

## Comparative Study on Climate Change Knowledge Between Government and Private Secondary School students of Almora, Uttarakhand ( India)

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**ABSTRACT:** The present study was conducted among the Government and Private students of secondary school for checking the climate change knowledge. A total of 90 students were selected from six schools for both open and close ended questions consisted of statements regarding causes, impact and mitigation of climate change. It was depicted that there was not much significant difference between them regarding the knowledge of climate change. In addition to this education community was emerged as a primary source of information followed by media. Therefore, it was clear that not only education community, media is also plays an important role in propagating the knowledge of climate change. Study of students' knowledge about the global warming can help policy makers to make holistic approach in mitigating of this critical environmental problem.

**Key Words:** Climate Change, Students knowledge, Kumaun Himalaya

**Introduction:** Global warming has become one of the major environmental issue facing the world today (Sahet *et al.*, 2015), due to global warming, climate is changing rapidly with adverse effects including excessive and uneven rainfall, floods, longer draughts, landslides and cyclones which impacts on forests, agriculture, environment and human health (Baulet *et al.*, 2013). IPCC's Fourth Assessment Report (IPCC 2007a; 2007b) concludes that there is a more than 90% probability that the observed warming since the 1950s is due to emission of green house gases from human activity. Temperature projections for the 21<sup>st</sup> century suggest a significant acceleration of warming over that was observed in the 20<sup>th</sup> century (Ruosteenoja *et al.*, 2003). In Asia, it is very likely that all areas will warm as during this century. Based on regional climate models, it is predicted that the temperature in sub-continent will rise between 3.5 and 5.5°C by 2100 (Kumaret al., 2006). Global warming is the major issue of 21<sup>st</sup> century at this stage its effects cannot be removed, only contained (Skamp *et al.*, 2000). Himalaya like many other places on earth are experiencing signs of rapid climate change, weather has been unpredictable and erratic (Chandhary *et al.*, 2011). Climate change is a real threat therefore there is a need of publicity to inform public about causes, impacts and mitigation of climate change problem (Ochieng and Koske, 2013). Education is an important to change behavior of individuals to reduce the green house gases emission, In fact, widely dissemination about environmental

degradation impacts; vulnerability etc. has already increased the interest among the students (Pekel and Ozay, 2005). Moreover, the students who the future voting citizens should be motivated towards an environmental friendly life style by inculcating the informed awareness so that they can influence adoption of better climate change policy by choosing pro-environment leadership (Rehman *et al.* 2014).

### Materials and Methods:

The study area is located in the town area of Almora district, Kumaun region of Central Himalaya. It lies between 29<sup>o</sup>30'N to 30<sup>o</sup>20'N latitudes and 79<sup>o</sup>20'E to 80<sup>o</sup>20'E longitudes. The study area has an average elevation of 1651m. The temperature ranged between 16<sup>o</sup>C to 24<sup>o</sup>C and the mean annual rainfall was 104cm.

A questionnaire survey was carried out for the checking of global warming knowledge among the private and Government secondary school students. A total of 90 students from six secondary schools were selected including 45 from each private and government. the questionnaire was designed on the basis of open and close ended questions. Random sampling technique was applied among the school students for the gathering of global warming knowledge. The questionnaire was consisted of statements (table-1.1) about the causes of global warming, impact and solution of green house effect, etc. The answers of question were gathered in the form of agree, disagree and also do

not know along with demographic information such as name, gender, age and class. They were likewise asked to check off the types of resources (e.g. school, TV, Newspapers etc.) Besides these other open ended questions was responsibility of mitigation of climate change and their regular activities to reduce global warming/climate change. All the statements both true and false were drawn

from literature and were scientifically proven facts. After gathering the complete information, the questionnaires were summarized and analyzed and then report was documented.

### Results

The results were presented in three parts regarding causes, impacts and solution of global warming.

**Table 1. Students' ideas about the greenhouse effect/ global warming**

Statements	Cat*	T/F	Agree %		Disagree %		Don't know %	
			Govt.	Pvt	Govt	Private	Govt.	Pvt.
1. Increase in concentration of green house gases leads to global warming.	Cause	True	76	80	4	10	10	-----
2. Carbon dioxide concentration increases in atmosphere because of fossil fuel combustion	Cause	True	54	66	20	26	10	4
3. Human activity is generally responsible for global warming.	Cause	True	76	66	8	24	6	----
4. Increasing deforestation, industries and transport are main causes of climate change.	Cause	True	80	60	6	20	4	10
5. Leaving the lights on in my home adds to green house effect/ global warming.	Cause	True	38	40	42	40	10	10
6. Use of organic fertilizers does not add to climate change.	Cause	False	52	44	20	34	18	12
7. The use of solar energy increases the green house effect.	Cause	False	38	22	40	48	12	20
8. Increasing temperature nowadays is due to green house effect/ global warming.	Impact	True	62	52	8	28	20	110
9. With the passage of time global temperature will rise.	Impact	False	60	62	6	14	24	14
10. Global warming/ climate change is not a real problem	impact	false	30	32	40	56	20	2
11. Delay of monsoons is due to global warming.	Impact	True	70	52	10	28	10	10
12. Recent floods in our country are not due to global warming/ climate change.	Impact	False	50	30	22	50	18	10
13. During last few years, the ice cover of Indian Himalaya region has increased.	Impact	False	42	26	40	50	8	14
14. Infectious disease will spread faster because of global warming.	Impact	True	42	44	32	28	16	18
15. The use of public transport will reduce the emission of green house gases.	Solution	True	64	44	20	30	6	16
16. Plantation of trees will not reduce global warming.	Solution	False	36	34	46	40	8	16

Statements	Cat*	T/F	Agree %		Disagree %		Don't know %	
			Govt.	Pvt	Govt	Private	Govt.	Pvt.
17. Climate change awareness programs will help people/students to understand the impacts of global warming and its causes.	Solution	True	80	75	4	10	6	5

**Abbreviations:** Cat\* = category, Govt.= Government Secondary school students , Pvt.= Private secondary school student.

#### Causes:

About, 60% (54%- 66%) students knew that concentration of carbon dioxide increasing in atmosphere due to fossil fuel combustion since they agreed with statement 2. Moreover, 78% (76%-80%) seemed to know that the increases in concentration of green house gases leads to global warming as they were agreed with the statement 1. It was evident that in both cases there has been a visible improvement in the accuracy of students' ideas between students of govt. and private secondary school students". About 71% (76%-66%) are agreed that global warming is generally due to human activities.

44 % (40% -48%) of students believed that the use of solar energy does not increase the greenhouse effect (statement 7). Regarding use of organic fertilizers (statement 6) in particular, the about 48% (52%- 44%) students wrongly considered that it does not contribute to the greenhouse effect, although use of organic fertilizers also adds to global warming.. It is rather surprising that only 39% (38%- 40%) of students believed that leaving the lights on adds to green house effect. Meanwhile high percentage of students 70% (80% -60%) are agreed with the (statement 4; table-1.1).

#### Impacts:

Increasing temperature nowadays is due to global warming; only 57% (62% -52%) were agreed with the statement.61% (60%- 62%) truly believed that the average global temperature will increase with the passage of time (statement 9). Average 31% students are wrongly answered that climate change is not a real problem. About 61% (70-52%) believes that delay of monsoons is due to global warming. Ice cover of Indian Himalayan region has increased since last few years, about only 45% ( 40-50% ) are disagree with the statement..Moreover, 43% (42% - 44%) students believe that global warming will result spread of infectious diseases (table1.1).

#### Solution

About54 % (64%- 44%) students stated that using public transport will reduce the emission of green house gases, while in total 11% did not reply (statement15). Surprisingly 35% (36%-34%) students wrongly answered that plantation of tress will not reduce global warming. Climate change awareness programs can help to reduce global warming 77.5% (80%- 75%) are agreed with the statement (table 1.1).

**Table 1.2: Source of information regarding global warming / climate change student's responses to open ended questions**

Source	Govt. secondary school students (%)	Private secondary school students (%)	Aggregate %
School	86	80	83
Television	64	80	72
Newspaper	58	80	69
Radio	44	70	57
Family/ friend	26	78	52
Government agencies	18	54	36
Non-government agencies	16	10	13
Internet	2	20	11
Textbook	---	4	2

In response to the open ended question 'where you heard about global warming/ climate change' majority of students (83 %) stated that they heard about it in education sectors, therefore education sectors were the major source of information regarding global warming followed by the Television (72%) , New spaper (69%), radio57 % and family/friend 52%. Less or more other sources of information regarding global warming were government agencies, Non governmental agencies, text books and internet.

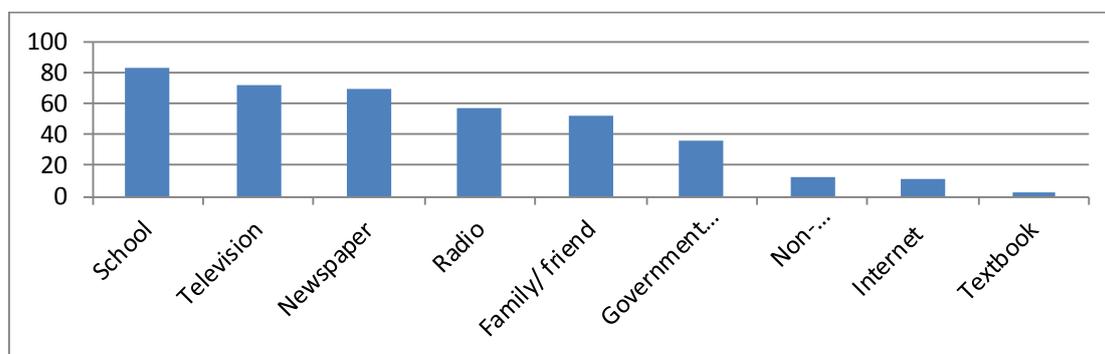


Fig1 – Graphical representation of the source of information through column

Table 3. Global warming /Climate change mitigation responsibility, a response provided to open ended question.

Global warming/ climate change mitigation bodies	% mentioning		
	Govt. S.S.Students	Private S.S.students	Aggregate
Government	22	16	19
Individuals	16	10	13
Both Govt. and individuals	62	74	68

Majority of students 68% (62-74%) responded that both government and individuals have responsibility to mitigate climate followed by government 19% (22-16%) and individuals 13 % (62-74%).

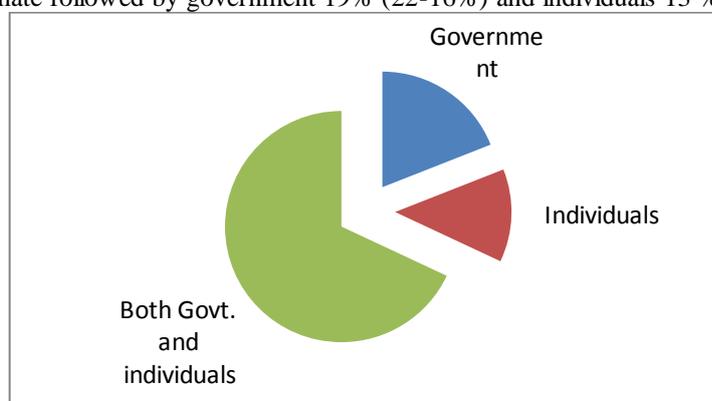
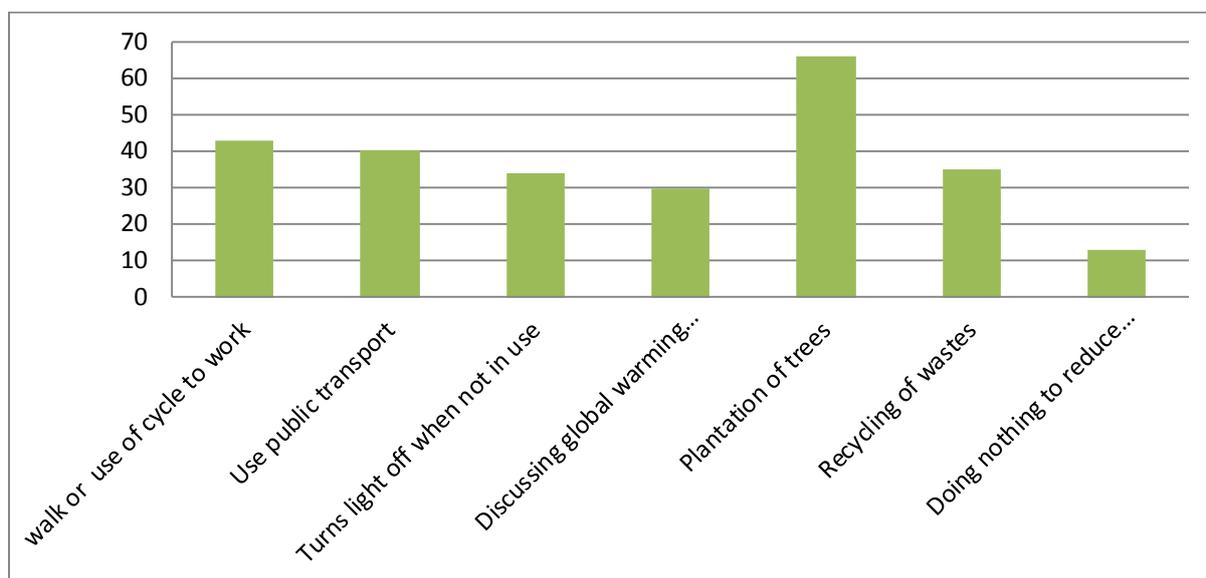


Fig 2- Graphical representation on climate change mitigation responsibility through pie chart.

Table 4.Regular actions students doing to reduce global warming, Responses were provided to open ended question

Actions	% mentioning		
	Govt.S.S.Students (%)	Private S.S.Students (%)	Aggregate (%)
walk or use of cycle to work	64	22	43
Use public transport	68	12	40
Turns light off when not in use	40	28	34
Discussing global warming knowledge with friends/classmates	40	20	30
Plantation of trees	72	60	66
Recycling of wastes	36	34	35
Doing nothing to reduce global warming	8	18	13

In response to the open ended question “What are you regularly doing to reduce global warming, most of the students answered that they plant trees and also walk or use cycle to work. A good score of students stated that the switch off use public transport and recycling of wastes. Small percentage of students replied that they are not doing anything to reduce global warming.



**Fig 4: Graphical representation on climate change mitigation responsibility by column.**

#### Discussion:

In the present study, among 90 participants of six secondary schools, 50% were selected from government schools and 50% were from private secondary schools. There was not much more significant difference of climate change knowledge between the students of government and private schools. Through result analysis it was cleared that in an average 59.76% including 59.47% and 60.06% students of government and private students respectively are aware about global warming.

Whereas an average 27.9% including 28.75% and 27.05% students of government and private secondary schools are unaware about global warming. Meanwhile 12.6% is the average percentage of students does not know about global warming.

Regarding the source of information the students seem to gain information primarily from education communities followed by television and newspaper, which is similar to the earlier study conducted among high school students by Sahet *et al.* (2015).

Regarding the mitigation of climate change responsibility, Majority of students replied that Climate change mitigation is a duty of both individuals and government. It was found that students are aware about their responsibility towards environmental problems.

It was interesting to hear that almost all students are doing some actions frequently to reduce the global warming. However small percentages of students have not started to do anything to reduce global warming.

#### Conclusion:

The findings of present study showed that there were not much more significant differences between the students of Government and private schools regarding climate change knowledge. The present study also reveals that though the majority of students were aware about global warming; but still global warming knowledge was not adequate among them. In order to inculcate the ideas of global warming in students, education community and media have to play an important role. It is suggested that awareness campaigns/programs regarding global warming should be organized to improve climate change awareness among students and their responsibilities towards mitigating the problem as they are future voter citizens.

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