



Impact of a Health Education Intervention on Health-Related Knowledge Among Market Traders in Selected Markets in Orlu Local Government Area, Imo State, Nigeria

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OPEN ACCESS

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Received Date: 11 Jul 2026

Accepted Date: 26 Aug 2026

Published Date: 28 Aug 2026

Citation:

Pamela EC, Ifeoma OF, Olivia NC, Chekubenachukwu OJ, Roseflora Esther EM. Impact of a Health Education Intervention on Health-Related Knowledge Among Market Traders in Selected Markets in Orlu Local Government Area, Imo State, Nigeria. WebLog J Nurs. wjnr.2026.h2801. <https://doi.org/10.5281/zenodo.22162138>

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Abstract

In developing countries, poor solid waste management is a serious environmental and public health concern, mostly owing to lack of awareness and inefficient trash disposal techniques. Health education is recognised as an effective approach to improve environmental health understanding and promote healthy waste management habits among community members. The study was aimed at assessing the effect of health education intervention on the understanding of solid waste management among market merchants in selected marketplaces in Orlu Local Government Area, Imo State, Nigeria. A quasi-experimental pre-test-post-test design was carried out on 361 market traders recruited by multistage selection method from three major markets in Orlu Local Government Area. Pre and post intervention health education on solid waste management was conducted utilising a standardised questionnaire prepared by the researcher for data collection. The intervention was based on interactive instructional workshops on classification, segregation, recycling, composting, proper disposal methods, and health effects of improper waste management. Data were examined using IBM SPSS version 22 software. Descriptive statistics (frequency and percentage) were used to describe respondents' characteristics and knowledge levels, and the Chi-square test was used to analyse the difference between pre- and post-intervention knowledge. The significance level was chosen at $p < 0.05$. Most of the respondents were women (59.0%), married (62.9%) and had secondary education (72.6%). The largest age group was 36–45 years (40.2%). Baseline data showed there was inadequate understanding on important components of solid waste management. Only 36.3% correctly identified that solid waste comprises wet and dry trash, 26.0% identified biodegradable materials as wet waste and 25.2% identified waste segregation as the first step of appropriate waste management. Moreover, 97.5% of them wrongly thought that open burning was a good way of disposing rubbish. After the health education intervention, there were significant gains in all knowledge indicators. Knowledge of trash classification rose to 97.5%, identification of biodegradable garbage to 95.3%, recognition of waste segregation as the first stage in proper waste management to 98.1% and awareness of composting as a waste reduction method to 99.4%. The number of respondents who correctly said that open burning was not a proper form of disposal rose to 90.0%. The total percentage of respondents with above-average knowledge grew from 45.2% before the intervention to 86.0% after the intervention, and those with below-average knowledge decreased from 23.8% to 3.6%. The increase in knowledge post intervention was statistically significant ($\chi^2 = 137.69, p < 0.001$). The health education intervention led to a considerable improvement in the understanding of market traders on solid waste management. The inclusion of regular environmental health education courses in market sanitation efforts could promote waste management practices significantly hence contributing to better environmental sanitation and public health in Nigerian marketplaces.

Keywords: Health Education; Solid Waste Management; Market Traders; Environmental Sanitation; Knowledge; Quasi-Experimental Study; Nigeria

Introduction

The production of solid waste has expanded dramatically all over the world due to rapid urbanisation, industrialisation, population growth and changing consumption habits. The excessive

usage of throwaway items including plastic bottles, food wrappers, nylon bags, electronic devices, and other consumer items has led to an unprecedented increase in municipal solid trash. These items enhance convenience and quality of life but the garbage they generate presents serious environmental and public health problems if not adequately managed. Waste is an inevitable by-product of human endeavours, and it can be in the form of solid, liquid or gaseous matter. Solid waste is one of the most pressing environmental issues in developing countries such as Nigeria [1].

Solid waste management involves the collection, transportation, treatment, recycling and disposal of garbage in a manner that protects human health and the environment. As stated by [2], the rate of urbanisation, industrialisation, migration, and population growth has increased the quantity of solid garbage produced and has exerted tremendous pressure on existing waste management systems. But in many developing countries the rate of trash produced still exceeds the capacity to collect and dispose of it properly. Therefore, uncoordinated garbage disposal has become rampant leading to environmental pollution, clogging of drainage channels, flooding and breeding of disease vectors which transmit diseases such as malaria, cholera, typhoid fever and dysentery.

The production of municipal solid trash has become a serious problem worldwide. Developed countries are expected to produce approximately 1.3 billion tonnes of solid trash each year, and this amount is forecasted to increase in the years to come. In developing countries, garbage is produced at an even faster rate as their cities are growing, and they lack proper systems for waste management [3]. Research shows that in Nigeria, despite the annual rise in garbage output, only a small percentage of the created waste is well collected and disposed of, while a large amount of the waste remains uncollected and mismanaged [4]. This imbalance has far-reaching consequences for environmental degradation and public health hazards.

The poor disposal of waste has major effects for human health and the environment. Accumulated trash provides breeding places for mosquitoes and rats and flies, which spread contagious diseases. Indiscriminate dumping of garbage often results in blocked drainage channels which result in floods during the rainy season, destruction of property, poisoning of water supplies and displacement of populations. Open rubbish burning releases hazardous pollutants into the atmosphere, causing respiratory illnesses and environmental damage [5].

Waste generation cannot be totally reduced; however appropriate waste management strategies can greatly minimise its negative impact. These include segregation of garbage, recycling, composting, safe collection and environmentally sound disposal. However, the successful implementation of these strategies depends on the proper public understanding, good attitudes and suitable waste disposal practices. Unfortunately, limited understanding on trash classification, recycling and proper disposal still remains a major obstacle to successful solid waste management in many Nigerian communities [6].

Health education is widely recognised as one of the most effective tools for improving environmental health practices. It is a deliberate educational process aimed at increasing the knowledge and developing the attitudes, skills and behaviours of people and communities to accept the concept of a healthy living. According to [7], health education is an effective instrument that enables

communities to identify, avoid and mitigate environmental and health problems including improper solid waste management. Health education can promote responsible waste disposal practices by increasing awareness and changing behaviours, leading to cleaner and healthier communities.

Markets are one of the main producers of Municipal solid waste due to the selling of food items, agricultural produce, household goods and other commodities in daily commercial activity. Large volumes of biodegradable and non-biodegradable wastes are produced from these operations. garbage generated in many Nigerian marketplaces are generally discarded indiscriminately due to inadequate garbage collection infrastructure, poor environmental sanitation practices and limited enforcement of waste management legislation [8]. Unfortunately, this leads to market environments that are often breeding grounds for disease vectors and expose traders, customers and neighbouring populations to a number of environmental health dangers.

Nigeria's poor waste handling infrastructure further complicates the situation. Environmental sanitation organisations are usually plagued by inadequate financing, inadequate manpower, inadequate waste collecting equipment, bad waste disposal technologies, poor institutional coordination and poor enforcement of environmental legislation [9]. These structural issues have motivated risky waste disposal behaviours such as dumping of rubbish in drainage channels, open spaces, roadsides and unauthorised areas, as well as open burning of waste. These behaviours have detrimental effects on environmental aesthetics, increase the incidence of floods, promote infectious diseases, and reduce the general quality of life of the population [10].

Markets in Nigeria often reflect the terrible sanitary conditions in many urban communities. Markets draw huge numbers of traders and customers daily and are generally located adjacent to residential areas, schools and work locations, so inadequate waste management within these contexts has extensive public health effects. Traders' waste management practices are determined by their knowledge level, attitudes, perception, motivation and availability of suitable waste disposal facilities [11] studies have reported. However, there still lacks consistent health education and behaviour modification interventions for market groups.

This is more pronounced in markets in Orlu Local Government Area of Imo State. Observations reveal that indiscriminate dumping of rubbish into drainage channels, open dumping of market waste and open air burning of refuse are still frequent practices. Blocked drainage systems sometimes lead to flooding of market areas and nearby residential neighbourhoods during the rainy season, which in turn results in environmental contamination, property damage and increased risk of infectious diseases. Many traders view waste management as the entire duty of government authorities, and so show little dedication to safe garbage disposal techniques. Even during organised environmental cleanliness exercises, debris is often cleared from drainage channels and dumped along the side of the channels so that the refuse can be washed back into the drains by following rainfall. Such practices indicate the critical need for continuous public health interventions to improve environmental sanitation behaviours.

The importance of health education as an effective intervention in promoting positive behaviour change and community participation

in environmental sanitation has been recognised. Health education is important in enhancing knowledge and developing positive attitudes to proper waste management, thereby improving waste disposal practices among market traders significantly and creating healthier market environments [12]. Similarly, It was established that public education greatly enhanced community participation in proper solid waste management [13].

Against this background, this study therefore attempts to assess the effect of health education intervention on awareness of solid waste management among market merchants in selected markets in Orlu Local Government Area of Imo State, Nigeria. The findings are likely to provide evidence for establishing successful health education programs for improving environmental sanitation practices and for reducing public health hazards related with poor solid waste management among market communities.

Materials and Methods

Study design

This study employed a quasi-experimental pre-test-post-test control group design to evaluate the impact of a health education intervention on the knowledge and attitudes of market traders regarding solid waste management in selected markets in Orlu Local Government Area (LGA), Imo State, Nigeria. Participants were assessed before the intervention (pre-test) and after the intervention (post-test), allowing comparison of changes attributable to the health education programme.

A quasi-experimental design was considered appropriate because it permits the evaluation of educational interventions where random assignment of participants is impractical. Similar designs have been successfully used by Karout and Altuwaijri (2012) to assess the effectiveness of health education on community knowledge, attitudes, and behaviours concerning solid waste management in Beirut, Lebanon, and by Elnour *et al.*, (2015) to evaluate the impact of health education on healthcare waste management knowledge and practices among hospital staff in Sudan.

Study area

The study was conducted in three major markets: International Market, Ahia Mgbede, and Ahia Owerre-Ebiri, located in Orlu Local Government Area of Imo State, southeastern Nigeria.

Orlu LGA covers approximately 132 km² and is one of the largest commercial centres in Imo State, with an estimated population exceeding 420,000 people (Egbokhare et al., 2002). The Local Government Area comprises over 18 towns and 33 autonomous communities, including Umuna, Umusasa, Owerre-Ebiri, Amaifeke, Ihoma, Okporo, Ogberuru, Obibi-Ochasi, Umuowa, and Ihete-Owerri.

The economy of Orlu is predominantly driven by commerce and agriculture, with trading serving as the principal occupation of many residents. The area hosts the Imo State University Teaching Hospital, several primary healthcare centres, private hospitals, and maternity homes. Although many markets in the LGA operate on the traditional market days (Eke, Orie, Afor, and Nkwo), the three selected markets operate daily and therefore provide an appropriate setting for studying waste generation and management practices.

The major sources of water supply are boreholes, wells, and water vendors, while Christianity is the predominant religion.

Study population

The study population comprised all registered adult traders (≥ 18 years) operating in the selected markets who owned or rented shops or stalls and regularly paid market dues.

Inclusion criteria

Participants were eligible if they:

- Were aged 18 years or older;
- Owned or rented a shop/stall within the selected markets;
- Had traded in the market for at least six months;
- Consented to participate in the study.

Exclusion criteria

Traders who were seriously ill during the study period, temporary traders, or those unwilling to participate were excluded.

Sampling technique

A multistage sampling technique was employed.

In the first stage, three towns (Umuna, Umusasa, and Owerre-Ebiri) were selected through simple random sampling from the towns constituting Orlu LGA.

In the second stage, one market was purposively selected from each town based on its daily operation:

- International Market (Umusasa)
- Ahia Mgbede (Umuna)
- Ahia Owerre-Ebiri (Owerre-Ebiri)

These markets had estimated trader populations of approximately 5,000, 3,000, and 1,000, respectively.

In the final stage, participants were proportionately allocated across the three markets according to their estimated trader populations using the ratio 5:3:1. Within each market, eligible traders were selected using simple random sampling.

Instrument for data collection

Data were collected using a researcher-developed structured questionnaire.

The questionnaire consisted entirely of closed-ended questions and was divided into four sections:

Section A: Socio-demographic characteristics (6 items)

Section B: Knowledge of solid waste management (14 items)

Section C: Attitudes towards solid waste management practices (8 Likert-scale items)

Section D: Factors influencing improper solid waste management (7 Likert-scale items)

The post-intervention questionnaire was identical to the pre-test questionnaire except that Section D was omitted because it assessed baseline factors rather than intervention outcomes.

For participants who could not read English, trained research assistants translated the questions into the local Igbo language.

Health education intervention

The intervention consisted of a researcher-developed health

education package on solid waste management.

The educational package comprised two instructional modules covering:

- Concepts of solid waste management;
- Health implications of improper waste disposal;
- Waste segregation;
- Recycling practices;
- Environmental sanitation;
- Personal responsibilities in waste management;
- Practical demonstrations of proper waste disposal practices.

Each session lasted approximately 40 minutes, consisting of a 30-minute interactive lecture followed by 10 minutes of discussion and questions.

The intervention was delivered over two weeks, with each market receiving two educational sessions separated by a two-day interval.

Validity of the instrument

Face and content validity were established by experts in Nursing, Public Health, and Measurement and Evaluation.

The questionnaire, study objectives, and intervention package were independently reviewed for relevance, clarity, comprehensiveness, and appropriateness. Suggestions from the reviewers were incorporated before the final administration of the instrument.

Reliability of the instrument

The reliability of the questionnaire was determined using the test-retest method.

The instrument was pretested among 38 traders (10% of the study sample) in Ori Market, Umuna, who possessed characteristics similar to those of the study participants but were not included in the main study.

The questionnaire was administered twice at an interval of two weeks.

Responses from the two administrations were analysed using the Pearson Product-Moment Correlation Coefficient (PPMCC), yielding a reliability coefficient of $r=0.844$, indicating excellent reliability.

Ethical considerations

Ethical approval was obtained from the Ministry of Health Research Ethics Committee Orlu LGA before commencement of the study.

Administrative permission was obtained from the leadership of the Orlu Market Amalgamated Traders Association (OMATA) in the selected markets. Approval was also obtained from the Local Government authorities.

Participation was entirely voluntary.

The purpose of the study was clearly explained to all eligible participants, and informed consent was obtained before questionnaire administration.

Participants were assured of confidentiality and anonymity. No identifying information such as names or addresses was collected.

Participants were informed of their right to withdraw from the study at any stage without any adverse consequences.

Data collection procedure

Six trained research assistants (three nurses and three teachers) assisted with data collection after undergoing training on the study objectives, ethical issues, questionnaire administration, and intervention procedures.

Data collection lasted eight weeks and consisted of four phases:

Phase I: Orientation (Week 1)

The researcher met with traders during their monthly market meetings, introduced the study, explained its objectives, and recruited eligible participants.

Phase II: Pre-intervention Assessment (Weeks 2-4)

Baseline data were collected using the structured questionnaire.

Questionnaires were completed within approximately 10–20 minutes, depending on respondents' literacy levels. Assistance was provided for participants unable to read English.

Completed questionnaires were retrieved immediately.

Phase III: Health Education Intervention (Weeks 5-6)

Health education sessions were delivered using the structured intervention package.

Each market received two instructional sessions over six days.

Interactive teaching methods, demonstrations, and question-and-answer sessions were employed to enhance participants' understanding.

Phase IV: Post-intervention Assessment (Weeks 7-8)

The post-test questionnaire was administered to the same participants using the same procedures adopted during the baseline survey.

Data analysis

Data were entered, cleaned, and analysed using IBM SPSS Statistics version 22.0.

Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarise respondents' characteristics and answer the research questions.

Inferential statistics were used to test the study hypotheses. Differences between pre-test and post-test mean scores were assessed using the paired-samples *t*-test, while comparisons between groups were performed using the independent-samples *t*-test, where appropriate.

All statistical tests were two-tailed, and *p*-values less than 0.05 were considered statistically significant.

Results

The ages of the respondents were fairly distributed but greater proportions (145; 40.2%) were aged between 36 and 45 years. Moreover, nearly three-fifth (213; 59%) were females, with majority (350; 97%) being Christians by religious belief. In addition, greater percentage (62.9%) of the participants were in marital union, roughly two-third (262; 72.6%) had completed secondary education, while 203(56.2%), 119(33%) and 39(10.8%) of the respondents were selected

Table 1: Socio-demographic characteristics of the respondents, (n=361).

Variable	Categories	Frequency	Percentages
Age	18-25 years	90	24.9
	26-35 years	126	34.9
	36-45 years	145	40.2
Sex	Male	148	41.0
	Female	213	59.0
Religion	Christianity	350	97.0
	Islamic	11	3.0
Marital status	Single	134	37.1
	Married	227	62.9
Educational level	Primary	29	8.0
	Secondary	262	72.6
	Tertiary	70	19.4
Name of Market	International market	203	56.2
	Ahia mgbede	119	33.0
	Nkwor Owerre-ebeirri	39	10.8

from international market, Ahia Mgbede and Nkwor Owerri-ebeirri respectively (Table 1&2).

Regarding the knowledge of waste management among the respondents before health education, A Little less than half (36.3%) of the respondents knew that solid waste is made up of wet and dry garbage; 94(26%) were aware that decomposable foods like egg, grass, vegetables are wet garbage, while 131(36.3%); were informed that plastic cans, paper and glass are dry garbage. Over half (56.5%) knew that composting is a good way of reducing waste; and that dumping wastes in gutters or by the roads is not a proper disposal method 218(60.4). However, only 91(25.2) of the subjects knew that waste separation is the first step to proper waste management and nearly all 352 (97.5%) of the respondents held the wrong notion that open burning of waste is a good method of waste disposal.

With regards to the knowledge of the respondents about the effect of solid waste management. Results showed that they were aware of most of the effects of proper and improper solid waste management.

Table 2: Knowledge of participants of solid waste management before health education, (n=361).

Assessment variable	Responses		Appropriate responses
	No f (%)	Yes f (%)	f (%)
Solid waste is made up of wet and dry garbage	230(63.7)	131(36.3)	131(36.3)
Decomposable foods like egg, grass, vegetables are wet garbage	267(74.0)	94(26.0)	94(26.0)
Plastic cans, paper and glass are Dry garbage	230(63.7)	131(36.3)	131(36.3)
Dumping in gutters or by the roads is a proper disposal method?	218(60.4)	143(39.6)	218(60.4)
Composting is a good way of reducing waste?	204(56.5)	157(43.5)	204(56.5)
Open Burning is a good way of disposing waste?	9(2.5)	352(97.5)	9(2.5)
Waste separation is the first step to proper waste management	270(74.8)	91(25.2)	91(25.2)
Reuse of materials makes little impact on waste management	59(16.3)	302(83.7)	59(16.3)
Proper waste management is necessary for the prevention of certain illnesses and diseases	137(38.0)	224(62.0)	224(62.0)
Improper waste disposal creates breeding sites for pests and rodents	53(14.7)	308(85.3)	308(85.3)
Improper waste management increase the risks of one contracting malaria, Lassa fever, cholera, dysentery etc.	71(19.7)	290(80.3)	290(80.3)
Proper waste management keeps our environment and air clean	40(11.1)	321(88.9)	321(88.9)
Living in an unpolluted environment has no benefits	351(97.2)	30(8.3)	351(97.2)
Disposing of Nylon and plastics in gutters causes sewage block	46(12.7)	315(87.3)	315(87.3)

Except for reuse of materials as reflected in the question if reuse of materials makes little impact on waste management were over four-fifth (83.7%) agreed (Table 3).

After the health education intervention, the responses on the knowledge of solid waste management shows that 352(97.5%) of the traders knew that solid waste is made up of wet and dry garbage, 336(93.1%) became well informed that plastic cans, paper and glass are dry garbage. In addition, 359(99.4%) now knew that composting is a good way of reducing waste, and nearly all of the traders agreed that solid waste separation is the first step to solid waste management. With regards to their knowledge of the effect of solid waste management, 357(98.9%) of the respondents became aware that reuse of materials has some impact on waste management.

Figure 1, shows the categorization of the respondents' knowledge of waste management. Before the intervention 23.8% of the respondents scored below average, 31.0% scored average and 45.2% had knowledge scores above average. However, after the intervention scores changed in a positive direction as only 3.6% were below average, 10.8% average and over 86% scored above average knowledge. There was a significant difference between the knowledge pre and post intervention ($\chi^2=137.69$, $p<0.001$) at 0.05 level of significance. It therefore implies that the knowledge improved marginally after the educational intervention.

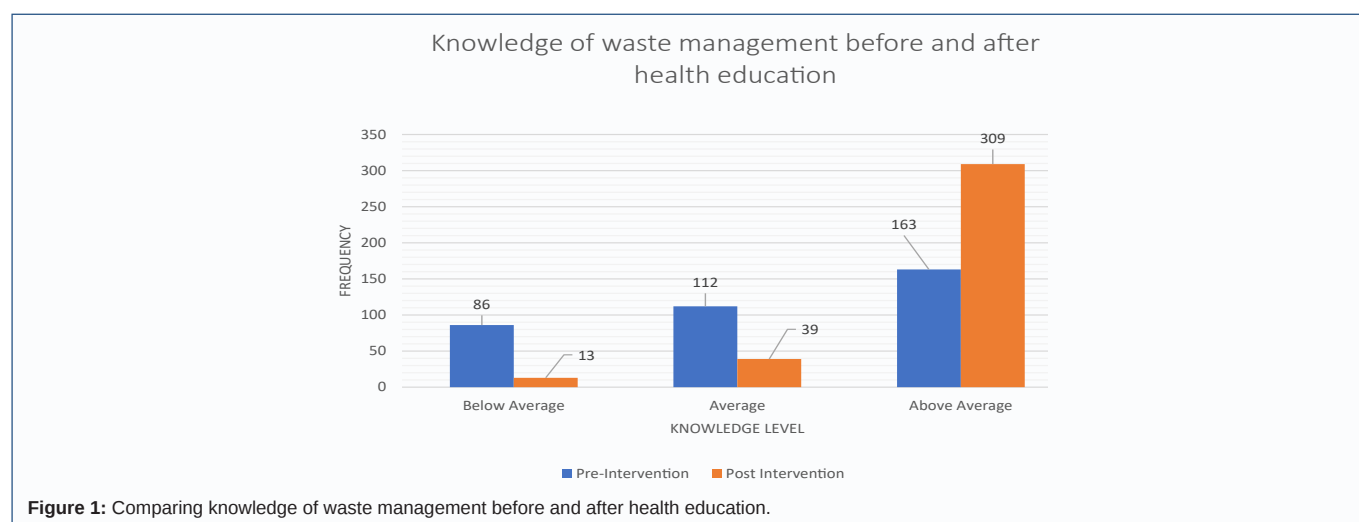
Discussion

The study findings are evaluated against the study objectives and existing empirical evidence on the effectiveness of health education interventions in enhancing understanding of solid waste management among market traders.

The present study reveals that the understanding of traders on solid waste management was generally low. Prior to the intervention, only a tiny fraction of the respondents was able to accurately identify the composition of solid waste, with just a little more than one-third of the respondents identifying that solid trash is moist and dry. A large number of respondents recognised plastics, paper and glass as dry trash, while a few respondents classified biodegradable goods such as meal leftovers, vegetables and grasses as wet garbage. This conclusion reflects ignorance of market participants on waste segregation

Table 3: Knowledge of solid waste management after health education, (n=361).

Assessment variable	Responses		
	No f (%)	Yes f (%)	Appropriate responses f (%)
Solid waste is made up of wet and dry garbage	9(2.5)	352(97.5)	352(97.5)
Decomposable foods like egg, grass, vegetables are Wet garbage	17(4.7)	344(95.3)	344(95.3)
Plastic cans, paper and glass are Dry garbage	25(6.9)	336(93.1)	336(93.1)
Dumping in gutters or by the roads is an improper disposal method?	36(10.0)	325(90.0)	325(90.0)
Composting is a good way of reducing waste	2(0.6)	359(99.4)	359(99.4)
Open burning is a good way of disposing waste?	326(90.0)	35(9.7)	326(90.0)
Waste Separation is the first step to proper waste management	7(1.9)	354(98.1)	354(98.1)
Reuse of materials makes little impact on waste management	357(98.9)	4(1.1)	357(98.9)
Proper waste management is necessary for the prevention of certain illnesses and diseases	9(2.5)	352(97.5)	352(97.5)
Improper waste disposal creates breeding sites for pests and rodents	23(6.4)	388(93.6)	388(93.6)
Improper waste management increase the risks of one contacting malaria, Lassa fever, cholera, dysentery etc.	9(2.5)	352(97.5)	352(97.5)
Proper waste management keeps our environment and air clean	5(1.4)	356(98.6)	356(98.6)
Living in an unpolluted environment makes one always healthy and happy	10(2.8)	351(97.2)	351(97.2)
Disposing of Nylon and plastics in gutters causes sewage block	6(1.7)	355(98.3)	355(98.3)



techniques. trash segregation, recycling and environmentally friendly trash disposal require knowledge of waste classification. Poor knowledge of these ideas is possibly a major reason for the incorrect garbage disposal methods often seen in Nigerian markets.

Similarly, just one-fourth of the respondents realised that waste segregation is the first stage in successful solid waste management. This finding is consistent with the study of [14] which found low level of awareness on waste reduction and source separation among households mainly due to poor environmental education. Proper segregation of trash at source helps in recycling, composting and safe disposal thereby decreasing pollution of environment. This knowledge gap consequently highlights the necessity of ongoing educational activities aimed at market audiences.

The study also revealed that although many of the traders were aware that indiscriminate dumping of waste in drainage channels and along roadsides was hazardous to the environment, many of them did not have adequate information on how to properly dispose of waste. Similarly, the level of awareness about composting as an environmentally friendly waste management approach was low

before the intervention. Such findings could be a consequence of lack of enlightenment of the public on sustainable waste management methods and paucity of accessible garbage disposal facilities in the market environment. Composting is still one of the best ways to deal with biodegradable trash, decreasing the pressure on landfills, cutting down on nasty smells and creating valuable organic manure to be used in agriculture. Thus, boosting awareness on composting may significantly enhance environmental cleanliness and waste reduction.

One of the major findings was the prevalent misperception on open burning of garbage. Almost all respondents first believed that burning rubbish in open locations was an appropriate form of waste disposal [15]. This suggests a poor grasp of health and environmental dangers connected with open burning, including air pollution, respiratory ailments, greenhouse gas emissions, and exposure to harmful compounds. Similar results were found by [16] who noted that people of Kinondoni Municipality in Dar es Salaam were only aware of the acute effects of burning rubbish, but not of its long-term health ramifications. This ongoing misperception highlights the need for thorough environmental health education that targets the dangers

of open burning [17].

The respondents had some shortcomings in practical waste management expertise but their understanding of some health implications resulting from inappropriate garbage disposal was relatively good. Most of the participants knew that improper waste management causes the development of infectious diseases such as malaria, cholera, dysentery, typhoid fever and Lassa fever by providing breeding grounds for insects and rodents. They also confessed that the dumping of plastics and nylon materials indiscriminately into the drainage channels adds to flooding and environmental destruction. However, a large number of respondents underestimated the value of reusing materials as an efficient waste reduction technique. The finding indicates that traders were generally aware of the impacts of poor waste management, but were not adequately knowledgeable about practical waste minimisation techniques such as reuse and recycling [18].

The health education intervention resulted in significant improvement in respondents' knowledge on solid waste management. Following the intervention, the majority of the respondents correctly identified the composition of solid wastes and had a clear comprehension of the principles of waste segregation. It is believed that the improved knowledge of waste classification will help sorting, recycling and composting properly, thus decreasing environmental contamination in the market environment.

Health education also had a considerable positive effect on the awareness of the responders on environmentally friendly ways of disposing trash. The majority of respondents after the intervention correctly recognised dumping rubbish in gutters as an inappropriate disposal practice and rejected open burning as an acceptable waste management strategy. Almost all respondents also recognised composting as a useful approach to reduce biodegradable trash. These results indicate that systematic health education campaigns are useful in addressing misconceptions and encouraging ecologically responsible behaviours.

The intervention also resulted in a significant increase in awareness on the environmental and public health benefits of proper garbage management. In particular, the instructional workshops led to a remarkable increase in understanding of the need of reusing resources. Almost all the respondents later agreed that re-use of recyclable materials contributes greatly to reducing waste. This finding is similar with the study of [19] that demonstrated considerable improvement in the participants' understanding of trash separation and reuse after a community-based health education programme.

The post-intervention outcomes also reveal that practically all respondents had good awareness on the health effects of poor waste management. Participants accurately identified improper waste disposal as a cause of disease transmission, environmental degradation, pest infestation, flooding, and a reduction in sanitation of the community. These results show that health education increases not only fact knowledge but also awareness of the wider public health implications of poor environmental sanitation.

The study indicated a statistically significant overall improvement in traders' knowledge after the intervention. Most respondents had below average or average understanding of solid waste management before the educational programme with less than one-quarter having above average knowledge. However, after the intervention, the vast majority of students scored above average in knowledge, with

only a tiny number of students still in the average or below normal categories. These results are in line with the results of [20] who also reported considerable improvement in knowledge of participants after community-based environmental health education.

The results provide strong evidence that structured health education interventions are very effective in enhancing environmental health knowledge among market traders. Enhanced information acquisition is expected to lead to positive behavioural change, promote safer waste disposal methods and eventually contribute to enhanced environmental sanitation and reduction of public health hazards in market areas.

Conclusion

The study revealed that the market traders in the selected markets in Orlu Local Government Area had poor baseline knowledge on critical issues of solid waste management, especially waste classification, segregation, composting, recycling, reuse of materials and the health hazards associated with open burning of waste. Many respondents were aware of the effects of incorrect garbage disposal, although there were still significant misconceptions and knowledge gaps.

The knowledge of the traders on almost all aspects of solid waste management improved statistically and practically significantly after the health education intervention. The participants were taught more on trash segregation, proper ways of disposal, composting, recycling, reuse of materials and the environment and health impact of poor waste management.

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