



PRIMARY AND MIDDLE SCHOOL STUDENTS' KNOWLEDGE AND PRACTICES IN ENVIRONMENTAL POLLUTION

Habtamu WODAJ

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0002-5199-6376>

habtamuabel@yahoo.com

Desta GEBEYEHU

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0003-3290-9131>

dgebeyeh68@gmail.com

Mulugeta HAGOS

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0001-9301-8194>

mhago1978@gmail.com

Woldie BELACHEW

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0002-8748-4209>

bewoldie@gmail.com

Aklilu DALELO

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0001-9373-6241>

akliludw@googlemail.com

Abera ABATE

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0002-6602-6057>

aberaabate32@gmail.com

Fikadu ESHETU

Addis Ababa University, Ethiopia

ORCID: <https://orcid.org/0000-0003-0316-9082>

fik4jju@gmail.com

Received: January 7, 2026

Accepted: May 18, 2026

Published: June 30, 2026

Suggested Citation:

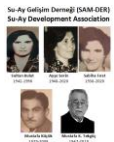
Wodaj, H., Gebeyehu, D., Hagos, M., Belachew, W., Dalelo, A., Abate, A., & Eshetu, F. (2026). Primary and middle school students' knowledge and practices in environmental pollution. *International Journal of Su-Ay Development Association (IJOSDA)*, 5(1), 52-70.



Copyright © 2026 by author(s). This is an open access article under the [CC BY 4.0 license](#).

Abstract

This study aimed at investigating primary and middle school students' knowledge and practices with regards to environmental pollution in some selected cities of Ethiopia. A descriptive survey research design was used and 1583 participants from five major cities in Ethiopia were involved. Questionnaires were used to measure the knowledge and practices. Descriptive statistics such as frequency and percentage were used to analyze data. The findings revealed that majority of the students had a good knowledge about environmental pollution and had a good practice to prevent environmental pollution. More than one fourth of the students had no knowledge about the concepts. In relation to knowledge, however, 67 percent did not know as chemicals pollute the environment. With regards to each city, around 60 percent of respondents from each city had a good knowledge of concepts related to environmental pollution. Similarly, in relation practice, the finding revealed that majority of students from Addis Ababa, Direedewa, Hawassa and Jimma and a



little bit lower percentage from Bahirdar had a good practice but around 30 percent of students from these cities had poor practice to prevent environmental pollution. Generally, majority of students had adequate knowledge of environmental pollution and encouraging practices in preventing pollution.

Keywords: Environmental education, environmental pollution, knowledge, practice.

INTRODUCTION

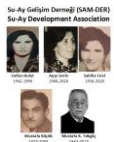
Over the past many years, environmental education has been given a great emphasis and became part of the curriculum of nations in the world. Environmental education is a process of recognizing values and classifying concepts in order to develop skills and tools necessary to understand and appreciate the interrelationship amongst man, his culture and his bio-physical surrounding. It is through the environmental education that people will be aware of the needs for improving the environment. The most widely accepted definition of EE is learning process that increases peoples knowledge and awareness about environment and associated challenges(e.g. environmental pollutions), develops the necessary skills and expertise to address the challenges and commitment to make informed decisions and take responsible action (UNESCO, 1978). In a similar fashion Stapp (1969) described environmental education as knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems and motivated to work towards their solution.

In recent years, environmental education is becoming of the major concerns in the world due to its associated problems and issues. It has risen steadily with the goal of fostering environmentally literate citizens (Srbinovski, et al., 2010; Spinola, 2015; McBeth & Volk, 2010) which have the knowledge, skills and commitment to work individually and collectively towards solutions of current environmental problems and issues. Environmental literacy according to Rowe (2002) refers to the foundation of understanding towards the concept and knowledge on relevant issues and information with health and environmental sustainable. This includes environmental issues relating to human health with regards to environmental pollution.

Environmental pollution is a major issue that affects the entire world and is quite likely to have an impact on the health of human populations, but it is important to grasp what "pollution" is before comprehending what "environmental pollution" is. According to Jande (2005), the term pollution of the act defines as a man-made or man-aided alteration of the chemical, physical or biological quality of the environment beyond acceptable levels. It is the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected. Specially, air, water, soil and noise pollution have reached such levels that have already resulted in serious health problems, as well as negative impact on the environment, and inevitably influencing prospects for long-term economic growth (Krishnamacharyulu and Reddy, 2005; Sneh, 2018; Stephen et al., 2020; Manisalidis et al., 2020; Nayak, 2020).

All forms of pollutions are of the greatest environmental evils. Outdoor air, water and noise pollutions are major problems in developing countries (Gallagher *et al.*, 2000; Yerkes & Haras, 1997; Emanuel, 2010, Sibiya, 2013; Barbara, 2010; Jasper et al., 2012). Indoor air pollution has been identified as one of the most critical global environmental problems (Krshana, 1987; WRI, 1998). Moreover, access to safe drinking water and sanitation is a global concern. However, developing countries, like Ethiopia, have suffered from a lack of access to safe drinking water from improved sources and to adequate sanitation services (WHO, 2006). In Ethiopia over 60 % of the communicable diseases are due to poor environmental health conditions arising from unsafe and inadequate water supply and poor hygienic and sanitation practices (MOH, 2011). About 80 % of the rural and 20 % of urban population have no access to safe water. Three-fourth of the health problems of children in the country are communicable diseases arising from the environment, specially water and sanitation.

Furthermore, children are exposed to many different types of noise while at school. Previous studies have shown that schools may be exposed to high levels of environmental noise, particularly in urban areas (Shield & Dockrell, 2004; Shield & Dockrell, 2008; Xie et al., 2011). Sources include road



traffic, trains, aircraft, and construction noise. Furthermore, there have been some studies on the detrimental influence of chronic external noise upon the academic performance and attainments of school children. A number of findings have indicated that chronic noise exposure would impair concentration, general cognitive functioning, and particularly reading skills (Shield & Dockrell, 2008; Astolfi & Pellery, 2008; Stansfeld & Matheson, 2003; Maxwell & Evans, 2000; Evans & Maxwell, 1997).

The environmental pollution can affect students' academic performance in schools. There are four mechanisms by which pollution could affect students' academic performance: (i) school absenteeism due to illness caused by pollution; (ii) attention problems in school due to illness caused by pollution; (iii) fatigue when doing homework due to illness caused by pollution; and (iv) a direct negative effect of pollution on brain development. Exposure to indoor pollutants can lead to a variety of health and cognitive problems, which can affect students' academic performance. Children, being one of the most sensitive subgroups of the population, can be highly vulnerable, and high air pollution can end up affecting children's daily school performance. Indoor and outdoor air, water, and noise pollutions have significant known consequences for human health and life expectancy (Pope, Ezzati, & Dockery, 2009; Chay & Greenstone 2003).

Moseley (2000) has suggested that being environmentally literate is viewed as having occurred when students' Knowledge and sensitivity and active participation to positive environmental change is increasing and responsible environmental action skills are developed as a result of environmental education. Environmental knowledge and participatory practice are key elements and objectives of environmental education. However, students, teachers, and other members of society exhibit a lack of awareness and knowledge of environmental issues (Hungerford, and Volk. (1990; Hausbeck, Milbrath, & Enright, 1992; Loubser, Swanepoel, & Chacko 2001; Mansaray & Toili, 2007; Aminrad, et al. 2013). According to Knife (2017) and Ademe and Alemayehu (2014), the low awareness of the people and the leadership together with increasing is risking public health and the environment. This is because is because they did not get opportunities to observe wide range of the environment. A study of schoolchildren in Kenya, for instance, revealed that "students rarely walked outside the neighborhood surrounding the school to assist in conserving and improving the quality of the environment" (Toili, 2007, P. 64).

Hence, schools have a responsibility to teach children about responsible environmental stewardship, and if at all possible, this responsibility should be shared with each child's family. All learners are expected to achieve environmental literacy and an appreciation for and knowledge of a range of environmental issues, perspectives, and positions. All learners should be taught how to think through an issue using critical-thinking skills, while avoiding instructor or media bias regarding what to think about the issue. To this end, the Ethiopian government policy and initiatives attempted to make environmental education an integral part of formal education through its national curriculum framework (TGE, 1994; EPE, 1997; CRGE, 2011; ESDP IV, 15; ESDP V, 2016; World Bank, 2013).

Environmental Education in Ethiopia is considered across the curriculum at primary, middle and secondary levels for all subjects. To be specific, environmental education is taught as a single subject (i.e. environmental science syllabus) in primary school (grade 1-6). However, environmental education is not well addressed in the rest grade levels (grade 7 to 12). Environmental education is not confined to just academic subjects but it is also embedded in the extra co-curricular activities in schools, outdoor activities as well other school projects with the community.

Statement of the problem

Over recent decades, global problems relating to degradation of natural resources and pollution have increased dramatically, this is made possible by excessive use of natural resources by man in agriculture, construction, urbanization and industrialization, and since then the natural resources are being depleted by excessive use. There are currently a number of increasingly significant

environmental concerns and threats to the future of society. At the global level, these concerns include, climate change, depletion of the ozone layer, over-consumption of non-renewable resources and air pollution (Desta, 2008; Desta, 2018). Among these global problems, environmental pollution represents one of the most critical global challenges of the time (Desta, 2008; Desta, 2012; Desta, 2018). Environmental pollution resulted in global climate change which in turn resulted in loss of biodiversity, stress on terrestrial and ocean food processing system change in hydrological system and the supplies of freshwater and the global dissemination of persistent organic pollutants (McMichael, et al., 2003).

To alleviate these problems there is a need to produce knowledgeable citizens concerning the environment and its associated problems/challenges that are capable of solving the problems. Environmental education is the key to providing educators with the knowledge, skills, practices and values that will assist them in this task (Tan, 2004; Sengupta, et al., 2010; Sarkar, 2011; Aminrad, et al., 2013; Chen, 2016). It is in this light that students' knowledge and practice on various environmental concepts and problems are important. Environmental education in schools can help produce motivated students, high-performance lifelong learners, effective future workers and problem-solvers, thoughtful community leaders and individuals who care about the people, creatures and places that surround them (NCEE, 2002). For this reason, the UNESCO-UNEP International Environmental Education Program (IEEP) has developed the Environmental Education Series focusing on the incorporation of EE into primary and secondary curricula, teacher education, university general education, technical and vocational education and non-formal education (UNESCO-UNEP, 1994).

To this end, Environmental education integration in the school curricula is going on in many countries. Therefore, EE curriculum should allow students to discover how they interact with the environment themselves and to assess their own impact on the environment. Learners further must be allowed to develop investigative skills, evaluative skills, and action skills by using these processes as well as learning about them (UNESCO-UNEP, 1994). Only with these critical thinking skills will citizens in the world over be able to make sound and responsible decisions about present and future environmental issues.

So far, attempts were made by the Ethiopian government such as in integrating environmental concepts into the existing curriculum, developing new strategies, preparing instructional material for effective implementation of environmental education in the formal system to make environmental education an integral part of formal education through its national curriculum framework (ETP, 1994; EPE, 1997; MoE, 2010; ESDP IV, 2015; ESDP V, 2016). Therefore, knowing the level of environmental literacy in terms of knowledge and behavior among primary and middle schools students is crucial for better understand the effectiveness of environmental education programs in schools. However, research into the extent of integration of environmental education across school curricula at all levels and the level of knowledge, skills, and awareness of primary and middle secondary schools students has been done generally inadequate in Ethiopia (Aschalew, et al., 2013, Ademe and Alemayehu, 2014, Aklilu, 2011; Desta, 2008, 2012, 2018, Knife, 2017;).

Therefore, conducting a study on primary and middle school students' environmental literacy in some selected cities in Ethiopian is crucial as we will be able to gain better insights of how environmental knowledge and practices dimensions reflected in the minds of the students schooling.

Objectives

1. To investigate primary and middle school students' knowledge on environmental pollution
2. To explore primary and middle school students' practice in solving environmental pollution

METHOD

Research method and design

For this study, quantitative research methods and descriptive survey design was used in order to have direct contact with the population of its study and because of its relevance in terms of efficiency and usefulness and wide range of data collection (Creswell, 2002) to provide a fuller understanding of participants' responses (Patton, 2002). Descriptive survey is preferred for gathering information about the characteristics, actions, or opinions of a large group of people and used for assessing needs, evaluating demands, and examining impacts (Pinsonneault & Kraemer, 1993; Salant & Dillman, 1994).

Population and Sampling technique

Some selected cities of Ethiopia such as Addis Ababa (Addis Ababa city administration), Diredewa, Bahirdar, Hawassa (Sidama Regional State) and Jimma (Oromia regional state) were selected purposively. Furthermore, primary and middle schools in those cities were selected randomly. A random total sample of 33 primary and middle schools were involved in this study. Moreover, total sample of 1583 participants were selected randomly from grade 6 and 8 students.

Data collection Instruments

Questionnaires were used to measure students' knowledge and practice in environmental pollution education. Questionnaires are a likert scale type with a scale ranging from 1 to 3 for knowledge where, 3= Correct, 2= wrong, 1 = no idea and with a scale ranging from a 1 to 5 for practice where, 5 = always 4 = frequently, 3 = some times, 2 = rarely, and 1 = not at all. It consists of a total of 27 items (13 knowledge and 14 practices). The reliability of questionnaires was measured using cronbach's alpha in order to ascertain the internal consistency of the instrument and found in acceptable range (i.e cronbach alpha values were 0.85 and 0.95 for knowledge and practice items respectively).

Data Analysis

In this study, the quantitative data were analyzed using Statistical Package for Social Science (SPSS) software version 24. Thereby, the quantitative data were analyzed using descriptive statistics such as frequency tables and percentages.

RESULT and DISCUSSION

Result

Background information

In this study, a total of 1583 participants from major cities of Ethiopia were participated. Of these 436 were from Addis Ababa, 294 from Bahirdar, 290 from Diredewa, 283 from Hawassa and 280 from Jimma. In terms of grade their grade level, 779 (49.2%) were from grade 6 and 803 (50.8%) were from grade 8 (Table 1).

Table 1. Background information.

s.no	Cities	Total	Grade level	
		population	Grade 6	Grade 8
1	Addis Ababa	436	216	220
2	Bahir Dar	294	146	148
3	Dire Dewa	290	152	138
4	Hawassa	283	122	161
5	Jimma	280	140	140
	Total	1583	779	804
	%	100	49.2	50.8

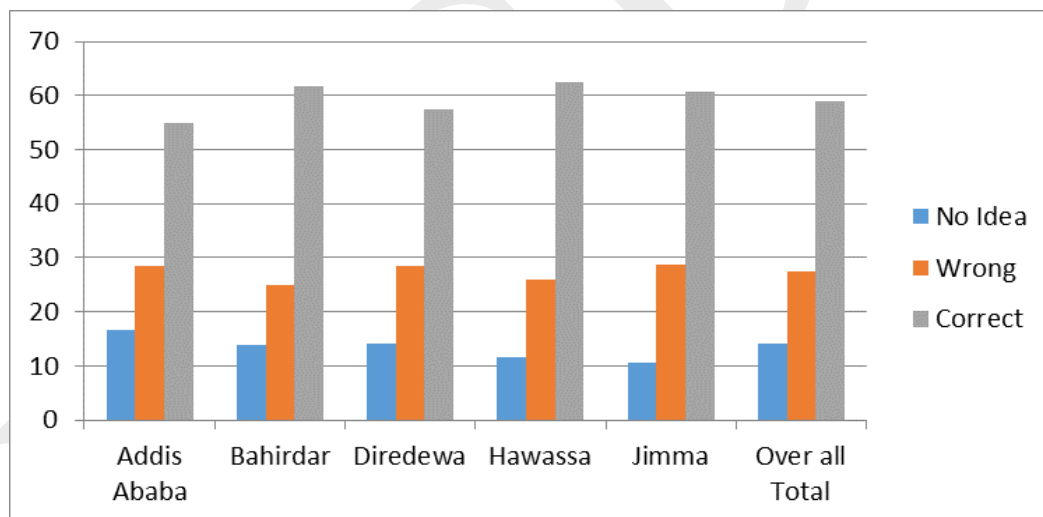
Knowledge of Environmental Pollution

The analysis result of responses of respondents from each cities with respect to No idea, Wrong and Correct responses showed that 59.02 percent of the respondent correctly answered the items. However, 27.43 and 14.01 percent of the respondent answered the items wrongly and no idea respectively. This indicates that majority of teachers had a good knowledge of environmental pollution. Similarly, around 60 percent of respondents from each city answered the answer correctly and around 30 percent of respondents from each city answered wrongly. Students across cities had also a good knowledge concerning environmental concepts and considerable number of students had no knowledge of environmental pollution. Less than 15 percent of the students had no idea about concepts related to environmental pollution (Table 2).

Table 2. Knowledge summary.

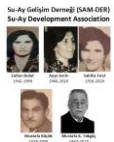
Cities	Addis Ababa		Bahirdar		Diredeewa		Hawassa		Jimma		Over all Total	
Response	N	%	N	%	N	%	N	%	N	%	N	%
No Idea	72	16.56	42	13.86	41	14.05	32	11.68	30	10.65	214	14.01
Wrong	124	28.55	60	24.98	82	28.45	74	26.09	80	28.62	434	27.43
Correct	239	54.89	181	61.63	167	57.48	176	62.49	170	60.75	934	59.02
Total	436	100	283	100	290	100	283	100	280	100.02	1583	100

The above result can also be shown in graph as follows. As the graph shows students in all cities had almost similar environmental knowledge.



Graph 1. Percentage of students' response to items on environmental knowledge.

In addition to overall analysis, item wise analysis also carried out. Table 2 shows percentage of respondents for each item across regions. With regards to item1, the answer for the item is correct. However, from the total population, only 318 (20.2%) of the total respondents responded correct whereas 1066 (67.6%) of the respondent responded wrong. Majority of the participants do not know that contamination of environment with chemicals is considered as a pollution of the environment. Few number of respondents, 194 (12.3%), responded no idea about the item. Similarly, the same patter was observed across regions. Only small number of respondents from each region, 92 (21.1%), 44 (15%), 75 (26.3%), 43 (15.2%) and 649 (22.9%) from Addis Ababa, Bahi Dar, Diredeewa, Hawassa and Jimma respectively answered the item correctly whereas majority of the respondents, 265 (60.8%), 227 (77.2%), 186 (65.3%), 217 (76.7%), 171 (61.1%) respectively answered the item wrongly. Highest percentage of respondents from Bahi Dar and Hawassa did not consider contamination of the environment with chemicals as environmental pollution.



With regards to item 2, the answer for this item is correct and unlike item 1, majority of the respondents, 1095(69.4%) of the total population responded correct. This shows that majority of the respondents knows that human daily activities are causes for environmental pollution. When we look in terms of regions, similar result were found in that 279 (64%), 209 (71.1%) 199 (69.6%), 201 (71%) and 207 (74%) from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively responded correct indicating that daily human activities are causes of environmental pollution. Relatively higher number of respondents 105 (24.1%) from Addis Ababa followed by Diredewa 64 (22.4%) responded that human daily activity do not increase environmental pollution.

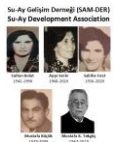
In view of item 3, the correct answer for this item is wrong and majority of the respondents 967(61.2%) responded wrong which implies that carbon dioxide released from burning of coal do not cause environmental pollution. However, around 26% answered the item correct. At regional level, 254 (58.3%) 194 (66%), 169 (58.9%), 199 (70.3%), 151 (53.7%) of respondents from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively answered wrong for the item that states carbon dioxide released from burning of coal do not cause for environmental pollution. Considerable number of respondents 115 (26.4%), 70 (23.8%), 80 (27.9), 55 (19.4%) and 87 (31%) respectively answered correct for the item.

With regards to item 4, the answer for this item is correct and majority of the respondents 1235 (77.8%) responded correct for the statement that states wild fires, smoke from factories and cars contribute to atmospheric pollution. However, around 15% responded wrong for the statement. With regards to each region, 254 (58.3%), 194 (66%), 169 (58.9%), 199 (70.3%) and 151 (53.7%) of respondents from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively answered the statement as correct. Relatively small number of respondents 70 (16.1%), 41 (13.9%), 45 (15.3), 37 (13.1%), 53 (18.9%) from these regions respectively responded wrong for the item.

With regards to item 5, the answer for this item is correct and majority of the respondents 1035 (65.2%) answered correctly the statement that states individual lifestyles such as mode of transport affect the environment directly. However, 364 (22.9%) answered the statement wrong. Regionally, 272 (62.4%), 195 (66.3%), 191 (65%), 179 (63.3%), 198 (70.7%) of respondents from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively answered correct indicated that individual lifestyles affect the environment directly. Considerable number of respondents from these regions respectively answered wrong for the statement.

In view of item 6, the answer for the item is correct and majority of the respondents 1066 (67.3%) responded correct indicating that emissions gases from factories contribute to the formation of acid rain. However, 298 (18.8%) answered wrong indicating that emissions gases from factories do not contribute to the formation of acid rain. At regional level, 255 (58.5%) 242 (82.3%), 175 (60.1%), 208 (73.5%), 186 (66.2%) of respondents from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively answered correct and small number of respondents 95 (21.8%), 32 (10.9%), 62 (21.3), 41 (14.5%), 68 (24.2%) from these regions respectively answered wrong for the statement.

In view of item 7, the answer is for the item is correct and majority of the respondents 1067 (67.4%) responded correct indicating that green revolution is a program that contributes in reducing environmental pollution. However, small number of respondents 230 (14.5%) answered the item wrong and 286 (18.1%) answered no idea. When we look at each region, 266 (61.0%) 187 (63.6%), 192 (66%), 231 (81.6%), 191 (68.5%) of respondents from Addis Ababa, Bahi Dar, Diredewa, Hawassa and Jimma respectively answered correct indicating green revolution is a program that contributes in reducing environmental pollution and small number of respondents 83 (19.0%), 32 (10.9%), 37(12.7), 24 (8.5%), 54 (19.4%) from these regions respectively answered wrong for the statement. Relatively, higher number of respondents 87 (20.0), 75 (25.5), 62 (21.3), from Addis Ababa, Bahi Dar and Diredewa respectively answered no idea about the statement.



With regards to item 8, the correct answer is wrong and majority of the respondents 985 (62.4%) responded wrong for the item controlled consumption of natural resources results in environmental pollution. However, considerable number of respondents 387 (24.5%) answered correct for the statement. However, 207 (13.1%) of respondents had no idea about the item. When we look at each region, 222 (50.9%), 223 (75.9%), 172 (60.1%), 199 (70.3%), 169 (60.4%) of respondents from Addis Ababa, Bahi Dar, Direedewa, Hawassa and Jimma respectively answered wrong for the item and small number of respondents 140 (32.1%), 46 (15.6%), 79 (27.6%), 53 (18.7%), 69 (24.6%) from these regions respectively answered correct for the item.

Regarding item 9, the correct answer is wrong and majority of the respondents 923 (58.2%) responded wrong for the statement when pesticides are used to kill insects, other animals are not affected. However, 439 (27.7%) answered correct for the statement. When we look at each region, 228 (52.3%), 205 (69.7%), 157 (54%), 193 (68.2%), 140 (49.8%) of respondents from Addis Ababa, Bahi Dar, Direedewa, Hawassa and Jimma respectively answered wrong indicated that when pesticides are used to kill insects, other animals are not affected and considerable number of respondents 134 (30.7%), 47 (16%), 95 (32.6%), 57 (20.1%), 106 (37.7%) from these regions respectively answered correct for the item.

Considering item 10, the answer of the item is correct and majority of the respondents 717 (45.2%) responded wrong for the statement economic growth causes environmental pollution. However, 660 (41.6%) answered wrong indicating that economic growth do not causes environmental pollution. When we look at each region, 191 (43.8%), 109 (37.1%), 115 (39.2%), 103 (36.4%), 199 (70.8%) of respondents from Addis Ababa, Bahi Dar, Direedewa, Hawassa and Jimma respectively answered correct for the item and considerable number of respondents 162 (37.2%), 142 (48.3%), 142 (48.5%), 151 (53.4%), 63 (22.4%) from these regions respectively answered wrong for the statement.

With regards to item 11, the correct answer for the item is correct and majority of the respondents 754 (47.7%) responded correct indicating that noise and vibration are considered as an environmental pollution. However, 563 (35.6%) answered wrong indicating that noise and vibration are not considered as an environmental pollution. When we look at each region, 189 (43.3%), 127 (43.2%), 132(45.2%), 161 (56.9%), 145 (52.3%) of respondents from Addis Ababa, Bahi Dar, Direedewa, Hawassa and Jimma respectively answered correct indicated that noise and vibration are considered as an environmental pollution and considerable number of respondents 165 (37.8%), 104 (35.4%), 114 (39%), 82 (29%) and 98 (35.4%) from these regions respectively answered wrong for the item.

Considering item 12, the correct answer is correct and majority of the respondents 1168 (73.7%) responded correct for the statement pollution is caused by undesirable byproducts of industrialization and urbanization. However, 284 (17.9%) answered wrong for the stateemetn. When we look at each region, 333 (76.4%), 241 (82%), 218 (74.1%), 194 (68.6%), 182 (65.5%) of respondents from Addis Ababa, Bahi Dar, Direedewa, Hawassa and Jimma respectively answered correct in that undesirable byproducts of industrialization and urbanization causes pollution and considerable number of respondents 65 (14.9%), 36 (12.2%), 37 (12.6%), 68 (24%), 78 (28.1%) from these regions respectively answered wrong for the item.

With regards to item 13, the answer for the item is correct and majority of the respondents 817 (51.5%) responded correct for the statement carbon dioxide and water vapor are responsible for greenhouse effect. However, 373 (23.5%) answered wrong indicating that carbon dioxide and water vapor are not responsible for greenhouse effect. Considerable number of respondents 395 (24.5%) had no idea about the item. When we look at each region, 203 (46.6%), 141 (48%), 148 (50.9%), 157 (55.5%), 168 (59.8%) of respondents from Addis Ababa, Bahirdar, Direedewa, Hawassa and Jimma respectively answered correct indicated that carbon dioxide and water vapor are responsible for greenhouse effect and considerable number of respondents 116 (26.6%), 59 (20.1%), 65 (22.3%), 51 (18%), 82 (29.2%) from these regions respectively answered wrong for the item. A little bit greater

than 25% of respondents from all regions except Jimma (11%) had no idea about relation between carbon dioxide and water vapor cause of greenhouse effect.

Table 3. Percentage of respondents for knowledge across region per items.

Cities Items		Addis		Bahirdar		Diredewa		Hawassa		Jimma		Over all	
		Ababa										Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1. Pollution is the contamination of the environment with chemicals	No Idea	79	18.1	23	7.8	24	8.4	23	8.1	45	16.1	194	12.3
	Wrong	265	60.8	227	77.2	186	65.3	217	76.7	171	61.1	1066	67.6
	Correct	92	21.1	44	15	75	26.3	43	15.2	64	22.9	318	20.2
2. Human daily activities are increasing environmental pollution	No Idea	52	11.9	31	10.5	23	8	25	8.8	23	8.2	154	9.8
	Wrong	105	24.1	54	18.4	64	22.4	57	20.1	49	17.6	329	20.8
	Correct	279	64.0	209	71.1	199	69.6	201	71	207	74.2	1095	69.4
3. Carbon dioxide produced by burning coal do not causes air pollution.	No Idea	67	15.4	30	10.2	38	13.2	29	10.2	43	15.3	207	13.1
	Wrong	254	58.3	194	66	169	58.9	199	70.3	151	53.7	967	61.2
	Correct	115	26.4	70	23.8	80	27.9	55	19.4	87	31	407	25.7
4. Wild fires, smoke from factories and cars contribute to atmospheric pollution	No Idea	39	8.9	15	5.1	20	6.8	15	5.3	17	6.1	106	6.7
	Wrong	70	16.1	41	13.9	45	15.3	37	13.1	53	18.9	246	15.5
	Correct	327	75.0	238	81	229	77.9	231	81.6	210	75	1235	77.8
5. Individual lifestyles such as mode of transport affect the environment directly	No Idea	61	14.0	34	11.6	37	12.6	37	13.1	19	6.8	188	11.8
	Wrong	103	23.6	65	22.1	66	22.4	67	23.7	63	22.5	364	22.9
	Correct	272	62.4	195	66.3	191	65	179	63.3	198	70.7	1035	65.2
6. Emissions gases from factories contribute to the formation of acid rain	No Idea	86	19.7	20	6.8	54	18.6	34	12	27	9.6	221	13.9
	Wrong	95	21.8	32	10.9	62	21.3	41	14.5	68	24.2	298	18.8
	Correct	255	58.5	242	82.3	175	60.1	208	73.5	186	66.2	1066	67.3
7. Green revolution is a program that contributes in reducing environmental pollution	No Idea	87	20.0	75	25.5	62	21.3	28	9.9	34	12.2	286	18.1
	Wrong	83	19.0	32	10.9	37	12.7	24	8.5	54	19.4	230	14.5
	Correct	266	61.0	187	63.6	192	66	231	81.6	191	68.5	1067	67.4
8. Controlled consumption of natural resources results in environmental pollution.	No Idea	74	17.0	25	8.5	35	12.2	31	11	42	15	207	13.1
	Wrong	222	50.9	223	75.9	172	60.1	199	70.3	169	60.4	985	62.4
	Correct	140	32.1	46	15.6	79	27.6	53	18.7	69	24.6	387	24.5
9. When pesticides are used to kill insects, other animals are not affected.	No Idea	74	17.0	42	14.3	39	13.4	33	11.7	35	12.5	223	14.1
	Wrong	228	52.3	205	69.7	157	54	193	68.2	140	49.8	923	58.2
	Correct	134	30.7	47	16	95	32.6	57	20.1	106	37.7	439	27.7
10. Economic growth causes environmental pollution	No Idea	83	19.0	43	14.6	36	12.3	29	10.2	19	6.8	210	13.2
	Wrong	162	37.2	142	48.3	142	48.5	151	53.4	63	22.4	660	41.6
	Correct	191	43.8	109	37.1	115	39.2	103	36.4	199	70.8	717	45.2
11. Noise and vibration are considered as an environmental pollution	No Idea	82	18.8	63	21.4	46	15.8	40	14.1	34	12.3	265	16.8
	Wrong	165	37.8	104	35.4	114	39	82	29	98	35.4	563	35.6
	Correct	189	43.3	127	43.2	132	45.2	161	56.9	145	52.3	754	47.7
12. Pollution is cause by undesirable byproducts of industrialization and urbanization	No Idea	38	8.7	17	5.8	39	13.3	21	7.4	18	6.5	133	8.4
	Wrong	65	14.9	36	12.2	37	12.6	68	24	78	28.1	284	17.9
	Correct	333	76.4	241	82	218	74.1	194	68.6	182	65.5	1168	73.7
13. Carbon dioxide and water vapor are responsible for greenhouse effect	No Idea	117	26.8	94	32	78	26.8	75	26.5	31	11	395	24.9
	Wrong	116	26.6	59	20.1	65	22.3	51	18	82	29.2	373	23.5
	Correct	203	46.6	141	48	148	50.9	157	55.5	168	59.8	817	51.5

Practices in Preventing Environmental pollutions

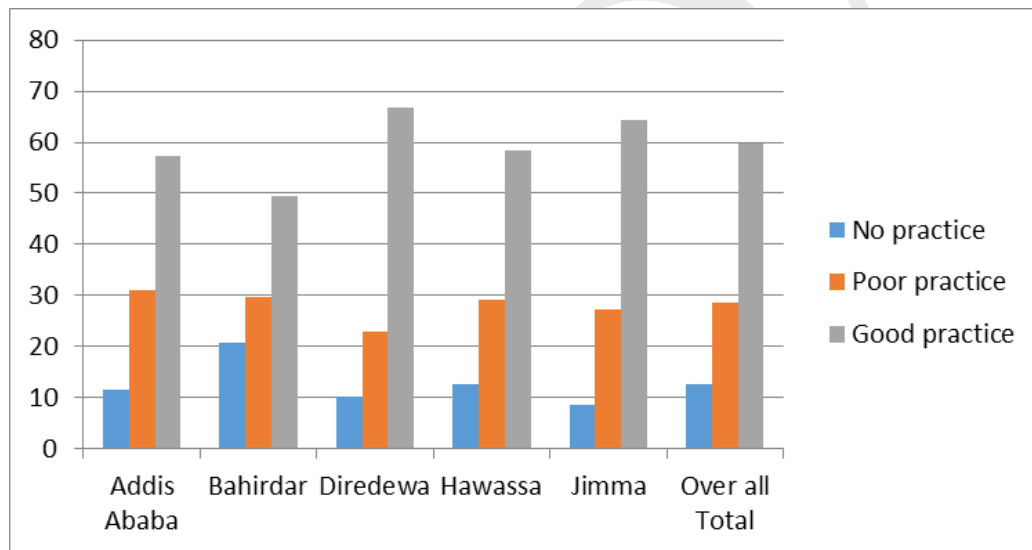
For the analysis of students' response on practice, there responses were categorized as a **good practice** (always and frequently responses), **poor practice** (some times and rarely responses) and **no practice** (not at all responses). As shown in table 4 below, most of the respondents 930 (59.6%) had good practice and considerable number of participant, 445 (28.5%), had poor practice in protecting environment from pollution. Few number of participants, 200 (12.6%), indicated that they had no

practice of protecting the environment from pollution. With regards to regions, As shown in table 4, most respondents, 162 (57.4%), 145 (49.5%) and 191 (66.9%), 164 (58.3%), 178 (64.4%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively reported as they had a good practice. Whereas 134 (30.9%), 87 (29.8%) and 65 (22.9%), 82 (29.2%), 75 (27.2%) from these regions had poor practice respectively. Around 20% from Bahirdar had no practice and less than 15% had poor practice in the rest region.

Table 4. Mean average for practice by region gender and grade.

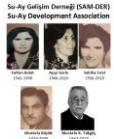
Cities	Addis Ababa		Bahirdar		Diredewa		Hawassa		Jimma		Over all Total	
Response	N	%	N	%	N	%	N	%	N	%	N	%
No practice	51	11.6	61	20.7	29	10.3	36	12.7	23	8.5	200	12.6
Poor practice	134	30.9	87	29.8	65	22.9	82	29.2	75	27.2	445	28.5
Good practice	162	57.4	145	49.5	191	66.9	164	58.3	178	64.4	930	59.6
Total	436	100	293	100	287	100	283	100	277	100	1576	100

The above analysis of data can be also presented in graph as shown below. As the graph shows, students from Diredewa and Jimma city had better practices.



Graph 2. Percentage of students response to items on environmental practice.

In addition to overall analysis, item wise analysis was conducted. Table 5 demonstrates the mean average for practice (BP) across region per item. In addition to overall analysis across region, item wise analysis also conducted. With regard to item 1, of the total population, most of the respondents, 1019 (65.5%) reported that they had good practice in purchasing 'environmentally friendly' products. However, considerable number of respondents, 394 (24.7%), reported as they had poor practice and few of them, 152 (9.8%), had no practice. When we look at regional level, as indicated in the table below (table 5), the majority of respondents 271 (62.2%), 177 (60.4%), 203 (72.2%), 193 (68.2%) and 175 (64.3%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice in purchasing 'environmentally friendly' products and considerable number of respondents 127 (29.1%), 85 (29%), 51 (18.1%), 59 (20.8%) and 72 (26.5%) from these regions had poor practice respectively in this activity. With regard to item 2, most of the respondents, 1020 (64.8%), responded that they had good practice to comment to people who throw trash in public space or damage the environment in any manner and some, 412 (25.7%), of them responded as they had poor practice. Few of the respondents, 147 (9.5%), responded as they had no practice. At regional level, the majority of respondents 274 (62.8%), 162 (55.2%), 212 (73.4%), 193 (68.2%) and 179 (64.4%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively responded that they had good practice



in commenting to people who throw trash in public space or damage the environment in any manner and considerable number of respondents, 131 (30%), 84 (28.7%), 51 (17.6%), 73 (25.8%) and 73 (26.3%) from each region respectively responded as they had poor practice of the activity.

Regarding item 3, majority of the respondents, 921 (58.7%), responded that they had good practice in collecting things that people have thrown in public areas and dispose of them in trash barrels and, 484 (30.4%) of them reported as they had poor practice. Few of them, 176 (11.0%), reported as they had no practice. When we look at regional level, the majority of respondents 237 (54.3%), 139 (47.4%), 197 (67.4%), 168 (59.3%) and 180 (65%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice and considerable number of respondents 145 (33.3%), 97 (33.1%), 72 (24.7%), 93 (32.9%) and 77 (27.8%) from each region respectively had poor practice in doing activities indicated in this item. With regard to item 4, majority of the respondents, 870 (55.5%) responded that they had good practice in using appropriate channels to report to authorities on environmental pollutions. However, some of them, 455 (28.7%) had poor practice and few of them, 248 (15.8%) had no practice. At regional level, the majority of respondents 239 (54.8%), 183 (64.5%), 153 (54%) and 182 (65.7%) from Addis Ababa, Diredewa, Hawassa and Jimma respectively, except Bahirdar, 113 (38.6%) had good practice in using appropriate channels to report to authorities on environmental pollutions and considerable number of respondents 133 (30.5%), 96 (32.7%), 69 (24.3%), 86 (30.4%) and 71 (25.6%) from each region respectively had poor practice of doing such activities.

Considering item 5, most of the respondents 936 (60.3%), responded that they had good practice in take part in campaigns for prevention of environmental pollution. However, 434 (27.1%) of the respondents had poor practice and 200 (12.6%) of the respondents had no practice of participation. When we look at regional level, the majority of respondents 235 (53.9%), 163 (55.7%), 180 (64.7%), 167 (59.1%) and 191 (68.2%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively reported that they had good practice in take part in campaigns for prevention of environmental pollution and considerable number of respondents 143 (32.8%), 67 (22.8%), 76 (27.3%), 83 (29.3%) and 65 (23.2%) from each region respectively had poor practice of participation in this type of activities. With regard to item 6, majority of the respondents, 921 (58.9%), responded as they had good practice in inviting others to join the community to clean the residences. However, some of them, 459 (28.8%) , reported as they had poor practice and 193 (12.2%) of them as they had no practice. When we look at regional level, the majority of respondents 245 (56.2%), 142 (48.4%), 191 (66.8%), 153 (54.1%) and 190 (69.1%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice and considerable number of respondents 139 (31.9%), 99 (33.7%), 69 (24.1%), 87 (30.8%) and 65 (23.6%) from these regions respectively had poor practice in this regard.

In view of item 7, most of the respondents, 1072 (68.4%), reported they had good practice in picking litter whenever they find them in the school compound. However, some of them, 394 (24.8%) had poor practice and a very few of them, 107 (6.8%) had no practice. At regional level, , the majority of respondents 287 (65.8%), 182 (62.1%), 216 (76.6%), 197 (69.6%) and 190 (68.1%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice in doing this types of activities and considerable number of respondents 119 (27.3%), 81 (27.7%), 54 (19.1%), 70 (24.7%) and 70 (25.1%) from these regions respectively had poor practice of dong it. With regard to item 8, majority of the respondents, 928 (58.9%) responded that they had good practice in waiting for authorities to instruct me to collect dirt in the school compound. This implies that they do not collect dirty in the school unless instructed from authorities. However, some of them, 494 (31.1%) and few of them 155 (10.0%) had poor and no practice respectively. They do not wait instruction from authorities to collect dirty in the school. When we look at regional level, the majority of respondents 255 (58.5%), 146 (49.9%), 204 (70.4%), 150 (53%) and 173 (62.9%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice in waiting for authorities to instruct me to collect dirt in the school compound and considerable number of respondents 144 (33%), 104

(35.5%), 67 (23.1%), 102 (36%) and 77 (28%) from each region respectively had poor practice in this regard.

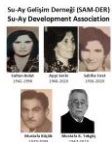
Regarding item 9, most of the respondents, 992 (63.7%), reported that they had good practice of participation in tree planting in our environment. However, some of them, 442 (27.4%) reported as they had poor practice and few of them, 139 (8.9%) reported as they had no practice of tree planting. At regional level, the majority of respondents 254 (58.3%), 153 (52.2%), 200 (70.4%), 188 (66.4%) and 197 (71.1%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively reported as they had good practice and considerable number of respondents 150 (15.0%), 89 (30.4%), 65 (22.8%), 73 (25.8%) and 65 (23.5%) from each region respectively had poor practice of participation in tree planting.

With regard to item 10, majority of the respondents, 882 (56.3%), responded as they had good practice of participation in environmental protection club. However, some of them, 432 (27.3%) had poor practice and few of them, 260 (16.4%) had no practice. When we look at regional level, the majority of respondents 238 (54.5%), 130 (44.4%), 177 (61.9%), 164 (57.9%) and 173 (62.7%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice of participation in environmental protection club and considerable number of respondents 125 (28.7%), 79 (27%), 66 (23%), 82 (29%) and 80 (29%) from each region respectively had poor practice. However, relatively higher number of respondents from Bahirdar, 84 (28.7%) reported as they had no practice at all. With regard to item 11, most of the respondents 937 (59.2%) had good practice of giving priority to walking, cycling and taking public transportation. However, some of them, 456 (29.0%) had poor practice and few of them 185 (11.8%) had no practice. When we look at regional level, the majority of respondents 266 (61%), 159 (54.3%), 189 (65.1%), 156 (55.1%) and 167 (60.5%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had good practice and considerable number of respondents 125 (28.7%), 82 (28%), 76 (26.2%), 86 (30.4%) and 87 (31.5%) from Addis Ababa, Bahirdar, Diredewa, Hawassa and Jimma respectively had poor practice of giving priority to walking, cycling and taking public transportation.

Considering item 12, majority of the respondents, 898 (57.0%), responded that they had good practice in using multi-media, such as newspapers, magazines, or the internet to obtain information related to environmental pollution issues. However, 464 (28.9%) of the respondents had poor practice and 220 (14.1%) of them had no practice. When we look at regional level, the majority of respondents 241 (55.3%), 192 (65.5%), 157 (55.4%) and 174 (62.9%) from Addis Ababa, Diredewa, Hawassa and Jimma respectively had good practice using multi-media and relatively smaller number, 134 (45.7%) from Bahirdar had good practice. Considerable number of respondents 145 (33.3%), 94 (32.1%), 62 (21.1%), 85 (30%) and 78 (28.2%) from each region respectively had poor practice of obtaining information from such source.

Table 5. Mean average for practice across region per item (pr = practice).

Cities Items		Addis Ababa		Bahirdar		Diredewa		Hawassa		Jimma		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1. I Purchase 'environmentally friendly' products	No. Pr	38	8.7	31	10.6	27	9.6	31	11	25	9.2	152	9.8
	Poor Pr	127	29.1	85	29	51	18.1	59	20.8	72	26.5	394	24.7
	Good Pr	271	62.2	177	60.4	203	72.2	193	68.2	175	64.3	1019	65.5
2. I Comment to people who throw trash in public space or damage the environment in any manner.	No. Pr	31	7.1	47	16	26	9	17	6	26	9.4	147	9.5
	Poor Pr	131	30	84	28.7	51	17.6	73	25.8	73	26.3	412	25.7
	Good Pr	274	62.8	162	55.2	212	73.4	193	68.2	179	64.4	1020	64.8
3. I collect things that people have thrown in public areas and dispose	No. Pr	54	12.4	57	19.5	23	7.9	22	7.8	20	7.2	176	11.0
	Poor Pr	145	33.3	97	33.1	72	24.7	93	32.9	77	27.8	484	30.4
	Good Pr	237	54.3	139	47.4	197	67.4	168	59.3	180	65	921	58.7



of them in trash barrels

4.I Use appropriate channels to report to authorities on environmental pollutions

5. I take part in campaigns for prevention of environmental pollution

6.I invited others to join the community to clean the residences

7. I pick litter whenever I find them in the school compound

8. I wait for authorities to instruct me to collect dirt in the school compound

9. I participate in tree planting in our environment

10. Participate in environmental protection club

11. While I go out, I am willing to give priority to walking, cycling and taking public transportation

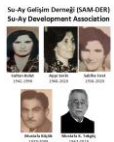
12. I will use multi-media, such as newspapers, magazines, or the Internet to obtain information related to environmental pollution issues.

13. I Participate in creating newspaper, magazine, and public display by school managements to increase public awareness on environmental pollution

14. I prepare or deliver a message for general public about the importance of preventing environmental pollution

No. Pr	64	14.7	84	28.7	32	11.3	44	15.5	24	8.7	248	15.8
Poor Pr	133	30.5	96	32.7	69	24.3	86	30.4	71	25.6	455	28.7
Good Pr	239	54.8	113	38.6	183	64.5	153	54	182	65.7	870	55.5
No. Pr	58	13.3	63	21.5	22	7.9	33	11.7	24	8.6	200	12.6
Poor Pr	143	32.8	67	22.8	76	27.3	83	29.3	65	23.2	434	27.1
Good Pr	235	53.9	163	55.7	180	64.7	167	59.1	191	68.2	936	60.3
No. Pr	52	11.9	52	17.7	26	9.1	43	15.2	20	7.3	193	12.2
Poor Pr	139	31.9	99	33.7	69	24.1	87	30.8	65	23.6	459	28.8
Good Pr	245	56.2	142	48.4	191	66.8	153	54.1	190	69.1	921	58.9
No. Pr	30	6.9	30	10.2	12	4.3	16	5.7	19	6.8	107	6.8
Poor Pr	119	27.3	81	27.7	54	19.1	70	24.7	70	25.1	394	24.8
Good Pr	287	65.8	182	62.1	216	76.6	197	69.6	190	68.1	1072	68.4
No. Pr	37	8.5	43	14.7	19	6.6	31	11	25	9.1	155	10.0
Poor Pr	144	33	104	35.5	67	23.1	102	36	77	28	494	31.1
Good Pr	255	58.5	146	49.9	204	70.4	150	53	173	62.9	928	58.9
No. Pr	32	7.3	51	17.4	19	6.7	22	7.8	15	5.4	139	8.9
Poor Pr	150	34.4	89	30.4	65	22.8	73	25.8	65	23.5	442	27.4
Good Pr	254	58.3	153	52.2	200	70.4	188	66.4	197	71.1	992	63.7
No. Pr	73	16.7	84	28.7	43	15	37	13.1	23	8.3	260	16.4
Poor Pr	125	28.7	79	27	66	23	82	29	80	29	432	27.3
Good Pr	238	54.5	130	44.4	177	61.9	164	57.9	173	62.7	882	56.3
No. Pr	45	10.3	52	17.7	25	8.6	41	14.5	22	8	185	11.8
Poor Pr	125	28.7	82	28	76	26.2	86	30.4	87	31.5	456	29.0
Good Pr	266	61	159	54.3	189	65.1	156	55.1	167	60.5	937	59.2
No. Pr	50	11.5	65	22.2	39	13.3	41	14.5	25	9	220	14.1
Poor Pr	145	33.3	94	32.1	62	21.1	85	30	78	28.2	464	28.9
Good Pr	241	55.3	134	45.7	192	65.5	157	55.4	174	62.9	898	57.0
No. Pr	83	19	105	35.8	54	18.4	68	24	35	12.5	345	21.9
Poor Pr	114	26.1	82	28	65	22.1	85	30	84	30	430	27.2
Good Pr	239	54.9	106	36.1	175	59.5	130	45.9	161	57.5	811	50.8
No. Pr	64	14.7	86	29.4	46	15.9	55	19.4	25	9.1	276	17.7
Poor Pr	147	33.8	83	28.4	75	26	90	31.8	88	32	483	30.4
Good Pr	225	51.6	124	42.3	168	58.2	138	48.8	162	58.9	817	52.0

With regard to item 13, nearly half of the respondents, 811 (50.8%), reported as they had good practice of participation in creating newspaper, magazine, and public display by school managements to increase public awareness on environmental pollution. However, 430 (27.2%) of the respondents had poor practice and 345 (21.9%) of the respondents had no practice of this. When we look at



regional level, the majority of respondents 239 (54.9%), 175 (59.5 %), and 161 (57.5%) from Addis Ababa, Direedewa, and Jimma respectively and relatively below half of the respondent from Bahirdar 106 (36.1%) and Hawassa 130 (45.9%) reported as they had good practice of participate in creating newspaper, magazine, and public display by school managements to increase public awareness on environmental pollution. Significant number of respondents 114 (26.1%), 82 (28%), 65 (22.1%), 85 (30%) and 84 (30%) from Addis Ababa, Bahirdar, Direedewa, Hawassa and Jimma respectively reported that they had poor practice in these activities. However, relatively higher number of respondents, 105 (35.8%), from Bahirdar and 68 (24%) from Hawassa reported as they had no practice of these activities. Regarding item 14, nearly more than half of the respondents, 817 (52.0%) had good practice in preparing or delivering a message for general public about the importance of preventing environmental pollution. However, 483 (30.4%) of the respondents had poor practice and 276 (17.7%) of the respondents had no practice. When we look at regional level, 225 (51.6%), 124 (42.3%), 168 (58.2%), 138 (48.8%) and 162 (58.9%) of respondents from Addis Ababa, Bahirdar, Direedewa, Hawassa and Jimma respectively had good practice in these activities. Considerable number of respondents 147 (33.8%), 83 (28.4%), 75 (26%), 90 (31.8%) and 88 (32%) from these regions respectively had poor practice in these activities.

DISCUSSION, CONCLUSION, and RECOMMENDATIONS

Knowledge is the capacity to acquire, retain and use information; a mixture of comprehension, experience, discernment and skill. Knowledge is a precondition for environmental awareness to ignite in individual. In relation to knowledge, the finding of this study revealed that majority of the students had a good knowledge about environmental pollution and considerable number of students had no knowledge of environmental pollution. More than 60 percent of the total respondents had a good knowledge in most of the concepts related to environmental pollution. However, percentage of the respondents that had knowledge on concepts like that of the economic growth can cause environmental pollution; noise and vibration are considered as an environmental pollution; carbon dioxide and water vapor are responsible for greenhouse effect is below 50 and more than 35 percent of the total population and population of each region had no knowledge on these concepts. Highest percentage, 53 percent of populations from Hawassa city didnot know that noise and vibrations are considered as an environmental pollution. In relation the concept that states pollution is the contamination of the environment with chemicals, the finding is different in which only 20 percent from the total respondent answered correctly and more that 67 percent of the total population answered wrongly. This means most of them do not know as environment can be polluted with chemicals.

Similarly, small number of respondents from each region, less than 25 percent, knows the concept that states pollution is the contamination of the environment with chemicals and more than 65 percent did not know this concept across regions. The result revealed that more than 60 of the respondents from Addis Ababa, Direedewa and Jimma and more than 75 percent of respondents from Bahirdar and Hawassa did not know this concept. Most industries are found around major cities and release chemicals but participants lack knowledge this. Hence, there is a need to take actions to enhance people awareness. In relation to the effect of using pesticides to kill insects that damage crops on other animals, 70 percent from Bahirdar and 68 percent from Hawassa had knowledge of concepts related to the effects of using pesticides on other animals. Respondents from Bahirdar and Hawassa are more knowledgeable compared to Addis Ababa, Direedewa and Ormoia. In relation to concepts related to green revolution, 67 percent of the total population knows that green revolution is a program that contributes in reducing environmental pollution. The result revealed that more than 60 of population in each region had knowledge about this concept and highest populations (82 percent) from Hawassa were knowledgeable of this concept.

Various previous Studies have focused on the knowledge of students in primary, middle and secondary school students and found similar results with this study. For instance, Lu and Shon (2012)

found higher levels of environmental knowledge among students who learned environmental education. Can et al. (2016), in their study on environmental knowledge of primary school students, found similar results. Similarly, Frensley et al. (2020), found that the grades 5 and 4 students had a moderate environmental literacy. Scholars also indicated that the students' knowledge about environmental problems was fragmentary and often incorrect (Kuhlemeier, Bergh & Lagerweij, 1999). Hence, different scholars claimed that middle school pupils' environmental literacy has to be improved (Şahin, 2020 and Güler, 2013, Aminrad, et al. 2013).

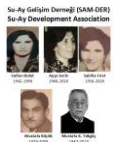
The first step in protecting the environment is practice/ participatory behaviour. It is the last phase of the Environmental objectives, which represents an informed populace capable of acting and making decisions. Environmental education entails practice in decision-making and formulation at the individual and group levels of a code of behaviour about issues concerning environmental quality (IUCN, 1970). Environmental Practice/Behaviour: is willingness to make decision to support, act to protect and conserve the environment without coercion or force (Fien, 2002). In relation to practice, the findings of this study revealed that, majority of the respondents, around 60 percent, indicated that they had good practice. However, around 29 percent and 13 percent of them indicated that they had poor practice and had no practice of protecting the environment from pollution respectively. With regards to regions, the finding revealed that around 57 percent from Addis Ababa, 50 percent from Bahirdar, 67 percent from Diredewa 58 percent from Hawassa and 64 percent from Jimma had a good practice and more than 25 percent from these regions had poor practice. Bahirdar is one of the big cities in Ethiopia and environmental pollution is expected but peoples practice is a little bit lower and hence there is a need to devise mechanisms of enhancing people awareness.

In relation to specific activities, more than 65 percent of participants had good practice in purchasing environmentally friendly' products, commenting to people who throw trash in public space or damage the environment in any manner, taking part in campaigns for prevention of environmental pollution, picking litter whenever they find them in the school compound and participating in tree planting. On the other hand, only half of the participants (50 percent) had good practice on participation in creating newspaper, magazine, and public display by school managements to increase public awareness on environmental pollution and prepare/deliver a message for general public about the importance of preventing environmental pollution.

Highest percentage of respondents (76.6 percent) from Diredewa had good practice in picking litter whenever they find them in the school compound. On the other hand, smallest percentage of respondents (36.1 percent) from Bahirdar had good practice on participation in creating newspaper, magazine, and public display by school managements to increase public awareness on environmental pollution and 28 and 35 percent had poor and no practice in this regards. Similarly, only 38.6 percent of participants from this region had good practice of use appropriate channels to report to authorities on environmental pollutions and 32.7 and 28.7 percent had poor and no practice in this regards.

Various previous studies have focused on practice of students in primary, middle and secondary school students. Lu and Shon (2012) found that environmental education has a fairly good impact on their environmental behaviour. According to a study by Al-Rabaani and Al-Shuili (2020) on Students, environmental education has a moderate impact on students' environmental behaviour. According to Kuhlemeier, Bergh & Lagerweij (1999) environmentally responsible behaviour of many students was not desirable and the students were not willing to take extra pains or to make financial sacrifices for the environment.

The findings of this study revealed that, students had a good knowledge about environmental pollution and good practices in preventing environmental pollution. More than 60 percent of students demonstrated good knowledge and good practice in engaging activities related to environmental pollution prevention. Frensley, et al (2020) discovered a favourable correlation between middle school students' environmental literacy levels and their involvement in outdoor activities. In line with this, Confente and Scarpi (2021) and Chen, (2016) asserts that understanding a situation is a



prerequisite to acting responsibly. However, some scholars found that the relationship between environmental knowledge and environmentally responsible behaviour was not significant (Kuhlemeier, Bergh & Lagerweij, 1999). Hence, Al-Rabaani and Al-Shuili (2010) research findings show that more work needs to be done to close the gap between excellent environmental knowledge and practice.

Generally, majority of the students had knowledge of environmental pollution and good practice in preventing environmental pollution. From this it is possible to conclude most of the population had adequate knowledge on concepts related to environmental pollution. Though the findings are encouraging, there is a need to design a mechanism of enhancing their knowledge and practices of primary and middle school students. School curriculum should give emphasis on environmental education, particularly in relation to pollution which is a global problem. Hence, curriculum experts are recommended to give emphasis on pollution while preparing environmental education school curriculum at all level. Moreover, teachers and students give emphasis to environmental pollution while teaching and learning in school to enhance their understanding and practices to protect their environment.

Funding

No funding was received from any individual or institution for this research.

Ethics and Conflict of Interest

The authors declare that they have adhered to ethical standards at all stages and declare no conflict of interest.

Author Contributions

All authors made equal contributions to the conception, design, data collection, analysis, and writing of this article. All authors have read and approved the final version of the article.

Data Availability

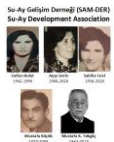
The data that support the findings of this study are available on request from the corresponding author.

Corresponding Author

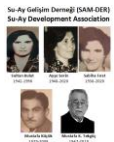
Correspondence to Habtamu WODAJ, habtamuabel@yahoo.com

REFERENCE

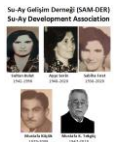
- Ademe, A. S., & Alemayehu, M. (2014). Source and determinants of water pollution in ethiopia: distributed lag modeling approach. *Intel Prop Rights* 2(110). doi:10.4172/2375-4516.1000110.
- Aklilu. (2011). Global climate change in geography curricula for ethiopian secondary and preparatory schools. *International Research in Geographical and Environmental Education*, 20(3), 227-246
- Al-Rabaani, A., & Al-Shuili, A. (2010). Environmental knowledge, attitudes, and behavior among Omani post-basic education students. *European Journal of Social Sciences*, 60(1), 29-38.
- Aminrad, Z., Zakariya, S. Z. B. S., Hadi, A. S., & Sakari, M. (2013). Relationship between awareness, knowledge and attitudes towards environmental education among secondary school students in Malaysia. *World Applied Sciences Journal*, 22(9), 1326-1333.
- Aschalew, A., Lemma, B., & Karippai, R. S. (2013). Knowledge and attitude of students on the environment: The case of two secondary schools in Harari Region, Ethiopia. *East African Journal of Sciences*, 7(1), 51-58.
- Astolfi A, Pellerey F. (2008). Subjective and objective assessment of acoustical and overall environmental quality in secondary school classrooms. *The Journal of the Acoustical Society of America*, 123(1), 163-73. DOI:[10.1121/1.2816563](https://doi.org/10.1121/1.2816563)



- Barbara A. (2010). *Water pollution awareness and drinking water treatment in Rural South Africa*, Population Studies Center, University of Michigan, Institute for Social Research.
- Bennet, D., Bryan, W., Fulton, J., Harlick, S., Mac-Gregor, J. M. et al. (1969). The Concept of environmental education. *The Journal of Environmental Education*, 1(1), 30-31.
- Can, D., Üner, S., & Akkuş, H. (2016). Determination of environmental literacy of middle school students. *Ondokuz Mayıs University Journal of the Faculty of Education*, 35(2), 23-35.
- Chay, K. Y., Greenstone, M. (2003). The impact of air pollution on infant mortality: Evidence from geographic variation in pollution shocks induced by a recession. *Quarterly Journal of Economics*, 118(3), 1121-1167.
- Chen, M. F. (2016). Impact of fear appeals on pro-environmental behavior and crucial determinants. *International Journal of Advertising*, 35, 74-92.
- Confente, I., & Scarpi, D. (2021). Achieving environmentally responsible behavior for tourists and residents: A norm activation theory perspective. *Journal of Travel Research*, 60, 1196-1212.
- Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Columbus, OH: Prentice Hall.
- CRGE (2011). *Ethiopia's climate resilient green economy strategy*.
- Desta, G. (2012). The potential impact of climate change and extreme events on the energy systems in the African region. *Proceedings of the Association of Ethiopians Educated in Germany*, 18 February 2012, Addis Ababa, Ethiopia.
- Desta, G. (2018). The role of renewable energy education in climate change mitigation and sustainable development: A review. *The Ethiopian Journal of Education XXXVIII* (2), 1-50.
- Desta, G. (2008). Energy & environmental education: Prospects and challenges for a sustainable global future, *Proceedings of the 3rd Annual National Conference on "Teacher Education in Ethiopia: Prospects and Challenges"*, (2008), 263-287.
- Emanuel, E. (2010). *Wastewater management in the wider Caribbean region: Knowledge, attitudes and practice (KAP) study*. Caribbean: Caribbean Regional Fund for Wastewater Management.
- EPE (1997). *The environmental policy of Ethiopia* (1997), Addis Ababa, Ethiopia.
- ESDP IV. (2015). *Education sector development program IV (ESDP IV)* (2010/11-2014/15), Ethiopia Federal Ministry of Education, Addis Ababa.
- ESDP V. (2016). *Education sector development program V (ESDP V)*, (2010/11-2014/15), Ethiopia Federal Ministry of Education, Addis Ababa.
- Evans GW, Maxwell L. (1997). Chronic noise exposure and reading deficits – the mediating effects of language acquisition. *Environment and Behavior*, 29, 638-656. <https://doi.org/10.1177%2F0013916597295003>.
- Fien, J. (2002). Advancing sustainability in higher education: Issues and opportunities for research. *International Journal of Sustainability in Higher Education*, 3(3), 243-253.
- Frensley, T., B., Stern, M. J., & Powell, R. B. (2020). Does student enthusiasm equal learning? The mismatch between observed and self-reported student engagement and environmental literacy outcomes in a residential setting. *The Journal of Environmental Education*, 51(6), 449-461.
- Gallagher, J., Wheeler, C., McDonough, M., & Namfa, B. (2000) Sustainable environmental education for a sustainable environment: Lessons from Thailand for other nations. *Water, Air and Soil Pollution*, 123(1-4), 489-503.
- Güler, E. (2013). *Determination of environmental literacy levels of primary school 8th grade students and examination of students' literacy levels in terms of various variables* (Unpublished master's thesis). Çukurova University, Adana, Turkey.
- Hausbeck, K. W., Milbrath, H. L., & Enright, S. M. (1992). Environmental Knowledge, Awareness and Concern among 11th-Grade Students: New York State. *The Journal of Environmental Education* 24(1), 27-34.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behaviour through environmental education. *The Journal of Environmental Education* 21(3), 8-21.
- IUCN (1970). *International working meeting on environmental education in the school curriculum, Final Report. Tech. rep., IUCN*.
- Jande, G.G. (2005) Legal Mechanisms for the control of Pollution on the high seas. *African Journal of Environmental Law and Development Studies*, 1(1), 1-13.



- Jasper, C., Le, T. T., & Bartram, J. (2012). Water and sanitation in schools: a systematic review of the health and educational outcomes. *International journal of environmental research and public health*, 9(8), 2772-2787.
- Knife Mesfin, (2017). Evaluation of air pollutant levels in dire-dawa city, Ethiopia. *Int J Environ Sci Nat Res.*, 17(3). DIO : 10.19080/IJESNR.2017.07.555711.
- Krishnamaracharyulu, V., & Reddy, G. S. (2005). *Environmental education: aims and objectives of environmental: Importance of environmental education*. Hyderabad: Neelkamal Publications Pvt. Ltd.
- Krshana, K. (1987). *Enviroment pollution and public helth. Legal and administrative Aspects in R.K.Spra (E.d) Env.Mgmt. In India Vol. II. Ashis Publishing house. New Delhi.*
- Kuhlemeier, H., Bergh, H., & Lagerweij, N. (1999). Environmental knowledge, attitudes, and behavior in Dutch secondary education. *The Journal of Environmental Education*, 30(2), 4-14.
- Loubser, C. P., Swanepoel, C. H., & Chacko, C. P. C. (2001). Concept formulation for environmental literacy. *South African Journal of Education*, 21(4), 317-323.
- Lu, J. L., & Shon, Z. Y. (2012). Exploring airline passengers' willingness to pay for carbon offsets. *Transportation Research*, 17, 124-128.
- Manisalidis, J., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E., (2020). Environmental and health impacts of air pollution: A review. *Frontiers in Public Health*, 8, 1-13.
- Mansaray, A., Ajiboye, J. O., & Audu, U. F. (1998). Environmental knowledge and attitudes of some Nigerian secondary school teachers. *Environmental Education Research*, 4(3), 329-339.
- Maxwell, L. E., & Evans, G. W. (2000). The effects of noise on pre-school children's prereading skills. *Journal of Environmental Psychology* 20(1), 91-97. DOI:[10.1006/jevp.1999.0144](https://doi.org/10.1006/jevp.1999.0144)
- Mc Michael, A. J., Campel – Lendrum, D. H., Corvalan, C. F., Ebi, K. L., Githeco, A. K., Scheraga, J. D., & Woodward, A. (2003). *Climate change and human health: risks and responses. An Asssessment prepared by a task group on behalf of the World Health Organization, the World Metrological Organization, and the United Nations Environmental Programme, Geneva, Switzerland (document WHO).*
- McBeth, W., & Volk, T. L. (2010). The national environmental literacy project: A baseline study of middle grande students in the United States. *The Journal of Environmental Education*, 41(1), 55-67.
- MOH (Ministry of health), (2011). *Knowledge, attitude and practice of water supply, environmental sanitation and hygiene practice in selected worked as of Ethiopia.*
- Moseley, C. (2000). Teaching for environmental literacy. *Clearing House*, 74(1), 23- 24.
- Nayak, D. K., A (2020). Study of environmental pollution and its effects on human health. *International Journal of Innovative Research in Science, Engineering and Technology*, 9(7), 6201-6205.
- NCEE, (2002). *The North Carolina environmental education plan*, Third Edition. , W. P.;
- Patton, MQ (2002). *Qualitative research and evaluation methods*. 3rd Sage Publications; Thousand Oaks, CA: 2002.
- Pinsonneault, A., & Kraemer, K. L. (1993). Survey research methodology in management information systems: An assessment. *Journal of Management Information Systems*, 10, 75-105.
- Pope, C. III, Ezzati, M., & Dockery D.. (2009). Fine-particulate air pollution and life expectancy in the United States. *New England Journal of Medicine*, 360: 376-386.
- Rowe, D. (2002). *Environmental literacy and sustainability as core requirements: Success stories and models*, in W. Leal Filho (ed.), *Teaching Sustainability at Universities: Towards Curriculum Greening*. Frankfurt: Peter Lang, 79–103.
- Şahin, N. (2020). *Investigation of environmental literacy levels of middle school students according to various variables*. (Unpublished master's thesis). Gazi University, Ankara, Turkey.
- Salant, P., & Dillman, D. A. (1994). *How to conduct your own survey*. New York: John Wiley and Sons.
- Sarkar, M. (2011). Secondary students' environmental attitudes: The case of environmental education in Bangladesh. *International Journal of Academic Research in Business and Social Sciences* 1, 2222-6990.
- Sengupta, M., Das, J., & Maji, R. K. (2010). Environmental awareness and environmental behaviour of twelfth grade students in Kolkata: Effects of stream and gender" *Anwesa*, 5, 1-8.



- Shield, B., & Dockrell, J. E. (2004). External and internal noise surveys of London primary schools. *Journal of the Acoustical Society of America* 115(2), 730-8. DOI:10.1121/1.1635837.
- Shield, B., & Dockrell, J. E. (2008). The effects of environmental and classroom noise on the academic attainments of primary school children. *The Journal of the Acoustical Society of America* 123, 133. doi: 10.1121/1.2812596.
- Sibiya, J. E., & Gumbo, J. R. (2013). *Knowledge, attitude and practices (KAP) survey on water, sanitation and hygiene in selected schools in Vhembe district, Limpopo, South Africa.*
- Sneh, S. (2018). Environmental pollution: Types, causes and consequence. *Journal of Emerging Technologies and Innovative Research (JETIR)*. 5(12), 540-552.
- Spinola, H. (2015). Environmental literacy comparison between students taught in Eco-schools and ordinary schools in the Madeira Island region of Portugal. *Science Education International*, 26 (3), 392-413.
- Srbnovski, M., Erdogan, M., & Ismaili, M. (2010). Environmental literacy in the science education curriculum in Macedonia and Turkey. *Procedia Social and Behavioral Sciences* 2, 4528-4532.
- Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: non-auditory effects on health. *Br Med Bull*, 68:243-57.
- Stapp, W. B. (1969). The concept of environmental education. *Environ Educ* 1(1), 30-31.
- Stephen, T., Odonkor, L., & Tahiru, M. (2020). Knowledge, attitudes, and perceptions of air pollution in Accra, Ghana: A critical survey. *Journal of Environmental and Public Health* 20, 1-10.
- Tan, M. (2004). Nurturing scientific and technological literacy through environmental education. *Journal of International Cooperation in Education*, 7(1), 115-131.
- TGE (1994). *Education and training policy*. Addis Ababa, Ethiopia.
- Toili, W.W (2007). Secondary school students' participation in environmental action: Coercion or dynamism? *Eurasia Journal of Mathematics, Science & Technology Education*, 3(1), 51-69
- UNESCO, (1978). Intergovernmental Conference on Environmental Education. Organized by UNESCO in cooperation with UNEP, Tbilisi, USSR, 14-26 October 1977. Final Report .Paris: UNESCO.
- UNESCO-UNEP. (1994). *A prototype of environmental education curriculum for the middle school (revised): A discussion guide for UNESCO training seminars on environmental education. Environmental Education Series 29.* http://www.unesco.org/education/pdf/333_49.pdf.
- World Bank (2013). *Secondary education in Ethiopia: Supporting growth and transformation, a World Bank Study* 2013.
- World Health Organization (2006). *In water, sanitation and health world Organization.*
- WRI (World Research Institute), (1998). *In collaboration with the United Nations Environment Programme, the United Nations Development Programme, and the World Bank. World Resources Report 1998-99 New York: Oxford University Press.*
- Xie, H., Kang, J., & Tompsett, R. (2011). The impacts of environmental noise on the academic achievements of secondary school students in Greater London. *Applied Acoustics* 72, 551-555.
- Yerkes, R., & Haras, K. (1997). *Outdoor education and environmental responsibility*. West Virginia: ERIC Digest.