

Effect of Health Education on Cognition and Attitude towards Household Waste Management among Women in Mgbuoshimini Community, Rivers State.

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Abstract

This study investigated the effect of health education on the household waste management cognition and attitude of women in Mgbuoshimini community. The study was a quasi-experimental pre-test and post-test study which specifically focused on four (4) research questions and four (4) hypotheses. Data for the study were obtained from a sample size of 162 women drawn from a population of 6,591 women living in Mgbuoshimini using the purposive sampling technique. A validated self-structured questionnaire titled Household Waste Management Cognition and Attitude Questionnaire (HWMCAQ) with an overall reliability index of 0.77 was used for data collection. The data collected was analyzed employing the mean and standard deviation, which were used to answer the research questions, while the paired-sample t-test and analysis of covariance (ANCOVA) were used to test the null hypotheses at 0.05 level of significance. The result showed that health education significantly increased the cognition and attitude of the women from mean 2.38 to 2.92 and 2.54 to 3.04, leading to a statistically significant change ($t(161) = 19.680, p < 0.05$) and ($t(161) = 12.316, p < 0.05$) respectively. However, there were variations in their cognition and attitude based on the demographic variables of age, level of education, and occupation. Based on the findings of the study, it was recommended, among others, that the Rivers State Waste Management Agency should collaborate with local authorities, environmental agencies, health institutions, and non-governmental organizations to adopt this intervention. Using women (homemakers) to address household waste management from the grassroots.

Keywords: Health, Cognition, Attitude, Age, Environment.

Introduction

Household waste management has become a critical global challenge, particularly in developing countries where rapid population growth, urbanization, and ineffective governance exacerbate waste generation, accumulation, and mismanagement, leading to significant environmental and public health risks. In Nigeria, the scale of this crisis is highlighted by the Waste Management Society of Nigeria (WAMASON), which reports that the country generates approximately 1.5 million tonnes of waste annually, with less than 10% being recycled (World Bank, 2020). This stark reality underscores the urgent need for improved waste management practices, including better waste collection and treatment facilities, stricter regulatory frameworks, and enhanced public awareness to promote responsible waste disposal and recycling. The practice of indiscriminate waste disposal, such as dumping waste into the environment without sorting or recycling, continues to pose severe threats to both the environment and public health (Ajibuah & Terdoo, 2014; Banga, 2019; Ihekwoaba & Efetobo, 2021; Olawuni, 2022). Efforts, including international collaborations, are essential for tackling these challenges and steering the country toward more sustainable waste management practices.

In Port Harcourt, high waste generation due to industrialization and population density exacerbates challenges in areas like Mgbuoshimini. Proximity to industrial zones and ineffective government initiatives, such as the “waste-to-wealth” program, has led residents to dump waste in streets, drainages, and waterways. This mismanagement fuels health risks like vermin infestation, malaria, and cholera, while contributing to climate change through greenhouse gas emissions and aquatic ecosystem contamination, highlighting the urgent need for effective waste management solutions (Owhor & Stanley, 2018; Ambusaidi & Fulaiti, 2022; Eshete et al., 2023; Kalonde et al., 2023).

Household waste, comprising food scraps, plastics, and textiles, poses a challenge due to its diversity and increasing urban generation. Effective management requires waste sorting at the source and minimization, supported by public education and behavior change programs (Kalonde et al., 2023; Nwosu & Okoye, 2019). Awareness campaigns and educational interventions are key to improving waste practices (Sofia et al., 2021; Ambusaidi & Al Fulaiti, 2022; Eshete et al., 2023). Understanding cognition and attitudes is crucial for developing strategies that promote sustainability (Stockert & Bogner, 2020; Chen et al., 2021; Pongpunpurt et al., 2022).

Cognition, as defined by Stockert and Bogner (2020), encompasses mental actions, understanding, awareness, and information acquired through learning, experience, observation, or study. It involves acquiring knowledge, understanding, and skills through learning, experience, and observation, serving as the foundation for reasoning, decision-making, and action. Factors like education and resources significantly influence waste management cognition, which varies among individuals. Continuous education enhances this knowledge, particularly among women, empowering them to make informed decisions and adopt sustainable practices (Oda, 2021). Baby and Mathew (2020) highlight that cognition equips individuals with the tools needed for effective problem-solving and waste management, fostering sustainable environmental outcomes.

Attitudes significantly influence behavior, shaping responses to waste management practices. Positive attitudes promote eco-friendly actions like waste reduction and recycling. Educational interventions play a key role by raising awareness about the environmental and health impacts of improper waste disposal and fostering cognitive and attitudinal shifts. Research shows that individuals who understand the importance of sustainable waste management and view it as personally relevant are more likely to adopt responsible behaviours, contributing to improved environmental and public health outcomes (Abdullah & Marwa, 2022; Raghu & Rodrigues, 2021).

Cognition and attitude are closely linked in waste management. Accurate knowledge raises awareness of environmental impacts, promotes sustainable practices, and fosters a sense of personal responsibility. Understanding the consequences of improper waste disposal motivates behavior change by shaping social norms and empowering individuals. Awareness of waste's effects on ecosystems, resources, and health encourages the adoption of practices like recycling and composting, cultivating positive attitudes and a stronger commitment to effective waste management in daily life (Raghu & Rodrigues, 2021; Abdullah & Marwa, 2022).

Women play a vital role in household waste management, but their effectiveness depends on having the necessary knowledge, attitudes, and motivation. Despite their importance, there is limited research on how educational interventions impact women's waste management practices in Nigerian communities. Addressing this gap offers an opportunity to explore how tailored programs can enhance women's participation, improve environmental health, and foster sustainability. Educated women can lead change in households and communities, driving broader improvements in waste management and environmental outcomes (Baby & Mathew, 2020; Oda, 2021).

Health education is a key strategy for promoting lasting behaviour change related to waste management (Maqbool et.al, 2023). Educational interventions, such as workshops, awareness campaigns, and school programs, can enhance waste management knowledge and attitudes, driving better practices. These strategies are vital in urban areas like Port Harcourt, where industrialization and population growth increase waste generation. Public engagement is crucial to ensuring the success of these initiatives. Without active participation, efforts to reduce waste and mitigate its environmental and health impacts will likely be ineffective, underscoring the need for community involvement (Ghazy, 2024).

Statement of the Problem

Waste management remains a global concern with profound environmental and public health ramifications. Globally, approximately 2.01 billion metric tons of municipal solid waste are generated annually, with a staggering 33% not managed in an environmentally safe manner (World Bank, 2022). This mismanagement contributes significantly to pollution, including contamination of water, soil, and air, which, in turn, exacerbates public health crises. Developing countries, including Nigeria, are particularly vulnerable, as inadequate infrastructure and poor governance often hinder effective waste management systems. In Mgbuoshimini, the study area, waste management challenges are acute due to its high population density and indiscriminate waste disposal practices. Streets, drainage systems, waterways, and other unauthorized locations are typically used as dumping grounds, creating severe environmental hazards and health risks. Municipal solid waste generated in such areas is predominantly from households, underscoring the need for household-level engagement in waste management practices.

Cognition and attitudes toward waste management are crucial for fostering proper practices like segregation, recycling, and disposal. Women, as primary household managers, play a central role in daily waste-related activities, making their involvement essential. Equipping them with knowledge and skills can enhance waste management behaviors, reducing municipal waste volume and improving efficiency. Targeted interventions focused on building women's capacity for proper household waste management are vital to achieving sustainable waste reduction and better overall management outcomes.

Studies from Iran, India, and Egypt highlight the effectiveness of educational interventions in improving waste management awareness, attitudes, and practices. However, Mgbuoshimini lacks such targeted initiatives, particularly for women. Addressing this gap through localized health education could reduce environmental risks, improve waste systems, and foster

sustainable practices. This study aims to leverage women's potential in advancing waste management cognition, attitudes, and environmental health, addressing a critical need in the community.

Aim and Objectives of the Study

The study examined the effect of health education on cognition and attitude towards household waste management among women in mgbuoshimini community. The study further explored the influence of demographic variables of age, level of education and occupation on the outcome of the intervention.

Hypotheses

To guide the study, the following hypotheses were formulated and tested at 0.05 level of significance:

- 1) Health education has no significant effect on the waste management cognition of women in Mgbuoshimini community.
- 2) Health education has no significant effect on attitude towards waste management among women in Mgbuoshimini community.
- 3) Health education has no significant effect on the waste management cognition of the women based on demographic variables of age, level of education, and occupation.
- 4) Health education has no significant effect on the attitude of the women towards waste management based on age, level of education, and occupation.

Methods

A Pretest Post-test Quasi-experimental research design was used for this study. A quasi-experiment is an empirical study used to estimate the causal impact of an intervention on its target population without random assignment (Nworgu, 2015). This design is useful in situations where the application of a randomized approach may not be realistic (Kothari & Garg, 2014). The pretest and posttest equivalent group design is specifically adopted. This design was chosen for its ability to provide pre-intervention baseline data from respondents, which could then be compared with post-intervention data from the same respondents to demonstrate the effects of the intervention. It was selected as the most suitable method because the study aimed to assess the impact of health education on the cognition, attitude, and behavioural intentions of women in Mgbuoshimini community. The pretest-post test design measures the dependent variables once before and once after the intervention is implemented. This design has also been successfully utilized by Hubaybah et al (2022), Abdullah & Marwa, (2022), Maqbool et al. (2023) and Charkhtab et al., (2024) to carry out similar studies.

Population and Sample for the Study

The study focused on 6,591 women of various ages, projected from National Bureau of Statistics (2020) data. A sample of 162 women aged 20 and above from Mgbuoshimini community was selected using purposive sampling. This technique enabled the deliberate selection of participants meeting specific criteria aligned with the research objectives.

Instrument for Data Collection

The data collection instrument, the Household Waste Management Cognition and Attitude Questionnaire (HWMCAQ), was self-structured, validated by experts, and divided into three sections: Section A captured demographic details, while Sections B and C assessed cognition and attitude using a 4-point Likert scale. Reliability was tested using Cronbach's alpha, yielding scores of 0.85 for cognition and 0.80 for attitude, indicating high reliability. The instrument effectively measured respondents' waste management cognition and attitudes.

Method of Data Collection

To conduct the study, oral consent of the participants was sought and obtained before the commencement of the intervention and distribution of the questionnaire. Four research assistants highly knowledgeable in solid waste management were properly guided and used for the intervention and administration of the questionnaire to participants. Copies of the questionnaire were served twice as pre-test and post-test. First, copies of the instrument were served to the sampled 162 respondents before the intervention, and baseline data reflecting the waste management cognition and attitude status of the women were obtained. Health Education Intervention was implemented on the participants for six (6) weeks at agreed periods (once a week, usually Saturdays) and location (a town hall in Mgbuoshimiri community). The researcher maintained close contact with the participants directly and (sometimes) through the research assistants via phone calls and physically during appointment days to ensure that the groups were intact for the post-test. After six (6) weeks, copies of the same instrument were also served and retrieved from the respondents.

Intervention procedure

The six-week household waste management education program aimed to teach women effective waste management strategies. Sessions were held every Saturday to minimize absenteeism and included interactive discussions, Q&A, practical activities like waste sorting, and instructional slide presentations. A teaching guide, validated by experts, outlined the program's goals, content, teaching methods, and evaluation processes. The intervention began with an orientation session to explain objectives and collect baseline data using a pretest

questionnaire. Participants engaged with materials such as PowerPoint slides and practical demonstrations, received tasks for follow-up discussions and were motivated with incentives. The final session assessed the program's impact through post-test data collection, ensuring active participation and measurable outcomes in improving household waste management.

Method of Data Analysis

The data from the respondents were collated, coded, and analyzed using Statistical Package for Social Sciences (SPSS version 25). The percentage was used to analyze the demographic data. A paired sample t-test and Analysis of Covariance (ANCOVA) were used to test the effect of the intervention at 0.05 level of significance.

Results

Demographic analysis

Table 1: Demographic characteristics of the participants

S/No	Demographics	Cohorts	F	%
1	Age	20-29 years	36	22.22
		30-39 years	69	42.59
		40-49 years	42	25.93
		50 years and above	15	9.259
		Total	162	100
2	Marital Status	Married	126	77.78
		Single	18	11.11
		Divorced/Separated	6	3.704
		Widow	12	7.407
		Total	162	100
3	Level of Education	No Formal Education	3	1.852
		Primary Education	12	7.407
		Secondary Education	93	57.41
		Tertiary Education	54	33.33
		Total	162	100
4	Occupation	Business	93	57.41
		Civil Servant	33	20.37
		House wife	27	16.67
		Farming	9	5.556
		Total	162	100

The demographic characteristics of the 162 participants show a diverse distribution across age, marital status, education, and occupation. The age group 30-39 years was the largest cohort at 42.59%, followed by 40-49 years at 25.93%, 20-29 years at 22.22%, and 50 years and above at 9.26%. Most participants were married (77.78%), with singles, widows, and divorced/separated constituting 11.11%, 7.41%, and 3.70% respectively. Educationally,

57.41% have secondary education, 33.33% tertiary, 7.41% primary, and 1.85% no formal education. Occupationally, 57.41% were engaged in business, 20.37% were civil servants, 16.67% were housewives, and 5.56% were farmers.

Hypotheses

Table 2: Summary of Paired Samples T-Test on the effect of Health education on waste management cognition of women in Mgbuoshimini community

Paired Samples T-Test Statistics						
Waste Management Cognition	n	Mean	Std. Deviation	Df	T	Sig.
Pre-test	16	2.38	0.18			
	2					
				16	19.6	0.0
				1	80	00
Post-test	16	2.92	0.27			
	2					

Source: Researchers' Primary Data. ** Significant at 0.05 alpha level

The result from Table 2 showed that the mean score for waste management cognition increased from ($M = 2.38$, $SD = 0.18$) in the pre-test to ($M = 2.92$, $SD = 0.27$) in the post-test, indicating an improvement in cognition after the health education intervention. The t-value of ($t = 19.680$) and a p-value of 0.000 ($p < 0.05$) suggested that the difference in mean scores between the pre-test and post-test was statistically significant ($t(161) = 19.680$, $p < 0.05$). This indicated that the health education intervention had a significant positive effect on waste management cognition among the women in Mgbuoshimini community.

Table 3: Summary of Paired Samples T-Test on the effect of Health education on the attitude of the women towards household waste management in Mgbuoshimini community

Paired Samples T-Test Statistics						
Waste Management Attitude	n	Mean	Std. Deviation	Df	T	Sig.
Pre-test	162	2.54	0.50	161	12.316	0.000
Post-test	162	3.04	0.36			

The result from Table 3 indicated that the mean score for waste management attitude increased from ($M = 2.54$, $SD = 0.50$) in the pre-test to ($M = 3.04$, $SD = 0.36$) in the post-test, indicating an improvement in attitude towards waste management following the health education intervention. The t-value of ($t = 12.316$) and a p-value of 0.000 ($p < 0.05$) proposed that the difference in mean scores between the pre-test and post-test was statistically significant ($t(161) = 12.316$, $p < 0.05$). This implied that the health education intervention had a significant positive effect on the attitudes of the women towards waste management.

Paired Samples t-test Statistics

Table 4: Tests of Between-Subjects Effects: ANCOVA on the effect of health education on household waste management cognition of women based on age, level of education and occupation.

Dependent Variable: Waste Management Cognition

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.127 ^a	23	0.092	0.708	0.83	0.11
Intercept	14.478	1	14.478	110.897	0.00	0.45
Age	0.657	3	0.219	1.678	0.17	0.04
Educational Level	0.172	3	0.057	0.438	0.72	0.01
Occupation	0.065	3	0.022	0.165	0.92	0.00
Age * Educational Level	0.151	4	0.038	0.289	0.88	0.01
Age * Occupation	0.271	6	0.045	0.347	0.91	0.02
Educational Level * Occupation	0.040	2	0.020	0.152	0.85	0.00
Age * Educational Level * Occupation	0.089	2	0.045	0.341	0.71	0.01
Error	18.016	138	0.131			
Total	68.600	162				
Corrected Total	20.143	161				

a. R Squared = .106 (Adjusted R Squared = .043)

The ANCOVA result from Table 4 indicates that the intercept is significant ($p < 0.05$), indicating that the mean of waste management cognition differs significantly from zero. The effect of health education on waste management cognition was not statistically significant based on age ($F(3, 1.678, p > 0.05)$), educational level ($F(3, 0.438, p > 0.05)$), and occupation ($F(3, 0.165, p > 0.05)$). This means that age, educational level, and occupation do not have an individual effect on cognition related to waste management.

The joint interactions between age, educational level, and occupation were also not statistically significant ($F(2, 0.341, p > 0.05)$), indicating that the combined effects of these factors do not significantly affect waste management cognition; consequently, the null hypothesis was accepted. The corrected model explained only 11% of the variance in waste management cognition ($R^2 = 0.106$, Adjusted $R^2 = 0.043$), suggesting that the model has weak explanatory power. There may be other factors not included in this model that could explain the variability in waste management cognition.

Table 5: Tests of Between-Subjects Effects

ANCOVA on the effect of Health education on the attitude of women towards household waste management based on age, level of education, and occupation

Tests of Between-Subjects Effects

Dependent Variable: Waste Management Attitude

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9.218 ^a	24	.384	6.863	.000	.647
Intercept	16.204	1	16.204	289.524	.000	.763
PRETESTWMA	.471	1	.471	8.408	.005	.085
AGE	.515	3	.172	3.066	.032	.093
EDUCATIONAL_LEVEL	1.426	3	.475	8.492	.000	.221
OCCUPATION	.173	3	.058	1.027	.384	.033
AGE * EDUCATIONAL_LEVEL	1.612	4	.403	7.199	.000	.242
AGE * OCCUPATION	1.726	6	.288	5.140	.000	.255
EDUCATIONAL_LEVEL * OCCUPATION	.303	2	.151	2.706	.072	.057
AGE * EDUCATIONAL_LEVEL * OCCUPATION	.247	2	.124	2.209	.116	.047
Error	5.037	90	.056			
Total	1068.343	115				
Corrected Total	14.255	114				

a. R Squared = .647 (Adjusted R Squared = .552)

The ANCOVA result from Table 5 demonstrated a significant overall model ($F = 6.863$, $p < 0.001$), explaining 64.7% of the variance in waste management attitude ($R^2 = 0.647$, adjusted $R^2 = 0.552$). This indicated a strong model fit, with the independent variables collectively making a substantial contribution. The intercept was highly significant ($F = 289.524$, $p < 0.001$), showing a significant baseline level of waste management attitude. The pretest scores of waste management attitude were also significant ($F = 8.408$, $p = 0.005$), explaining 8.5% of the variance, reflecting a moderate effect size. Among the main effects, age significantly influenced waste management attitude ($F = 3.066$, $p = 0.032$), with a partial eta squared of 0.093, accounting for 9.3% of the variance. Educational level had a stronger effect ($F = 8.492$, $p < 0.001$), explaining 22.1% of the variance, indicating a large effect size. In contrast, occupation was not a significant predictor ($F = 1.027$, $p = 0.384$), contributing minimally to the variance (3.3%). Interaction effects revealed significant contributions. The interaction between age and educational level was significant ($F = 7.199$, $p < 0.001$), explaining 24.2% of the variance, indicating a strong interaction effect. Similarly, the interaction between age and occupation was significant ($F = 5.140$, $p < 0.001$), contributing 25.5% of the variance, another strong effect. However, the interaction between educational level and occupation was not significant ($F = 2.706$, $p = 0.072$), and the three-way interaction among age, educational level, and occupation was also not significant ($F = 2.209$, $p = 0.116$). The model revealed significant determinants of waste management attitude, with educational level and age playing prominent

roles. The interactions between age and educational level and between age and occupation further highlighted their combined effect, while occupation alone and other interaction effects contributed minimally.

Discussion

This study examined the effect of health education on household waste management cognition and attitude of women in Mgbuoshimini community, River State.

The study revealed that health education interventions significantly enhanced waste management cognition and attitude among the women of the Mgbuoshimini community. This finding highlights the effectiveness of structured health education in improving waste management knowledge and behavior. By addressing the environmental and health impacts of improper waste disposal and teaching strategies like sorting, composting, and the 3Rs (reduce, reuse, recycle), participants developed better cognitive abilities and recognized the importance of proper waste practices. Clear, practical instruction fostered deeper engagement, aligning with studies like Sofia et.al. (2021) and Ding et al. (2022), which emphasize education's critical role in promoting sustainable waste management behaviors. The study demonstrated that health education significantly improved waste management attitudes among Mgbuoshimini women by fostering awareness of the personal and community benefits, such as better hygiene, reduced pollution, and improved health. Relatable methods like visual aids and real-life examples made waste practices tangible, while participatory activities like discussions and role-play created an engaging, supportive environment. This interactive approach empowered women to adopt sustainable behaviors. Studies by Kurbett et al. (2022) and Zhang and Wang (2020) similarly confirm that educational interventions enhance attitudes and promote effective waste management practices. Collectively, the findings underscore the transformative impact of health education in driving sustainable environmental behavior change.

The study revealed that health education significantly improved waste management cognition among Mgbuoshimini women, with variations based on age, education, and occupation. Women aged 50 and above showed the greatest improvement, likely due to heightened health risk awareness and alignment with communal values, echoing findings by Fadhullah et al. (2022) and Almasi (2019). However, ANCOVA analysis found no statistically significant cognitive differences across age groups, suggesting general baseline improvements. Educationally, women with secondary education showed the largest gains, as their foundational knowledge enhanced receptiveness to the intervention. Women with no formal education showed the smallest improvements, highlighting the need for tailored approaches, as supported

by Zhao et al. (2021) and Nwosu and Chukwueloka (2020). Occupationally, civil servants and farmers exhibited the highest gains, attributed to structured work environments and environmental connections, respectively, while businesswomen showed minimal gains due to time constraints. Overall, health education proved effective across all demographics.

The study demonstrated that health education significantly improved waste management cognition among Mgbuoshimini women, with variations by age, education, and occupation. Women aged 50 and above showed the greatest improvement due to heightened health risk awareness and alignment with communal values, while ANCOVA analysis indicated general baseline improvements across age groups. Educationally, women with secondary education benefited most, leveraging their foundational knowledge, while those with no formal education required tailored methods. Occupationally, civil servants and farmers showed the highest gains, linked to their structured work environments and environmental ties. Businesswomen exhibited smaller gains due to time constraints. Overall, health education proved effective. This suggests that the relevance of education to one's daily life plays a critical role in them getting informed, thereby shaping their attitudes.

Conclusion

Based on the findings of this study, it is evident that health education plays a pivotal role in enhancing waste management attitudes among women. The health education intervention demonstrated a significant effect on waste management cognition and attitude, with substantial improvements across all demographic groups, particularly among older women and those with secondary education. These findings highlighted the effectiveness of structured educational programs in raising awareness and deepening understanding of waste management practices, which is especially crucial in communities where women are key actors in household waste management. However, demographic-specific interventions may be necessary to maximize the intervention's effectiveness, as age, education level, and occupation were found to influence the degree of impact in each area. This awareness suggests that adapting health education programs to meet the unique needs of different demographic groups can enhance their overall effectiveness, promoting more sustainable waste management practices at both the household and community levels.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Local governments and NGOs should create tailored educational materials and host community workshops targeting women, emphasizing their key role in household waste management to enhance their knowledge and participation in sustainable practices.
2. Health institutions should incorporate waste management education into maternal and child health services, especially antenatal care, to promote environmentally responsible behaviors among women and households from an early stage.

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