Pro-Environmental Behaviors, Pollution Control Attitudes and Environmental Knowledge of Secondary School Students

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Abstract

This study assessed the level of pro-environmental behaviors, pollution control attitudes and knowledge among a sample of 424 secondary school students within Abuja the capital city of Nigeria. The data for this study was collected using three tools: environmental attitude test, environmental knowledge test and pro-environmental behavioral scale. The study data were analyzed using Ms. Excel computer program. Pearson correlation coefficient was used to compare individual responses on environmental knowledge with environmental attitude to see if both responses correlate with one another. According to the study results, the environmental attitude of the students was high, and results also showed their environmental knowledge to be also high while their pro-environmental behaviors were found to be moderate. It also reviewed that female student exhibited better pro-environmental behaviors, while the male students gave a better attitude to environmental related issues. The result displayed a very strong positive correlation value of 0.807 between environmental knowledge and environmental attitude, meaning the higher the environmental knowledge, the better their attitude towards issues of the environment and vice versa.

Keywords: Environment, Environmental Knowledge, Pollution Control, Pro-Environmental Behaviors

1. Introduction

Over the years, there has been a steady increase in human activities around the globe, such as industrial production, resource exploitation, and private consumption on the environment which results in the degradation of the ecosystem, threats to future generations (Decamps, 2000). As a result of the increase in environmental problem such as ozone layer depletion, the rise of sea levels, global warming, natural resource exploitation and numerous health hazards from the activities of man, society is becoming aware and more sensitive to things about the environment (Bearer, 1995). Scholars all over the globe have continually called for environmental awareness to create a room in which the environment can be saved by humans from further harm.

Nigeria's capital was moved to Abuja in the year 1991 by General Babangida due to the fact that its former capital, which was Lagos state was not only congested but was also perceived to be prone to attacks since it's by the sea border and as well suffered from slum and environmental pollution. Ever since Abuja was made the capital, it has been facing serious environmental problems from the consequences of rapid growth on human population from the influx of people from across the nation looking for greener pastures, urbanization, and industrialization (Obiadi & Onochie, 2018). These consequences include wastewater disposal problems, poor air, and water quality, and a polluted environment from improper waste management and disposal practices among its inhabitants (Babayemi & Dauda, 2009). Some of these environmental problems of waste management in developing country is as a result of no recycling policies created in their countries which contributed to the accumulation of waste and as a result caused the inability of waste management authorities to cope with the volume of solid waste generated and at the same time caused the overstretching of waste management facilities (Nnaji, 2015).

Navaro and Vincenzo (2019), revealed in their study that more than 250,000 tons of waste is generated in Abuja per year and Abuja had only four major disposal site they manage which was shut down in the year 2005 due to poor management of the facilities which led to the contribution of air pollution and land pollution from the leachate that flowed to the surface in the rainy season period. Meanwhile, Adeyemi (2011), in their study revealed that population growth and construction boom is the major problem causing environmental pollution in Abuja, as this generates over 3000 tones of solid waste daily, of which eventually ends up not properly disposed. In addition, (Babayemi, Ogundiran, & Osibanjo 2016) lack of awareness among populace who are still tied to traditional and cultural practices, preindustrial norms contribute to the environmental problems the country is facing.

According to Akinyele, (1994), Poverty implies as a distinct form and levels of deprivation, which inflict crucial constraints on traditional human functioning and existence. Poverty is undeniably associated to lack of control over resources including capital, knowledge, land, skills, and social connections. (United Nations, 1996). And Nigeria being a 3rd world country has about 40% of its population living in Poverty, although the statistics for 2021 has not been estimated but it was projected to increase by 5% according to The Nigerian National Bureau of Statistics report on poverty and inequality between September 2018 and October 2019.

Nigeria as a country is facing daily increase on environmental consequences as a result of polluted environment, such problems include flooding of the environment whenever there's a heavy rainfall due to waterway blockages from the indiscriminate dumping of domestic waste into it, food contamination from the dirty environment and wrong application of fertilizers by farmers on their farmlands to improve crop production for food for the ever-increasing population of the country (Imam et al. 2008; Adedeji and Eziyi, 2019).

These environmental problems cannot only be solved through law enforcement by the government as to the sustainability of the environment, therefore this can also be solved by finding out the levels of environmental knowledge, attitude and pro-environmental behaviors of students as this would help create basis for more environmental education that would help them be more environmentally friendly people with positive decisions tomorrow.

1.1 Background

Environmental knowledge, attitude and pro-environmental behaviors are determined by various factors. Haron, et al. (2005), in their research found out that factors that determines how high or low levels of environmental knowledge were education, income levels of households, and as well gender. Results from their study also indicated that households' sources of environmental knowledge were from newspapers, television, and radio. And they also noticed that the higher the level of education, the higher the level of their environmental knowledge. Ibrahim and Babayemi (2010) investigated university of Ibadan undergraduate students' knowledge and attitudes toward environmentalism, results from their investigation showed a positive, significant and strong relationship between knowledge and attitude towards environmentalism and there was significant differences in the scores of knowledge and attitude toward environmentalism between Subgroups of Gender, in which Males had significantly better knowledge of environmentalism than their female counterparts, Insignificant differences were recorded across religion-subgroups as regards knowledge of environmentalism, although the Christians had a significantly better attitude towards environmentalism and lastly, Significant differences were recorded across field of study subgroups as regards knowledge of environmentalism. Respondents in the field of health sciences, science and technology as well as those in humanities and arts had the best better and worse knowledge of environmentalism respectively while Insignificant differences was recorded across field of study subgroups as regards attitudes towards environmentalism. They suggested the earnest need to update undergraduates' environmental knowledge such that their attitudes may also improve.

Purpose of the study: This study aims at ascertaining the level of Pro-Environmental behaviors of secondary school students, and their attitudes towards controlling environmental pollution as well as their knowledge on the consequences resulting from environmental pollution. The research will help lay the foundation for environmental awareness activities in schools and their locality.

Research Question: For the purpose of this study, we are going to answer the following questions
1) How is the pro-environmental behavior of the secondary students differing in respect to Gender (Boys and Girls) and Schools (Government-owned and Private Schools)?
2) How are the attitudes towards environment differ in respect to Gender (Boys and Girls) and Schools (Government-owned and Private Schools)?
3) What is their level of knowledge on the consequence of our actions to the environment?

4) Is there any correlation between their environmental knowledge and environmental attitudes?

Significance of the study: Since there has been an increase of environmental problems caused by the daily activities of a man to fend for his family, destroying ecosystem to erect infrastructures like railways, roads, and buildings. These problems have gotten the attention of scholars around the world and they are calling for more environmental awareness among people and this study will help in understanding the level at which the students behave pro environmentally, attitude towards the environment, and knowledge about the consequences of environmental pollution in Abuja, it'll also help to improve the attitude towards the protection and proper use of natural resources, and it would also help create room for further research.

Limitation of the study: This study interest is limited to only secondary school students of both private and government-owned within the 2020/2021 academic year calendar in Abuja.

2. Methods

2.1 Study Area

Abuja is Nigeria's administrative and political capital, located center of the country (as seen in Figure 1). The land area is 8,000 square kilometers, bordering Kaduna to the north, Nasarawa to the east and southeast, Niger to the west, and Kogi State to the southwest. It lies in latitude 7° 25' N and 9° 20° North of the Equator and longitude 5° 45' and 7° 39' (www.fct.gov.ng). Abuja belongs to the Guinea forest-savanna mosaic area in the West African subregion. The terrain of Abuja is gently undulating, with a height of 305m in the west and 610m in the east (Abuja-Citiserve, 2004).
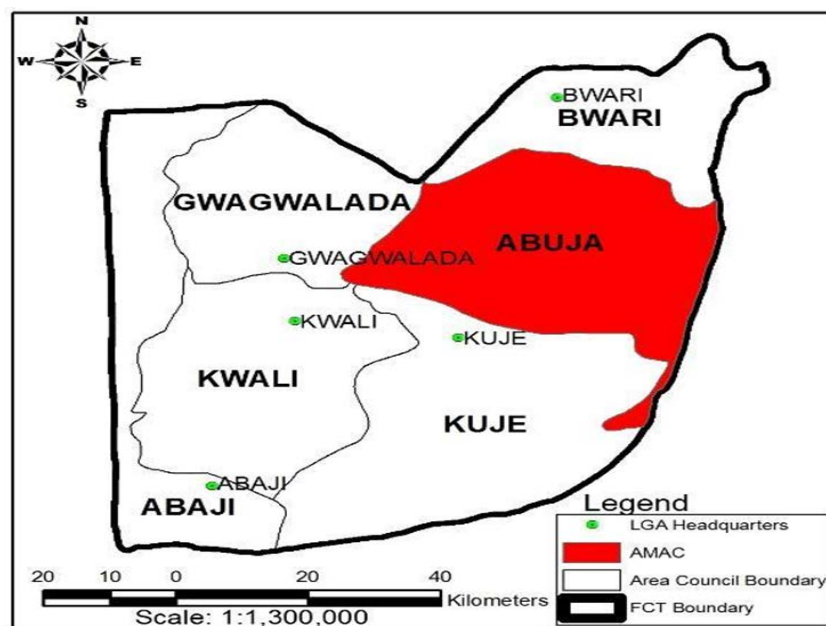

Figure 1. Map of Abuja showing Abuja municipal area council

2.2 Study Area Population

Abuja is composed of six municipalities, including Abaji, AMAC, Bwari, Gwagwalada, Kuje, and Kwali. These municipalities are further subdivided into districts and areas. Abuja has a population of 1, 406,239, the city's population has been growing by 20%-30% per year, making it the fastest growing city in Africa according to the National Population Commission (NPC, 2012), it is also considered to be the eight most populous cities in Nigeria. The inhabitants of Abuja are mainly people of different cultural groups who migrated from other parts of Nigeria.

2.3 Methodology

The data for the study was collected primarily with the help of questionnaire containing 19 questions on environmental attitudes, 18 questions on environmental knowledge and 21 questions on pro-environmental behaviors, and administered it to students from both private owned and government-owned schools in the six Municipals of Abuja. 400 students were initially targeted for this study but at the course of receiving the data, we noticed that 424 students

responded to the questionnaire, so we made use of the 424 respondents for the study, and Secondary data was collected from data sources like books and journals.

2.3.1 Margin of Error details

Confidence level %	Sample size	Population Proportion %	Population Size	Margin of Error %
95	424	0.03	1406239	0.16

2.4 Scoring of the Scale and Classification

The attitudinal level towards the environment and knowledge of environmental issues of the students who participated in the study was obtained using the "five-point Likert scale" and interpreted. The scoring and grading adopted for this study is as follows.

Table 1 Scoring and grading of the scale material for environmental attitude

Likert Description	Scale	Value Range Allocation	Value/Level
Strongly agree	5	849-1060	Very high
Agree	4	637-848	High
Neutral	3	425-636	Average
Disagree	2	213-424	Low
Strongly disagree	1	212	Very low

Table 2 Scoring and grading of the scale material for pro-environmental behaviors

Likert Description	Scale	Value Range Allocation	Value/Level
I do it very often	5	849-1060	Very high
I do it	4	637-848	High
I sometimes do it	3	425-636	Average
I barely do it	2	213-424	Low
I never do it	1	212	Very low

Significant difference between groups was tested using one-way analysis of variance (ANOVA) to see if there is any significant difference in their response in respect to school and gender.

2.5 Data analysis

The data collected in this study was quantitatively analyzed using the computer software excel for windows, and the analysis was based on the research objectives. Reasons why we chose a quantitative method for the purpose of this study is that it is fast in obtaining information and more scientific, and secondly, we are trying to check levels and also the correlation between variable of environmental knowledge and environmental attitude scales. Quantitative method of research according to Dźwigoł (2018), is a method that is designed to determine how many people think, react, or behave in a specific way, and is also the best choice for large sample sizes.

2.6 Ethical Consideration

Informed consent was obtained from the participants before administering the questionnaires to them, and data was kept encrypted in a laptop.

2.7 Demographics properties

The findings based on the demographics properties of the questionnaire which includes gender, age, school and location is shown in table 3 below.

Table 3 Distribution of sample

	Frequency (N=424)	Percentage (%)
Gender Female	212	50

Male	212	50
Age		
14	78	18.4
15	126	29.7
16	103	24.3
17	117	27.6
School		
Government School	212	50
Private school	212	50
Location		
AMAC	91	21.5
Bwari	72	17.0
Gwagwalada	87	20.5
Kuje	53	12.5
Kwali	64	15.1
Abaji	57	13.4

Table 3 above shows that 50% of the respondents numbering about 212 were females and 50% which is about 212 were males. The majority (29.7%) of the respondents were students who are 15 years of age, while students who were 16 and 17 years of age was 24.3% and 27.6% respectively and the age with the least number of respondents were students of whom were 14 years as at the time the survey was carried out. According to the table above, distribution of sample according to schools shows that 50% of the respondents numbering about 212 were students from government-owned schools while the remaining 50% which is about 212 were students from private schools. According to table above showing distribution of sample according to locations, it shows that 21.5% of the respondents numbering about 91 were students living within AMAC, 72 students which are about 17% of the total respondents were living within Bwari, 87 students which are 20.5% of the respondents lives within Gwagwalada, 53 students live in Kuje, 64 lives in kwali and 57 lives within Abaji council.

3. Results

The following session contains the findings based on the research questions earlier mentioned.

3.1 Pro-Environmental Behavior

In order to access level of Pro environmental behaviour of the students, a total of 21 items was used and table 4 below shows the distribution of students' response according to gender and according to school as well.

Table 4 Pro-environmental behavior of the secondary students differing in respect to gender (boys and girls) and schools (government-owned and private schools).

Items	Male	Female	Private school	Government owned school
1	527	498	559	466
2	457	480	457	480
3	746	723	696	773
4	654	612	596	580
5	591	473	547	517
6	552	547	535	564
7	508	541	512	538
8	558	662	655	565
9	372	479	447	407
10	340	429	375	394
11	855	736	736	670

12	480	522	448	554
13	623	591	651	563
14	426	543	490	479
15	514	413	499	528
16	602	577	669	510
17	624	636	612	648
18	743	766	695	814
19	640	559	604	595
20	773	813	838	749
21	677	616	625	668
AVG	**579.6**	**581.7**	**583.1**	**574.3**

On comparing the response given by the students on pro-environmental test, it was seen on table 4 above that the female students exhibited a more pro-environmental behavior with an average score of 581.7 than their male counterparts that had an average score of 579.6. meanwhile, students from the government owned schools had an average score of 574.3, scoring above students from private schools that had an average score of 583.1. On relating the results to the Pro-environmental scale on Table 2, we found out that the level of the students' pro-environmental behaviors is within average on the scale.

3.1.1 Significant difference of the students' responses.
This session shows the significant difference of the students' responses on pro-environmental behaviour based on their gender and as well as their schools and it is shown in table 5 below.

Table 5 Significant difference of student's response on pro-environmental behavior in respect to gender and to schools

	Source of Variation	SS	Df	MS	F	P-value	F crit
Gender							
	Between Groups	50.38	1.00	50.38	0.00	**0.95**	4.08
Pro-environmental Behaviors	Within Groups	595646.10	40.00	14891.15			
	Total	595696.48	41.00				
Schools							
	Between Groups	806.10	1.00	806.10	0.06	**0.80**	4.08
Pro-environmental Behaviors	Within Groups	508049.52	40.00	12701.24			
	Total	508855.62	41.00				

As seen on table 5 above, there was no significant difference found on students' response on Pro-Environmental behavior responses when compared to gender and schools because the P-values for both were all above 0.05.

3.2 Attitudes Towards Environment

A total of 19 items was used to assess the level of students' attitude towards the environment and table 6 below shows the distribution of the students' response according to gender as well as school.

Table 6 Difference in student's response to questions on environmental attitude scale according to gender and according to schools

Items	Male	Female	Private school	Government owned school
1	739	787	718	808
2	916	902	858	903
3	840	739	804	895
4	662	734	693	703
5	679	766	681	460
6	667	712	737	642
7	596	575	648	523
8	670	543	636	577
9	833	860	828	865

10	818	758	812	764
11	555	636	552	639
12	802	806	843	777
13	783	836	828	793
14	584	603	593	561
15	770	840	809	801
16	668	735	653	750
17	855	746	786	815
18	873	798	825	746
19	915	808	861	866
AVG	**748.5**	**746.5**	**745.5**	**730.9**

On comparing the response to the questions from the students, it was seen that the students exhibited a relative high level of environmental attitude with the male having a score of 748.5 as against their female counterparts scoring 746.5 while for that of schools, private school students had a more positive environmental attitude with an average score of 745.5 as against students from government schools that scored an average of 730.9.

3.2.1 Significant difference of the students' responses
This session shows the significant difference of the students' responses on environmental attitude based on their gender and as well as their schools and it is shown in table 7 below.

Table 7 Significant difference of student's response on environmental attitude in respect to gender and to schools

	Source of Variation	SS	Df	MS	F	P-value	F crit
Gender							
	Between Groups	44.24	1.00	44.24	0.00	**0.95**	4.11
Environmental Attitude	Within Groups	398028.84	36.00	11056.36			
	Total	398073.08	37.00				
School	Between Groups	2019.18	1.00	2019.18	0.15	**0.70**	4.11
	Within Groups	472119.68	36.00	13114.44			
Environmental Attitude	Total	474138.87	37.00				

As seen on table 7 above, there was no significant difference found on students' response on Environmental Attitude responses when compared to gender and schools because the P-values for both were all above 0.05.

3.3 Environmental Knowledge

A total of 18 questions was asked in order to assess the level of knowledge of the students who participated in the study about the environment and their response to those question is shown in table 8 below.

Table 8 Distribution according to student's environmental knowledge

	Questions (*perfect answer*)	Frequency	%
1	Environmental issues are a danger and threat to whom? (*For all living things in the world*)	313	73.8
2	Which of the following must be disposed of into the trash? (*leftovers*)	282	66.6
3	Which of the following are from vertebrates? (*frog*)	324	76.4
4	Which is not necessary for growth of plants? (*starch*)	356	84
5	Which of the following examples show environmental problems which threaten the future of our world? (*Global warming and Acid rain*)	287	67.7
6	Which of the following air pollution is not caused by people? (*Volcanic eruption*)	290	68.4
7	Which of the following is not a natural disaster? (*Tankers and traffic accidents*)	319	75.2
8	Which of the following is not as a result of climate change, considering that all plant species in the world disappears? (*The amount of oxygen in the atmosphere increases*)	191	45
9	Which of the following event is useful for the environment? (*Rather than using a car, walk short distances*)	332	78.3

10	Indiscriminate disposal of domestic waste outside leads to? (*Contaminated air, water, and soil*)	343	80.9
11	Which of the following is a living entity? (*plants*)	334	78.8
12	What would be the result of environmental pollution? (*Clean air is reduced*)	351	82.8
13	Which of the following will occur due to an increase in the proportion of poisonous gas in the air? (*The world's climate will change and global warming will happen*)	359	84.7
14	Which of the following will occur due to uncontrolled hunting? (*Many animal generations would become extinct*)	280	65.1
15	Which of the following is a protected plant? (*Orchid*)	155	36
16	Which one of the following is the reason for the cities and industrial enterprises being built on the fertile land? (*We get more products*)	325	76.7
17	Which of the following is the camel habitat? (*desert*)	321	75.7
18	Which of the following is not a factor which destroyed the vegetation? (*Watering trees*)	295	69.6
	Average total respondents who answered correctly		**71.42**

After analyzing the data from their responses, results from average total respondents who answered correctly was 71.42%, and this showed a high level of environmental knowledge among the students.

3.4 Correlation Between Environmental Knowledge and Environmental Attitudes

In order to determine if whether there wass a correlation between environmental knowledge and environmental attitude level, we used the Pearson correlation coefficient and on comparing the individual responses scores on environmental knowledge with environmental attitude, the result displayed a strong positive correlation value of r=0.807 shown in table 9 below between the two variables, which means the higher the environmental knowledge, the positive their attitude towards issues of the environment and vice versa.

Table 9 Correlation between responses of students on environmental knowledge and environmental attitudes

	Variable	1	2
1.	Environmental Attitude	-	
2.	Environmental Knowledge	**0.807**	-

4. Discussions and Conclusion

Pro-environmental behavior, environmental attitude and environmental knowledge level of secondary school students in Abuja, Nigeria was assessed, discussions and conclusion were made in the session based on the findings of this study.

On comparing result findings with that of Haron *et al.* 2015; Ibrahim and Babayemi (2010), it is found out that there were some similarities with their findings, where environmental knowledge correlated positively with pro-environmental behavior.

This study also supports the findings from previous research made on pro-environmental behavior by Desrochers, *et al.,* (2019) where it was stated that females were more environmentally friendly than the male, this may be due to females having these traits of kindness, honesty, full of emotions and compassions more that the male, these makes them more conscious of the environment and more likely to participate in environmental sustaining behaviors than their male counterparts.

When results for pro-environmental behavioral responses from the students were compared according to the objectives of the study, it was observed that the general student's pro-environmental behavioral level was on the average, but the female students exhibited more pro-environmental behaviors more than the male students.

Meanwhile, when it is compared pro-environmental according to schools, it was observed that the students from private owned schools exhibited more environmentally friendly behaviors. The reason for this could be because in Nigeria, private schools provide better learning environment for the students with options of self-development and extra-curricular activities.

Students' environmental knowledge were high but has a room for improvement because the more the knowledge, the beneficial it is for our environments. On comparing environmental knowledge response with environmental attitudes, it was observed that the environmental knowledge response correlated with their attitude, this shows that environmental knowledge is indeed a factor that determines environmental attitude.

4.1 Recommendations

The following recommendations were made after findings and conclusions were made in regards to the deficiency found in the students' responses.

In order to promote an environmentally friendly nature among the students in Abuja, we suggested that government should invest in impacting environmental knowledge through awareness programs because the better the knowledge level, the better their attitude which helps the students to make rightful decision in the future.

Government should mandate all National TV, News Papers and Magazines to always advertise environmental related issue on their platforms because what is seen sinks better in our subconscious mind than what is heard.

Since students spend more time nowadays with their phones, information regarding the environment should be pass through social media, as this tool can help educate more students on environmental related issues.

Competitions should be set between schools in Abuja, both private and government owned regarding environmental related issues, this would help create more environmental awareness among the students.

Stakeholders should organize rallies on environmental related issues from time to time in Abuja, as this would help increase environmental consciousness among the students.

And also, environmental awareness program should always be organized in school right from the kindergarten stages, so they grow to understand what to do and what not to do concerning the environment.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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