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Environmental awareness perception of senior high school students in Ghana, the case of the Bolgatanga Municipality

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Abstract: *This research examines environmental awareness perception among senior high school students in Ghana using socio-demographic indicators and the Environmental Awareness and Active Participation Scale. The research topic hinges on the notion that the attainment of the environmental components of sustainable development depends largely on the youth who are the future generation, and the custodians of the earth. Data for the research were obtained through a quantitative approach. Survey questionnaires were distributed to the three senior high schools in the Bolgatanga Municipality. The findings of this research show a high score on the Environmental Awareness and Active Participation scale. This is an indication of the high environmental awareness perception of students via the educational system and by the media. The results also show that the major socio-demographic factor that influences the environmental awareness perception in senior high school students is their mothers' level of occupation. This finding has both theoretical and practical implications.*

Keywords: *Sustainable development; Environment; Education; Bolgatanga Municipality*

1. Introduction

Sustainable development as defined by the Bruntland Commission is the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs (Sustainable Development Commission, 2011). The Bruntland Commission heralded the era of sustainable development and charged governments to account to ensure the needs of society, the economy, and the environment were completely balanced in the decision it makes and the way they ran themselves. Unfortunately, the quest for economic emancipation is always higher than the desire to protect the environment. This is illustrated by Gareth Hardin in his famous work on the tragedy of the commons. In the tragedy of the commons, Hardin asserts that individuals neglect the well-being of society and the environment in the pursuit of personal gains (Frischmann et al., 2019; Hardin, 1968).

Our planet faces various forms of environmental problems such as water pollution, air pollution, soil pollution, solid waste, nuclear waste, global warming, earthquakes, and floods (Dunlap & Jorgenson, 2012). These environmental problems coupled with the increasing human population have resulted in an ecological imbalance that may have further repercussions for our planet.

The increase in the global population has increased the number of youth. According to the United Nations, in 2019 there are approximately 1.2 billion youth aged 15 to 24 years in the world, and this equates to approximately 16% of the global population (United Nations, 2019). It is projected that the number of youth is expected to grow by 7% to 1.3 billion by the year 2030, which is the target year for achieving the Sustainable Development Goals. Considering the youthful nature of the world's population, it is paramount that environmental awareness among especially senior secondary school students is emphasized. A high level of environmental awareness among senior high school students will go a long way to help achieve the environmental component of sustainable development.

Ghana's population is also youthful. For instance, Ghana's Statistical Service reported in its 2021 population census that over 11 million (out of approximately 32 million Ghanaians) are aged under 15 years old (United Nations Department of Economic and Social Affairs: Population Division, 2022). The average age for students to complete senior secondary school in Ghana is 17 years of age (Iddrisu et al., 2017). This research, therefore, targets senior high school students because they form an integral part of the youthful population in Ghana and the world.

The target population for this research is the Bolgatanga Municipality. Bolgatanga is the regional capital of the Upper East Region of Ghana. It is adjacent to the border of Burkina Faso. A report released by the Ghana Statistical Service with support from the United Nations Development Program (UNDP) implies that with the current population of 31 million, 14 million Ghanaians are estimated to be multi-dimensionally poor (UNDP, 2020), and the Bolgatanga Municipality is one of the poorest municipalities¹. The activities of the youth in the Bolgatanga Municipality pose great environmental threats. For instance, after completing senior high school, the majority of students, especially males engage in tricycle riding (locally known as pragia or candu) to make a living. The oil spills from the tricycles pollute the land. Also, the worn-out tires from the pragia are not disposed-off properly. The females sell fried

¹ The Northern, Upper East, and Upper West Regions of Ghana continue to have the highest poverty rate of about 44% (Ofori-Boateng, 2015; UNDP, 2020)

rice on the streets (locally known as check-check). The plastic bags used to serve the check-check are not disposed-off properly and ends up in the open drains. These activities of the tricycle operators and the check-check operators are sources of environmental pollution. Hence a sample of the youth environmental awareness would help inform policy.

Few studies have also examined environmental awareness among senior high school students. For instance, Sudhakar et al. (2020) examined environmental awareness among secondary school students in the Guntur District. They investigated six schools in the Guntur district using a random sampling technique. They found that the level of environmental awareness did not vary between the schools. Danielraja (2019) also studied the environmental awareness of students in High Schools and found that environmental awareness differs between students in different disciplines. For instance, science students have high environmental awareness than vocational skills students. This current research adds to the already few studies on environmental awareness among senior secondary school students.

Given the above, this research would seek to achieve the following objectives:

- i. To determine the level of environmental education in senior high schools.
- ii. To determine the role of the media on environmental education among senior high school students.
- iii. To measure senior high school students' perception of environmental issues using the Environmental Awareness and Active Participation Scale (EAAPS).
- iv. To determine the socio-demographic factors that influence the environmental perception of senior high school students.

The remainder of this manuscript is divided into four sections. First, we discuss the role of the school and the media in creating environmental awareness among senior high school students. Second, we describe our methodology. We used a survey questionnaire for our data collection. There are three senior high schools in the Bolgatanga Municipality, and we distributed the questionnaires to the three schools. Third, we discuss the results and analysis. Finally, we concluded by suggesting that the level of environmental awareness in senior high schools in the Bolgatanga Municipality is adequate, and the major socio-demographic factor that influences environmental awareness among senior high school students is the mother's educational level.

2.0 Role of the school in environmental education

Environmental education aims to encourage public awareness of environmental issues, problems, and solutions. Environmental education provides the opportunity for people to acquire the knowledge, attitudes, values, commitment, and skills to protect and improve the environment (Ardoin et al., 2020; *Belgrade Charter*, n.d.; Erhabor & Don, 2016; Fang et al., 2023). Because of this, environmental education seeks to develop an active and well-informed citizenry that is committed to the prospect of environmental protection (Fien, 1993, 1995). Research shows that there is a high level of student concern about the environment (Dunlap et al., 1993; Jusoh et al., 2018; National Environmental Education and Training Foundation, 1994), and environmental education in the formal education system is vital in the quest to empower students since they are tomorrow's leaders and stewards of the earth.

There is a strong argument for the need to educate future environmental stewards to ensure sustainable utilization of the earth's natural resources, as many environmental problems especially in the developing world are desperately in need of attention (Sutherland & Ham, 1992, 2010). Arguably, students, parents, community elders and other adults in a community are better placed to help address environmental problems. However, there are many challenges associated with educating adults in a community. A primary challenge is the lack of time for involvement in environmental education and projects (Ballantyne et al., 1998; Kimaro et al., 2022). The need to educate students as a catalyst for environmental change is very important (Danielraja, 2019; Sudhakar et al., 2020). The youth are agents of intergenerational influence, hence the need to educate especially secondary school students to help protect the environment is paramount (Brothers et al., 1991; Ryan, 1991).

Education for Sustainability

The role of the school in environmental education towards the attainment of the sustainable development goals (SDGs) is very vital. Education for sustainability allows every person to acquire the knowledge and the requisite skills, attitudes, and values needed to shape the environment by ensuring that natural resources are utilised wisely (UNESCO, 2018; Wamsler, 2020).

Education for sustainability requires schools to use participatory teaching and learning approaches that motivate and empower students to change their behaviour and take actions that ensure the protection of the environment. Education for sustainability, therefore, promotes

competencies such as critical thinking, imagining future scenarios, systemic thinking and analysis, and collaborative decision-making (UNESCO, 2018).

The educational system needs to adapt its teaching and learning approach to adhere to the ideas of education for sustainability. This will ensure that the environment and available natural resources are utilised sustainably.

3.0 The role of the media in environmental education

The media plays a vibrant role when it comes to informing the general public about environmental issues, their consequences, and remedies put in place (Blum, 1987; Robelia & Murphy, 2012; Salaudeen & Onyechi, 2020). Various media such as radio, TV, newspaper, and the internet play two major roles concerning environmental awareness. On the one hand, the media helps to disseminate and explain environmental policies, regulations, and plans, and on the other hand, they help to reflect the concerns of the public concerning environmental problems (Maurya, 2019).

The role of the media in forming environmental perceptions among the youth, especially, senior high school students is very vital in the current technological age. The youth spend most of their time on social media. Research by Lenhart (2015) indicates that 92% of the youth are active on social media and that the age group of 13-17 years are heavy users of social media. There are many negative impacts associated with the use of social media (Keles et al., 2020; Tripathi, 2017), and its role in creating environmental awareness among the youth has been widely studied (Hamid et al., 2017; Mallick & Bajpai, 2019; Ors, 2012).

4.0 Materials and Methods

To measure environmental awareness perception among senior high school students in the Bolgatanga Municipality, we studied all three senior high schools in the municipality. The schools are Bolgatanga Technical Institute (located at Yekene), Bolgatanga Girls Senior High School (located at Zare), and Zamse Senior High/Technical School (located at Bolgatanta Estate).

The Bolgatanga Municipal is situated in the Upper East Region of Ghana. It contains a landmass of 729 km², bordered to the north by the Bongo district, south and east by the Talensi and Nabdam districts, and to the west by the Kassena-Nankana municipality (Abanyie et al., 2016). It has a population of 139,864 out of which 73,257 are females and 66,607 are males

(Population and Housing Census, 2021). Farming is the main occupation of the people of Bolgatanga. They engage in subsistence farming of millet, maize, guinea-corn, rice, beans, groundnuts, and sweet potatoes during the rainy season and irrigation farming of onions, tomatoes, and pepper during the dry season (Abanyie et al., 2016).

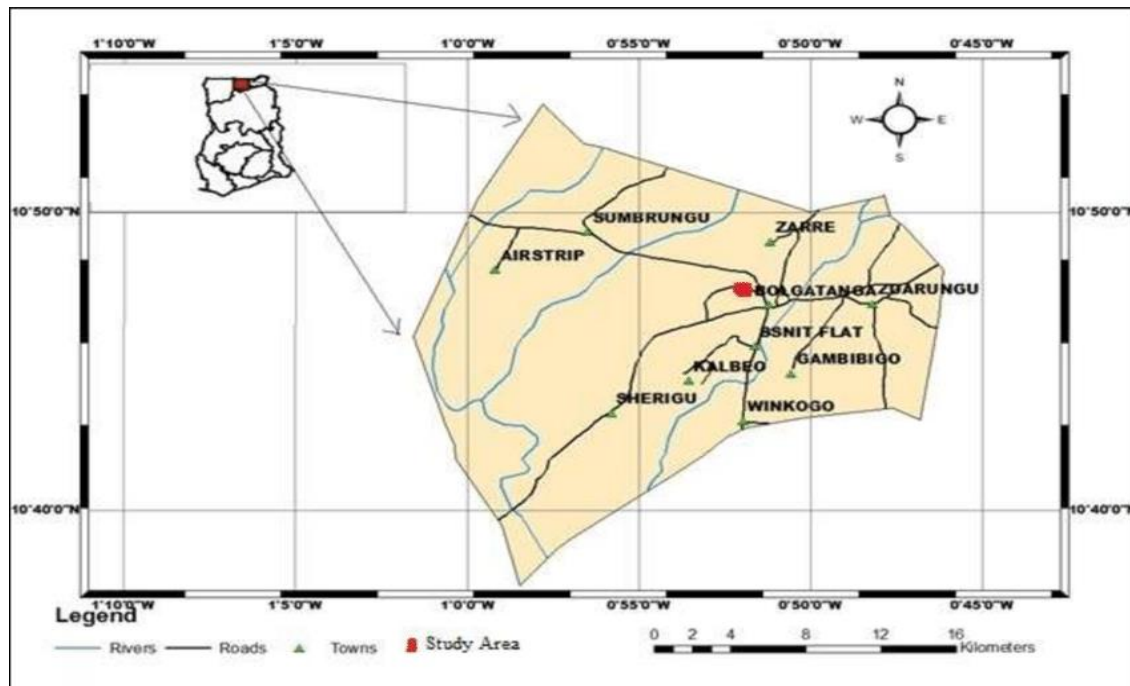


Figure 1: An outline of the Bolgatanga Municipality, located in the Upper East Region of Ghana

Quantitative Survey

To answer the four objectives, we use a quantitative survey questionnaire to gather the necessary data. As stated above, three senior high schools in the Bolgatanga Municipality were surveyed. The survey questionnaire was divided into three sections. Section I is the socio-demographic indicators, section II is the socio-media indicators for measuring environmental awareness, and section III is the environmental awareness and active participation scale EAAPS.

The EAAPS is a survey instrument developed by Altin et al. (2014) that is used extensively in environmental awareness perception studies. It is a 5-point Likert-type scale consisting of 11 questions. The first 7 questions measure the environmental awareness of students and the remaining 3 questions measures participation levels in environmental organizations/activities (Altin et al., 2014). The EAAPS is such that responses are rated 1 for 'strongly disagree', 2 for 'disagree', 3 for 'neither disagree nor agree', 4 for 'agree', and 5 for 'strongly agree'.

The survey questionnaires were delivered by hand to each school after seeking the permission of the school's principals. A total of 600 questionnaires were delivered to the three schools. Each school was given 200 questionnaires. A total of 150 students responded to the survey, making a response rate of 25%. The socio-demographic variables suggest that the percentage of females in the sample is 53.3%. This is fairly representative of the female population in the municipality i.e., 52.38% in the 2021 population and housing census (Bolgatanga Municipal Assembly, 2022). About 48.32% of the respondents are aged below 18 years and 51% are aged between 18-24 years.

5.0 Results and Discussion

In this section, we answered the four objectives by analyzing the available data. We analyze the data based on the objectives of the study. It is worthwhile to note that with a 10% margin of error, a response rate of 16% is statistically enough to draw a conclusion (Aryee et al., 2020; Graglia, 2022).

Objective one:

The first objective is to determine the level of environmental education in senior high schools in the Bolgatanga Municipality. To answer this objective, we asked the following questions:

- i. Is the environmental course in your school an elective or core (compulsory) course?
- ii. How well do you take advantage of environmental education in your school?
- iii. Is there an activity in the school that seeks to educate the local community about the dangers of environmental degradation?

Question 1 asked students whether the environmental course in their school is an elective or core course. This question was coded 1 for an elective environmental course, and 2 for a core environmental course. All 150 respondents answered the question. Out of the 150 respondents, 114 representing 76% said environmental education in their schools is a core or compulsory course while 36 students representing 24% said environmental education in their school is an elective course, i.e., they are at liberty to choose it or not.

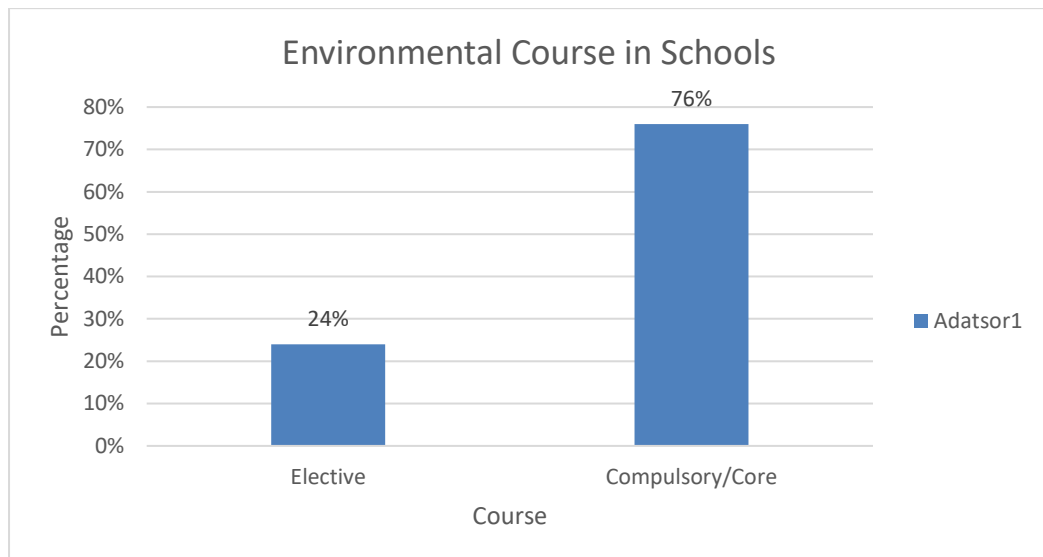


Figure 2: Environmental course as an elective or core subject in senior high schools (n=150).

In the Ghana education system, environmental education is incorporated into the Integrated Science and Social Studies courses. Integrated science and social studies are compulsory modules, so it is expected that every senior secondary school student should have basic environmental knowledge after completion of high school.

The second question asked how well students take advantage of environmental education in their schools. This question was coded 1 for 'not at all well', 2 for 'slightly well', 3 for 'moderately well', 4 for 'very well', and 5 for 'extremely well'. All 150 respondents answered this question. Over 72% of the students admitted that they take advantage of environmental education in their schools.

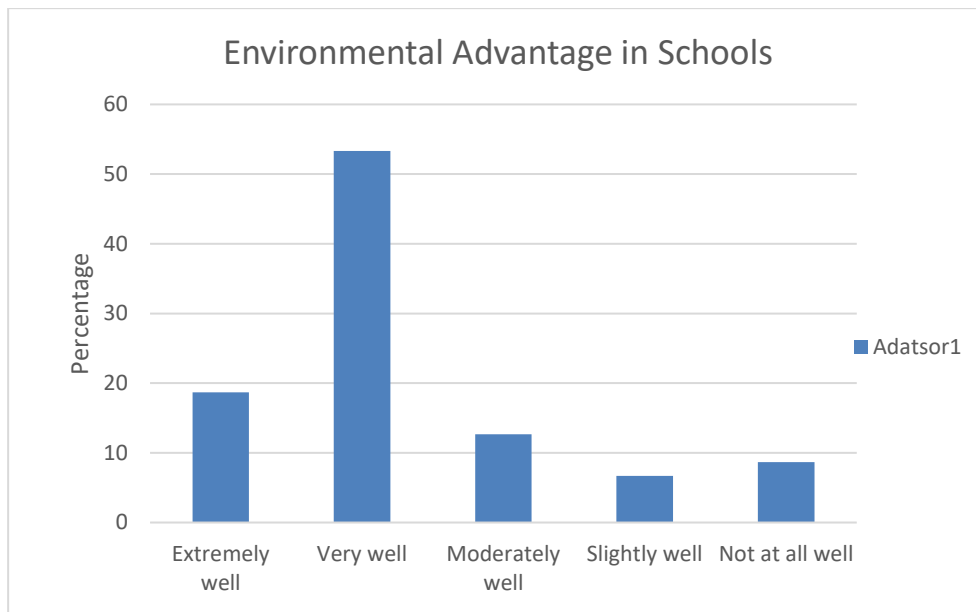


Figure 3: How students take advantage of environmental education in senior high schools (n=150).

The third question asked respondents if there is any activity in their school that seeks to educate the community members on the dangers of environmental degradation. The question was coded 1 for 'yes', and 2 for 'no'. This question is intended to find out whether environmental education in the school has any bearing on the community. All 150 respondents answered this particular question, and about 76% say there are no such programs that seek to educate the local community about environmental degradation.

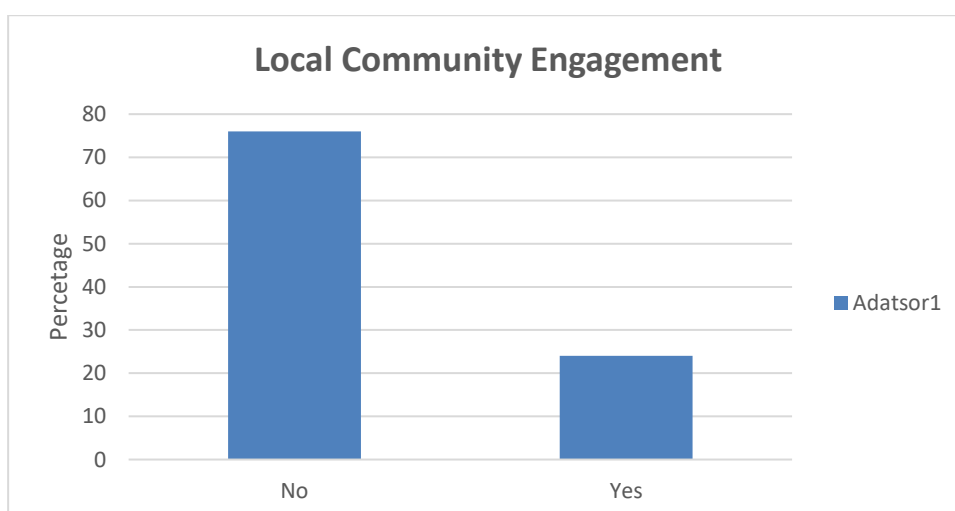


Figure 4: Activities in senior high schools that educate community members on environmental education (n=150).

Objective two:

The second objective is to determine the role of the media in environmental education among senior high school students in the Bolgatanga Municipality. To answer this objective, we asked the following questions:

- i. On average, how many hours do you watch TV every day?
- ii. Do you try to follow publications and broadcasts about environmental issues?
- iii. Mass media (newspaper, radio, TV, etc.) has contributed to the development of my environmental awareness.

Question one asked: on average, how many hours do you watch TV every day? This question was coded 1 for ‘up to 2 hours’, 2 for ‘between 2 – 4 hours’, 3 for ‘between 4 – 6 hours’, and 5 for ‘more than 6 hours’. 150 respondents answered this question, and the results are indicated in the graph below.

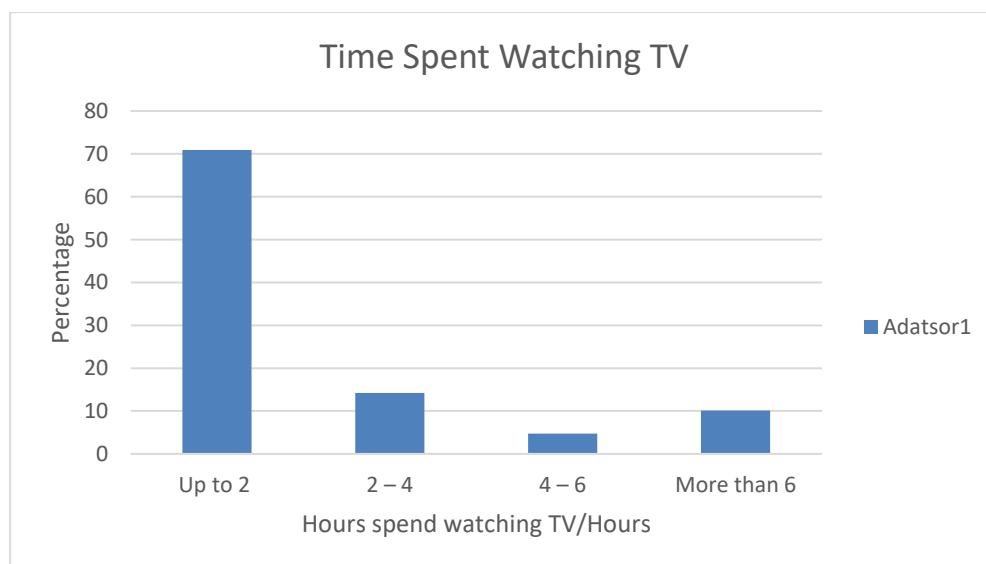


Figure 5: Time senior secondary students spend watching television (n=150).

From the bar graph above, approximately 70% of the respondents watch TV for up to 2 hours a day. Since the respondents are secondary school students, most of the students are in boarding schools and do not have access to television (Abdallah et al., 2014). Secondly, most students prefer to spend time on social media than to watch mainstream television (Asare-Donkoh, 2018; Salaudeen & Onyechi, 2020; Tsfati et al., 2020).

Question two asked students whether they follow publications and broadcast about environmental issues. This question was coded 1 for ‘no’, and 2 for ‘yes’. 150 respondents

answered this question. 110 respondents representing approximately 73% admitted that they followed publications and broadcast on environmental issues.

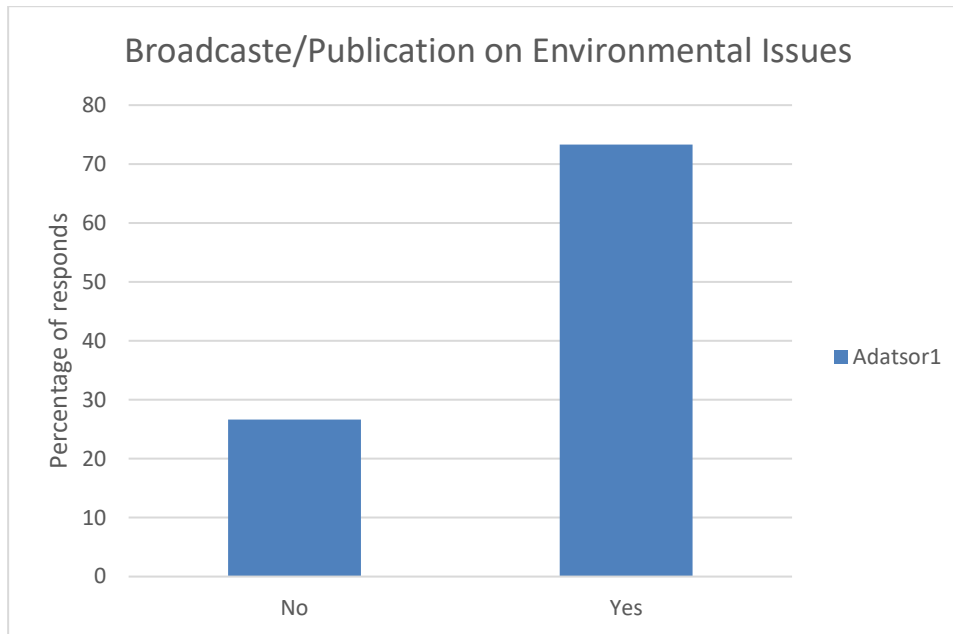


Figure 6: Senior high school students who follow broadcasts and publications on environmental issues (n=150).

The second question asked respondents to agree or disagree with whether social media has contributed to the development of their environmental awareness. This question was coded 1 for 'strongly disagree', 2 for 'disagree', 3 for 'neither agree nor disagree', 4 for 'agree', and 5 for 'strongly agree'. 149 respondents answered this question and 127 respondents corresponding to approximately 84.3% agree and strongly agree that mass media has played a major role in shaping their environmental awareness.

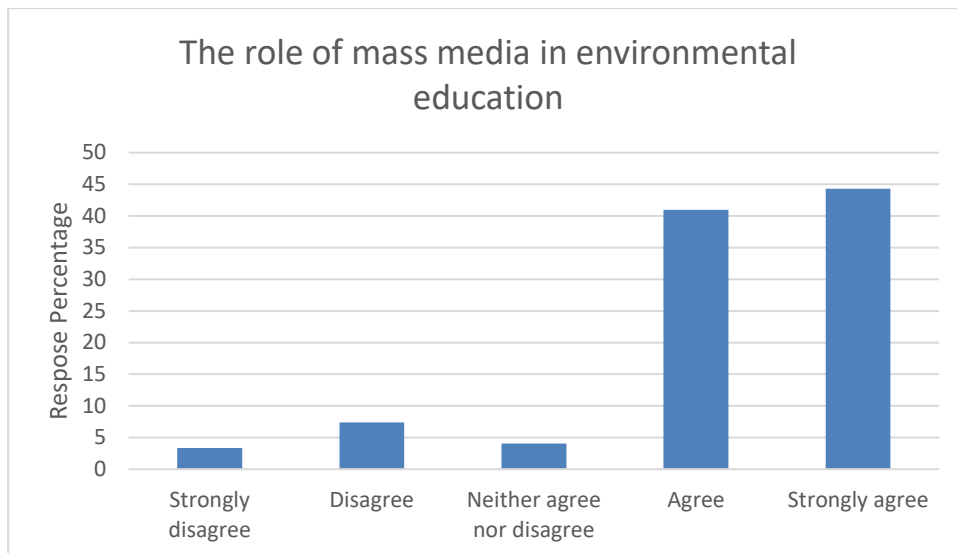


Figure 7: Whether mass media has affected senior high school students environmental education (n=150)

Objective three:

The third objective is to measure senior high school students' perception of environmental issues using the Environmental Awareness and Active Participation Scale (EAAPS). As noted above, the EAAPS is a 5-point Likert scale (Appendix A) and the questions were coded '1' for responses that strongly disagree with these statements, '2' for responses that disagree with these statements, '3' for responses that neither agree nor disagree with these statements, '4' for responses that agree with these statements, and '5' for responses that strongly agree with these statements, and blank for blank responses. Table 1 below is the average (mean) score of the respondents on the EAAPS.

Table 1: Environmental Awareness and Active Participation Scale (EAAPS) Score Distribution

		No of Students	Mean Score	STD
1	I have sufficient information about environmental problems.	150	4.11	1.06
2	If people keep producing and consuming like this, would there be a serious raw material shortage?	150	3.47	1.33
3	Economic growth and technological developments have dangerously damage nature	150	2.94	1.41
4	There should be limitations on economic growth in order to prevent destruction of the nature.	150	3.65	1.28
5	Developed countries are more responsible for environmental pollution and destruction of nature	149	3.20	1.50
6	We do not inherit the earth from our ancestors; We borrow it from our children	150	2.29	1.32
7	Development of personal environmental awareness is an important feature for protection of the environment.	150	4.37	0.86
8	I am aware of activities of environmental club in my school	150	3.65	1.29
9	I do recognize environmental non-governmental organizations	149	3.14	1.24
10	I know government agencies that deal with protection of the environment.	150	3.91	1.25
11	I have participated in an environmentalist groups or organization	150	3.31	1.23

Analysis of the first 7 questions which measure environmental awareness indicated a high mean score on the EAAPS scale. Questions 1 and 7 had the highest average scores.

Question 1 asked: I have sufficient information about environmental problems. 150 respondents answered this question and 124 respondents representing approximately 83% agreed and strongly agreed that they have sufficient information about environmental problems.

Table 2: EAAPS Q1: I have sufficient information about environmental problems n=150.

EAAPS Q1	Frequency	Percentage	Cumulative Frequency
Strongly disagree	4	2.67	2.67
Disagree	15	10.00	12.67
Neither agree nor disagree	7	4.67	17.33
Agree	58	38.67	56.00
Strongly agree	66	44.00	100.00
Total	150	100	

Question 7 also asked: Development of personal environmental awareness is an important feature for the protection of the environment. 150 students answered this question and 138 out of the 150, representing approximately 92% agreed and strongly agreed with the statement that the development of personal environmental awareness is important.

Table 3: EAAPS Q7: Environmental awareness is an important feature for environmental protection n=150

EAAPS Q7	Frequency	Percentage	Cumulative Frequency
Strongly disagree	4	2.67	2.67
Disagree	3	2.00	4.67
Neither agree nor disagree	5	3.33	8.00
Agree	60	40.00	48.00
Strongly agree	78	52.00	100.00
Total	150	100	

Objective four:

The fourth objective seeks to determine the socio-demographic factors that influence the environmental perception of senior high school students. The specific socio-demographic indicators used to measure environmental perception were analyzed using Ordinary Least Square Regression (OLS) where the total EAAPS is the dependent variable and the socio-demographic variables are the independent variables.

The socio-demographic indicators that were considered are the gender of respondents, age of respondents, mother's education level of respondents, father's education level of respondents, household monthly income, mothers' occupation, and fathers' occupation. We tested the reliability of these seven socio-demographic variables on STATA-13 and found that the variables are internally consistent ($\alpha = 0.71$). As a result, we specifically hypothesized that as the socio-demographic indicator scores increase, the total EAAPS will also increase.

Table 4: Ordinary Least Squares Regression Coefficients (*b*) and Standard Errors (SE) for the Total EAAPS and the Socio-Demographic Variables

Socio-Demographic Variables	Total EAAPS	
	<i>b</i>	SE
Gender	1.45	1.04
Age	0.18	0.93
Mother Education Level	-0.18	0.41
Father Education Level	-0.16	0.35
Household Monthly Income	0.11	0.34
Mother Occupation	-0.80*	0.41
Father Occupation	0.62	0.39
Constant	37.69	2.51
<i>N</i>	111	
Adjusted <i>R</i> ²	-0.0121	

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ significance (two-tailed).

The results in Table 4 indicate that only the mothers' occupation is significant. All the other socio-demographic variables are insignificant. This result implied the significance of the relationship between the mother's occupation and the level of environmental awareness of senior high school students.

From Table 4, a unit increase in the mother occupation score corresponds to a 0.80 increase in the EAAPS score. This increase is significant, and as a result, we reject the null hypothesis that there is no relationship between the mother's occupation and the total EAAPS. The hypothesis

that as the socio-demographic variable (mother's occupation) increases, the total EAAPS score would also increase is supported by the data.

This finding is supported by the literature. For instance, research by von der Lippe (1999) found that educated working mothers' have a positive influence on their children's decisions making capabilities, as compared with the fathers'. Other studies also found a positive relationship between a mother's occupation and the development of environmental awareness among children (Altin et al., 2014; Hampel et al., 1996).

6.0 Conclusion

Achieving the sustainable development goal by the stipulated year of 2030 is very vital to the sustainability of the Earth. A vital component of sustainable development is the protection of the environment. The youth as a major component of the earth's population and future custodians of the earth has a significant part to play in ensuring environmental sustainability. This research aimed at measuring the environmental awareness perception of senior high school students in the Bolgatanga Municipality of Ghana. An instrument called the EAAPS was used to measure environmental awareness perception.

It was found that the level of environmental education in senior high schools in the Bolgatanga Municipality of Ghana is acceptable. However, this does not translate in the local community as 71% of the respondents did not have any knowledge of programs or projects run by their schools that seek to educate the local communities on environmental issues.

The mean score on the EAAPS also indicated that the level of environmental awareness and participation of senior high school students in environmental education is high. This is highly recommendable.

Finally, we found that the socio-demographic indicator that is responsible for the high environmental awareness perception among the senior high school students in the Bolgatanga municipality is the mother's occupation variable. This is a clear indication of the role of mothers in inculcating environmental education in their children.

Theoretical and Practical Implication

This research has two theoretical implications. First, the research adds to the literature on the role of senior high school and the media in environmental awareness perception study. A few research has examined the role of schools and the media on environmental awareness

perception among students. This research, therefore, improves the literature in this regard. Second, a significant finding of this research is that the factor that improves environmental awareness perception among students is the mothers' occupation. This research is one of the few research available that has explicitly confirmed the impact of a mother's occupation on students' environmental awareness perception development.

Practically, this research informs policy on the need to make environmental studies a core (compulsory) subject in senior high schools. Although the level of environmental awareness in senior high school is adequate, this research found that it is not reciprocated in the local community. There is therefore the need for senior high schools to occasionally engage in outreaches and other projects that promote environmental awareness in their immediate community.

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Appendix A

The Environmental Awareness and Active Participation Scale (EAAPS).

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I have sufficient information about environmental problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If people keep producing and consuming like this, would there be a serious raw material shortage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Economic growth and technological developments have dangerously damage nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There should be limitations on economic growth in order to prevent destruction of the Nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developed countries are more responsible for environmental pollution and destruction of Nature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We do not inherit the earth from our ancestors; We borrow it from our children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Development of personal environmental awareness is an important feature for protection of the environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am aware of activities of environmental club in my school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do recognize environmental non-governmental organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know government agencies that deal with protection of the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have participated in an environmentalist groups or organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>