 0.05$.

Table 8: Correlation for respondent views on level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria.

Variables	N	\bar{X}	S.D	Df	r-cal	r-crit	P	Remark
Agree	174	55.8	4.36	310	0.54	0.09	0.0015	Significant
Disagree	111	35.6	3.13					
r-crit = (0.09)		P>0.0015						

Table 8 revealed agreed respondents have percentage average mean score of 55.8% with standard deviation of 4.36 which is positive while for disagreed respondents have average percentage mean of 35.6% with standard deviation of 3.13 which is negative. There was a negative correlation between the two variable, which was statistically significant ($r = 0.52$, $n = 312$, $p = 0.0015$). Based on the result, the null hypothesis which states that there is no significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria, is therefore rejected and retained that there is significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal

Colleges Education in the North- West Geo-Political Zone, Nigeria.

Null Hypothesis Two: There is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria.

The hypothesis was carried out in order to test whether there is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria. The Pearson's Product Moment Correlation was used to analyze the data as presented in Table 4 at $p \geq 0.05$.

Table 9: Correlation for significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria.

Variables	N	\bar{X}	S.D	Df	r-cal	r-crit	P	Remark
Male	142	68.3	3.76	310	0.64	0.09	0.35	N. S
Female	170	67.3	4.31					
r-crit = (0.09)		Not significant at P>0.35						



Table 9 revealed male respondents have percentage average mean score of 68.3% with standard deviation of 3.76 which is positive also the female respondents have average percentage mean of 67.3% with standard deviation of 4.31 signifying also positive. The correlation between the two variable, which was not statistically significant ($r = 0.64$, $n = 312$, $p = 0.35$). Based on the result, the null hypothesis which states that there is no significant difference relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria was retained.

SUMMARY OF MAJOR FINDINGS

- i. The study revealed that there is significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria.
- ii. The study accepted that there is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North-West Geo-Political Zone, Nigeria.

DISCUSSION ON FINDINGS

The study revealed that there is significant relationship in the level of awareness and attitudes of Biology students to waste management in Federal Colleges Education in the North- West Geo-Political Zone, Nigeria. The students had a high level of knowledge regarding society waste management. This finding is in line with that of Zeng *et al*, (2017) who posited that students were reported to have become aware of the importance of waste separation through the public media. Similarly, Rahmaddin *et al* (2015) researched the KAP about waste management in communities near Martapura River Bank in Indonesia. The community's attitude and their knowledge were considered suitable. However, the results on performance showed unsatisfied behaviors for handling and managing river-dumped wastes, demonstrating that the student's knowledge and attitude were completely

correlated with their performance. The recycling of solid wastes counting plastic/glass, cans, and paper was also related to good knowledge rating rather than attitudes. Adeolu *et al* (2014) also reported the most positive correlations between knowledge and performance levels. The finding is also consistent with the findings of Almasi *et al* (2019) and Rodrigues *et al* (2018), indicating the adequate knowledge of intelligent cities regarding the diseases caused by waste and the environmental impact of waste.

The study accepted that there is no significant relationship between gender, attitude and awareness to waste management among Biology students in Federal Colleges of Education in the North- West Geo-Political Zone, Nigeria. This finding is in consonance with that of Magda *et al*. (2009) which showed that attitude was significantly related to students' level of knowledge before and following Environmental Education sessions. However, this result is contrary to that of Ibrahim and Babagemi (2010) who found negative environmental attitudes among some Nigerian secondary school teachers. Similarly, Adeolu *et al*, (2014) and the results revealed that the KAP level did not differ between male and female respondents.

CONCLUSION

The research initiative aimed to understand the level of awareness and attitude of biology students towards waste management among students of Federal Colleges of Education in the North-West Political Zone of Nigeria. The finding of the study indicated that awareness and attitudes to waste management is significantly related. It also showed significant relationship between awareness, attitude and gender among biology students of Federal Colleges of Education in the North-West Political Zone of Nigeria.

RECOMMENDATION

The following recommendations were put forward based on the findings of this study:

- i. The importance of waste management should be emphasized in the community, especially among students.
- ii. There should be training and re-training of science teachers through series of workshops, seminars and symposia on



environmental issues and problems as well as how to come up with effective pedagogy in handling the teaching and learning of solid waste management practices in colleges of education.

- iii. Companies should be sensitized on the dangerous effects of indiscriminate and improper disposal of solid wastes and the need to employ environment-friendly strategies such recycling of industrial waste products through relevant agencies and defaulters sanctioned.

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