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INFLUENCE OF DEMOGRAPHIC VARIABLES, AWARENESS AND ATTITUDES OF STUDENTS TOWARDS SOLID WASTE DISPOSAL PRACTICES IN TERTIARY INSTITUTIONS IN THE CALABAR EDUCATION ZONE OF CROSS RIVER STATE

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ABSTRACT

This study examined the influence of demographic variables, awareness and attitude of Students towards solid waste disposal in tertiary institutions in Calabar Education Zone of Cross River State, Nigeria. Five statements of hypotheses were formulated to guide the study. Literature review was carried out based on the variables under study. Survey research design was considered most suitable for the study. Purposive, proportionate random sampling techniques were adopted in selecting the four tertiary institutions and 883 respondents sampled for the study. A validated 15 item four point modified likert scale questionnaire was the instrument used for data collection. The reliability estimate of the instrument ranged from 0.71-0.83 using Cronbach Alpha method. To test the hypotheses formulated for the study, independent t-test, Analysis of Variance and Simple linear regression statistical tools were used. The hypotheses were tested at 0.05 level of significance. The findings revealed that gender, age, educational level and income level all had a significant influence on attitude toward waste disposal while awareness has a weak influence on attitude toward waste disposal. It was recommended among others that Tertiary institutions should integrate environmental education, including solid waste disposal practices, into the curriculum and extracurricular programs to enhance students' awareness and attitudes. Gender-Sensitive Interventions: Environmental programs should include gender-targeted strategies to encourage male students to adopt proper waste disposal practices, such as workshops, competitions, and mentorship programs.

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INTRODUCTION

Background of the Study

Solid waste disposal refers specifically to the final handling and discarding of unwanted materials after consumption, including practices such as use of refuse bins, dumping at designated sites, backyard burning, and roadside disposal. In developing countries such as Nigeria, improper solid waste disposal remains a major environmental and public health challenge due to rapid urban growth, increasing consumerism, and weak enforcement of environmental regulations (UNEP, 2017). Tertiary institutions are important micro-environments where large volumes of solid waste are generated daily, and students' disposal practices significantly shape campus sanitation conditions.

Recent studies by World Bank, (2019) emphasize that inappropriate disposal behaviours among students contribute to blocked drainage systems, unpleasant learning environments, and the spread of disease vectors. According to UNESCO (2020), "educational institutions mirror the waste disposal culture of the wider society," highlighting the influence of social and demographic factors in shaping disposal practices. Within the context of Calabar Education Zone in Cross River State, Nigeria, visible problems of littering, open dumping, and informal refuse sites within and around campuses remain persistent despite periodic sanitation campaigns and the provision of waste bins (Nwankwo & Okafor, 2021).

A growing body of literature shows that awareness plays a fundamental role in determining how students dispose of solid waste. Awareness encompasses knowledge of environmental consequences, health risks, and institutional rules guiding waste disposal. Students who are better informed are more likely to engage in safe disposal practices such as using authorized bins and avoiding open dumping (Zhao et al., 2018). However, evidence suggests that awareness alone does not guarantee appropriate disposal behaviour. A study by Musa and Ali (2022) reported that although many students were aware of the dangers of improper solid waste disposal, they still engaged in littering and illegal dumping due to convenience and peer influences.

Therefore, there is a strong justification for an empirical study that examines how awareness, gender, age, family income level, and family educational level influence students' attitudes towards solid waste disposal in tertiary institutions in the Calabar Education Zone of Cross River State. Such evidence is necessary for designing demographic-sensitive educational

programmes and policy interventions that can lead to sustainable improvement in waste disposal practices on campuses.

Statement of the Problem

Solid waste disposal in tertiary institutions within the Calabar Education Zone of Cross River State has deteriorated into a serious environmental and public health concern. Presently, the campuses of these institutions are characterized by indiscriminate dumping of refuse, littered walkways, overflowing waste bins, blocked drainage channels, and open burning of solid waste. Despite the existence of institutional sanitation policies and periodic environmental sanitation exercises, improper disposal practices among students remain widespread and persistent.

The current situation has produced several negative consequences. Environmentally, improper waste disposal has led to aesthetic degradation of campuses, foul odours, and pollution of soil and nearby water bodies. From a public health perspective, accumulated waste provides breeding grounds for flies, rodents, and mosquitoes, increasing the risk of malaria, typhoid, cholera, and other waste-related illnesses. Blocked drainages caused by improperly disposed waste have contributed to localized flooding, erosion, and damage to campus infrastructure, especially during the rainy season. These conditions negatively affect students' health, academic concentration, and overall quality of campus life.

The lack of current, localized data on these relationships has created a significant knowledge gap. Without such information, school administrators and environmental agencies are unable to develop targeted, evidence-based interventions that address the root causes of poor disposal behaviour among different student groups. As a result, existing measures remain largely ineffective, and the problem continues to worsen.

Therefore, the central problem addressed by this study is the persistent and worsening practice of improper solid waste disposal among students in tertiary institutions in the Calabar Education Zone, and the inadequate understanding of how demographic variables shape students' awareness and attitudes, thereby limiting the effectiveness of policy and intervention strategies.

Purpose of the Study

The main purpose of this study is to examine the influence of demographic variables, awareness and attitudes of students towards solid waste disposal practices in tertiary institutions in the Calabar Education Zone of Cross River State. Specifically, the study seeks to:

1. Determine the level of awareness and students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
2. Investigate the influence of gender and students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
3. Examine the influence of age and students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
4. Determine the influence of family income level and students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
5. Assess the influence of family educational level and students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

Research questions

The study will be guided by the following research questions:

1. What is the level of awareness on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone?
2. How does gender influence students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone?
3. How does age influence students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone?
4. Does family income level influences students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone?
5. How does family educational level influence students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone?

Statement of hypotheses

The following hypotheses were formulated for the study:

1. Awareness has no significance influence on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
2. There is no significance influence of gender on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
3. Age does not significantly influence students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

4. There is no significance influence of family income level on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.
5. There is no significance influence of family educational level on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

LITERATURE REVIEW

Gender and attitude of students toward waste disposal

Gender has been widely examined as a key socio-demographic factor influencing students' environmental attitudes and behaviors, including their approach to waste disposal. Over the past decade, researchers have increasingly focused on whether male and female students differ in their knowledge, attitudes, and practices toward solid waste management and waste separation. This body of research reveals both consistent patterns and important contradictions, highlighting that gender influences waste disposal attitudes in complex and context-dependent ways.

Gendered differences in waste-related attitudes have been documented across different cultural and geographical contexts. In Nigeria, a study conducted in the Calabar Education Zone revealed that **"**the females in the study area tend to have more positive attitude towards solid waste management than their male counterparts," indicating that female students are more likely to value appropriate waste disposal practices and environmental cleanliness (Journal of Environmental and Tourism Education, 2024). This pattern is consistent with broader environmental behavior research, which frequently characterizes women as displaying stronger pro-environmental orientations than men.

In summary, empirical research reveals that gender is an important but not uniformly decisive factor influencing students' attitudes toward waste disposal. Many studies report that female students demonstrate stronger positive attitudes than male students, as reflected in claims such as **"female students had better attitudes and behaviors toward sorting waste than male students"** and that **"gender was proven as a major factor that might affect a citizen's intention to separate waste."** At the same time, other studies conclude that **"gender was shown not to have any significant influence on knowledge and attitudes,"** illustrating that the influence of gender is mediated by context.

Overall, gender differences in students' attitudes toward waste disposal arise from the interaction of socio-cultural norms, social roles, environmental education exposure, and methodological variation across studies. While females are often more positively inclined toward

proper waste disposal, the inconsistency in findings indicates that gender should be considered alongside other factors such as age, education level, income, and institutional environment. Future research should therefore employ longitudinal and mixed-method designs to further clarify how gender shapes attitudes over time and across settings.

Age and attitude of students toward waste disposal

Attitude toward waste disposal is a critical determinant of responsible environmental behavior among students. Age, as a socio-demographic variable, is often linked to differences in awareness, knowledge, and engagement in solid waste disposal practices. Understanding how age shapes students' attitudes toward waste disposal is essential for designing effective environmental education programs and campus sustainability initiatives.

Age is frequently examined as a predictor of environmental attitudes. Research suggests that individuals of different age groups may exhibit varying perceptions, behaviors, and attitudes toward waste management. Beshel et al. (2024) emphasized that "participants of different age groups exhibit varying attitudes, perceptions, and behaviours towards waste management," highlighting the significance of age in shaping attitudes toward responsible disposal practices.

A study conducted in Cross River State, Nigeria, found that "respondents aged 38 and above demonstrated the highest level of involvement in solid waste management, followed by those aged 18–27," suggesting that both young adults and older individuals display positive attitudes, albeit for different reasons (Beshel et al., 2024).

Research focusing on student populations supports the notion that age influences attitudes toward environmental responsibility. For instance, in studies of high school and university students, it was observed that "higher year level student-teachers have a more positive attitude compared to those from the lower ones," suggesting that age and educational progression intersect to shape attitudes toward waste disposal (Ferrer, 2015, as cited in Scribd, 2025).

2.3.4 Family income level and attitude of students toward waste disposal.

Socioeconomic factors including family income level are widely acknowledged as important determinants of individual attitudes and behaviors toward environmental issues, including waste disposal. Family income can shape access to resources, awareness, and participation in proper waste disposal behaviors. In the context of students, the economic background of their families influences their exposure to environmental information, material

resources available to manage waste, and overall attitudinal disposition toward responsible solid waste disposal.

Although research specifically linking students' family income to their attitudes toward solid waste disposal is less abundant than studies on general socioeconomic variables and waste behavior, relevant evidence from multiple empirical sources and analogous studies on environmental attitudes highlights how income levels can foster or hinder positive attitudes toward waste disposal among student populations.

or competing financial priorities (International Journal of Environmental Sciences, 2025).

This finding suggests that income level directly impacts environmental behavior by shaping the conditions under which individuals, including students and families, can practice positive waste disposal. In settings where higher income provides greater access to waste collection and recycling facilities, attitudes tend to be more favorable because favorable disposal options are available and affordable. Conversely, low family income often correlates with limited access to such infrastructure, reinforcing negative or ambivalent attitudes toward proper waste disposal.

2.4 Family educational level and attitude of students toward waste disposal.

Family educational level is widely recognized as a key socio-demographic factor influencing environmental attitudes and behaviors. The educational attainment of parents and family members can shape children's worldviews, norms, and values regarding pro-environmental behavior, including attitudes toward solid waste disposal. Research in environmental education and psychology consistently shows that family context including parents' educational attainment plays a significant role in shaping young people's environmental attitudes. Studies of children's pro-environmental behavior note that "studies often adopted self-reported scales rather than observational measurements … identifying various factors influencing children's pro-environmental behaviours," and familial influences were frequently highlighted as important external determinants of environmental attitude and behavior (Liu & Green, 2024).

Research on the influence of parental education has identified that higher levels of parental education are associated with stronger pro-environmental values, attitudes, and behavior in children. Herdiansyah, Brotosusilo, Negoro, Sari, and Zakianis (2021) observed that "parental education is one of the most important factors in shaping human behavior," suggesting that norms

taught by parents directly influence environmental attitudes such as waste classification and reduction.

2.5 Awareness and attitude of students toward waste disposal

Awareness of environmental issues and attitudes toward proper waste disposal are critical determinants of sustainable waste management behaviors among students. Research in educational and environmental sciences consistently shows that awareness influences students' attitudes, which in turn shape their participation in responsible waste disposal practices. In environmental behavior research, awareness refers to the extent of knowledge individuals possess about environmental problems and their implications, while attitude reflects the evaluative predisposition toward engaging in specific environmental behaviors, such as proper waste disposal. Scholars emphasize that awareness forms the cognitive base for pro-environmental attitudes, which then influence behavior (Ajzen, 1991 as foundational theory). In the context of waste disposal, students who are more aware of the consequences of improper waste handling are often more inclined to develop positive attitudes toward responsible disposal practices.

A study by Reyes and Madrigal (2020) on school students' solid waste management highlighted this connection, finding that "awareness, attitude, and practice on solid waste management were correlates" and that "awareness and attitude significantly predict the practice of SWM," underscoring the important predictive role of awareness on attitude and behavior toward waste management. While much research on awareness and attitude comes from secondary or elementary settings, a growing number of studies focus directly on undergraduate students and their perceptions of waste disposal.

2.5 Appraisal of Literature Reviewed

The literature reviewed on demographic variables and students' attitudes toward solid waste disposal provides a wide range of empirical evidence from different cultural, geographical, and institutional contexts.

Similarly, research in Nigeria confirmed that "students' gender ($F = 5.113$, $P = 0.024$) is the only socio-demographic variable that is significantly associated with the respondents' attitudes towards waste disposal" (Springer, 2022). These findings provide a robust foundation for exploring gender as a determinant of waste disposal attitude.

However, some studies challenge this assumption. The North Central Zone study in Nigeria reported no significant difference between male and female students in their attitudes toward solid waste management (ERIC, 2020), suggesting that gender effects may be context-specific and influenced by institutional culture, environmental education, or other socio-cultural factors. This variability indicates a need for contextually sensitive research and highlights that gender, while important, cannot be assumed to have a uniform effect across populations.

Research design

This study adopts a descriptive survey research design. The descriptive survey design is appropriate because it allows the researcher to collect data from a large population to describe characteristics, opinions, and relationships among variables without manipulating them. According to Best and Kahn (2016), descriptive surveys are particularly suitable for studies that seek to examine the status of a phenomenon, identify patterns, and determine relationships among variables.

3.2 Area of the study

The study was conducted in Calabar Education Zone of Cross River State. The area comprises seven Local Government Areas (LGAs) viz; Akamkpa, Akpabuyo, Bakassi, Biase, Calabar Municipality, Calabar South, and Odukpani. The area lies between latitudes $4^0 27^{'}$N and $5^0 32^{'}$N and longitudes $7^0 50^{'}$E and $9^0 28^{'}$E (Balogun, 2009) with a landmass of 9980km^2. Its neighbours are Atlantic Ocean to the South, the Republic of Cameroun to the East, Ikom Educational Zone to the North, and Abia and Akwa Ibom States to the West. The Calabar, Cross and Great Kwa Rivers including the creeks of the Cross River from its inland delta serve as the area's major waterways. The area lies within the mangrove swamp and tropical rainforest regions of Nigeria. The area experiences harmattan periods and is characterized by a maximum temperature of 27^0C (80.6^0F) with a peak of 35^0C (95^0F) during January and February (Weatherbase, 2011). The Calabar Education Zone sits within the Niger Delta coastal ecological belt: low elevation, intertidal creeks and rivers, secondary forest patches, and urban built-up areas. The climate is humid tropical (often classified as "Am" in Köppen terms) with heavy rainfall during the wet season — conditions that influence waste-generation patterns (e.g., decomposition rates, need for covered receptacles) and logistics for collection and transport in the study. Several local studies and campus reports note

that the campus micro-landscape (hostels, canteens, lecture halls) and proximity to waterways shape waste-management challenges and solutions.

Population of the Study

The population of this study comprises all students in tertiary institutions within the Calabar Education Zone of Cross River State. This includes students from universities, polytechnics, and colleges of education located in the zone. The population is heterogeneous, consisting of students of different genders, ages, family income levels, and family educational backgrounds, which aligns with the study's focus on demographic variables.

Sampling Technique

The study employed a stratified random sampling technique to ensure that students from different institutions, faculties, and demographic groups are proportionally represented. Stratified random sampling was appropriate because the population is heterogeneous, comprising students of different genders, ages, family income levels, and family educational backgrounds.

Sample

The sample of this study comprises 883 students drawn from tertiary institutions in the Calabar Education Zone, Cross River State. The sample was determined using 10%, based on a total student population of 8,848 across the four institutions.

A stratified random sampling technique was used to ensure that each institution is proportionally represented according to its student population. This ensures fairness in representation and allows for meaningful analysis of demographic variables, awareness, and attitude toward solid waste disposal across the different institutions.

Instrumentation

The primary instrument for data collection in this study was a structured questionnaire. Title: Demographic variables, awareness and attitude of students towards solid waste disposal questionnaire (DVAASTSWDQ). The questionnaire is appropriate for this research because it allows for the collection of standardized data from a large number of respondents in a systematic and efficient manner (Orodho, 2016). It is designed to capture information on demographic variables (gender, age, family income, family educational level), awareness, and attitude toward solid waste disposal among students in tertiary institutions in the Calabar Education Zone.

3.6.1 Validity of the Instrument

Validity ensures that a research instrument accurately measures what it is intended to measure. For this study, both content validity and face validity was established to ensure the questionnaire was appropriate and effective for measuring demographic variables, awareness, and attitude toward solid waste disposal among students.

Procedure for data preparation and scoring

After collecting the questionnaire, codes/scores were assigned to each item. For case of data preparation, a coding schedule was prepared by developing a key for each of the constructs in the instrument in a tabular form.

Procedure for data analysis

Hypothesis one:

Awareness has no significant influence on attitude of students toward waste

Independent Variable: Awareness

Dependent Variable: Attitude of students to waste disposal

Statistical Tool: Simple linear regression statistical tool.

Hypothesis two:

There is no significant influence of gender on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

Independent Variable: Gender (Male and Female)

Dependent Variable: students' attitude towards solid waste disposal

Statistical Tool: Independent t-test

Hypothesis three:

Age does not significantly influence students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

Independent Variable: Age

Dependent Variable: students' attitude towards solid waste disposal

Statistical Tool: Analysis of variance (ANOVA)

Hypothesis four:

There is no significant influence of family income level on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

Independent variable: family income level

Dependent Variable: students' attitude towards solid waste disposal

Statistical Tool: Analysis of variance (ANOVA)

Hypothesis five:

There is no significance influence of family educational level on students' attitude towards solid waste disposal in tertiary institutions in the Calabar Education Zone.

Independent Variable: Family educational level

Dependent Variable: students' attitude towards solid waste disposal

Statistical Tool: Analysis of variance (ANOVA)

General description of data/variables

The main purpose of this study was to examine demographic variables, awareness and attitude of students toward solid waste disposal in tertiary institution in Calabar Education Zone of Cross River State, Nigeria The independent variable of the study is demographic variables and awareness which were sub-divided into gender, age, income level, educational level and awareness while the dependent variable is attitude of students toward solid waste disposal in Calabar Education Zone. A sample of eight hundred and eighty three (883) respondents was used for the study. The results of the frequency distribution and descriptive data analyses are presented in Tables 5 and 6 respectively.

The result presented in Table 5 revealed that 552 representing 62.5% respondents were Females while 331 representing 37.5% respondents were Males.

Furthermore, the result revealed that 499 representing 56.5% respondents were between 16-25 years, 332 representing 37.6 respondents were 26-35 years, 42 representing 4.8% were between 36-45years, 9 representing 1.0% were between 46-55years while I respondent representing .1% respectively was 56 years and above.

The result also showed that 501 representing 56.7% respondents have an average monthly income that is between 18,000- 30,000, 305 representing 34.5% respondents have an average monthly income that is between N31,000—N50,000 while 77 representing 8.7% respondents have an average monthly income that is above N51,000.

Finally, the result also revealed that 307 representing 34.8% respondents have FSLC/SSCE, 237 representing 26.8% respondents have NCE/ND, 267 representing 30.2 respondents have B.Sc/HND while 72 representing 8.2% respondents have Postgraduate degrees

The result presented In Table 5 indicated that 395 of the respondents representing 45.2% were from the University of Calabar, 267 representing 30.1% from University of Cross River State,

97 respondents representing 10.8% from the College of Health Technology, while 124 representing 57% of the respondents were from the University of Education and Entrepreneurship . The result in Table 6 revealed that the mean score obtained by the 883 subjects as regards to awareness of solid waste was attitude of higher education students toward solid waste disposal was 37.97 with a standard deviation of 5.21 and 36.22 with a standard deviation of 8.00 as regards attitude toward solid waste.

Presentation of results

The results of the analysis are presented hypothesis by hypothesis. The hypotheses were tested at 0.05 level of significance.

4.2.1 Hypothesis one

The first hypothesis stated that there is no significant influence of gender on attitude of students toward waste disposal in tertiary institutions in Calabar Education Zone. The independent variable is gender which was categorized into male and female while the dependent variable is attitude of students toward waste disposal in tertiary institutions in Calabar Education Zone. The hypothesis was tested using Independent test analysis at .05 levels of significance as presented in Table 7.

The result in Table 7 revealed that the mean score obtained by the 331 male subjects as regards to attitude of students toward waste disposal in Calabar Education Zone was 42.22 with a standard deviation of 5.21 is less than the mean score of 46.18 with a standard deviation of 7.38 obtained by the 552 female subjects. The mean difference was statistically significant since the obtained t-value of 5. 124 in absolute sense with a p-value of .000 met the criteria for significance at 05 alpha level. This means that male subjects in tertiary institutions in Calabar Education Zone had a significant lower mean than the females as regards resource conservation practices.

Based on this, the null hypothesis which stated that there is no significant influence of gender on attitude of students toward waste disposal in tertiary institutions in Calabar Education Zone was rejected.

Conclusion

The study examined the influence of demographic variables (gender, age, family income, and family educational level) on students' awareness and attitude toward solid waste disposal in tertiary institutions in the Calabar Education Zone, Cross River State.

5.4 Recommendations

Based on the findings, the following recommendations are made:

1. Integration of Environmental Education: Tertiary institutions should integrate environmental education, including solid waste disposal practices, into the curriculum and extracurricular programs to enhance students' awareness and attitudes.
2. Gender-Sensitive Interventions: Environmental programs should include gender-targeted strategies to encourage male students to adopt proper waste disposal practices, such as workshops, competitions, and mentorship programs.
3. Youth Engagement Programs: Younger students (under 18 and 18–22 years) should be specifically targeted with awareness campaigns and orientation programs to cultivate positive attitudes and knowledge early in their academic journey.

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