

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/377201766>

The Environmental Education of Adolescents: A Solution for Sanitation Problems in Ibadan Municipality

Article in Chinese Journal of Urban and Environmental Studies · January 2024

DOI: 10.1142/S2345748123500197

CITATIONS

0

4 authors:



Ayomide Alalade

1 PUBLICATION 0 CITATIONS

SEE PROFILE



Oluwale Daramola

Obafemi Awolowo University

72 PUBLICATIONS 429 CITATIONS

SEE PROFILE

READS

179



Gbemiga Bolade Faniran

Obafemi Awolowo University

24 PUBLICATIONS 72 CITATIONS

SEE PROFILE



Oluwasegun Odunlade

Lagos Business School

6 PUBLICATIONS 13 CITATIONS

SEE PROFILE

The Environmental Education of Adolescents: A Solution for Sanitation Problems in Ibadan Municipality

Ayomide Oluwaseun ALALADE ^{*}, Gbemiga Bolade FANIRAN [†]
and Oluwole Philip DARAMOLA [‡]

*Department of Urban and Regional Planning
Obafemi Awolowo University
P.M.B. 13, Ile-Ife, Osun 220282, Nigeria
*alaladeayomide01@gmail.com
†bolafaniran@gmail.com
‡oluwoledaramola@gmail.com*

Oluwasegun Raphael ODUNLADE 

*Lagos Business School, Pan-Atlantic University
Km 22, Lekki-Epe Expressway, Lekki 106104, Lagos, Nigeria
oodunlade@lbs.edu.ng*

Received October 20, 2023; Accepted November 28, 2023; Published 5 January 2024

Environmental sanitation problems are a bane in cities in developing countries caused by poor sanitation behavior of individuals, particularly adolescents. Several recommendations have been made to effectively curb the menace, one of which is environmental education. The impact of education especially among adolescents who are forming lifelong behaviors is however not adequately documented. This study is a quasi-experimental research designed to fill this gap toward ameliorating sanitation problems in the city. From six schools selected in the municipality, 185 adolescents were selected from both public- and private-owned secondary schools in Ibadan, Nigeria, using multistage sampling. Information was collected through a structured questionnaire administered to the sampled adolescents before and after eight weeks of an environmental education intervention. The study revealed that the intervention significantly improved the adolescents' environmental sanitation knowledge and behavior. The study concludes that environmental education has to be efficiently incorporated into learning process to curb the ever-present sanitation problems effectively.

Keywords: Environmental education; adolescents; environmental sanitation; sanitation behavior.

Alalade, Ayomide Oluwaseun, Gbemiga Bolade Faniran, Oluwole Philip Daramola, and Oluwasegun Raphael Odunlade. 2023. "The Environmental Education of Adolescents: A Solution for Sanitation Problems in Ibadan Municipality." *Chinese Journal of Urban and Environmental Studies*, 11(4): 2350019-1 to 2350019-16.

^{*}Corresponding author.

This is an Open Access article published by World Scientific Publishing Company. It is distributed under the terms of the [Creative Commons Attribution-NonCommercial 4.0 \(CC BY-NC\)](https://creativecommons.org/licenses/by-nc/4.0/) License which permits use, distribution and reproduction in any medium, provided that the original work is properly cited and is used for non-commercial purposes.

1. Introduction

One fascinating and most complex stage of life is adolescence. This is the period wherein young people take up new duties (which are different from when they were children) in transition into adulthood (NAAEE, 2008). Individuals begin to take personal decisions, develop morals, and take risks at adolescence (11–18 years) (Eisenberg *et al.*, 1995; American Psychological Association, 2002; Zhang *et al.*, 2019). Morton *et al.* (2016) observed that adolescents also experiment with independence at this stage. Adolescents search for identity and learn to apply values and principles learned earlier in life that will define and influence their adulthood. When adolescents are nurtured, instructed, supported and encouraged by parents, tutors, mentors or other more experienced adults, they thrive to become responsible for themselves. They also go on to become resourceful and contributing members of households and communities. Due to the innate character of bursting energy, inquisitiveness, and enduring spirit to what they have interest in, young people have the potential to influence their surroundings. They can change observed negative societal patterns of behavior and break unfavorable cycles passed down from one generation to subsequent ones. With their creativity, energy, and enthusiasm, young people can change the world in astonishing ways, making it a better place not only for themselves but for everyone (UN, 2017; Jazat *et al.*, 2023).

2. Literature Review

Environmental sanitation is the control of all factors in human beings' environment that exercise or may exercise a deleterious effect on human physical developmental health and survival (WHO, 2005; Adeoye *et al.*, 2023). Environmental sanitation entails set of actions and processes involved in making the environment healthy, hygienic and aesthetically pleasing for living, working and recreating (Sustainable Sanitation Alliance [SuSanA], 2008; Duru *et al.*, 2017; WHO and UNICEF, 2017; Budge *et al.*, 2022). Bosah (2013) described environmental sanitation as involving individuals' responses to the environment in promoting health through prevention of human contact with the hazards of waste, as well as its proper disposal and treatment. Thus, environmental sanitation can be referred to as the sets of responses (actions and procedures) designed for protecting human health and the environment. These responses to the environment consist of environmental sanitation behavior. According to Agwu (2012) and Linder *et al.* (2022), environmental sanitation behavior includes activities that involve the effective use of tools and actions that keep the environment healthy. Activities that constitute environmental sanitation include solid waste management, water management, industrial waste management, air pollution and noise control, personal hygiene, toilet sanitation, kitchen hygiene, and market hygiene (Ibrahim-Adedeji, 2015; Banks, 2018). This study is focused on personal hygiene, solid waste management and water management.

Sweeting and Hunt (2014) identified several factors that influence the behavior of adolescents. These influences include knowledge and skills, demands of culture, gender stereotype, globalization and poverty. Others factors include social motivation, structural motivation, home/family environment, age group, peer pressure, health and well-being, physical environment, and educator practice/educational environment (Agrawal and Agrawal, 2011;

Piotrowska *et al.*, 2015; Linder *et al.*, 2022). The importance of education cannot be over emphasized. Environmental sanitation behavior of individuals is largely influenced by the education, enlightenment and orientation received. Environmental Education is a learning process (Bosah, 2013). It helps individuals to become more knowledgeable about their environment and to develop responsible environmental behavior, commitment and skills so that they can improve the quality of the environment (Wisconsin Environmental Education Board, 2016). Environmental Education further refers to organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behavior and ecosystems to live sustainably (Michelsen and Fisher, 2017; Collado *et al.*, 2020). In other words, Environment Education can be referred to as a knowledge acquisition process that helps individuals form behavior and skills that can make the environment healthy and sustainable.

The overall environmental conditions of many urban areas in developing countries are an eyesore (Burgers, 2000; Agwu, 2012; Ahmed and Isaac, 2016; Adeoye *et al.*, 2023). Ibadan Municipality, Nigeria exemplifies this case as all forms of wastes and unsanitary conditions are evident in the city. These conditions are in existence despite the various strategies put in place to curb the eyesore and resultant dangers such as disease outbreaks and flooding. The various strategies include legislation (Oyo State Government, 1999, 2004, 2011, 2012a, b), encouraging community participation and public enlightenment (Chess, 2000; Omoleke, 2004; Daramola, 2012). A study has shown that despite instituting an arrangement for the conduct of monthly environmental sanitation exercise in the Municipality and other local government areas of Oyo State, citizens' participation in activities geared toward improved environmental sanitation is generally low (Afon and Faniran, 2013; Olanrewaju and Bolaji, 2020; Jazat *et al.*, 2023). Indeed, residents can be noticed to engage in the display of poor environmental etiquette. Even so, young individuals who are supposedly taught in school are not left out in this regard. As a result, this questions the effectiveness of environmental education on sanitation behavior of citizens and most importantly young individuals who are expected to have been taught in school. Furthermore, issues related to environmental sanitation have been explored in several studies (Kofoworola, 2007; Acheampong, 2010; Mmom and Faith, 2011; Daramola, 2012; Lüthi, 2012; Afon and Faniran, 2013; Adeolu *et al.*, 2014; Ekong, 2015; Daramola *et al.*, 2017; Kuo *et al.*, 2019). While some of these studies were focused on social problems and issues about provision and deficiencies of facilities and services, others were on legislation and community participation. Fundamental observation in these studies is the immense importance of the recommendation of, and the need for Environmental Education as a tool to ameliorate the deteriorating environment. Many of these studies, however, have not gone beyond the recommendation as no known work has reported the observed change(s) in sanitation behavior after enlightenment. There is, therefore, a need to properly document the effect that environmental education has on the sanitation behavior of young individuals for the purpose of effectively ameliorating sanitation problems.

3. Method

The research was quasi-experimental. Multistage sampling was employed for this study. In the first stage, secondary schools in Ibadan Municipality were grouped based on ownership

Table 1. Secondary schools in Ibadan Municipality according to ownership and gender.

Ownership Typology	Government secondary schools	Private secondary schools	Total
Boys Only	12	5	17
Girls Only	21	6	27
Co-educational	134	169	303
Total	167	180	347

Source: Oyo State Bureau of Statistics (2018).

and gender. These groups are government secondary schools and private secondary schools. There were 347 secondary schools in Ibadan Municipality; 167 government-owned and 180 private-owned secondary schools. Similarly, there were 17 Boys only, 21 Girls only and 314 Co-educational secondary schools (see Table 1).

Thus, one secondary school each from the boys only, girls only and co-educational secondary schools from Government and Private Ownership categories were selected. Hence, six secondary schools were selected for the study. Systematic sampling was used in selecting 1 out of every 20 students (5%) in each selected level. There was a total of 3,674 students. In other words, systematic sampling technique was adopted in choosing 185 students from secondary schools across Ibadan Municipality for the study. These selected students were regathered in each selected school after eight weeks and resampled with the initial set of questionnaires.

Paired *T*-test was employed in this objective. To measure the effect size of the intervention, Cohen’s *d* was calculated as follows:

$$\text{Cohen's } d = \frac{t}{\sqrt{n}},$$

where *t* = *t* value *n* = sample size.

Table 2 contains descriptors for magnitudes of *d* = 0.01 to 2.0, as initially suggested by Cohen (1988) and expanded by Sawilowsky (2009).

Table 2. Cohen’s *d* magnitude descriptors of effect size.

<i>d</i>	Effect
≤ 0.01	Very small
≤ 0.20	Small
≤ 0.50	Medium
≤ 0.80	Large
≤ 1.20	Very large
≤ 2.00	Huge

Source: Adapted from Cohen (1988) and Sawilowsky (2009).

4. Results

The sampled students comprised of females (50.8%) and males (49.2%). They were mostly of Yoruba tribe (81.1%) and were either of Christian or Islamic religious background (83.2% and 16.8%, respectively). The students were mostly (67.6%) from small families and had whose parent/guardians who were private organization employees (42.2%), civil servants (36.2%), self-employed (21.1%) or retired (0.5%) (see Table 3).

The study revealed that the students sourced information about elements of environment sanitation from majorly parents, teachers and books (see Table 4). Television, radio and internet are other notable sources of information to the students concerning environmental sanitation. The least of these sources of information were religious bodies.

Comparisons of the adolescents' knowledge before and after the environmental education intervention revealed knowledge of secondary students about environmental sanitation and its component terms increased as more student provided answers that were rated at least good (see Table 5). There were also observed increases in the proportion of students' responses that were rated acceptable regarding knowledge of the ideal environmental sanitation actions or behaviors after the environmental education intervention.

Table 3. Socio-economic background of secondary school students in Ibadan municipality.

		School type						Ibadan municipality	
		Boys only		Girls only		Co-educational			
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Gender	Male	56	100.0	—	—	35	53.0	91	49.2
	Female	—	—	63	100.0	31	47.0	94	50.8
	Total	56	100.0	63	100.0	66	100.0	185	100.0
Ethnic Group	Yoruba	45	80.3	52	82.5	53	80.3	150	81.1
	Igbo	10	17.9	6	9.5	7	10.6	23	12.4
	Hausa	—	—	—	—	4	6.1	4	2.2
	Others	1	1.8	5	8.0	2	3.0	8	4.3
	Total	56	100.0	63	100.0	66	100.0	185	100.0
Religion	Christianity	48	85.7	49	77.8	57	86.4	154	83.2
	Islam	8	14.3	14	22.2	9	13.6	31	16.8
	Total	56	100.0	63	100.0	66	100.0	185	100.0
Household Size	Small family (1–6)	31	55.3	48	76.2	46	69.7	125	67.6
	Medium family (7–10)	10	17.9	7	11.1	10	15.2	27	14.6
	Large family (Above 10)	2	3.6	—	—	2	3.0	4	2.1
	No Response	13	23.2	8	12.7	8	12.1	29	15.7
	Total	56	100.0	63	100.0	66	100.0	185	100.0
Parent or Guardian Employment Status	Civil Servants	16	28.6	21	33.3	30	45.5	67	36.2
	Private Organization Employees	27	48.2	25	39.7	26	39.4	78	42.2
	Self-employed	12	21.4	17	27.0	10	15.1	39	21.1
	Retired	1	1.8	—	—	—	—	1	0.5
	Total	56	100.0	63	100.0	66	100.0	185	100.0

Source: Authors' field work (2019).

Table 4. Sources of students’ knowledge on environmental sanitation.

Sources	School type							
	Boys only		Girls only		Co-educational		Ibadan municipality	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Parents	34	24.3	34	32.4	49	24.1	117	26.1
Friends	10	7.1	4	3.8	13	6.4	27	6.0
Teachers	32	22.9	32	30.5	40	19.7	104	23.2
Books	12	8.6	12	11.4	21	10.4	45	10.1
Religion	6	4.3	4	3.8	13	6.4	23	5.1
Television	14	10.0	10	9.5	26	12.8	50	11.2
Radio	16	11.4	5	4.8	18	8.9	39	8.7
Internet	16	11.4	4	3.8	23	11.3	43	9.6
Total	140	100.0	105	100.0	203	100.0	448*	100.0

Note: *The number of responses exceeded the number of students surveyed because of multiple responses.
Source: Authors’ field work (2019).

For the students’ sanitation behavior after the environmental education intervention, 90.8% of the students flushed the toilet always after use compared to 87.0% prior (see Table 6). Similarly, 90.8% of the students washed their hands at least often compared to 87.6% prior. It was revealed in the study that the proportion of adolescents that close running water at home at least often increased to 86.5%.

Paired *T*-test was used to measure the magnitude of the impact of environmental education. The environmental education largely increased (Cohen’s *d* = 0.62) the students’

Table 5. Comparisons of the adolescents’ knowledge before and after the environmental education intervention.

Knowledge of environmental sanitation concepts	Grading	School type							
		Boys only		Girls only		Co-educational		Ibadan municipality	
		%		%		%		%	
Environmental sanitation	Excellent	Prior	After	Prior	After	Prior	After	Prior	After
	Very good	1.8	42.9	—	46.0	—	37.9	0.5	42.2
	Good	12.5	37.5	4.8	23.8	4.5	18.2	7.0	25.9
	Fair	48.2	14.3	17.5	20.6	22.8	19.7	28.8	18.4
	Poor	26.8	—	38.1	3.3	50.0	9.1	38.9	4.3
	Very poor	—	—	—	—	4.5	—	1.6	—
	Total	10.7	5.3	39.6	6.3	18.2	15.1	23.2	9.2
Personal hygiene	Excellent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Very good	3.6	42.9	1.6	66.7	—	51.5	1.6	54.0
	Good	46.4	42.9	7.9	23.8	21.2	19.7	24.3	28.1
	Fair	39.3	10.7	49.2	3.2	47.0	9.1	45.5	7.6
	Poor	—	—	1.6	—	—	—	0.5	—
	Very poor	—	—	—	—	—	—	—	—
	Total	10.7	3.5	39.7	6.3	31.8	19.7	28.1	10.3
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5. (Continued)

Knowledge of environmental sanitation concepts		School type						Ibadan municipality	
		Boys only		Girls only		Co-educational			
		%		%		%		%	
	Grading	Prior	After	Prior	After	Prior	After	Prior	After
Solid waste management	Excellent	1.8	55.4	—	60.3	—	50.0	0.5	55.2
	Very good	23.2	12.5	1.6	9.5	18.2	9.1	14.1	10.3
	Good	12.5	10.7	7.9	3.2	15.2	7.6	11.9	7.0
	Fair	5.4	5.4	11.1	—	3.0	3.0	6.5	2.7
	Poor	1.8	—	—	1.6	—	—	0.5	0.5
	Very poor	55.3	16.0	79.4	25.4	63.6	30.3	66.5	24.3
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Water management	Excellent	—	50.0	—	41.3	—	51.6	—	47.6
	Very good	16.1	10.6	3.1	11.1	7.6	1.5	8.7	7.6
	Good	25.0	17.9	14.3	19.0	25.8	18.2	21.6	18.4
	Fair	10.7	5.4	1.6	—	10.6	3.0	7.6	2.7
	Poor	0.0	—	0.0	—	1.5	1.5	0.5	0.5
	Very poor	48.2	16.1	81.0	28.6	54.5	24.2	61.6	23.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' field work (2019).

knowledge of environmental sanitation term. Also, the intervention positively impacted the students' knowledge of personal hygiene term (Cohen's $d = 0.95$). The environmental education intervention had a very large influence (Cohen's $d = 1.01$) on the students' knowledge of solid waste management term. The impact of the environmental education intervention on the students' definition of water management was very large (Cohen's $d = 0.95$)

Table 6. Paired *T*-test analysis of students' sanitation knowledge and behavior after environmental education intervention.

		School type			
		Boys only	Girls only	Co-educational	Ibadan municipality
Definition of Environmental Sanitation	Mean difference	−35.3	−41.1	−22.9	−32.8
	<i>T</i>	−3.178	−9.762	−7.307	−8.552
	<i>P</i>	0.002	0	0	0
	Cohen's <i>d</i>	0.43	1.23	0.9	0.63
Definition of Personal Hygiene	Mean difference	−17.6	−39.9	−24.3	−27.6
	<i>T</i>	−5.127	−10.026	−7.862	−12.927
	<i>P</i>	0	0	0	0
	Cohen's <i>d</i>	0.69	1.26	0.97	0.95
Definition of Solid Waste Management	Mean difference	−43	−55.7	−37.6	−45.4
	<i>T</i>	−7.255	−9.447	−7.14	−13.697
	<i>P</i>	0	0	0	0
	Cohen's <i>d</i>	0.97	1.19	0.88	1.01

Table 6. (Continued)

		School type			Ibadan municipality
		Paired T-test analysis	Boys only	Girls only	Co-educational
Definition of Water Management	Mean difference	-34.2	-44	-39.9	-39.6
	T	-7.091	-8.136	-7.171	-12.874
	P	0	0	0	0
	Cohen's d	0.95	1.03	0.88	0.95
Students' Knowledge of the Importance of Environmental Sanitation	Mean difference	-17.1	-18.3	-7.7	-14.1
	T	-4.754	-6.891	-7.081	-9.434
	P	0	0	0	0
	Cohen's d	0.64	0.87	0.87	0.69
Proper Act after Toilet Use	Mean difference	-3.1	-19.8	-0.4	-7.8
	T	-1.021	-6.185	-0.574	-4.963
	P	0.312	0	0.568	0
	Cohen's d	0.14	0.78	0.07	0.37
Proper Place to Urinate	Mean difference	0	-0.1	0	0
	T	1.427	-2.555	-1.425	-1.911
	P	0.159	0.013	0.159	0.058
	Cohen's d	0.19	0.32	0.18	0.14
Proper Place to Defecate	Mean difference	0.1	-0.1	0	0
	T	1.764	-3.003	-1.425	-1.513
	P	0.083	0.004	0.159	0.132
	Cohen's d	0.24	0.39	0.18	0.11
Proper Waste Water Disposal	Mean difference	-0.1	-0.3	-0.3	-0.2
	T	-1.475	-4.442	-4.455	-5.788
	P	0.146	0	0	0
	Cohen's d	0.2	0.56	0.55	0.43
Proper Act toward Running Tap Water	Mean difference	-0.2	-0.6	-0.2	-0.3
	T	-2.512	-3.099	-4.191	-4.724
	P	0.015	0.003	0	0
	Cohen's d	0.34	0.39	0.52	0.35
Proper Act toward Stagnant Water	Mean difference	-6.8	-20.4	-22.2	-14.7
	T	-1.613	-4.174	-3.915	-5.033
	P	0.113	0	0.001	0
	Cohen's d	0.22	0.53	0.48	0.37
Effects of Litter on the Environment	Mean difference	-0.1	-0.5	-0.2	-0.3
	T	-1.59	-7.249	-3.065	-6.514
	P	0.118	0	0.003	0
	Cohen's d	0.21	0.91	0.38	0.48
Overall Environmental Sanitation Knowledge	Mean difference	-22.4	-36.8	-35.4	-30.3
	T	-9.518	-14.408	-9.241	-17.855
	P	0	0	0	0
	Cohen's d	1.27	1.82	1.14	1.31

Source: Authors' field work (2019).

Table 7. Paired *T*-test analysis of students' sanitation behavior in Ibadan municipality.

	School type			Ibadan municipality
	Boys only	Girls only	Co-educational	
Mean Difference	0.3	−1	−0.1	−0.2
<i>t</i>	0.436	−1.123	−0.214	−0.452
<i>p</i>	0.666	0.273	0.831	0.652
Cohen's <i>d</i>	0.06	0.14	0.03	0.03

Source: Authors' field work (2019).

in the Municipality. The environmental education intervention had a large influence (Cohen's $d = 0.69$) to increase the students' knowledge on the importance of environmental sanitation.

Overall, in the Municipality, the intervention had a medium positive effect (Cohen's $d = 0.14$) on the knowledge of students on the proper action after toilet use. The environmental education intervention had a small increase effect (Cohen's $d = 0.11$) on the students' knowledge of the proper place to defecate. The Cohen d values of 0.43, 0.35, and 0.37, respectively, revealed that the intervention had a medium effect on the students' knowledge of proper wastewater disposal, act toward running tap water and act toward stagnant water in the Municipality. Also, Cohen's d value of 0.48 indicated that the environmental education intervention had a small effect on the students' knowledge of the effect of litter in the environment. Generally, in the Municipality, there was a 30.3 environmental sanitation knowledge score increase. The environmental education intervention had a huge increase effect (Cohen's $d = 1.31$) on the environmental sanitation knowledge of students in secondary schools in the area. Thus, environmental education increased secondary school students' knowledge of environmental sanitation.

Furthermore, there was an improvement in the environmental sanitation behavior of the sampled students. The environmental education intervention had a small effect on improving the environmental sanitation behavior of the students at home after eight weeks after the intervention (Cohen's $d = -0.07$) (see Table 7). In other words, the environmental education intervention impacted the environmental sanitation behavior of students at home, albeit that the impact was small. In the Municipality, there was a small effect of the environmental education intervention (Cohen's $d = 0.02$) that resulted in the observed improvement in environmental sanitation behavior of the students. Generally, in Ibadan Municipality, the environmental education intervention caused improved environmental sanitation behavior change. The impact of the intervention was observed to be small (Cohen's $d = 0.03$) after eight weeks of the intervention. Thus, environmental education caused improved environmental sanitation behavior.

5. Discussions

The environmental education instrument used covered personal hygiene, solid waste management and water management which are central to the environmental sanitation. The results of the re-examination of the students after eight weeks revealed that the education

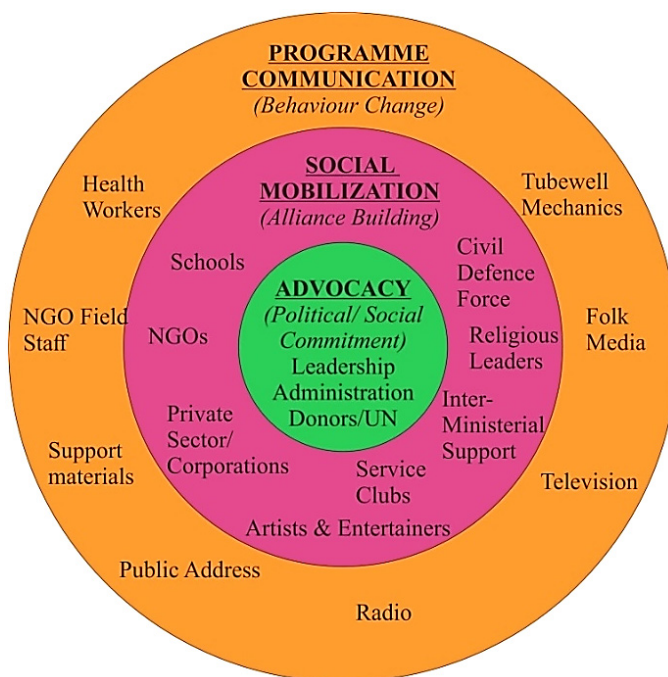
still had significant effect on their sanitation knowledge and behavior. Thus, environmental education and enlightenment can significantly improve sanitation especially in cities of developing countries such as Ibadan where sanitation problems have been a bane as often recommended in studies (Ogbalu, 2004; Adewole, 2009; Agwu, 2012; Daramola, 2012; Faniran, 2012; Abur *et al.*, 2014; Adeolu *et al.*, 2014; Anestina *et al.*, 2014; WHO and UNICEF, 2017; Rosa and Collado, 2019).

Environmental Education is recognized as a veritable tool for achieving a healthy environment (United Nations Educational Scientific and Cultural Organization [UNESCO], 1978; NAAEE, 2008). Environmental Education could be delivered in a formal setting; it can also be through informal and non-formal arrangement. Gifford *et al.* (1982) stated that a well-educated populace is the best insurance for preserving the environment. With sanitation problems facing Ibadan Municipality which includes the widespread of environmental related diseases including COVID-19, flooding, reduced road space, and localized air pollution (Omoleke, 2004; Faniran, 2012; Adeolu *et al.*, 2014; Egbinola and Amanambu, 2015; Tamene, 2021), education will play key roles in ameliorating them. According to Adeolu *et al.* (2014), Olanrewaju and Bolaji (2020), Tamene (2021) and Jazat *et al.* (2023), these problems have persisted for decades due to the high rate of illiteracy, ignorance and uncivil culture of indiscriminate waste littering.

The goals of environmental education efforts around the world are similar, which is to maintain and improve environmental quality and to prevent future environmental problems (Omoogun *et al.*, 2014). In part, environmental education is information education, increasing student knowledge about the environment. Students learn about personal hygiene, solid waste, water management, global warming, and other environmental problems. They learn about ecology and how the world operates. They further learn about the consequences of environmental degradation and their role in creating and preventing environmental problems. Environmental education also increases awareness about issues and an understanding of personal values by digging into attitudes and beliefs and helping students evaluate and clarify their feelings about the environment and how they contribute to environmental problems (Michelsen and Fisher, 2017). It helps individuals understand that there are conflicting values among people and that these conflicts must be addressed to ultimately prevent and solve environmental problems. Environmental education is also practical education: how to maintain personal hygiene, how to plant a tree, how to apply pesticides carefully, and how to plant crops to lessen environmental damage. Environmental education stresses citizen action skills from writing an effective letter to lobbying village councils, local and state governments, and national and international organizations as exemplified by the aftereffects of the COVID-19 pandemic (Rosa and Collado, 2019; Collado *et al.*, 2020; Tamene, 2021).

Recommended communication program targeted toward behavioral change is therefore recommended. This, according to MacKee (1992), consists of three broad and linked segments. These segments are program communication, social mobilization and advocacy (see Fig. 1).

- (i) **Program Communication:** This communication line is to bring about behavioral change through fieldwork. Thus, it has a direct link with the public. Health workers,



Source: Adapted from MacKee (1992).

Fig. 1. Communication planning process.

NGO field staff, support materials among others are required. The information and materials are circulated through television, radio and other forms of media communication.

- (ii) **Social Mobilization:** Social gatherings and alliance building are utilized in this program to pass sanitation information. This is composed of religious leaders, entertainers, service clubs, schools among other forms of gatherings.
- (iii) **Advocacy:** This program implies having policy makers understand sanitation issues to improve political and social commitment. Political leaders, administrators and donors of local and international influence are the focus of this program.

6. Conclusion

This research concludes that when an individual undergoes environmental education, there is cognitive development and formation of new behavior. When an adolescent is the focus of this education, it has the added advantage to affect his/her peers, household and community practices in environmental sanitation, through inter-generation influence.

Environmental education should be incorporated fully into the regular school curriculum with an emphasis on behavioral improvement and the proper use of sanitation facilities while being inculcated as well at homes. Government, school authorities and private organizations should encourage the establishment of Environmental Education focused

clubs in schools and communities that educate and enlighten adolescents among others about environmental management alongside other environmental issues. The regular enlightenment programs or sessions will further increase their knowledge and enable adolescents to develop proper and ideal environmental sanitation behavior.

ORCID

Ayomide Oluwaseun ALALADE  <https://orcid.org/0000-0002-1342-5011>

Gbemiga Bolade FANIRAN  <https://orcid.org/0000-0003-2040-2034>

Oluwole Philip DARAMOLA  <https://orcid.org/0000-0002-5698-2002>

Oluwasegun Raphael ODUNLADE  <https://orcid.org/0000-0002-8351-8707>

References

- Abur, Benjamin Ternenge, Emmanuel Enomema Oguche, and Gideon Ayuba Duvuna. 2014. "Characterization of Municipal Solid Waste in the Federal Capital Abuja, Nigeria." *Global Journal of Science Frontier Research: Environment and Earth Science*, 14(2): 1–6.
- Acheampong, Philip Tieku. 2010. "Environmental Sanitation in the Kumasi Metropolitan Area." (Master's thesis). Department of Planning. Kwame Nkrumah University of Science and Technology, Kumasi.
- Adeolu, Adedotun Timothy, David Oluwaseun Enesi, and Morufu Olalekan Adeolu. 2014. "Assessment of secondary school students' knowledge, attitude and practice towards waste management in Ibadan, Oyo State, Nigeria." *Journal of Research in Environmental Science and Toxicology*, 3(5): 66–73.
- Adeoye, Israel Adedayo, Kayode Hassan Lasisi, Temitope Fausat Ajibade, Ehizonmhen S. Okonofua, Musbahu Abdullahi Bagwai, Oluwaseyi Aderemi Ajala, Adedamola Oluwafemi Ojo, Bashir Adelodun, and Fidelis Odedishemi Ajibade. 2023. "Environmental Management and Sanitation: Perspectives on Waste." In *The Route Towards Global Sustainability*, eds. Pardeep Singh, Yulia Milshina, André Batalha, Sanjeev Sharma, and Marlia Mohd Hanafiah, pp. 395–414. Cham, Switzerland: Springer Nature.
- Adewole, A. Taiwo. 2009. "Waste Management towards Sustainable Development in Nigeria: A Case Study of Lagos State." *International NGO Journal*, 4(4): 173–179.
- Afon, Abel Omoniyi, and Gbemiga Bolade Faniran. 2013. "Intra-urban Citizen Participation in Monthly Environmental Sanitation in Nigeria: The Ibadan Experience." *Journal of Applied Sciences in Environmental Sanitation*, 8(1): 1–10.
- Agrawal, Sutapa, and Praween Agrawal. 2011. "Adolescent Risk-taking Behaviour in India: The Influence of Socio-economic Characteristics and Living Arrangement." *Journal of Indian Association for Child and Adolescent Mental Health*, 7(2): 57–69.
- Agwu, Mba Okechukwu. 2012. "Issues and Challenges of Solid Waste Management Practices in Port Harcourt City, Nigeria — A Behavioural Perspective." *American Journal of Social and Management Sciences*, 3(2): 83–92.
- Ahmed, Sanusi, and Sarfo Isaac. 2016. "Assessing the Effects of Indiscriminate Disposal of Waste: A Case Study of the Keta Lagoon in the Volta Region of Ghana." *Journal of Biodiversity and Endanger Species*, 4(2): 1–5.
- American Psychological Association. 2002. *Developing Adolescents: A Reference for Professionals*. <http://www.apa.org/pi/families/resources/develop.pdf> (accessed November 29, 2023)

- Anestina, Ifeoma Agboje, Adeoti Adetola, and Irhivben Bright Odafe.** 2014. "Performance Assessment of Solid Waste Management Following Private Partnership Operations in Lagos State, Nigeria." *Journal of Waste Management*, 2014(1): 1–8.
- Banks, Summer.** 2018. What Is Environmental Sanitation? <http://www.wisegeek.org/what-is-environmental-sanitation.htm> (accessed June 2, 2018).
- Bosah, Victoria O.** 2013. "Environmental Education in Nigeria: Issues, Challenges and Prospects." *Mediterranean Journal of Social Sciences*, 4(15): 159–168.
- Budge, Sophie, Argaw Ambelu, Jamie Bartram, Joe Brown, and Paul Hutchings.** 2022. "Environmental Sanitation and the Evolution of Water, Sanitation and Hygiene." *Bulletin of the World Health Organisation*, 100(04): 286–288.
- Burgers, Lizette.** 2000. *Background and Rationale for School Sanitation and Hygiene Education*. New York, USA: UNICEF. <http://www.irc.nl/sshe/resources/rationale.html> (accessed June 2, 2018).
- Chess, Caron.** 2000. "Evaluating Environmental Public Participation: Methodological Questions." *Journal of Environmental Planning and Management*, 43(6): 769–784.
- Cohen, Jacob.** 1988. *Statistical Power Analysis for the Behavioral Sciences*. 2nd edn. New York: Routledge.
- Collado, Silvia, Claudio D. Rosa, and José A. Corraliza.** 2020. "The Effect of a Nature-Based Environmental Education Program on Children's Environmental Attitudes and Behaviors: A Randomized Experiment with Primary Schools." *Sustainability*, 12: 6817.
- Daramola, Oluwale Philip.** 2012. "Clapping with One Hand: The Case of Urban Environmental Sanitation Practices in Nigeria." *Journal of Applied Technology in Environmental Sanitation*, 2(4): 223–228.
- Daramola, Oluwale, Olowoporoku Oluwaseun, and Odunsi Oluwafemi.** 2017. "Assessment of Environmental Sanitation Behaviour of Market Traders in Selected Markets in Ibadan, Nigeria." *Advances in Environmental Research*, 6(3): 231–242.
- Duru, Chukwuma B., Anthony C. Iwu, Kevin C. Diwe, Kenechi A. Uwakwe, Irene A. Merenu, Ugochukwu Chinyem Madubueze, Ijeoma N. Okedo-Alex, Emmanuel U. Ndukwu, Ikechi Ohale, and Ernest Nwaigbo.** 2017. "Environmental Sanitation Practices: A Case Study of Solid Waste Management in Semi-Urban Communities in Orlu, Imo State Nigeria." *Occupational Diseases and Environmental Medicine*, 5(4): 88–105.
- Egbinola, Christiana Nndi, and Amobichukwu Chukwudi Amanambu.** 2015. "Water Supply, Sanitation and Hygiene Education in Secondary Schools in Ibadan, Nigeria." *Bulletin of Geography. Socio-economic Series*, (29): 31–46.
- Eisenberg, Nancy, Gustavo Carlo, Bridget Murphy, and Patricia van Court.** 1995. "Prosocial Development in Late Adolescence: A Longitudinal Study." *Child Development*, 66(4): 1179–1197.
- Ekong, Ibanga Eyo.** 2015. "An Assessment of Environmental Sanitation in an Urban Community in Southern Nigeria." *African Journal of Environmental Science and Technology*, 9(7): 592–599.
- Faniran, Gbemiga Bolade.** 2012. "Residents' Perception of the Monthly Environmental Sanitation Exercise in Ibadan, Nigeria." Master's thesis. Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria.
- Gifford, Robert, Robert Hay, and Karen Boros.** 1982. "Individual Differences in Environmental Attitudes." *The Journal of Environmental Education*, 14(4): 19–23. <https://doi.org/10.1080/00958964.1983.10801933>.
- Ibrahim-Adedeji, Kamaldeen Babatunde.** 2015. "Attitude of Market Woman towards Weekly Environmental Sanitation Exercise in Bodija Market in Ibadan, Oyo State, Nigeria." *Journal of Sociology, Psychology and Anthropology in Practice*, 7(1): 57–62.
- Jazat, Joseph Pam, John Adebayo Akande, and Timothy Ogunbode.** 2023. "State of Solid Waste Disposal and Suggested Fixes for Iwo and Ibadan Metropolis, Nigeria." *Frontiers in Sustainability*, 3: 1022519.

- Kofoworola, Oyeshola Femi.** 2007. "Recovery and Recycling Practices in Municipal Solid Waste Management in Lagos, Nigeria." *Waste Management*, 27(9): 1139–1143.
- Kuo, Ming, Michael Barnes, and Catherine Jordan.** 2019. "Do Experiences with Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship." *Frontiers in Psychology*, 10: 305.
- Linder, Noah, Matteo Giusti, Karl Samuelsson, and Stephan Barthel.** 2022. "Pro-environmental Habits: An Underexplored Research Agenda in Sustainability Science." *Ambio*, 51: 546–556.
- Lüthi, Christoph.** 2012. *Community-Based Environmental Sanitation Planning Approaches for the South: The Household-Centred Approach*. Eawag Department of Sanitation, Water and Solid Waste for Development. Berlin.
- MacKee, Neill.** 1992. *Social Mobilization and Social Marketing in Developing Communities: Lessons for Communicators*. Penang, Malaysia: Southbound.
- Michelsen, Gerd, and Daniel Fisher.** 2017. "Sustainability and Education." In *Sustainable Development Policy: A European Perspective*, eds. Michael von Hauff and Claudia Kuhnke, pp. 135–158. London, UK: Routledge.
- Mmom, Prince Chinedu, and Mmom Chigozirim Faith.** 2011. "Environmental Sanitation and Public Health Challenges in a Rapidly Growing City of the Third World: The Case of Domestic Waste and Diarrhoea Incidence in Greater Port Harcourt Metropolis, Nigeria." *Asian Journal of Medical Sciences*, 3(3): 115–120.
- Morton, Katie, Andrew Atkin, Kirsten Corder, Marc Suhrcke, and Esther M. F. van Sluij.** 2016. "The School Environment and Adolescent Physical Activity and Sedentary Behaviour: A Mixed-Studies Systematic Review." *Pediatric Obesity/Public Health*, 17: 142–158.
- North American Association for Environmental Education (NAAEE).** 2008. Using Environment-Based Education to Advance Learning Skills and Character Development. <https://catalogue.nla.gov.au/Record/5685896> (accessed October 26, 2017).
- Ogbalu, Anthony Ikechukwu.** 2004. "Recycling and Management of Waste Materials: Need for Health Education." *Education Studies and Research Journal*, 3(1): 36–46.
- Olanrewaju, Samson Olaitan, and Afolabi M. Bolaji.** 2020. "A Review of Sanitation Challenges in Ibadan Metropolis, Nigeria." *LAUTECH Journal of Civil and Environmental Studies*, 4(1): 134–142.
- Omoreke, Ishaq Isola.** 2004. "Management of Environmental Pollution in Ibadan, an African City: The Challenges of Health Hazard Facing Government and the People." *Journal of Human Ecology*, 15(4): 265–275.
- Omoogun, Ajayi C., Usang Nkanu Onnoghen, and Gertrude Alorye Ateb.** 2014. "Adequacy of Knowledge of Environmental Concepts among Junior Secondary School Teachers for the Multidisciplinary Approach of Implementing Environmental Education Curriculum." *Journal of Education and Practice*, 5(36): 106–112.
- Oyo State Government.** 1999. *Oyo State of Nigeria Gazette, Edict No.1 of 1999*. Ibadan: Oyo State Environmental Protection Agency, Oyo State Government Press.
- Oyo State Government.** 2004. *Oyo State Solid Waste Management Authority Law 2004 ("OYOWMA Law")*. Ibadan: Oyo State Government Press.
- Oyo State Government.** 2011. *Ministry of Environment and Habitat Law, 2011 ("MEH Law")*. Ibadan: Oyo State Government Press.
- Oyo State Government.** 2012a. *Oyo State Solid Waste Management Authority (Amendment) Law 2012 ("OYO WMA Amendment Law")*. Ibadan: Oyo State Government Press.
- Oyo State Government.** 2012b. *Oyo State Environmental Protection Agency Law 2012 (OSEPA Law)*. Ibadan: Oyo State Government Press.
- Oyo State Directory of Secondary Schools In Ibadan Municipality.** 2018. *Ibadan*. Nigeria: Oyo State Government Press.
- Piotrowska, Patrycja J., Christopher B. Stride, Simone E. Croft, and Richards, Rowe.** 2015. "Socioeconomic Status and Antisocial Behaviour among Children and Adolescents: A Systematic Review and Meta-analysis." *Clinical Psychology Review*, 35: 47–55.

- Rosa, Claudio D., and Silvia Collado.** 2019. "Experiences in Nature and Environmental Attitudes and Behaviors: Setting the Ground for Future Research." *Frontiers in Psychology*, 10: 763.
- Sawilowsky, Shlomo S.** 2009. "New Effect Size Rules of Thumb." *Journal of Modern Applied Statistical Methods*, 8(2): 467–474.
- Sustainable Sanitation Alliance (SuSanA).** 2008. "Towards More sustainable sanitation solutions — SuSanA Vision Document." <http://www.susana.org/en/resources/library/details/267> (accessed April 23, 2018).
- Sweeting, Helen, and Kate, Hunt.** 2014. "Adolescent Socio-Economic and School-Based Social Status, Health and Well-being." *Social Science & Medicine*, 121: 39–47.
- Tamene, Aiggan.** 2021. "What It Takes to Save Lives: An Assessment of Water, Sanitation, and Hygiene Facilities in Temporary COVID-19 Isolation and Treatment Centers of Southern Ethiopia: A Mixed-Methods Evaluation." *PLoS ONE*, 16(8): e0256086.
- United Nations.** 2017. *Household Size and Composition around the World*. Economic and Social affairs. Data Booklet. http://www.un.org/en/development/desa/population/publications/pdf/ageing/household_size_and_composition_around_the_world_2017_data_booklet.pdf (accessed April 20, 2019).
- United Nations Educational, Scientific and Cultural Organization (UNESCO).** 1978. *Tbilisi Declaration (Final Report of the Intergovernmental Conference on Environmental Education: Tbilisi [USSR])*. Paris.
- Wisconsin Environmental Education Board.** 2016. Environmental Education: Definition and Requirements. <http://www.uwsp.edu/cnr-ap/weeb/Pages/default.aspx> (accessed September 22, 2017).
- World Health Organization (WHO).** 2005. *Sanitation and Hygiene Promotion Guide*. Switzerland: Water Supply and Sanitation Collaborative Council.
- World Health Organization (WHO) and United Nations Children's Fund (UNICEF).** 2017. *Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines*. Geneva. <https://washdata.org/reports> (accessed October 26, 2017).
- Zhang, Weizhe, Jinli Zhao, and Jin Chen.** 2019. Nature Club Programs Promote Adolescents' Conservation Behavior: A Case Study in China's Biodiversity Hotspot. *The Journal of Environmental Education*, 50: 192–207.

Appendix A

Questionnaire

Influence of Environmental Education on Sanitation Behavior of Secondary School Students in Ibadan Municipality

Dear Respondent,

This questionnaire is designed to gather information on the above research work. This survey is strictly for academic purposes. Your co-operation and support will be greatly appreciated in providing the information requested. Be assured that the information provided will be treated with utmost confidentiality.

Thank you.

Instruction: *Please tick [✓] or fill in the spaces provided as appropriate.*

Name of School: _____ Student ID No.: _____ School Type: _____

a. Socio-economic characteristics

1. Gender: (a) Male [] (b) Female []

2. Age (in years): _____

3. Ethnicity: (a) Yoruba [] (b) Igbo [] (c) Hausa [] (d) Others (specify) _____

4. Religion: (a) Christianity [] (b) Islam [] (c) Others (specify) _____
5. Parents' occupation: _____
6. Average family monthly income (in Naira): _____
7. Household size: _____

b. Knowledge of environmental sanitation

1. Where do you know/learn about environmental sanitation? (*Parents; Friends; Teachers; Books; Churches; Mosque; Television; Radio; Internet*)
2. What is environmental sanitation?
3. What is Personal Hygiene?
4. What is Solid waste management?
5. What is Water Management?
6. Why do you think environmental sanitation is important?
7. What are you to do after using the toilet?
8. Where should you urinate?
9. Where should you defecate?
10. Which of the following ways should solid wastes be properly disposed?
(a) *Ground/Floor* [] (b) *Open Dumpsites* [] (c) *Nearby Bush* []
(d) *Drainage* [] (e) *Burning* [] (f) *Waste Collection Service* []
(g) *Barrow* [] (h) *Abandoned/Dilapidated Building* [] (i) *Vacant land* []
(j) *Outside the fence* [] (k) *Burying* [] (l) *Recycling* []
11. Should waste bins be left uncovered?
12. Which is better to use, disposable products like paper plate or durable products like plastic plate?
13. Where should waste water be disposed?
14. What should be done running tap water?
15. Should stagnant water be allowed and why?
16. What can litter cause to the environment?