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Young People and the Environment: Knowledge, Attitude and Practice towards Climate Change and Its Impact in Selected Preparatory Schools of Sidama Zone, Ethiopia

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Abstract: Formal education systems has a critical role to play in creating environmentally literate and practitioners citizens about the prevailing climate change and related environmental issues. This study investigates the major source of environmental information, the influence of independent variables (age, gender, academic stream and grade level) on the knowledge, attitude and practice towards climate change. The total numbers of respondents for this research were 202 which were selected using simple random sampling method. The respondents' attitude and practice towards climate change was evaluated using the Likert scale type questions and also multiple-choice questions were used to assess their environmental knowledge on climate change and its impact. Besides, to strengthen the data obtained through Questionnaire, Focused Group Discussions and Interview were used. Then, the data were analyzed using SPSS version 15.0 for windows. Results of the study revealed that there is statistically significant variation on overall environmental knowledge, attitude and practice across study participants due to variation in age and grade level. In relation to gender and academic streams, the respondents' knowledge on climate change and its impacts is significant. According to the Pearson correlation coefficient, the respondents' knowledge, attitude and practice towards climate change and its effect are significantly correlated to each other. The study participants' knowledge of climate change is a significant positive predictor of attitude and practice. Therefore, knowledge on climate change is powerful predictor of responsible concern and practice towards climate change.

Key words: Knowledge, Attitude, Practice, Climate Change

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I. INTRODUCTION

In its fourth assessment report, the intergovernmental panel on climate change (IPCC) concluded that climate change is already happening with its multi-faceted effects on human society and the environment. An increased concentration of the so called greenhouse gases (i.e. $C0_2$, CH_4, N_20) in the atmosphere as a result of human activities and its possible consequences of climate change has been an international issue since the 1980's [9].

Climate and climate change will certainly have an effect on the future sustainable development of much of our planet's resources such as those relating to biodiversity, water, forests, land and oceans as well as in relation to various socio-economic sectors including water resource, agriculture, forestry, fisheries and human settlements, ecological systems and human health in many parts of the world, with developing countries being the most vulnerable ones [6].

A common theme in the climate change impact and vulnerability literature is the idea that countries, regions, economic sectors and social groups differ in their degree of vulnerability to climate change. This is partly due to the fact that changes in temperature and precipitation will occur unevenly and that climate change impacts will be unevenly distributed around the globe. It is also recognized that even with in regions impacts, adaptive capacity and vulnerability will vary [7]. The least developed countries (LDCs) have contributed the least to the amount of global emission of greenhouse gases, but they are the most vulnerable to the adverse effects of climate change and have the least capacity to adapt to these changes. They will suffer from a possible increase in natural disasters such as floods and droughts due to climate change. The LDCs lack the necessary institutional, economic and financial capacity to cope with climate change impacts and to rebuild the infrastructure damaged by natural disasters [5]. When affected by natural disasters, the LDCs become dependent on external aid, as they do not have the necessary funds available to deal with the problems themselves. Therefore, poverty accentuates the degree of vulnerability to the impact of climate change [8].

The majority of developing countries are in tropical and sub-tropical zones, areas predicted to be seriously affected by the impacts of climate change. Africa, Asia, Latin America and the small Island states have all identified as regions of concern.

Africa is the most vulnerable region to climate change, because of the low adaptive capacity of the African population. This low capacity is due to the extreme poverty situation of many Africans, frequent natural disasters such as droughts, floods, and agriculture, which are heavily dependent on rainfall. The main impacts of climate change are on the water resource, food security and agriculture, natural resource management and biodiversity, and human health [5]. Within the African region, the Horn Countries are among the most vulnerable and are the least prepared countries for adverse global environmental change in the world with a very weak economy, climate-sensitive livelihoods and fragile agro-ecological conditions. Among the Horn countries, Ethiopia is one of the most poor and known by high population growth, which is adversely affected by the impact of climate change.

Since Ethiopia is mountainous country, nearly half of the country and 90% of Ethiopian live on the highlands, which are the delicate components of the environment. The degradation of the environment and poverty made Ethiopia vulnerable to climate change impacts and has least adaptive capacity to climate change impact.

Drought occurs anywhere in the world but its damage is not as severe as in Africa in general and in Ethiopia in particular due to low adaptive capacity [10]. Rainfall variability and associated droughts have been major causes of the country's food shortage and famine because agriculture is the foundation of the national economy and constitutes the primary source of livelihood for the overwhelming majority of the population. Due to climate change impact, poverty, health, food security, ecosystems and social situation of the people are headache of the country [9].

Scientists around the world overwhelmingly agree that recent human activities that release large volumes of several gases (especially carbon dioxide) into the atmosphere have been causing changes in the earth's climate. Climate changes include warmer air and sea temperatures, changed patterns of precipitation, and more intense weather events (such as storms and hurricanes). Some of these climate changes are already having, or are likely to have, effects that can cause serious harm to humans and to the planet – including rising seas that can flood low-lying areas, droughts, increased disease, and extinction of many animal species.

Thus climate change is occurring as a result of our actions, and that it is bringing serious dangers, urgently calls for us, as a society, to change our behavior. Many people in this country and around the world – scientists, environmental activists, some political leaders, and many ordinary citizens– are, in fact, trying to bring about relevant changes in policy and in behavior. However, a great many people seem to be little concerned about climate change and little inclined to take personal actions, or to support policies, that can counter such change. To have the best probability to slow and maybe even reverse the slide toward disastrous global climate change, we want mobilize the widest attainable public support for effective actions. And to do this effectively, we need to understand the bases of students' knowledge, attitudes and practice.

Since climate change has become a topic of public discussion in the last few decades, a considerable number of studies have examined the influences on student's knowledge, attitudes and practice relevant to climate change. Personal pro-environmental behavior (such as reducing energy use in the home) and support for "green" policies (such as higher fuel standards for cars) have been shown to be affected by a variety of factors. These include: worldviews such as those about the relation of humans to nature, perceptions of personal and social risks, political philosophy, knowledge, the personal discomfort of given actions, the perceived efficacy of one's actions, perception of personal responsibility, social norms, and many other influences [1].

Similarly, Level of awareness determines the scope of implementation that needs to be taken to tackles the problem. Lower awareness will make attitudes and intervention mechanisms (practices) to be very slow and untargeted. Environmental attitude of young people appears to be crucial as they ultimately play a direct role in providing knowledge-based solutions to in-coming environmental problems like climate change. Furthermore, school environmental program, although addressed to students can also influence upon the environmental knowledge, attitude and behavior of adults (parents, teachers and local community members) through the process of intergenerational influence [2].

While these studies are very useful in helping to build our knowledge base, some limitations remain to our understanding of attitudes and practice concerning climate change. Thus, this research will focus on assessing the knowledge, attitude and practice of young peoples, assessing local impacts of climate change and the adaptation strategies of the people in Selected Preparatory Schools of Sidama Zone, Ethiopia.

The main objective of this study was to assess the knowledge, attitude and practice of students towards climate change in selected Preparatory Schools of Sidama Zone, Ethiopia. The specific objectives are (1) To identify the students' main sources of information about climate change and its impact; (2) To Investigate students' level of knowledge and attitude and practice towards climate change; (3) To compare the similarities and differences in students' awareness, attitude and practice towards climate change based on independent

variables; (4) To find out the existing relationship between the awareness, attitude and practice in relation to climate change.

II. MATERIAL AND METHODS

Study Area

Sidama zone covers 6972.1 square kilometer and lies between 6.14^0 to 7.18^0 latitude and 37.92^0 to 39.19^0 longitudes, with an elevation ranging 501-3000 meters above sea level. The zone is divided in 19 Woredas with a total population of 3,019, 442 (2007).

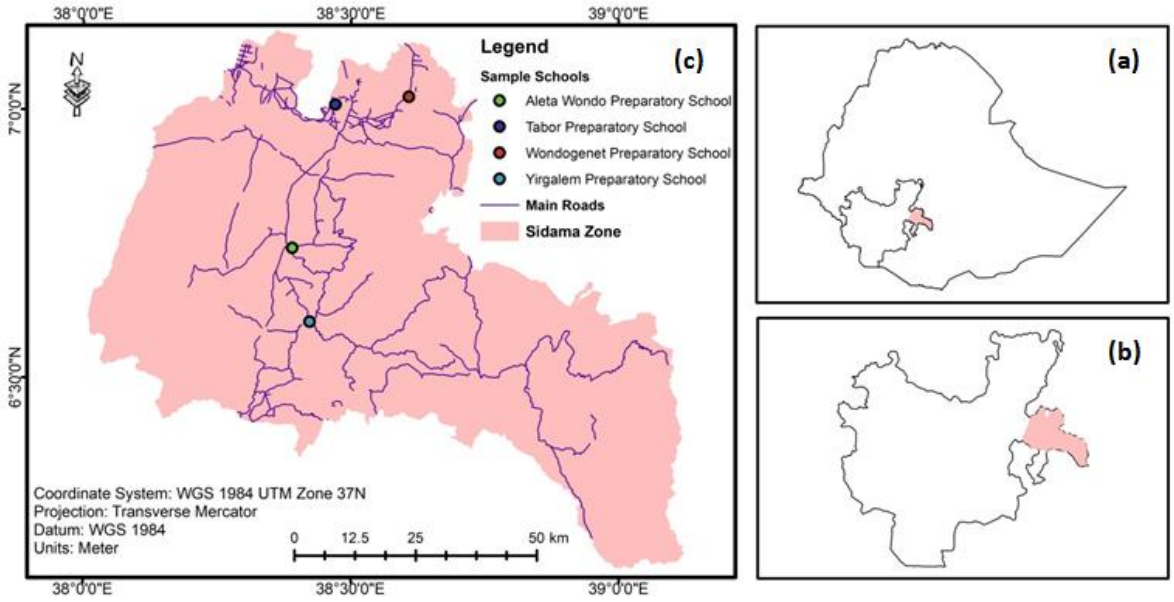

Figure 1: Map of the Study Area

Regarding the Agro – Ecology of the zone, out of the total land size 26.8% is *kolla*[1], 45.49% *Weinadega*[2] and 27.71% *Dega*[3]. The annual mean temperature of the zone ranges between 10.1 and 27^0C and the annual mean rainfall ranges 801- 1600 mm.

According to the land utilization data of the zone, 50.67% is cultivated land, 17.57% grazing land, 6.51% forest bushes and shrub land, 17.84 % cultivable, and the remaining 7.41% is covered by others.

In Sidama Zone due to less awareness of the community and less availability of schools, less percentage of young babies are attending school education. In Sidama Zone currently there are 75 kindergartens, 633 primary schools and 14 secondary schools.

Study Subject

The target population of this research includes the students of purposively selected government preparatory schools. Thus, the schools selected are *Tabor* Preparatory School, *Wondogenet* Preparatory School, *Yirgalem* Preparatory School and *Aletawondo* Preparatory School. The main reason for the selection is that these schools are more experienced and serving as center of education for long time within the zone.

Sample Size Determination and Sampling Procedure

This study follows cross-sectional survey research design with quantitative and qualitative research methods in order to study whether similarities or differences exist in level of student's knowledge, attitude and practice (participatory behavior) towards climate change and its impact at global and local scale as well as to examine similarities and differences in knowledge, attitude and practice based on independent variables.

According to the Sidama Zone Education Department, the total numbers of students in the sample Preparatory Schools were about 2842 students (both 11^{th} and 12^{th} grades) in 2016/17 academic year. To select a representative sample of students in this study stratified random sampling was employed. This sampling technique is good to make certain that the subjects included in the sample are selected in proportion to their occurrence in the population. The population under study is divided under strata based on school name,

[1] *Kolla* is a local term that defines low altitude climate.
[2] *Woina-dega* is a local term that defines mid altitude climate.
[3] *Dega* is a local term that defines high altitude climate.

academic stream (social science and natural science), grade level (11^{th} and 12^{th} and gender (male and female). The number of subjects selected from these different strata is proportional to the total number of subjects in each stratum.

The next step is determination of adequate sample size of the study. In determining the sample size the following formula was used to determine the adequate size of the subjects under study.

The sample size determination formula was adopted from [4].

$$n = \frac{n_0 * N}{n_0 + (N-1)}$$

Where,

$n =$ *Sample size*

$N =$ *Total population*

$n_0 =$ *Sample size based on the pilot study (i.e.* $217.89 \sim 218$*).*

n_0 *is calculated using the formula* $n_0 = (\frac{Z}{e})^2 * pq$

Where*;*

$n_0 =$*Sample population in the pilot study*

$Z =$ *The value of the confidence level at 1.96 (95%)*

$e =$ *The sampling error at 0.05 (5%)*

$p =$ *Estimated value for the proportion of sample that was responded to pilot test*

$q =$ *is estimated value for the proportion of sample that was not responded to pilot test* $q = 1 - p$

Therefore, the sample size for this research is computed as;

$$n = \frac{n_0 * N}{n_0 + (N-1)} = \frac{218 * 2842}{218 + (2842 - 1)} = \mathbf{202}$$

Furthermore, using the proportion, stratified sampling method was employed to determine the sample size based on school, academic stream, grade level and gender. Then, using simple random sampling method the questionnaires were distributed to the proportioned sampled students in the selected preparatory schools.

Study Methodology and Data Sources

This study incorporated qualitative data from interviews, focused group discussions and open-ended questions to enrich the quantitative data obtained from multiple choice knowledge tests and attitude and practice *Likert* scale items which are used as the main data gathering instruments in this study. Tests and *Likert* type of items were used as main data gathering instrument in this research. The main contents incorporated in the test and in the scale were mainly focused on climate change, its causes, consequences, and adaptation and mitigation measures at global and local scale.

Data collection instruments were piloted to check whether they can generate the expected information and to consider their internal consistency. In this respect, the instruments were given to professionals in the field to judge the content validity and revisions were made based on their comments and suggestions. Besides, the tests were distributed to thirty subjects; twenty grade twelve students and ten teachers of secondary and preparatory school. Moreover, the analysis of the pilot data was made to examine the relevance of each item to answer the research question. The internal consistency of the scale was found to be 0.78, 0.75 and 0.76 respectively for knowledge, attitude and practice inventory items using *Cronbach's* alpha.

Data Management and Analysis

After collecting knowledge, attitude and practice inventory questionnaire, the researcher conducted Focused Group Discussions (FGDs) that contain 4 male and 4 female student from grade 11 and 12 for a session of 1 hours in each schools (a total of 4 FGDs were held). In selecting Focused Group Discussion participants the researcher selects students who are skillful in sharing their views and perceptions to other people purposively with the support of room teachers of the school.

The survey questionnaire knowledge test has four choices and the correct responses were assigned a score of one and incorrect responses as a score of zero. The lowest possible total score is zero and the highest total score is 26 (26 x 1) which is changed out of 100% for comparison convenience. Accordingly, when the participants scored for instance 26, 20, and 15; it is scored as 100, 77 and 58, respectively.

To identify students' attitude towards climate change issues, a standardized Likert type of scale was employed. Likert scale applies scales ranging from strongly agree to strongly disagree. There were 21 items presented to measure students' attitude, which some of the items forward definite favorableness while the remaining items forward definite unfavorableness. In assigning values to favorable items the scale were weighted going from strongly agree, agree, undecided, disagree, strongly disagree, having 5, 4, 3, 2, 1 values respectively. But, in the case of unfavorable items these values were reversed in the scale strongly disagree,

disagree, undecided, agree, strongly agree, having 5, 4, 3, 2, 1 values respectively. Then sum of the highest score for responses of an individual accounts $21 * 5 = 105$ and the lowest possible score $21 * 1 = 21$ and the average score is $21 * 3 = 63$. The highest score shows the most favorable attitudes and average score shows neutral attitude, whereas, the lowest score shows the most unfavorable attitude. A score of less than 63 shows unfavorable attitude and a score of greater than 63 shows favorable attitude.

Twenty practice inventory items written on a five point *Likert* scale was used to measure students' practical measures and activities to mitigate climate change and adapt with the impact of climate change. The scale employs five point *Likert* scales, ranging from strongly agree to strongly disagree. In this scale some of items were worded to show positive values whereas others were worded to show negative value. For the positive items value was assigned 5, 4, 3, 2 and 1 for strongly agree, agree, undecided, disagree and strongly disagree and this value was reversed for negative value items. The maximum score is hundred if a student has scored five for all of the twenty items. The minimum score is twenty if a student scored one for all of the twenty items. A score of sixty is in the middle position if a student scores three for all of the twenty items. If the mean score of students are below sixty, it indicates that students have not participatory behavior to take action for climate change and a score greater than sixty indicates that students have the practiced different actions to reduce and tackle the problem of climate change at global and local scale.

To analyze and interpret data gathered from the questionnaires, the data were tabulated, analyzed and interpreted by using SPSS version 15.0 for windows. In order to analyze the data, appropriate descriptive statistical tools such as percentage, frequency table, standard deviation, mean, and inferential statistics of T-test, one-way ANOVA, linear regression and Pearson's correlation coefficient are used.

Mean and standard deviation as well as percentage and frequency table are used to investigate students' average scores with respect to the variables under investigation; T-test and one-way ANOVA are used for comparison and analyzing significance of difference between the mean scores of the respondents and correlation coefficient to examine the relationship among respondents knowledge, attitude and practice towards climate change and its impact while linear regression is used to examine whether respondents knowledge predicts their attitude and practice.

Moreover, students' knowledge, attitude and practice towards climate change and its impact which is obtained from open-ended questions, interviews and focused group discussions are analyzed thematically in a qualitative way.

III. RESULTS AND DISCUSSION

Sources of Information

According to the survey result, 85.14% of the sampled students have the view that having information about climate change is very important. Thus, if the majority of the students recognize that environmental information is very important, students can learn so many things about their environment willingly from various sources if it is provided for them.

The smallest proportion of students around 17% reported that they had very easy and somewhat easy access to the accurate information about climate change and its impact. The majority of the sampled students which are around 74 % reported that it is somewhat difficult for them to get accurate information about environmental issues in detail. The other 9% of the sampled students also reported that "it is very difficult" for them to get accurate information about their environment. Thus, if students are expected to contribute for the improvement of environmental quality in their living area, they need to have an easy access to get the right information concerning on what is going on their environment.

The main sources of information for students about climate change are given in figure 2. According to the results of the study formal education has a greater contribution in providing information about environmental issues for students that help in acquiring the basic knowledge, right attitude and good practice to protect and conserve environmental resources which help in reducing the impact of climate change as well as to contribute for the solution of prevailed and the coming environmental problems. This finding is similar with the other researcher's finding that discloses formal education is the main sources of environmental information that help students in disseminating environmental issues into community. Thus, this finding calls for the integration of environmental education with the formal education curriculum across all educational levels particularly high school, preparatory, college and university levels.

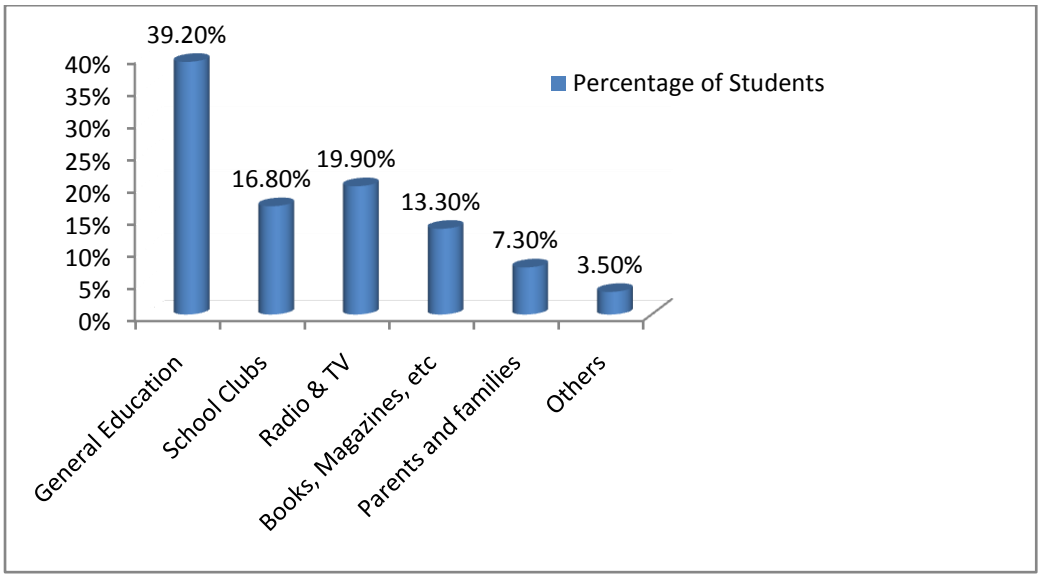

Figure 2: Students' sources of information about climate change and its impact

Students' Awareness, Attitude and Practice towards Climate Change and its Impacts

Measuring the level of students' environmental awareness is somehow challenging as there is no a standardized set value. In this study the researcher observing the distribution of students' score in the awareness test, judgmental values were assigned to categorize the level of students' awareness towards climate change and its impact.

As shown in table 1, the average score of environmental knowledge about climate change and its impacts for students is (66.8). The majority of students (70%) score above average which shows their environmental knowledge about the causes, consequences and possible strategies that are important to reduce and tackle the problem are promising.

As can be seen from table 1, the mean score of attitude towards climate change for the students is 78.9; more than half of students (54.5%) scored above mean. From this one can deduce that the students have positive attitude towards climate change and related environmental problems. This shows a favorable attitude towards conservation of natural resources.

Table 1: Mean scores of students' knowledge, attitude and practice towards climate change

Level of Education	№ of respondents	Variables	Mean	Above mean		Below mean		Standard deviation
				№	%	№	%	
Students	202	Knowledge	66.8	141	70	61	30	17.1
		Attitude	78.9	110	54.5	92	45.5	8.3
		Practice	77.7	116	57.3	86	42.7	8.7

When students' practices towards climate change examined, as illustrated in table 1 students' mean score is (77.7). Similar to their attitude score, more than half of students (57.3%) scored above mean which is an indication of their actual level of participation in environment friendly activities that cures and prevents climate change and related environmental problems. This revealed that students are ready and willing to engage and participate in activities that promote environmental sustainability and protection of the environment for better living.

Generally, the thematic analysis of open-ended questions, interviews and focused group discussions shows that students have promising environmental knowledge, attitude and participatory behavior towards climate change and related environmental issues. For instance, from the responses for open-ended questions that focus on cause, consequence and possible solutions for climate change it is concluded that students have fair level of environmental knowledge. Similarly, as the summary of interview and FGDs of students imply that they have good attitude and understanding about the solutions that can help in reducing and tackling the problems of climate change.

In similar way, the summary of students FGDs and interviews revealed that they are willing to actively participate in acquiring environmental information depending up on the time, ability and energy they have and disseminating it to the wider community as well as they are willing and ready to participate in activities which

can improve and protect the environment and its major components which are crucial for sustenance of life in this world.

Comparison of Students' Awareness, Attitude and Practice based on Independent Variables

There are some socio-demographic factors that affect students' awareness about their environment. In this research students mean score in awareness, attitude and intension test was compared based on age, gender, academic stream and grade level.

In comparing environmental knowledge based on age, the mean scores for 18 and<18, 19-22, 23-25 and 26 and>26 age categories are 64.8, 64.8, 73.6 and 77.1 respectively which shows difference between age categories. To check if such mean difference based on age is statistically significant, one-way ANOVA is employed as summarized in table 2. The ANOVA summary revealed that there is a statistically significant mean difference (df=3, 198; F=8.994; P<.05) in environmental knowledge of respondents about climate change due to their variation in age.

On the other hand, in comparing participants attitude towards climate change based on age, the mean attitude score of study participants are 78.7, 78.4, 83.6 and 92.6 for respondents aged 18 and <18, 19-22, 23 -25, and 26 and >26 respectively that shows difference between age categories in their attitude towards climate change. The ANOVA summary shown on table 2 also revealed that the existing difference in the mean attitude score of participants based on age was statistically significant ((df=3, 198; F=26.819; p<.05).

In the case of practices, study participants aged 18 and below 18, 19-22, 23-25, and 26 and >26 scored 75.2, 78.1, 83.6 and 87.8 respectively having difference between age categories. The ANOVA summary also revealed that the existing difference in the study participants practices of mitigation and adaptation measures of climate change is statistically significant ((df=3, 198; F=18.510; p<.05).

Generally, based on the mean scores obtained between different age categories it is concluded that study participants aged twenty three and above are knowledgeable, have right attitude and environment friendly practices which can help in solving and preventing environmental problems such as climate change than those participants of the study who are young and below twenty-three. In other words, this study revealed that older aged are wise than younger aged in their environmental knowledge, attitude and practices towards climate change.

Table 2: Summary of ANOVA for knowledge, attitude and practice towards climate change by age groups

Variables	Sources	Sum of Squares	df	Mean Square	F	Sig.
Knowledge	Between Groups	6716.774	3	2238.925	8.994	.000
	Within Groups	70197.328	198	248.927		
	Total	76914.101	201	-		
Attitude	Between Groups	5724.182	3	1908.061	26.819	.000
	Within Groups	20062.769	198	71.145		
	Total	25786.951	201	-		
Practice	Between Groups	3875.041	3	1291.680	18.510	.000
	Within Groups	19678.455	198	69.782		
	Total	23553.497	201	-		

As it can be seen from table 3, the mean scores of male and female respondents are 71.2 and 65.3 with standard deviation of 15.4 and 17.1 respectively. There is mean difference of 5.9, 2.8 and 2.7 for environmental knowledge, attitude and practices, respectively between the means of the two gender groups. In order to find out whether there is a significant statistical difference between mean scores of male and female participants of the study in their knowledge, attitude and practices, a t-test was employed.

As depicted in table 3, the result of t-test showed that there is statistically significant difference between males and females in their knowledge (df=198; t=3.049; P<0.05). However, there is no statistically significant difference between males and females in their attitude (df=198; t=0.013; P >0.05) and practice (df=198, t=0.011; P >0.05) towards climate change problem and related environmental issues. This shows that males had better knowledge than females while having similar attitude and participatory behavior towards the problem, causes, consequences and solution towards climate change.

This finding is consistent with the findings of [12], which indicate that males are knowledgeable than females in their environmental knowledge. On the other hand, in terms of environmental attitude and practice the study finding is similar with that of the findings of [3; 2] who reports that there is no difference in students environmental attitude and participatory behavior based on their gender. Nevertheless, this study fails to consistent with the findings of [11] that report there is no difference in eco-literacy levels among males and females.

Table 3: Result of T-Test for knowledge, attitude and practices towards climate change based on gender

Variables	Gender	N	Mean	Standard Deviation	df	Mean Difference	t	Sig.
Knowledge	Male	110	71.17	15.436	198	5.850	3.049	.003
	Female	92	65.32	17.014				
Attitude	Male	110	82.7105	9.15404	198	2.78515	2.493	.013
	Female	92	79.9254	9.72604				
Practice	Male	110	80.7697	8.43320	198	2.71750	2.547	.011
	Female	92	78.0522	9.61227				

Table 4, revealed that the mean score of social science participants in the knowledge test is 76.5 with a standard deviation of 8.9 while natural science participants mean score and standard deviation is 67.9 and 19.4 respectively. The independent sample t-test also shows the existing difference in the mean score of the two academic streams is statistically significant ($df=112$; $t=2.955$; $p<0.05$) as a result of their difference in academic background. On the other hand as table 4 displays the mean score of social science study participants attitude and practice is 84.2 and 82.9 respectively which revealed that the result did not indicate statistically significant differences for their attitude ($df=112$; $t=-0.270$; $p>0.05$) and participatory behavior ($df=112$; $t=-0.314$; $p>0.05$) as a result of their academic stream background. Thus, from this it is concluded that those who learn and teach social science subjects are more knowledgeable than those who are natural science background. On the other hand, in terms of environmental attitude there is no difference between those who are natural science and social science academic stream.

Table 4: Result of T-Test for Students' knowledge, attitude and practices towards climate change based on academic stream across all groups

Variables	Stream	N	Mean	Standard Deviation	df	Mean Difference	t	Sig.
Knowledge	Social science	80	76.51	8.990	198	8.606	2.955	.004
	Natural science	122	67.90	19.374				
Attitude	Social science	80	84.2157	10.07832	198	-.48294	-.270	.788
	Natural science	122	84.6986	9.62446				
Practice	Social science	80	82.9020	7.33827	198	-.44050	-.314	.754
	Natural science	122	83.3425	7.91837				

Grade 12 research participants with mean and standard deviation of 73.1 and 13.6 respectively out scored grade 11 participants having corresponding figures of 66.9 and 20.3 in their environmental knowledge. In order to find out whether there is a significant statistical difference between the participants of grade11 and grade12 mean scores in their environmental knowledge about climate change and one-way ANOVA was employed. The ANOVA summary as it is illustrated in table 5 revealed that the existing difference in the participants environmental knowledge about environmental problems such as climate change is statistically significant ($df=3, 198$, $F=5.644$, $p<.05$).

As depicted in table 5, similar to environmental knowledge, grade 12 research participants with mean and standard deviation of 84.2 and 8.6 respectively out scored grade 11 participants having corresponding figures of 81and 10.1 in their attitude towards climate change. Similar to environmental knowledge as it is displayed in table 5, for environmental attitude mean score comparison one-way ANOVA is employed and show statistically significant difference ($df=3, 198$; $F=0.004$; $p<0.05$) in environmental attitude of study participants which resulted from grade level variations.

As shown in table 5, grade 12 study participants with mean and standard deviation of 82.5 and 7.3 respectively out scored grade 11 participants having corresponding figures of 81.6 and 7.3 in their practice. In order to find out whether there is a significant statistical difference between the participants of grade11 and grade12 mean scores in their practices towards climate change based on grade level and one-way ANOVA is employed and the summary of ANOVA in table 5 shows a statistically significant difference ($df=3, 198$; $F=0.004$; $p<0.05$) among the participants of the study as a result of grade level variations.

From the above results, it is clear that grade twelve participants of the study are better in their environmental knowledge, attitude and practice. From this, one can conclude that study participants who have been learning in high grade levels have thorough knowledge, better attitude and good practice than those from lower grade level learners. This may be due to, as their grade level increases their exposures for different concepts of environmental issues as well as their thinking ability also increases which finally develop strong sense of participatory behavior in environment friendly activities.

Table 5: Summary of ANOVA for knowledge, attitude and practices towards climate change based on grade level across all groups.

Variables	Sources	Sum of Squares	df	Mean Square	F	Sig.
Knowledge	Between Groups	4356.246	3	1452.082	5.644	.001
	Within Groups	72557.855	198	257.297		
	Total	76914.101	202			
Attitude	Between Groups	1195.040	3	398.347	4.568	.004
	Within Groups	24591.911	198	87.205		
	Total	25786.951	202			
Behavior	Between Groups	1091.736	3	363.912	4.569	.004
	Within Groups	22461.760	198	79.652		
	Total	23553.497	202			

The Relationship between Knowledge, Attitude and Practice

To find out the types of relationship that exist among the dependent variables of environmental knowledge, attitude and practice to each other, Pearson correlation coefficient is employed. As can be observed from the statistical values of Pearson coefficient correlation, study participants' environmental knowledge, attitude and practice are significantly correlated to each other. The relationship between attitude and practice (r=.701) as well as the relationship between knowledge and attitude (r=.423) are strong than the relationship between knowledge and practice (r=.397).

In general using the coefficient of correlation (r) it can be concluded that the relationship between these dependent variables is generally significant and moderate, but there is relatively better positive relation between attitude and practice (r=.623) followed by the relationship between knowledge and attitude (r=.487) and relationship between knowledge and practice (r=.451).

Students' Environmental Knowledge as Predictor of Attitude and Practice

As it can be seen from table 6, study participants environmental knowledge is a significant positive predictor of attitude (B=0.437, P<0.05) and practice (B=0.427, P<.05). Thus, environmental knowledge accounted for 25% and 18% of the change in study participants attitude and practice respectively. When study participants environmental attitude is regressed on their attitude, the result revealed that attitude is a significant positive predictor of their environmental practices (B=.637, P<.05). Thus, study participants attitude accounted for 48.1% of the change in their environment friendly practice.

Table 6: Summary of linear regression on environmental knowledge predictive power over environmental attitude and practice across all groups

Variables	Knowledge				Attitude			
	Beta(β)	R^2	T	Sig.	Beta(β)	R^2	t	Sig.
Attitude	.437	.200	8.419	.000				
Practice	.427	.174	7.730	.000	.637	.481	12.225	.000

IV. CONCLUSION

The results of the study revealed that formal education has a greater contribution in providing information about environmental issues for students. The study also confirmed that the students found to have moderate and promising level of knowledge, attitude and practice towards the issues of climate change raised in the study. However, the result was not sufficient as these students are the next leader and decision makers; they are expected to have high level awareness about the environment to make the right decision.

The study also showed significant differences in their environmental knowledge, attitude and practice towards climate change as a result of their variation in age. The older age groups are better in their environmental knowledge, attitude and participatory behavior than younger age groups. From this, one can understand that real experiences and close interaction with the environment helps to enhance the knowledge, attitude and practices of individuals and groups. Based on gender, the study infers significant differences in respondents' environmental knowledge while showing insignificant differences in their environment friendly attitude and practice towards climate change. Males are more knowledgeable towards the cause, consequence and possible solution for climate change than females. There is also significant difference in the mean score of the two academic streams knowledge about climate change. On the other hand, the mean score on attitude and practice did not indicate statistically significant differences among the two academic streams. The grade level comparison shows that students with higher grade level have better knowledge, attitude and practice towards climate change and related environmental issues.

According to Pearson correlation coefficient, the study participants' environmental knowledge, attitude and practice are significantly correlated to each other. Therefore, the relationship between attitude and practice as well as the relationship between knowledge and attitude are strong than the relationship between knowledge and practice. The study participants' knowledge of climate change is a significant positive predictor of attitude and practice. Therefore, environmental knowledge is powerful predictor of responsible environmental concern and practice.

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