



Climate Change Awareness among the High School Students: Case Study from a Climate Vulnerable Country

S. M. A. Rahman^{1*}, Sadeka Tasmin², Mohammad Kawser Uddin³, Mohammad Touhidul Islam⁴ and Mohammad Sujauddin²

¹Department of Environmental Science and Hazard Studies, Noakhali Science and Technology University, Noakhali-3814, Bangladesh.

²Department of Environmental Science and Management, North South University, Bashundhara, Dhaka-1229, Bangladesh.

³Department of Environmental Science, Stamford University, Dhaka, Bangladesh.

⁴Department of Civil Engineering, Southern University, Chittagong, Bangladesh.

*Email: shahriar.arif@gmail.com

History:

Received: 14 August 2014

Accepted: 30 September 2014

Available Online: 30 October 2014

Keywords:

Bangladesh, Secondary school, Climate Awareness Index (CAI), Climate Change awareness, Curriculum.

ABSTRACT

Bangladesh is one the worst sufferers of climate change. Climate change awareness creation is pivotal to adaptation and mitigation strategies. Effective dissemination of knowledge among the citizens during high school years is crucial to that end. In Bangladesh, secondary school students follow common curricula which include entries on climate change. This paper investigates the role of the diverse demographic profiles and inherent scholastic background of students on their *informedness*. The research is based on responses from secondary schools students in Chittagong, Bangladesh. Based on their understanding of climate change, we have constructed the Climate Awareness Index (CAI). Then the relative roles of demographic determinants of the awareness have been compared using the CAI. The quality of schools, and grade, major and merit position of students have affected the CAI values. Besides, the study concluded that the religion, gender, parental education, occupation and income, etc. could affect students' climate change *informedness* in Bangladesh.

1. Introduction

Climate change (CC), hitherto considered by many as a myth (Chivers, 2012; Carter 2007), is now a hard-felt reality (IPCC, 2013). Countries like Bangladesh have started facing the impacts of CC in the forms of temporal shifts in recurrent climatic events such as excessive rainfall, elevated summer temperature, changes in tidal regimes and heights etc. (IPCC, 2007). CC is considered as the most expansive global environmental (McCright, 2010), economic (Stern, 2007), and political (Giddens, 2009) problem facing humanity right now. Consequently, it has become the cornerstone of policy making throughout the world (Weber and Peters, 2009) and the coffee-table-discussion-topic among the masses now-a-days. Informed mass awareness on the causes, consequences and mitigation as well as adaptation strategies to CC is important to confront this largely human-induced phenomenon (Bohle et al., 1994).

Knowledge on CC, perceived as a part of formal environmental education, helps the development of a sense of responsibility through the creation of informed awareness. Such awareness is necessary to guide students' behaviour towards concerted ameliorative actions (McMillan et al., 2004; Kuhlemeier et al., 1999; O'connor et al., 1999). Consequently, youth environmental education had already been emphasized by the world policy makers (UNCED, 1992). Paragraph no. 25.9d of agenda 21 of UNCED states:

'For advancing the role of youth and actively involving them in the protection of the environment... governments, according to their strategies, should take a measure to ensure access of education for all youth... which incorporates the

concepts of environmental awareness and sustainable development throughout the curricula'.

In fact, widely disseminated information about environmental degradation i.e. climate change impacts, vulnerability, etc. has already increased the interest among the young students worldwide (Pekel and Ozay, 2005). Moreover, the school students, who are the future voting citizens, should be motivated towards an environment-friendly lifestyle by inculcating informed awareness in them so that they can influence adoption of better climate policy by choosing pro-environment leadership (Boyes et al., 1993). In order to ensure such intensive appreciation of CC by new generation, we need to build their awareness through a well-designed effective primary and secondary school curricula which addresses the issue of CC adequately (Kılınç et al., 2011; Bangay and Blum, 2010). However, knowledge addressing CC is often found perplexed since CC itself is a very complex and abstract concept with varied school of thoughts (Boyes and Stanisstreet, 1992). Besides, sporadic and excessive media coverage along with the over-excitement of pressure groups make the messages related to CC complicated to the students (Boyes et al., 1993). Furthermore, some studies suggest that the association between cognitive knowledge about CC and its behavioural implications i.e. adopting mitigative and adaptive personal lifestyle is not linear (Dijkstra and Goedhart, 2012; Pe'er et al., 2007). Considerable development towards the role of secondary curriculum in shaping awareness among students is well evident (Malandraki et al., 2011; Shepardson et al., 2011). However, in the absence of proper instrumentation to measure the students' awareness on CC, it is very difficult to assess the effectiveness of such curricular inclusions for which we need a representative climate change awareness

index (CAI) which has been constructed in this research. Besides, we need to identify the factors that may shape the CC awareness among the growing generations to design more effective contents and mode of their delivery. A number of studies have been conducted in different parts of the world. Individual's demographic characteristics such as age, gender, educational level, occupation, parents' educations and occupations etc. have been identified as influential factors alongside the sources of information on climate science (O'Connor et al., 1999; Berger, 1997; Sampei and Aoyagi-usui, 2009). Ozden et al. (2008) evaluated the relationship between environmental awareness and a number of socio-demographic factors i.e. gender, academic major, grade, income level of family, father's job and education, mother's job etc. Pe'er et al. (2007) found the influence of students' study major and mothers' education level on their environmental awareness. A study on secondary school students from five European countries reported a significant relationship between their CC knowledge and pro-environmental attitudes and highlighted the influence of gender, age and higher grade on students' CC knowledge (Dijkstra and Goedhart, 2012). Perception of CC among the Greek secondary school students are reported to be influenced by their education level, gender or previous participation (Liarakou et al., 2011). Similar outcome has been drawn by Kılınc et al. (2008) on Turkish high school students. It is, therefore, necessary to evaluate the role of these demographic factors on the comprehension of curricular information in order to understand the education-awareness climax better.

Bangladesh – one of the top ranked countries in the Global Climate Risk Index (Kreft and Eckstein, 2014) - is frequently cited to be ravaged by CC impacts (Ayers, et al., 2014) despite the fact that she is an insignificant or virtually zero contributor to greenhouse gas emissions (Reynolds et al., 2010; Ali, 1999). Her population has one of the highest densities (1,050 people per km²) in the world (BBS, 2012) and one of the youngest with 51.8 percent aged under 24 and 33 percent aged under 14 (U.S. Census Bureau, 2013) unfortunately with a low literacy rate of 51.8 percent (Ali, 1999) only. Considering the populous secondary level age group, secondary education could undoubtedly be the primary route to educate the population towards climate awareness. We believe that a successful dissemination of knowledge at the high school level is critical to ensure lifelong pro-environment behaviour among future Bangladeshi citizens. Unfortunately, when Bangladesh is in the process of implementing many CC adaptation and mitigation schemes, learning outcomes from the curricula and school and surrounding environment focusing CC and the role of different socio-demographic influential factors on Bangladeshi students have not been focused in previous researches. Therefore, in this study, along with the development of Climate Awareness Index (CAI) to be used as a general estimate of the level of awareness, we have focused on the demographic factors to see how they shape the level of *informedness* of secondary school students who has been exposed to similar curricular contents on CC.

2. Methodology

2.1 Sampling procedure

The study was aimed to analyze the CC awareness among the secondary (grade VI-X) level students of Chittagong, the second largest, often names as an industrial hub and the port city of Bangladesh. Chittagong is the abode to people from all the nooks of the country with mix of demographic profiles representative of the country. Moreover, Chittagong is the coastal city, and it is exposed to CC associated disasters i.e. sea level rise, cyclone, tidal surge, heavy rain, etc. (Karim

and Mimura, 2008).

The age range of the students was between 10 to 16 years. Stratified sampling method was used for selecting the students, and a structured questionnaire was used for collecting data from them. The schools in the city were stratified into three categories based on their administrative structures viz. the government schools, semi- government/autonomous schools and private schools. Further, based on their overall performances in Junior School Certificate (JSC) (Schooling year 8) and Secondary School Certificate (SSC) (Schooling year 10) examinations, each group of schools were divided into three tiers - Tier-1 (top 33.3%), Tier-2 (middle 33.3%) and Tier-3 (bottom 33.3%). Then from each category and tier, we randomly selected two schools, and a total of 18 schools were selected for conducting the survey.

The total number of respondents was 270 (male and female respondents to be 143 and 127 respectively). Three (3) students have been selected from each grade of the specified classes based on their result so that they represent the top, medium and low merit levels and ensure the representation of study majors viz. science, commerce and arts. The selection of the students has been done by teachers at the respective schools according to our instructions.

2.2 Questionnaire survey

A structured questionnaire was prepared with several sections to conduct the survey. The first section was on the demographic details of the respondents where some basic questions viz. name, merit position, age, class etc., family details of the students i.e. educational background of both parents and their occupation, family income were inquired. We have divided the educational background of the parents into three sections - below or equal to Higher Secondary Certificate (HSC) (Schooling year 12), Undergraduate and Post-graduate. Occupations of the parents have been divided into five categories - Businessmen, Service holder, Academic, Housewife (in case of the mother) and Others. The monthly income level of the family have been divided into four sections viz., Below or equal to BDT 6,000 (lower) (USD 1 = BDT 77); BDT 6,000-15,000 (lower middle); BDT 15,000-35,000 (middle) and more than BDT 35,000 (higher). We also have asked about their religious belief to find whether there is any co-relation between religion and CAI. The experience from our reconnaissance survey gave us an indication on the level of difficulty that the respondents may face in understanding the CC issue. We started the questionnaire with very basic questions followed gradually by complicated ones. The questions included open-ended, multiple choice, and ranking questions.

The appropriateness of the open-ended questions e.g. major effects of CC, ways to combat such effects etc., have been checked afterwards to ensure the inclusion of only the right answers. Some international organizations such as IPCC, World Bank, ADB, USDA, WHO, UNDP, WMO, IUCN, etc. are exclusively working on different CC related development projects in Bangladesh. We considered that the knowledge about the relatedness of these organizations with CC related work is also indicative of their awareness.

2.3 Constructing the Climate Change Awareness Index (CAI)

After collection of the data, the responses have been ranked on a scale of -5 to +5 based on the merit of the answers. Next to ranking the options, we have given weights to the questions on the basis of their significance. Table 1 lists the weightage given to each question and the maximum score it can yield. The product of ranks and the relevant weightage of

the questions or propositions yielded the score for each question. The sum of scores from all the questions for each student gave the CC awareness score of the respective student. CAI for the respective students has been calculated by expressing each student's climate change awareness score as the percentage of the maximum possible total score for the questionnaire as shown in equation below.

$$CAI (\%) = \frac{\sum_{i=1}^n R_i \times W_i}{\sum_{i=1}^n R_m \times W_i} \times 100$$

In the equation, CAI is climate change awareness index for a particular respondent, n denotes the number of questions considered for the index construction, R_i is the rank obtained from the i -th question, R_m is the maximum rank that can be obtained from the i -th question and W_i is the weight of i -th question.

Table 1: Individual weight of questions and subsequent maximum scores

Questions	Weight	Max. Score
Have you heard of the term "climate change"/"global warming"/"Greenhouse Effect"?	10	50
How often do you talk to your friends, family, and partners about things that relates to climate change?	4	20
How would you describe your knowledge on the likely causes of climate change?	8	40
Can you name three major effects of climate change?	8	40
What do you think are the effects of climate change on Bangladesh?	8	40
What is the most effective way to combat climate change effects?	8	40
To what extent do you know about IPCC's activities on climate change?	5	25
To what extent do you know about World Bank's activities on climate change?	2	10
To what extent do you know about ADB's activities on climate change?	2	10
To what extent do you know about USDA's activities on climate change?	2	10
To what extent do you know about WHO's activities on climate change?	2	10
To what extent do you know about WMO's activities on climate change?	2	10
To what extent do you know about IUCN's activities on climate change?	2	10
To what extent do you know about UNDP's activities on climate change?	2	10
How much do you know about "climate fund" that our policymakers are concerned of and interested to?	4	20
Did you already involve yourself in any kind of climate change related activity?	5	25
Do you wish to involve yourself in any kind of climate change related activity in future?	5	25
Proposition (Level of Agreement)		
The impact of climate change will be more adverse for the developing world than the developed world	5	25
The developed countries around the world are responsible for the climate change effects	5	25
Human being is responsible for climate change	10	50
The effects of climate change are already being felt in Bangladesh	8	40
I have a responsibility to act against climate change	4	20
The government has a responsibility to undertake steps to reduce CO ₂ emissions	6	30
Total		595

In the end, we have investigated the relationship of CAI values with different demographic factors to see how the demographics of students are related to their CC awareness. We have used SPSS (v 21.0) for these analysis.

3. Results and Discussions

Our results showed apparent variation in the mean CAI scores between male and female students based on the tier of their school (Figure 1-above). The variation was significant ($P < 0.05$) for male students between Tier-1 and Tier-2 schools and female students between Tier-2 and Tier-3 schools. Surprisingly, based on the merit position in respective classes, the middle third male students showed significantly higher ($P < 0.05$) awareness than the top thirds, while for the female students, the awareness level in the middle third students was significantly lower ($P < 0.05$) than top thirds (Figure 1-below). This is an interesting observation which indicates an opportunity for further research. Such significant difference in CAI between Tier-1 and Tier-3 schools may have been caused by the diverged care and attention from the teachers and authorities.

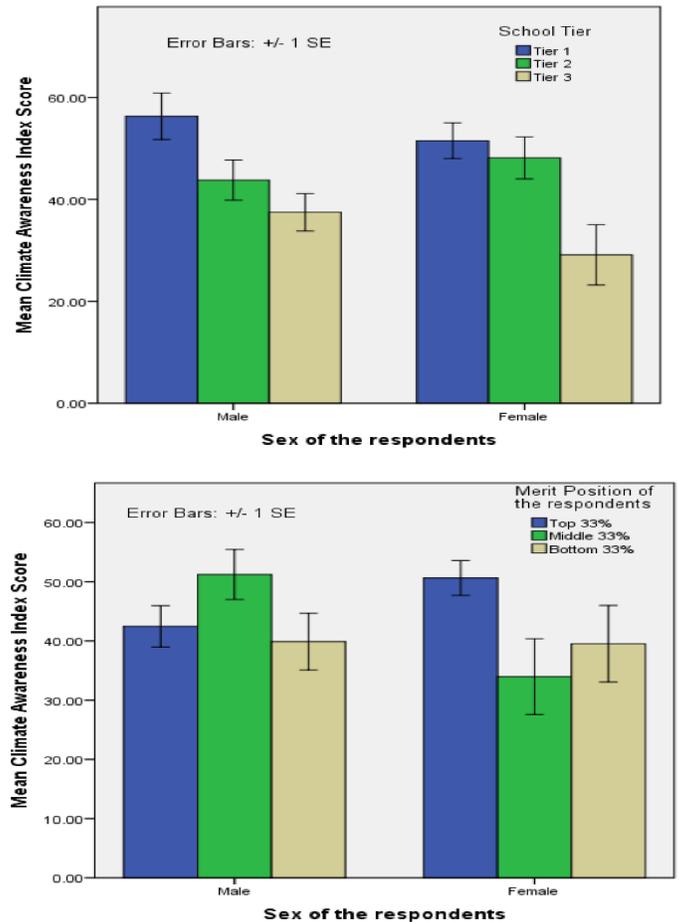


Figure 1: Mean CAI scores- in male and female students with respect to the school tiers (above) their merit position in the respective classes (below)

Looking closely, there are some top quality boys' schools that uplifted the score level of the male students. The lower score of female students from Tier-3 schools (Figure 1), situated mostly in the underdeveloped area of the city, may have been driven by their economic condition. In lower income families, daughters are bound to spend their time in contributing to their daily household activities like cooking, washing etc. rather than studying and attaining knowledge through different media. However, collectively the female students were found to be more knowledgeable about CC as they are more conscious about their study and current issues. The fact is consistent with the result drawn by

Erdogan et al. (2009) and Ozden (2008) in Turkey, Dijkstra & Goedhart (2011 and 2012) in EU countries, Yu et al. (2013) in China, McCright (2010) in USA, Gifford & Comeau (2011) in Canada. However, our results differed from the conclusion drawn by Ibidun and Gbadegesin (2005) for indigenous African community. Moreover, CAI showed dependence on students' merit and difference among male and female respondents due to varied access and exposure to the information sources on CC by different levels of schools in terms of merit uniformly.

3.1 Mean CAI of different types and tiers of schools

Among the three different types of schools, students of Tier-1 public schools showed significantly higher ($P < 0.05$) mean CAI in comparison with others (Figure 2 above). Tier-2 and Tier-3 school students had almost similar mean CAI irrespective of the types of schools. In case of semi government schools, the schools of Tier-1, to our surprise, showed lower mean CAI than the schools of Tier-2 while the Tier-3 schools students scored significantly lower ($P < 0.05$) mean CAI score as expected. In case of private schools, however, significant differences ($P < 0.05$) in mean CAI was observed between Tier-2 and Tier-3. Huge reduction in awareness level in the bottom thirds of these schools entailed a clear gap in the quality of education among such type of schools.

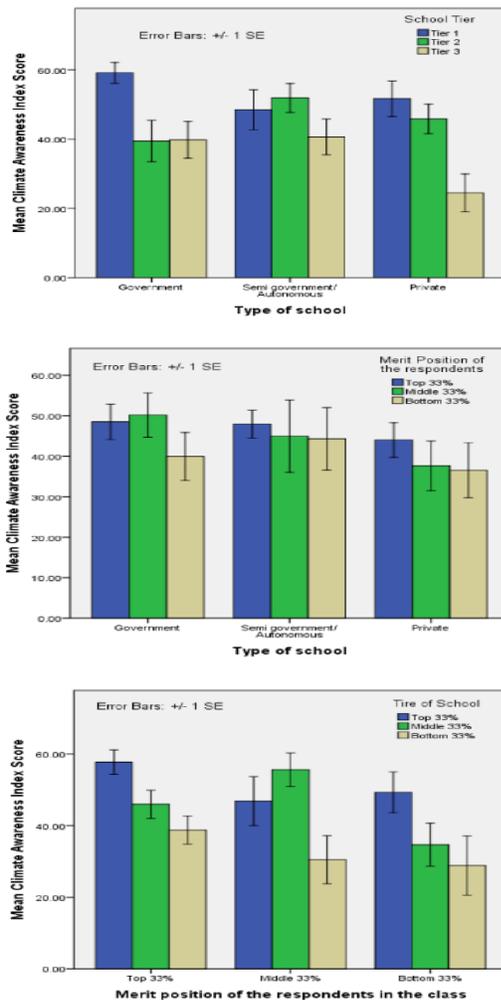


Figure 2: Mean CAI scores for types of schools with respect to their tiers (above) types of school with respect to the students' merit position (middle) student's merit position with respect to the school tiers (below).

When we compared different types of schools on the basis of merit position of students, we could not find any abnormal results and we confirmed the gradual reduction in mean CAI value from top to bottom third students except for the government schools (Figure 2-middle). It was clearly seen that the students of the private schools scored the lowest in terms of mean CAI among all the categories. A clear trend in CAI is observed when we tried to depict the relationship between tiers of the schools with students' individual merit positions in the classes (Figure 2-below). Irrespective of the students' merit position, the CAI scores of top third schools were found significantly higher ($P < 0.05$) than the bottom third schools. The top third students of the top third schools scored the highest, and the bottom third students of the bottom third schools scored the lowest in the awareness index.

According to Bangladesh standard, top third government schools comprised some good quality students as they intake students through a rigorous admission test which explains the highest CAI scores from those schools. Again, in our study we saw that the private schools exhibited the lowest CAI among all the categories. In fact, the private schools are the costliest options of secondary level in this country providing quality education to fewer students than the government or semi government schools. They have a diverse set of extra curricula that is designed for particular communities in the city or suburban area. Therefore, it is expected that the students from private schools get more intensive care from the school authorities and teachers. Knowledge level of the students of some private schools run by charity in a less developed area within the city could have affected the overall scores badly. Further investigation in this regard is needed to find out the reasons.

3.2 Students' CAI for different grades and study majors

The grade of the students is one of the most important factors influencing the knowledge level of the students. The maturity level of the students to understand and grasp the depth of the content in their text about CC increases with their grades. As we can see from Figure 3a, the respondents attained increasing awareness as we proceeded from lower to higher grades. It indicates the efficacy of curriculum in terms of gradual inclusion of advanced contents on CC into the curricula with grades. However, the maximum mean CAI for grades IX and X students was around 55% that meant that the content is less than adequate on CC in the high school curriculum of Bangladesh. The use of the same text books in grades IX and X explained the unchanged CAI between these two grades. However, for Sixth to Tenth grade students, interestingly, the female respondents are seen to know more about CC in comparison with their male counterparts. Interestingly, significant improvement in CAI are seen only between sixth and seventh grade, which is indicative of lower efficacy of the curriculum in this context. The CAI shows irregular values among different study majors which starts from ninth grade and includes three majors. Science students were expected to know more about CC due to the possible productive climatic content within their text books i.e. secondary Physics and Biology. Expectedly, the mean CAI of the science students was significantly higher ($P < 0.05$) than the other two majors (Figure 3-above). Breakdown of the scores within male and female students (Figure 3-middle) produced almost similar CAI scores between science and commerce male students. Erdogan et al. (2009) on Turkish schools and Chu et al. (2006) on Korean school, Dijkstra and Goedhart (2012) on European schools, and Liarakou et al. (2011) on Greek school found similar results. The significant ($P < 0.05$) difference in CAI was observed between male and female students of commerce major which demands further study.

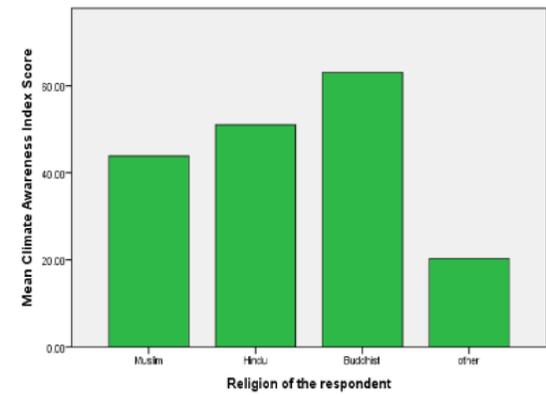
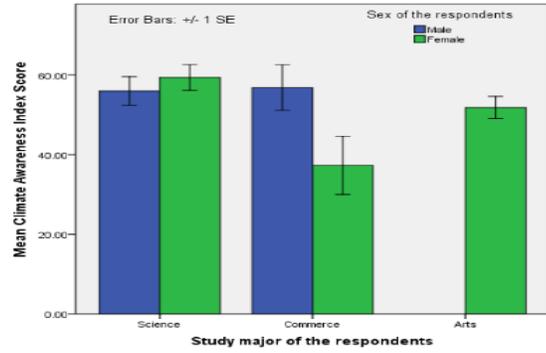
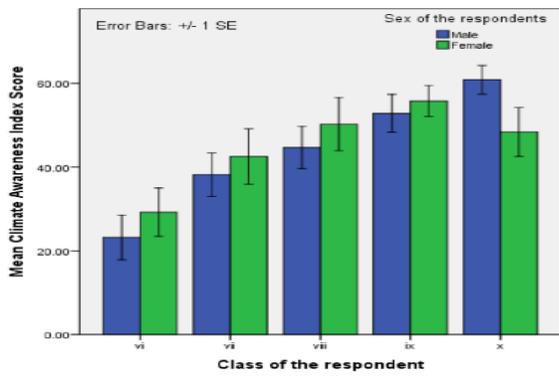


Figure 3: CAI scores of students focusing their - grades / class with respect to their gender (above) study majors with respect to their gender (middle) religion (below)

3.3 Parental education and CAI score

Families, particularly parents are one of the primary institutions to disseminate knowledge and awareness among their offspring. Well-educated and conscious parents are expected to be more aware about CC related issues (Pe'er et al., 2007). In our study we found a declining trend in the level of knowledge with the merit position of the schools in the board which undermined the influence of the fathers' educational background. Children with top third schools have the highest level of knowledge on CC (Figure 4). However, mothers' education level appears to be an important demographic feature which significantly impacts the awareness level. Knowledge level of children of post-graduate mothers further consolidated the claim (Figure 4b). Significant differences in the perception between the top and bottom level schools were seen for fathers and mothers without any education.

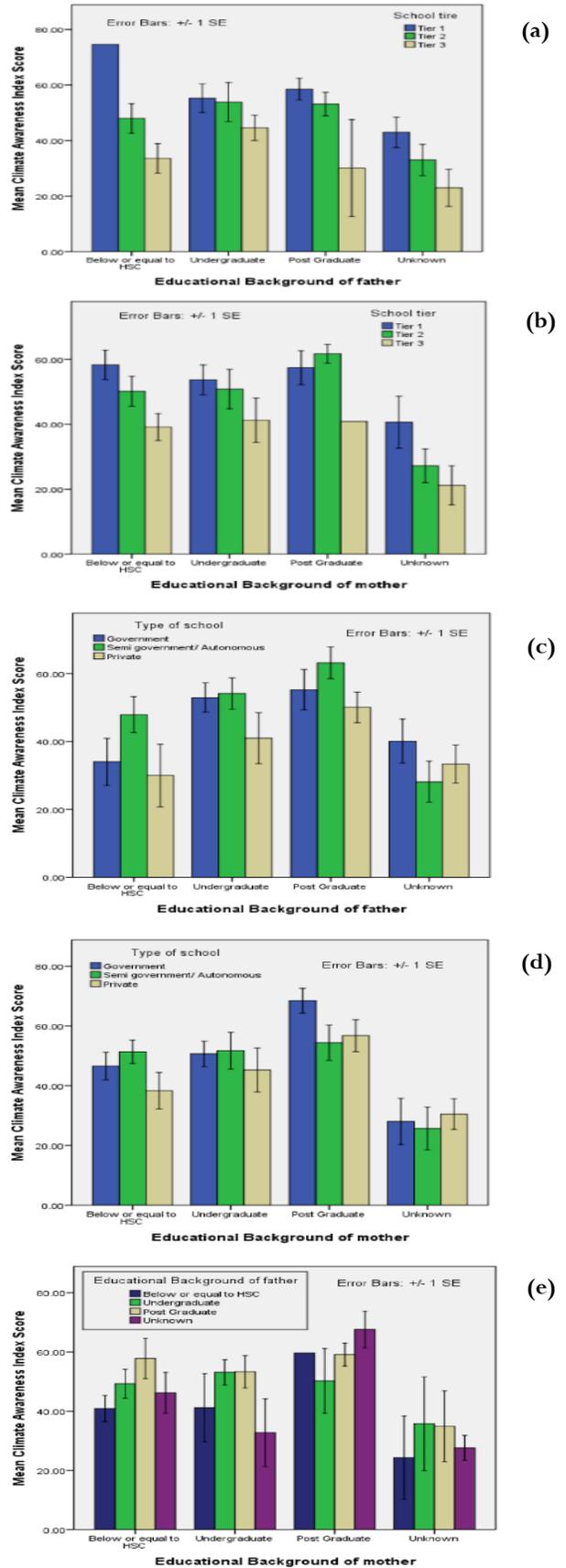


Figure 4. Mean CAI scores of the students focusing their parent's* educational background with respect to: (a)&(b) the tiers of schools; (c)&(d) the type of schools; and (e) each other [*&(a) &(c) focus on fathers' educational background; (b) &(d) focus on mothers' educational background].

CAI was higher among students having both parents with post-graduate education. The CAI score increases clearly for government and semi-government/ autonomous schools with the higher educational level of father (Figure 4c) and mother (Figure 4d). However, students from semi government/autonomous schools scored the highest with post-graduate fathers while students from government schools scored the highest with post-graduate mothers. Looking into the influence of overall parental education on children's perception, Figure 4e shows that in almost every cases where any of the parents are of below or equal to the HSC, the children know comparatively less than the children of parents with undergraduate or postgraduate degree. Hence, we conclude that parent's education influence the CC awareness level.

3.4 Parental occupation and family income Vs. CAI score

Children of service holder mothers, and businessman or service holder fathers exhibited higher CAI (Figure 5a). CAI for the students with housewife mother was consistently lower irrespective of their fathers' occupations. CAI value significantly ($P < 0.05$) differed for service holders and academic mothers. The children of academic parents were more conscious about CC. We could see that the children of working mothers, particularly as service holder or academic, know significantly more compared to the children of housewife mothers.

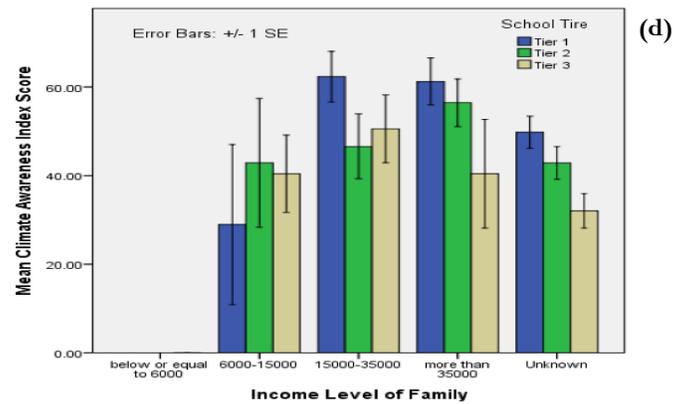
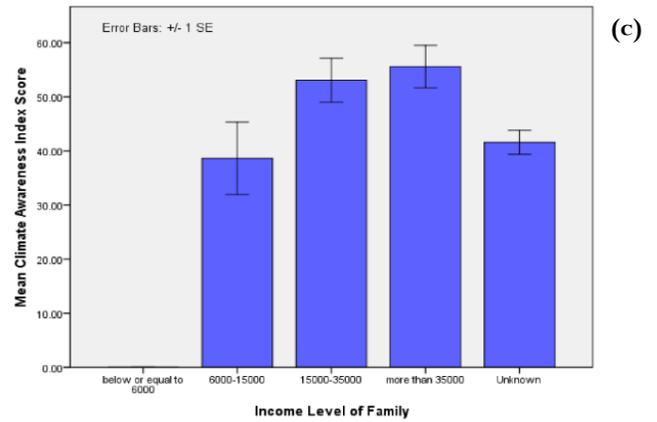
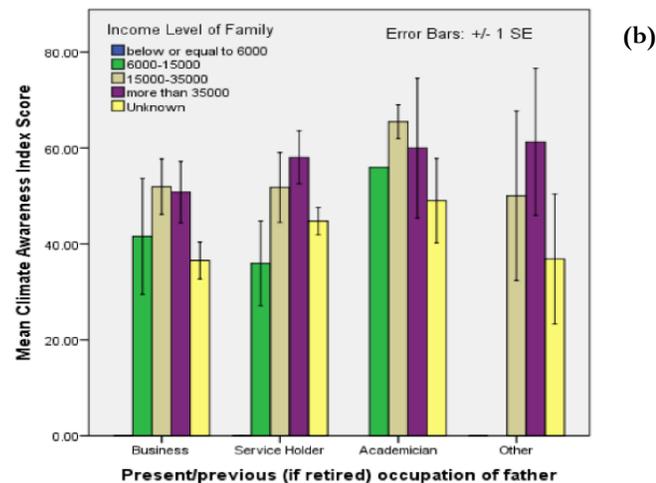
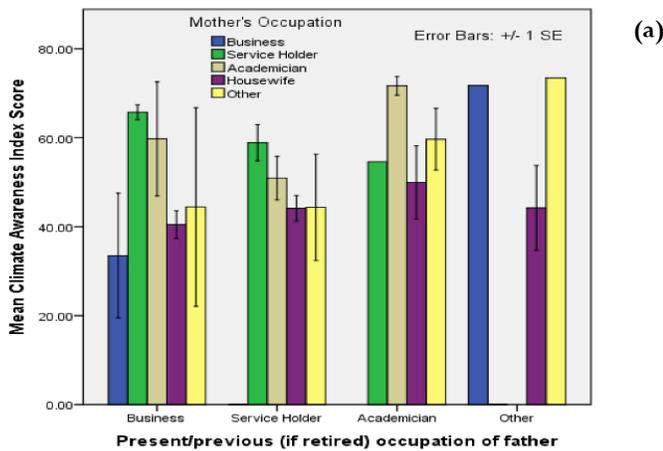


Figure 5: Mean CAI score of students focusing: (a) their fathers' occupation with respect to their mothers' (b) fathers' occupation with respect to the family income level; (c) the income level of the family (d) family income level with respect to the school tiers.

Mother's educational background seemed to be more influential to the knowledge of their children on CC than that of the father's. In Bangladesh, only 9.8% women are economically active against 66.0% men (BBS, 2012). Most of the mothers work as a housewife after their marriage. Interestingly, the perceptions of children with housewife mother were found to be consistently lower. Ozden (2008) found the similar result for Turkey. The matter needs further investigation. The mean CAI score for the children with academic parents was the highest since such parents are expected to discuss this kind of burning issue with their children.

The children from families with below or equal to BDT 6,000 income group were unable to score in the CAI scale. For any occupation of father, students of lower-middle income family (monthly income 6,000-15,000) acquired a lower perception score (Figure 5b). In this study, the students with fathers whose income levels are within the range of BDT 15,000 - 35,000 and academic by profession are seen to score the highest in the CAI scale followed by students with academic father with income more than BDT 35,000. Collectively, the CAI index score for children of parents with the income level of BDT 6,000-15,000 are significantly lower than that of the children of parents with income more than BDT 15,000 (Figure 5c).

Figure 5d showed the CAI of students depends on their parent's income. It was interesting to see that, for family income below or equal to BDT 6000, the students were found to know nothing about CC. Alike the

previous case, the bottom third students in the classes whose families fell within the lower middle income group (income range BDT 6,000-15,000), knew significantly less about CC compared to the others. This score, individually, responsible for the lower mean of CAI value representing the lower-middle income group.

Occupation and income of the parents also influence the children's perception of CC. In this study, lower income family (income below or equal to BDT 6,000) failed to score in CAI scale. In those families, students may need to think about economic contribution to the family. Again, parents cannot pay much attention to their children. These might be the possible reasons behind the minimal score by lower income family. On the contrary, upon economic solvency, parents can afford to provide good quality schooling, create a better learning environment at home and adopt technologies e.g. different reference books, desktop or laptop computer with internet facilities, DVDs, etc. to teach their children which enable them to learn more about CC related issues which is evident in case of middle and higher middle income families. The result shows consistency with the outcome shown by Ozden (2008) where rich students have more positive attitude towards environmental issues than poor and average ones. Therefore, lower middle income group needs to be addressed properly while designing a program to teach them about CC as they scored significantly lower than the middle and higher income group. The abrupt downfall of bottom third students of lower middle income group needs further research to explain.

3.5 CAI and religion

Diversity in traditional, religious and spiritual approaches and various philosophical directions lead variation in views, motivations and attitudes towards environmental protection (Cooper, 1998). For some religious group preservation of nature comes first (Schreiner, 2005). Figure-3c compared the CAI among the students of two major religions. About 89.5% of Bangladeshi people are Muslims followed by 8.5% Hindus (BBS, 2012). Our survey population also resembles the religion of the population of Bangladesh where 88.15% respondents were Muslims and 10.37% of the respondents were Hindus. Hindu students, as we could observe, showed higher mean CAI than their Muslim peers. Buddhists comprised insignificant percent of the respondents and therefore, though their awareness level seemed to be the highest, we opted not to comment on this observation.

The Hindus, being minority population in terms of percentage, face more challenges in the local and national level competitions and thus they tend to be more aware of their studies and surroundings. Several studies (Flynn, et al., 1994; Kellstedt, 20008; Bord et al, 1998) in the USA showed that racial minorities are more fearful of the risks of CC. They tend to know more about the CC issue as they are disproportionately exposed to climatic hazards (Mohai and Bryant, 1998). Our findings further consolidate previous findings. However, only this study is not enough to draw a conclusion about the higher awareness level of Hindus in the environmental education sector. Further in-depth research is needed in this regard.

4. Conclusion

Knowledge of CC may play a significant role in shaping the pro-environment attitudes of the school students and may empower them combatting its adverse effect on the region and the country. Although CC has already been included as a topic into the high school curricula in the recent past in Bangladesh, the quality of the instruction is varied and unknown. We interviewed junior secondary and secondary level

students from a number of schools in Chittagong City as a representative sample of secondary school students for the whole country and studied their level of knowledge along with the influence of socio-demographic conditions on their perception of CC. A weight based Climate Change Awareness index (CAI) has been constructed as an indicator of the level of awareness of a student in CC related issues. Later, we have investigated the bearings of different demographic factors on the CAI values of the students. The survey results indicated that the socio-economic variables including the quality and type of schools; genders; religion; grade, major and merit position of the students; mother's education and occupation; family income, etc. act as influential factors of students' outlook on CC and related issues. Even with the widespread media coverage of the issues, students lack in proper and decent interpretation of global and local CC. The present level of misconception and varied idea demands prodigious care and specially designed program focusing the students from family, school, society and nation. The study recommends that the contents on CC in the curricula should be revised by including contents that are decent, recent and interestingly presented. This research identified the probable target groups who can get addressed based on our results. A need for segmented, targeted communication approach for the youngsters wherein media and message schemes are involved are suggested. Bangladesh is a small country with relatively uniform demographic distribution having similar curricula and same textbook for all high school students who face the same public exams. Therefore, we can reasonably consider our findings to be applicable for all high school level students in the country. The socio-economic variables used in this study were selected based on extensive literature review and data availability; however, more socio-economic variables could be included in this research but it could complicate the findings. Nonetheless, the outcome of the study may serve as a baseline in the measurement of the level of awareness in order to compare the efficacy of the current curriculum and future revisions to it. Also our results will assist the development of a more effective strategy for information dissemination to improve the perception level of the high school students. It is expected that this study will encourage further researches on the perception level of students on CC.

Acknowledgement: Authors would like to thank Dr. Mohammad Mosharraf Hossain (Associate Professor, Institute of Forestry and Environmental Science, University of Chittagong, Bangladesh) for his invaluable time in this research project. This study would not have been possible without the assistance and support of him.

References

- Ali, A. (1999). Climate change impacts and adaptation assessment in Bangladesh. *Climatic Research*, 12, 109-116.
- Ayers, J. M., Huq, S., Faisal, A. M., Hussain, S. T. (2014). Mainstreaming climate change adaptation into development: a case study of Bangladesh. *Wiley Interdisciplinary Reviews: Climate Change*, 5, 37-51.
- Bangay, C. & Blum, N. (2010). Education Responses to Climate Change and Quality: Two Parts of the Same Agenda? *International Journal of Educational Development*, 30(4), 335-450.
- BBS (2012). Bangladesh Population and Housing Census 2011. (Bangladesh Bureau of Statistics, The Government of People's Republic of Bangladesh).
- Berger, I. E. (1997). The demographics of recycling and the structure of environmental behaviour. *Environment & Behaviour*, 29, 515-531.
- Bohle, H. G., Downing, T. E., Watts, M. J. (1994). Climate change and social vulnerability: Toward a sociology and geography of food insecurity. *Global Environmental Change*, 4, 37-48.

- Bord, R. J., Fisher, A., O'connor, R. E. (1998). Public perceptions of global warming: United States and international perspectives. *Climate Research*, 11, 75-84.
- Boyes, E., Chuckran, D., Stanisstreet, M. (1993). How do high school students perceive global climatic change: What are its manifestations? What are its origins? What corrective action can be taken? *Journal of Science Education & Technology*, 2, 541-557.
- Boyes, E., Stanisstreet, M. (1992). Students' perceptions of global warming. *International Journal of Environmental Studies*, 42, 287-300.
- Carter, R. M. (2007). The myth of dangerous human-caused climate change. The Australasian Institute of Mining and Metallurgy New Leaders' Conference, Brisbane, QLD, 2 – 3 May.
- Chivers, D. (2012). *Climate change denial (Essential Guide)*, New Internationalist Publications Pvt. Ltd., Adelaide, South Australia.
- Chu, H. E., Shin, D. H., Lee, M. N., Woollorton, S., Marinova, D. (2006). *Korean Students' Environmental Literacy and Variables Affecting Environmental Literacy. In: Sharing Wisdom for Our Future: Environmental Education in Action*. Proceedings of the 2006 Conference of the Australian Association for Environmental Education. Eisler, AD, 2006.
- Cooper, D. E. (1998). *Spirit of the environment: Religion, value and environmental concern*, Routledge, London.
- Dijkstra, E.M. & Goedhart, M.J. (2011). Evaluation of authentic science projects on climate change in secondary schools. A focus on gender differences. *Research in Science and Technological Education*, 29(2), 131–46.
- Dijkstra, E.M., Goedhart, M.J. (2012). Development and validation of the ACSI: measuring students' science attitudes, pro-environmental behaviour, climate change attitudes and knowledge. *Environmental Education Research*, 18(6), 733–749.
- Erdogan, M., Marcinkowski, T., Ok, A. (2009). Content analysis of selected features of K-8 environmental education research studies in Turkey, 1997–2007. *Environmental Education Research*, 15, 525-548.
- Flynn, J., Slovic, P., Mertz, C. K. (1994). Gender, race, and perception of environmental health risks. *Risk analysis*, 14, 1101-1108.
- Giddens, A. (2009). *The politics of climate change*, Polity Press, Cambridge, UK.
- Gifford, R. & Comeau, L. A. (2011). Message framing influences perceived climate change competence, engagement and behavioural intentions. *Global Environmental Change*, 21, 1301- 1307.
- Ibidun, O. A. & Gbadegesin, A. (2005). Analysis of the public perception of climate change issues in an indigenous African city. *International Journal of Environmental Studies*, 62, 115-124.
- IPCC (2013). *Summary for Policymakers*. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F. et al. (Eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC (2007), *Summary for Policymakers*. In: Solomon, S. et al. (Eds.) Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Karim, M. F., & Mimura, N. (2008). Impacts of climate change and sea-level rise on cyclonic storm surge floods in Bangladesh. *Global Environmental Change*, 18(3), 490-500.
- Kellstedt, P. M., Zahran, S., Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis*, 28, 113-126.
- Kılınç, A., Boyes, E., Staniss, M.T. (2011). Turkish school students and global warming: beliefs and willingness to act. *Eurasia Journal of Mathematics, Science & Technology Education*, 7, 121-134.
- Kılınç, A., Stanisstreet, M., & Boyes, E. (2008). Turkish students' ideas about global warming. *International Journal of Environmental & Science Education*, 3(2), 89-98.
- Kreft, S., Eckstein, D. (2014). *Global Climate Risk Index 2013: Who Suffers Most From Extreme Weather Events? Weather-Related Loss Events In 2012 And 1993 To 2012*. Germanwatch e.V. <http://www.germanwatch.org/en/crri>. Retrieved on 25 January 2014.
- Kuhlemeier, H., Bergh, H. V. D., Lagerweij, N. (1999). Environmental knowledge, attitudes, and behaviour in Dutch secondary education. *The Journal of Environmental Education*, 30 (2), 4-14.
- Liarakou, G., Athanasiadis, I., Gavrilakis, C. (2011). What Greek secondary school students believe about climate change? *International Journal of Environmental & Science Education*, 6 (1), 79-98.
- Malandraki, G., Boyes, E., Stanisstreet, M. (2011). Global warming: Greek students' belief in the usefulness of pro-environmental actions and their intention to take action. *International Journal of Environmental Studies*, 68, 947-963.
- Mccright, A. M. (2010). The effects of gender on climate change knowledge and concern in the American public. *Population & Environment*, 32, 66-87.
- McMillan, E. E., Wright, T., Beazley, K. (2004). Impact of a university-level environmental studies class on students' values. *The Journal of Environmental Education*, 35 (3), 19-27.
- Mohai, P. & Bryant, B. (1998). Is there a "race" effect on concern for environmental quality? *Public Opinion Quarterly*, 62(4), 475-505.
- O'connor, R. E., Bord, R. J., Fisher, A. (1999). Risk perceptions, general environmental beliefs, and willingness to address climate change. *Risk analysis*, 19, 461-471.
- Ozden, M. (2008). Environmental Awareness and Attitudes of Student Teachers: An Empirical Research. *International Research in Geographical and Environmental Education*, 17(1), 40-55.
- Pe'er, S., Goldman, D., Yavetz., B. (2007). Environmental literacy in teacher training: Attitudes, knowledge, and environmental behaviour of beginning students. *Journal of Environmental Education*, 39(1), 45–59.
- Pekel, F. O., Özay, E. (2005). Turkish high school students' perceptions of ozone layer depletion. *Applied Environmental Education & Communication*, 4, 115-123.
- Reynolds, T.W., Borstrom, A., Read, D., Morgan, M. G. (2010). Now What Do People Know About Global Climate Change? Survey Studies of Educated Laypeople. *Risk Analysis*, 30 (10), 1520–1538.
- Sampei, Y. & Aoyagi-usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, 19, 203-212.
- Schlesinger, W. H. (2004). Environmental education for a sustainable future. *Applied Environmental Education & Communication*, 3, 75-77.
- Schreiner, C., Henriksen, E. K., Hansen, P. J. K. (2005). Climate education: Empowering today's youth to meet tomorrow's challenges. *Studies in Science Education*, 41(1), 3-49.

Shepardson, D. P., Choi, S., Niyogim D., Charusombat, U. (2011). Seventh grade students' mental models of the greenhouse effect. *Environmental Education Research*, 17, 1-17.

Stern, Nicholas (Eds.) (2007). *The economics of climate change: the Stern review*. Cambridge University press.

U.S. Census Bureau (2013). Mid-year Population by Youth Age Groups and Sex. U.S. Department of Commerce. <http://www.census.gov/>. Retrieved on Accessed 20 July 2013.

UNCED (1992). Agenda 21. United Nations Conference on Environment & Development, Rio de Janeiro, Brazil.

Weber, C. L. & Peters, G. P. (2009). Climate change policy and international trade: Policy considerations in the US. *Energy Policy*, 37, 432–440.

Yu, H., Wang, B., Zhang, Y., Wang, S., Wei, Y. (2013). Public perception of climate change in China: results from the questionnaire survey. *Natural Hazards*, 69 (1), 459- 472.