IMPACT OF ENVIRONMENTAL EDUCATION ON KNOWLEDGE AND PRACTICE OF REFUSE DISPOSAL AMONG STUDENTS IN COMMUNITY SECONDARY SCHOOL EBEDEBIRI

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Abstract
Management of refuse is a serious public health challenge in Nigeria, because it is uncoordinated and poses serious threat to the health of man and its immediate environment. One way to address the issue of refuse disposal in the schools and even in the communities is through environmental health education programmes. Health education programmes are educational interventions aimed at promoting healthy behaviours and preventing diseases through the dissemination of information and the creation of awareness. The study aimed at investigating the impact of environmental health education programme on the knowledge and practice of refuse disposal among secondary school students in community secondary school, Ebedebiri, Bayelsa State. The study adopted quasi-experimental design of pretest-posttest non-equivalent control group research design. Two hypotheses guided the study. The sample size was determined using 20 percent of the school population, which resulted to 127 respondents. Purposive sampling technique was used in selecting the 54 respondents from JSS2 and 73 respondents from SS1 for the study. A self-developed, and validated questionnaire with two sections was used as instrument for data collection. The valid questionnaire was subjected to reliability test through the use of Cronbach's Alpha and a reliability coefficient of 0.77 was established which was considered appropriate for the instrument to be used for the study. A lesson guide was also developed and used by the researchers in line the content of the environmental education package. A 6-week environmental education programme was designed to impact the participant's knowledge and practice of refuse disposal methods. Data were analyzed using inferential statistics of ANCOVA set at 0.05 level of significance using pretest as covariance. From the findings, it was concluded that, the knowledge and practice of refuse disposal methods was improved after the environmental health education programme. Based on the conclusion, it was recommended that, the social mobilization unit of the Primary Health Care Department in the unified Local Government system should regularly carry out school out-reach programmes that are centered on environmental sanitation.

Introduction

All activities of man in his environment have the potential to generate waste that are eventually disposed on land, dispersed by air and sometimes dumped into open water bodies thereby leading to environmental pollution. A waste is simply described as unwanted or discarded matter in the environment. It is the ruminant from a process of conversion or

transfer of materials that have no minute value or usefulness to the community. Waste could be solid (refuse), liquid and gaseous waste. Refuse are discarded, useless and unwanted solid or semi-solid material that result from human activities in any environment (Berkhout et al., 2009). Refuse includes all non-liquid and non-soluble substances or materials from human and animal activities that are discarded or dumped in the environment. Solid waste can sometimes be used interchangeably with refuse which means all the discarded solid materials produced by human in the environment except excreta.

Refuse does not entail night soil. According to Yoshida et al., (2009), refuse is broadly classified into rubbish and garbage. Rubbish is the bulk of non-purifiable waste that do not decay. Some categories of rubbish are combustible while others are non-combustible. Rubbish includes papers, plastics, metals, glasses, and ceramics, wood, throw away containers, cloth, bedding, and furniture. Garbage is described as the decomposable waste from food stuff, animals, fruits and vegetables residues (Hoornweg et al., 2012). Garbage are putrefiable and are generated from the preparation, cooking and serving of food in the human environment. Management of refuse is a serious public health challenge in Nigeria, because it is uncoordinated. It poses serious threat to the health of man and its immediate environment. In Nigeria, more than 25 million tons of refuse are generated each year. The rate and quantity of refuse generated in Nigeria differs significantly from urban areas to rural areas and sometimes from state to state. The rate of generation ranges from 0.66kg/cap/day for urban areas to 0.44kg/cap/day for rural areas. Refuse generation is reciprocal to population growth, socio-economic background and degree of urbanization. It has a strong connection with the urbanization and socio-economic growth. According to experts, this situation is currently as a result of urbanization and rapid population growth in most cities of Nigeria (Anunobi, and Emecheta, 2017). This has also made refuse generation faster than they are collected, transported, and disposed. Urbanization has greatly compounded the problem of refuse management as land becomes scarce, human settlements encroach upon landfill space, and government in some cases encourage new development directly on top of recently closed landfills (Tchobanoglous et al., 2014). The urbanized environments with high population that are habited by individuals in the highest socio-economic ladder will always record a high rate of refuse generation. The uncoordinated disposal of refuse if allowed to continue without any control measure will lead to soil, water and air pollution (Taylor and Bryan, 2015).

In developed and normal societies, refuse management simply means the collection, keeping, treatment and disposal of refuse in such a way as to render them harmless to human and animal life and environment generally. The management of refuse has become a major concern despite several attempts by successive governments and private organizations in that direction. That is why, it is a common sight across the country today to see heaps of putrefying or decaying refuse dumps in almost every nook and crannies of cities. Refuse management remains one of the most daunting environmental sanitation challenges facing the Nigerian cities, and it has continually remained at its lowest ebb despite huge investments in the sector.

The school environment plays a vital role in determining the state of health and the academic performance of the learner. The school environment must be healthy and free

from hazards that could negatively affect the health of the learners, teachers and other personnel in the school. Healthful school environment is a major component of the school health programme that protects learners and staff against immediate injury or disease and promote prevention activities and attitudes against known risk factors that might lead to future disease or disability. A notable aspect of a healthful school environment is the management of waste, especially refuse in the school environment with a view to curtailing the spread of infection and prevent disease outbreaks. When the school environment is not health friendly, there would be high incidence of accidents and steady spread of communicable diseases. Communicable diseases thrive majorly in an environment that is not clean and favours the easy spread of pathogens. Every year about two million children die of diarrhoeal disease due to unsafe water supplies, poor sanitation and hygiene. Human excreta harbour pathogens like parasite, bacteria and virus that significantly contribute to the high mortality rate among infants.

Refuse disposal in schools has become a critical issue due to its negative impact on the health and well-being of the learners, teachers and overall quality of life of individuals in the communities. Improper handling and disposal of refuse can lead to the contamination of the school environment that might lead to various environmental health problems. One of the major consequences of inadequate refuse disposal is pollution. As averred by Kjeldsen et al., (2012), dumping waste in open spaces or water bodies in the school environment can contribute to the pollution of these areas, posing a threat to plant and animal life, as well as human health. The production of methane as a result of organic waste decomposition which is a potent greenhouse gas that contributes to climate change (Onward, 2020). The improper disposal of refuse can also lead to the spread of diseases in the school environment that can lead to epidemics. Refuse serves as a breeding ground for pathogens, vectors and pests, such as rats and flies. These pests can transmit diseases to humans, leading to epidemics of different dimensions (Anderson, 2019).

Furthermore, the presence of rotting refuse in the school environment can attract vermin and insects, posing a direct threat to the health of the learners and the staff. In many Nigerian schools or institutions where teaching and learning take place, refuse is disposed of by either dumping or burning, because there are no coordinated patterns or process of refuse management. These methods have negative impacts on the environment and human health. For example, dumped refuse can contaminate soil and water sources, while burning can release harmful toxins into the air. It is therefore, necessary to properly manage and dispose refuse to prevent these negative consequences among learners, staff and other individuals in the school community.

One way to address the issue of refuse disposal in the schools and even in the communities is through environmental health education programmes. Health education programmes are educational interventions aimed at promoting healthy behaviours and preventing diseases through the dissemination of information and the creation of awareness (Azodo et al., 2019). Such programmes can be implemented through different channels such as schools, community organizations, and the media. In the context of this study, environmental health education programmes refers to initiatives that specifically focus on educating individuals about proper refuse disposal methods and the potential hazards

associated with improper disposal. These programmes aim to change behaviours and attitudes towards waste management thereby promoting healthier and cleaner environments.

Environmental health education is paramount in the modern world where the environment is under constant threat from various factors including human activities. According to Amasuomo et al., (2015),it is a critical tool for promoting public health as it enlightens individuals and communities about the links between the environment and their health. Environmental health education seeks to arm individuals with knowledge and skills to make informed decisions and take responsible action concerning their health and the health of theenvironment.The primary objective of environmental health education is to enhance awareness and understanding of environmental health issues, leading to improved health outcomes and quality of life aims to equip individuals with the knowledge to recognize, assess, and manage environmental healthrisks in their communities (Guerrero et al., 2013). Environmental health education programmes can have a profound impact on individuals' knowledge, behaviour andattitudes toward the environment and health. A study by Goldstein, et al. (2015), underscores the positive role of environmental health education in foster ingattitudes and behaviors that contribute to environmental sustainability and public health. It influences practices relating to waste management, sanitation, and personal and community health, thereby mitigating environmental health risks.

In the context of refuse disposal, environmental health education playsa significant rolein shaping individuals' and communities' health knowledge, attitudes and practices. Proper education enlightens individuals about the environmental and health consequences of improper waste disposal and promotes the adoption of eco-friendly waste disposal methods (Afroz et al., 2010). This knowledge propels communities toward embracing sustainable waste management practices that protect the environment and public health (Raj, 2011). Education initiatives can also debunk myths and correct misconceptions regarding waste disposal, leading to more environmentally friendly and sustainable waste management practices. Furthermore, education enhances individuals' capacity to evaluate and understand the effectiveness and impact to different waste management strategies, allowing them to make choices that benefit both the environment and their communities.

The effectiveness of waste management strategies is significantly influenced by individuals' knowledge and attitude towards refuse disposal. Various factors play a role in shaping people's knowledge and practice of refuse disposal. Cultural beliefs, societal norms, and personal attitudes can have a profound effect on waste disposal behaviors (Sidique et al., 2010). Additionally, access to information and education about environmentally sound waste management practices significantly influences the practices and attitude towards refuse disposal (Bernstad, 2014). Developing positive attitudes towards refuse disposal and adopting environment friendly practices is crucial for effective waste management. Proper refuse disposal practices minimize environmental pollution, conserve natural resources, and protect publichealth (Gupta, etal., 2015). Positive attitudes towards waste management contribute to environmental sustainability by reducing there lease of harmful substances into the environment and promoting the

efficient use of resources.Refuse disposal is a pressing issue in many developing countries, including Nigeria. Inefficient and uncoordinated refuse management practices lead to the accumulation of uncollected garbage, which not only poses environmental hazards but also negatively affects the health and well-being of individuals and families in the community (Taylor and Bryan, 2015). In many secondary schools in rural communities in Bayelsa State, refuse disposal has been a major concern.

According to Wapwera et al., (2022), several tones of refuse of different forms are disposed indiscriminately in the premises of several schools especially at the rural areas. These indiscriminately dumped refuse could serve as a potential source of several communicable diseases that occur in epidemic dimension (Okafor and Okafor, 2016). Several studies have been conducted on the issues and challenges of improper disposal of refuse in Nigeria, but however, most of these studies have focused on adult populations, such as households and local communities, rather than students (Oyekale, 2015). There is a growing body of literature support the effectiveness of environmental health education programmes in improving waste management practices among individuals in the community (Oladiran, and Omotayo, 2018). However, there is limited research specifically examining the impact of such programmes on pupils and students in both primary and secondary schools in Bayelsa State, where attitudes and behaviours towards refuse disposal are formed and reinforced. Education is a significant factor that improves individuals' health attitudes and practices. As affirmed by Oladeji, and Awotidebe, (2016), it plays a significant role in influencing people's perceptions, beliefs, and behaviours towards behaviour change by providing them with the necessary knowledge and skills to make informed decisions. Environmental health education empowers individuals with knowledge about the environment and how it relates to the health of the individuals which is aimed at instigating a healthy behaviour change. It was the foregoing that necessitated the researchers to investigate the impact of environmental health education programme on the knowledge and practice of refuse disposal among secondary school students in community secondary school, Ebedebiri, Bayelsa State.

Methodology

The research design used for this study was a quasi-experimental design of pretest-posttest non-equivalent control group method. This design allows for the comparison of two groups, one exposed to the environmental health education programme and another not exposed(controlgroup)to determine the impact of the intervention. The population of this study consisted of all the students in Community Secondary School in Ebedebiri, Sagbama LGA of Bayelsa State which according to the School Management was 634 students as at July, 2024. The sample size was determined using 20 percent of the school population, which resulted to 127 respondents. For convenience and to avoid distracting the school's activities, simple random sampling technique was used to select two classes (JSS2 and SS1) for the study. Purposive sampling technique was used in selecting the 54 respondents from JSS2 and 73 respondents from SS1 for the study. The inclusion criterion was only students in classes JSS2 and SS1. The JSS2 class was assigned as the control group while the SS1 was the experimental group.

A self-developed, and validated questionnaire was used as instrument for collection of data for the study. The questionnaire had sections A and B. Section A was for demographic data while section B was on respondents' knowledge and practice of refuse disposal. The Cronbach's Alpha reliability test was used to establish the reliability coefficient of the instrument. The instrument was administered to 20 students in Kaiama Grammar School, Kaiama which was not part of the study sample. The data obtained was analyzed and a reliability coefficient of 0.77 was established which was considered appropriate for the instrument to be used for the study. A lesson guide was also developed and used by the researchers in line the content of the environmental education package. The environmental education package had a content that encapsulated, meaning of waste, types of waste, types of refuse, types of refuse that are generated in schools, dangers of improper refuse disposal, benefits of proper refuse disposal in schools, refuse disposal methods, and methods of disposal in schools. Mode of delivery of the lessons were direct instruction, discussion, demonstration and brainstorming. Learning objectives were set, and evaluation was conducted at the end of lesson session.

Data was collected from the respondents through a three-step process. Before the interventional protocol (environmental health education programme) was administered, baseline data was collected from the two groups through the administration of the questionnaire which formed the pre-test scores. The experimental group (SS1 class) was taught with the lesson guide on environmental health education for 5 weeks and the sixth week was for revision and evaluation was carried out in line the specific objectives. While the control group (JSS2 students) was given no treatment. Each lesson session lasted for 30 minutes and scheduled after the normal school hour. The researcher was assisted by two teachers in the school to teach the lesson, after being trained by the researchers. After the environmental health education package was given, the same instrument (questionnaire) was administered again to both the experimental and control group. The pre-test and post-test scores of both the experimental and control groups were analyzed using inferential statistics of Analysis of Covariance (ANCOVA) to test the null hypotheses set at 0.05 level of significance using pretest as covariance. Multiple classification analysis was carried out to ascertain the impact of the intervention package on the groups, including the proportion of the variance as highlighted by the intervention package.

Results

Hypothesis One: There is no significant impact of environmental health education on knowledge of refuse disposal methods among secondary school students in CSS Ebedebiri, Bayelsa State.

Table 1a: Summary of ANCOVA analysis on impact of treatment on respondents' knowledge on refuse disposal methods

Source	Sum of square	Df	Mean square	F	Sig.
Covariates	1.065	1	1.065	0.75	.026
Treatment	3543.613	1	3543.613	108.334	.006
Explained	3550.064	2	2843.212	64.704	.007
Residual	3483.163	124	30.151		
Total	7,033.227	126			

The ANCOVA analysis in table 1a showed that, there was a significant difference in knowledge of refuse disposal practices among the study participants after the environmental health education package as the p-value was less than 0.05(p-value $<$ 0.05). Since a significant difference was observed (p-value $<$ 0.05), the null hypothesis was rejected, hence there is significant impact of environmental health education programme on knowledge of refuse disposal practices among secondary school students in CSS Ebedebiri, Bayelsa State. To ascertain the direction of the difference, a multiple classification analysis was carried out which gave the mean scores of both groups as experimental group = 88.61 and control group=65.54 as showed in table 1b. Since the mean score of the experimental group is greater than the control group, the researchers concluded that the experimental group had better knowledge than the control group in refuse disposal methods.

Table 1b: Multiple classification analysis (MCA) showing the direction of difference between the experimental and control groups

Variable +category grand mean=74.52	N	Unadjusted variation	Eta	Adjusted for independent covariates deviation	Mean value	Beta
Groups						
Experimental group		3.17		3.15	77.69	
Control group		-6.65		-6.58	67.87	
			.62			.61
Multiple R-squared						.410
Multiple R						.652

Hypothesis Two: There is no significant impact of environmental health education on the practice of refuse disposal methods among secondary school students in CSS Ebedebiri, Bayelsa State.

Table 2a: Summary of ANCOVA analysis on impact of treatment on respondents' practice of refuse disposal methods

Source	Sum of square	Df	Mean square	F	Sig.
Covariates	10.264	1	10.264	1.563	.077
Treatment	365.650	1	365.650	16.785	.040
Explained	460.556	2	343.434	10.054	.056
Residual	2534.108	124	20.650		
Total	2,994.664	126			

The ANCOVA analysis in table 2a revealed a significant difference in the practice of refuse disposal methods among the study participants after the environmental health education package as the p-values was less than 0.05(p-value < 0.05). Since a significant difference was observed (p-value < 0.05), the null hypothesis was rejected, hence there is significant impact of environmental health education programme on the practice of refuse disposal methods among secondary school students in CSS Ebedebiri, Bayelsa State. To establish the direction of the difference, a multiple classification analysis was carried out which gave the mean scores of both groups as experimental group = 35.94 and control group=30.84 as showed in table 4b. Since the mean score of the experimental group is greater than the control group, the researchers concluded that the experimental group had better practice of refuse disposal methods than the control group.

Table 2b: Multiple classification analysis (MCA) showing the direction of difference between the experimental and control groups

Variable +category	N	Unadjusted grand mean=34.52 variation	Eta	Adjusted for independent covariates deviation	Mean value	Beta
Groups						
Experimental group		1.42		1.39	35.94	
Control group		-3.68		-3.59	30.84	
			.25			.23
Multiple R-squared						.213
Multiple R						.387

Discussion of findings

The study investigated the impact of environmental health education programme on the knowledge and practice of refuse disposal among secondary school students in community

secondary school, Ebedebiri, Bayelsa State. The findings revealed that participants had little initial knowledge on refuse disposal methods. Moreover, there was a significant improvement in the knowledge of refuse disposal methods among the experimental group compared with the control group after the interventional package as shown in tables 1a and b. This implies that, the environmental education programme had a positive effect on the knowledge of participants in the experimental group in refuse disposal methods. This result further affirmed the fact environmental education programme is very necessary in improving knowledge of refuse disposal methods among secondary school students. This finding was expected, and not surprising because, environmental health education playsa vital rolein shaping individuals' and communities' attitudes and practices. As affirmed by Amasuomo et al., (2015), proper education enlightensindividuals about the environmental and health consequences of improper waste disposal and promotes the adoption of eco-friendly waste disposal methods. This finding is in conformity with the findings of Oladeji, and Awotidebe, (2016) and Iyanda (2013), who also observed a significant improvement in awareness and practices of waste disposal among secondary school students after the administration of the environmental health education programme. This finding is still in line with the results of Oladiran and Omotayo, (2018), who equally affirmed in his study on impact of environmental health education on the attitude of secondary school students towards environmental sanitation that, students in secondary schools need enlightenment through public health campaigns and environmental education programmes in order to receive the desired knowledge. However, the findings of Afroz et al., (2010) contradicted these results. They concluded in their study on attitude and behaviour towards waste and recycling, in Malaysia and Japan, the knowledge of participants on refuse management methods were low, but not because of lack of enlightenment but lack of understanding of the dangers of improper refuse disposal.

The findings also revealed a significant impact of environmental health education programme on the practice of refuse disposal methods among secondary school students in CSS Ebedebiri, Bayelsa State. Since the mean score of the experimental group is greater than the control group, the researchers concluded that the experimental group had better practice of refuse disposal methods than the control group. This finding implies that, environmental education intervention is an appropriate measure capable of modifying the behaviour of students towards better refuse disposal practices. This finding was not surprising and was expected considering the fact that, environmental health education seeks to arm individuals with knowledge and skills to makeinformed decisions and take responsible action concerning their health and the health of theenvironment**.** The above finding is in agreement with the study findings of Azodo et al., (2019), who affirmed that the behaviour of an individual on health issues can be significantly enhanced through sustained health education programmes in the community. However, this finding is not in agreement with Wapwera, et al., (2022) who reported no significant impact of environmental education and awareness on the effective management of solid waste among residents of Jos-Bukuru metropolis.

Conclusion

From the study findings it was revealed that, environmental education programme had a positive impact on the knowledge and practice of refuse disposal methods among the experimental group as their mean scores were higher than the control group. It was therefore concluded that, the knowledge and practice of refuse disposal methods could be greatly improved if students are well informed through environmental health education programme.Based on the conclusion the following recommendations were made:

1. The school health programme in the state ministry of education be reinforced and made viable to routinely carry out school health education enlightenment programmes that are focused on sanitary disposal of refuse which will help to sustain the quality and health of the environment.
2. The social mobilization unit of the primary health care department in the unified local government system should regularly carry out school out-reach programmes that are centered on environmental sanitation.

References

Afroz, R., Hanaki, K. and Tudin, R. (2010). Attitude and behavior towards waste and recycling: A comparative analysis between Malaysia and Japan. *Journal of Environmental Management*, 91(12), 2587-2598.

Amasuomo, E., Tuoyo, O. J. A., and Hasnain, S. A. (2015). Analysis of public participation in sustainable waste management practice in Abuja, Nigeria. *Environmental Management and Sustainable Development, 4*(1), 180-193

Anderson, M. R. (2019). The role of waste management in public health. *Current Environmental Health Reports*, 6(2), 71-77.

Anunobi, C. V. and Emecheta, C. A. (2017). Effect of environmental health education programme on attitude of students towards waste management in Nigeria. *Journal of Educational Research*, 1(3), 116-124.

Azodo, C. C., Ojo, M. A. and Osazuwa-Peters, N. (2019). Effect of environmental health education programme on knowledge, attitude and practice of hand hygiene among secondary school students. *Journal of Community Medicine and Primary Health Care*, 31(1), 29-39.

Berkhout, F., Hartmann, C., Harmsen, R. and Hertin, J. (2009). *Waste and climate change: Global waste management outlook*. United Nations Environmental Programme (UNEP), Nairobi.

Bernstad, A. (2014). Exploring the role of environmental knowledge and responsibility for energy-saving behavior. *Journal of Environmental Psychology*, 38, 39-48.

Goldstein, B. D., Kriesky, J., Krzyzanowski, M. and Thurston, G. D. (2015). Environmental health education and public awareness: the role of the environmental health professional. *Environmental Health Perspectives*, 123(11), A296-A299.

Guerrero, L. A., Maas, G. and Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Waste Management*, 33(1), 220-232.

Gupta, N., Yadav, K. K., Kumar, V. and Kumar, S. (2015). Solid waste management in schools: a review. *International Journal of Environmental Research and Public Health*, 12(12), 15564-15574.

Hoornweg, D. and Bhada-Tata, P. (2012). *What a waste: A global review of solid waste management*. The World Bank.

Iyanda, A.B (2013). Roles of health education in creating awareness for managing schools environment**.** *Nigerian School Health Journal* (25)2, 188-195*,*

Kjeldsen, P., Barlaz, M. A., Rooker, A. P., Baun, A., Ledin, A. and Christensen, T. H. (2012). Present and long-term composition of MSW landfill leachate: A review. *Critical Reviews in Environmental Science and Technology*, 42(13), 1215-1252.

Okafor, S. and Okafor, C. I. (2016). Attitude of secondary school students towards indoor air pollution: implications for environmental health education. *Journal of Education and Practice*, 7(9), 173-179.

Oladeji, O. S., and Awotidebe, T. A. (2016). The impact of environmental health education on awareness and practices of waste disposal among secondary school students: a study of selected secondary schools in Osogbo metropolis. *Journal of Educational and Social Research*, 6(2), 31-37.

Oladiran, O. T. and Omotayo, A. O. (2018). Impact of environmental health education on the attitude of secondary school students towards environmental sanitation. *Journal of Environmental Science and Public Health*, 2(1), 135-146.

Onward. (2020). *The role of waste management in climate change*. Retrieved from https://onward.trek.fm/episodes/82.

Oyekale, A. S. (2015). Factors influencing household solid waste management intention in Nigeria. *Resources, Conservation and Recycling*, 104, 349-357.

Raj, S. (2011). Environmental health education: A tool for sustainable development. *Journal of environmental research and development*, 6(3), 627-634.

Sidique, S. F., Lupi, F. and Joshi, S. V. (2010). Factors influencing recycling behavior in Singapore: A case study of the University of Singapore. *Resources, Conservation and Recycling*, 54(7), 463-470.

Taylor, A. L. and Bryan, G. T. (2015). Environmentally significant behaviour: Examining the roles of egoistic, altruistic, and biospheric motives. *Environment and Behavior*, 47(11), 1203-1229.

Tchobanoglous, G., Theisen, H. and Vigil, S. (2014). *Integrated solid waste management: Engineering principles and management issues*. McGraw-Hill.

Wapwera, S. D., Akintunde, E. A. and Chiroma, R. S. (2022). The impact of environmental education and awareness on the effective management of solid waste among residents of Jos-Bukuru metropolis, Plataeu State, Nigeria. *Global Journal of Earth and environmental Science,* 7(3), 59-72.

Yoshida, A., Kanda, M., Osako, M., and Ichinose, T. (2009). Analysis of awareness among residents for implementing appropriate waste management practices. *Waste Management*, 29(6), 1949-1957.