

Exploring The Role Of Environmental Education In Shaping Waste Disposal Behaviors: A Case Study Of Secondary School Students In Azare Metropolis Of Bauchi State Nigeria

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Abstract

Background: Environmental challenges such as improper waste disposal are increasingly affecting urban centers like Azare metropolis, where rapid urbanization worsen the strain on existing waste management systems. Secondary school students, representing a key demographic in the education system, have the potential to act as agents of change in addressing these issues. This study seeks to explore the role of environmental education in shaping the waste disposal behaviors of students, focusing on their knowledge, attitudes, and practices (KAP) in this regard

Materials & Methodology: Employing a descriptive cross-sectional design, data was collected using a semi-structured questionnaire targeting 400 students sampled via multi-stage sampling. Data analysis included descriptive statistics and hypothesis testing using ANOVA to examine the relationships between environmental education and students' knowledge, attitudes, and practices (KAP) regarding waste disposal.

Result: The findings revealed that environmental education significantly influenced students' knowledge, attitudes, and practices, highlighting the need for enhanced curriculum integration and extracurricular initiatives to promote sustainable waste management behaviors.

Conclusion: These findings contribute to the growing body of literature emphasizing education as a pivotal tool for fostering environmental stewardship among youth.

Keywords: Environmental Education, Waste Disposal, Secondary School Students, Knowledge, Attitudes, Practices.

Date of Submission: 25-01-2025

Date of Acceptance: 05-02-2025

I. Introduction

Solid waste disposal remains a critical global issue, particularly in developing nations where inadequate waste management poses severe environmental and health challenges. In these regions, waste mismanagement arises from factors such as insufficient infrastructure, lack of funding, ineffective policy implementation, and certain lifestyle choices (Osinowo, 2001; Joseph, 2006). These challenges are exacerbated by economic development, urbanization, and improved living standards, which collectively increase waste generation. Schools, as part of this ecosystem, significantly contribute to waste production, with pollution levels in public educational institutions being particularly high (Bartlett, 2005).

The situation in Nigeria highlights these challenges, as limited access to waste disposal facilities and negative environmental attitudes compound the problem. Research underscores the importance of individual and community awareness, attitudes, and behaviors in addressing waste management issues (Kofoworola, 2007). Effective waste management is influenced by factors such as environmental motivation, social pressures, economic incentives, and attitudes toward conservation (Bartlett, 2005). Within schools, waste such as paper, plastics, and organic materials is generated through routine activities like class work, food services, and maintenance. Despite these challenges, gaps remain in understanding how environmental education influences the waste disposal behaviors of students in Nigeria, particularly in regions like Azare, Bauchi State.

Azare, a rapidly urbanizing metropolis in northern Nigeria, presents a unique case for exploring waste management challenges. The town's semi-arid environment, growing population, and evolving infrastructure

create a pressing need to address waste disposal issues. Population growth and urbanization in Azare, driven by improving living standards, contribute to increased waste generation and strain existing waste management systems. While schools play a critical role in shaping behaviors, limited research exists on the knowledge, attitudes, and practices (KAP) of secondary school students regarding waste management in the region.

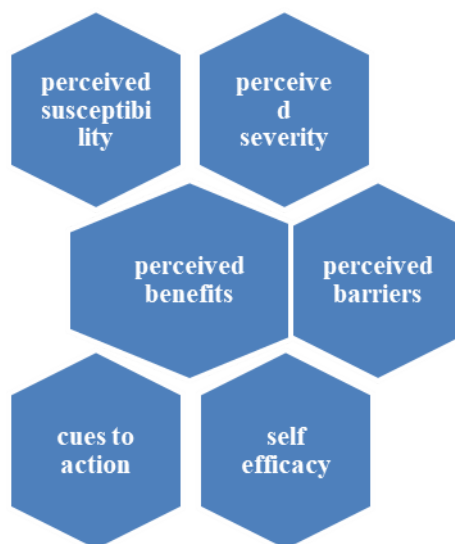
This study aims to examine the role of environmental education in shaping the waste disposal behaviors of secondary school students in Azare. By investigating students' knowledge, attitudes, and practices, this research seeks to identify factors influencing waste management and propose strategies for fostering sustainable behaviors. The findings will contribute to the broader discourse on waste management in developing regions while offering actionable insights for local interventions.

Theoretical Framework

The theoretical foundation adopted for this study is a health belief model developed by social psychologists.

Concept of Health Belief Model

The health belief model (HBM) is a social and a psychological health behaviour change model which is designed to describe and predict health-related behaviours, especially in the conduct of health services (Siddiqui & Ghazal, 2016). Janz and Marshall (1984) revealed that the HBM was developed in the early 1950s by social psychologists at the United State Public Health Service and the model becomes one of the best famous and most widely accepted theories in behavioral health research. This model is a value expectancy model that observes people's habits, styles, values and judgment of how a particular action will provide a positive outcome (Siddiqui & Ghazal, 2016). The major emphasis of HBM is to encourage the public to adopt the recommended health practices, which will therefore prevent severities or negative consequences and enhance the general public health (Glanz, 2015). Glanz and Bishop (2010) explained that the HBM stated that individual's beliefs about a number of health problems, perceived benefits of action (what benefits will be obtained after a particular action is done properly), barriers to action (that is, a kind of individual's assessment of the hindrances to a particular action or behaviour) and self-efficacy describe an engagement or absence of engagement in health-promoting actions.



The Health Belief Model

II. Materials And Method

Study Design and Population: A descriptive cross-sectional study design was employed. The population included secondary school students from public schools in Azare metropolis, with a total enrollment of 7,964 students.

Study Area

Azare, located in the Katagum Local Government Area of Bauchi State, Nigeria, serves as an important urban hub in the northern region. Positioned at approximately 11°40'27"N and 10°11'28"E, with an elevation of 436 meters, the town is characterized by its semi-arid climate and diverse population (Bauchi State Government, 2024). The local economy thrives on trade, agriculture, and small-scale industries, while its

strategic location along major transportation routes facilitates economic growth (Malami, 2019). However, rapid urbanization and population growth have strained the town’s infrastructure and services, including waste management systems (SWEET Foundation, 2024).

Schools in Azare are microcosms of the town's broader waste management challenges, generating diverse types of waste from routine activities. The region's socio-economic diversity, combined with its environmental and infrastructural constraints, underscores the importance of studying students' waste disposal behaviors. By focusing on Azare, this research provides valuable insights into how environmental education can address waste management challenges in similar urbanizing communities.

Sample and Sampling Technique: A sample of 400 respondents was drawn using Yamane’s formula and a multi-stage sampling procedure as shown below:-

Yamane T (1967) provides a simplified formula to calculate sample sizes.

Where n is the sample size, N is the population size, and e is the level of precision. And a 95% confidence level and P = 0.05 are assumed.

Students were stratified by school type (boys-only, girls-only, and mixed), and proportionate sampling ensured representative participation.

Data collection: Data collection utilized a researcher-designed questionnaire addressing KAP of waste disposal. Responses were measured on a four-point Likert scale, and data were analyzed using SPSS.

Table 1: Sampled Respondents from each Sampled Secondary Schools per category

S/N	School	Population size	Sampled Respondent
Boys only			
1.	Government Comprehensive Day Secondary School Azare	156	7
2.	Government Day Secondary School Azare	1369	58
3.	Government Day Secondary School Matsango	856	37
4.	Government Day Secondary School Baba Kafinta	878	37
5.	Government College Azare	656	28
6.	Government Secondary school Tatar Ali	280	12
Girls only			
7.	Government Girls Secondary School Ahmed Turaki	1016	43
8.	Married Women Secondary School Azare	81	5
9.	Government Girls Secondary School Nassarawa	1017	43
10.	Government Girls Secondary School Tsakuwa	461	20
Mixed			
11.	Government Day Technical College Azare	1705	73
12.	Federal Government College Azare	869	37
Total		9344	400

Source: Field Work, 2024

Validity and Reliability of the Research Instrument: The instrument was validated by expert in the field of public health research in national Open University of Nigeria and Federal University of Health Sciences Azare. This was done in order to make instrument measures what it was set measure. The reliability of the instrument was determined by using test-retest method of reliability. The instrument was first used on fifty members of the population and after one week the same instrument was administered to the same people. The two results were correlated using Pearson Product Moment Correlation Coefficient and the result found was 0.7. This makes the instrument very reliable because it measured at different times what it was supposed to measure.

Inclusion Criteria:

- 1) Students currently enrolled in secondary schools within Azare.
- 2) Participants who have provided informed consent were included.

Exclusion Criteria:

- 1) Individuals who are not currently enrolled in secondary schools within Azare.
- 2) Students who do not reside in Azare, Bauchi State, as the study area is specific to this location.

- 3) Students attending secondary schools located outside of Azare.
- 4) Individuals that refused to consent were excluded.

Ethical Considerations: Ethical approval was obtained, and informed consent was secured from participants.

Data Analysis

The Data collected were analysed using STATA 13 analysis software. Descriptive statistics of frequency and percentages and charts, mean and standard deviations were used. Inferential statistics of one way ANOVA was used to test the formulated hypotheses. The level $P < 0.05$ was considered as the cutoff value or significance

III. Results And Discussion

Demographic Characteristics

Table 2: Classifications of the Respondents’ Demographic Characteristics

Variable	Variable options	Frequency	Percent (%)
Age range in years	10-15years	239	59.8
	>16 years & above	161	40.2
	Total	400	100.0
Gender	Male	256	64.0
	Female	144	36.0
	Total	400	100.0
Class	JSS II	80	20
	JSS III	190	47.5
	SS II	75	18.75
	SS III	55	13.75
	Total	400	100.0

Source field work, 2024

The study surveyed 256 male (64%) and 144 female (36%) secondary school students, with the majority (59.8%) aged between 10–15 years. Most respondents were in JSS III (47.5%), representing a diverse demographic in terms of age and educational level. This diversity underscores the relevance of the findings in capturing the perspectives of students across different stages of adolescent development.

Knowledge of Waste Disposal

Table 3: Mean Score on Knowledge of waste disposal practices by the Respondents

S/n	Knowledge of Waste Disposal	Mean	Std. Dev.
1	I am aware of the proper methods for disposing of different types of waste	2.97	0.611
2	I know the potential environmental impact of improper waste disposal	2.42	0.750
3	I am familiar with the designated waste disposal areas within my school premises	3.38	0.622
4	I understand the importance of recycling in waste management	2.18	0.563
5	I understand the consequences of burning waste on the environment	3.43	0.864
	Aggregate mean	2.876	

Source: Field Work, 2024

(Decision mean = 2.50)

From the table above the students exhibited a strong awareness of proper waste disposal practices, with an aggregate mean score of 2.876. High scores were recorded for knowledge of designated disposal areas and the environmental impact of waste, reflecting a foundational understanding of proper waste management.

This finding aligns with studies such as those by Zurbrugg et al. (2012), which emphasized the significance of community-based educational interventions in improving waste management awareness. Moreover, Ajibade et al. (2013) found that students with environmental education were more likely to possess actionable knowledge on waste disposal practices. The results indicate the critical need for further strengthening environmental education to sustain and expand this awareness.

In addition Adejumo and Ajiboye (2020) found that environmental education significantly improves students’ knowledge of waste disposal practices. This aligns with the high knowledge scores in this study, emphasizing the importance of formal and informal education in shaping environmental awareness.

Attitudes toward Waste Disposal

Table 4: Mean Score on Attitude towards Waste Disposal by the Respondents

S/n	Attitude towards waste disposal	Mean	Std. Dev.
1	I believe that proper waste disposal is essential for a clean and healthy environment	3.56	0.543
2	I feel responsible for ensuring that I dispose of my waste in the designated areas	2.87	0.702
3	I think my school should have more initiatives to raise awareness about waste management	3.21	0.785

4	I believe that everyone, including students, plays a role in keeping the environment clean	3.54	0.867
5	I believe that reducing personal waste production is important for environmental sustainability.	2.88	0.756
6	I feel proud when I participate in activities that contribute to a cleaner environment	3.27	0.876
	Aggregate mean	3.22	

Source: Field Work, 2024

(Decision mean = 2.50)

The positive attitudes demonstrated by students, reflected in an aggregate mean score of 3.22, underscore their belief in the importance of waste management. Many respondents expressed willingness to engage in cleanliness initiatives and environmental conservation.

This aligns with the findings of Ahamad et al. (2020), who observed a positive correlation between environmental awareness and proactive attitudes toward waste management among students. Similarly, Lee et al. (2013) highlighted that students with strong environmental values are more likely to participate in sustainable practices, affirming the role of education in fostering these attitudes.

Practices of Waste Disposal

Table 5: Mean score on practices of waste disposal by the Respondents

S/n	Practice of waste disposal	Mean	Std. Dev.
1	I consistently dispose of my waste in the provided bins or containers	2.98	0.856
2	I encourage my classmates to follow proper waste disposal practices	2.47	0.971
3	I am aware of any waste management programs or initiatives in my school	2.55	0.841
4	I often participate in school clean-up activities.	3.51	0.872
5	I avoid littering, even if there are no visible waste bins around	3.55	0.977
6	Overall, I believe that waste disposal practices in my school need improvement	3.23	0.978
7	I feel confident in my ability to make environmentally responsible choices regarding waste.	3.32	0.764
8	I would participate in more waste management activities or programs if they were available in my school	2.87	0.675
	Aggregate mean	3.06	

Source: Field Work, 2024

(Decision mean = 2.50)

Students exhibited commendable waste disposal behaviors, with a mean score of 3.06. Most respondents reported consistent use of designated bins and active participation in clean-up activities. However, gaps were noted in creating broader awareness programs to further enhance these practices.

Research by Ahmed and Ali (2015) supports the importance of structured waste management systems in schools to encourage proper waste disposal. The current findings resonate with their observation that consistent practices require both awareness and accessible infrastructure. Furthermore, Hashim et al. (2022) highlighted the role of community involvement in sustaining such practices, a factor that can be explored in future interventions.

Findings by Kumar et al. (2017) noted that gender and educational level significantly influence waste management attitudes, similar to the positive attitudes and practices observed among the students in this study.

Role of Environmental Education

Table 6: One-way ANOVA results on influence of environmental education on students' knowledge, attitudes, and practices among Secondary School Students in Azare

Variable	N	Mean	Std. Dev.	Std. Error	t-value	Df	p-value
Role of Environmental education on KAP	400	2.856	0.442	0.198	9.154	399	0.000
Test mean	400	2.50	0.000	0.000			

(t-critical = 1.96, p < 0.05)

The influence of environmental education on students' knowledge, attitudes, and practices was statistically significant, with an aggregate mean score of 2.856 and one-way ANOVA results showing $p < 0.05$. Students advocated for integrating environmental topics into the curriculum and engaging in experiential learning through field trips.

This corroborates the findings of Kamaruddin et al. (2016), who emphasized the transformative impact of environmental education on students' behavior. Similarly, Uitto et al. (2014) highlighted that hands-on learning experiences significantly enhance students' understanding and commitment to environmental conservation.

Research by Adamu et al. (2019) demonstrated that incorporating environmental education into school curricula fosters a sustainable mindset among students, corroborating the current study's emphasis on curricular reform.

IV. Conclusion

The study underscores the positive impact of environmental education on waste disposal behaviors among secondary school students in Azare. Enhanced curriculum content and extracurricular activities focused on environmental issues can further improve students' KAP. Policymakers and educators should prioritize such initiatives to foster sustainable waste management practices within the community.

V. Recommendations

1. Environmental education topics, including recycling and sustainable waste management, should be incorporated into the secondary school curriculum across all levels, focusing on experiential learning and community-based projects
2. Schools should organize school-based clean-up drives, workshops, and excursions to reinforce theoretical knowledge with practical experiences.
2. Schools should organize seminars, workshops, and public campaigns to reinforce positive attitudes and behaviors toward waste management.
3. Providing adequate waste disposal facilities and recycling options in schools can enhance students' waste disposal practices.
4. Partnerships with local waste management organizations can support sustainable practices, such as composting and recycling.
5. Further research should track the long-term impact of environmental education interventions on students' behavior and the broader community.

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