

## Awareness and knowledge about global warming among the school students of south India

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**Abstract:** *Introduction:* Global warming means average increase in the earth's temperature and is considered as a major health issue of the 21<sup>st</sup> century. *Objectives:* To find out the awareness and knowledge about global warming among the school students. *Materials and Methods:* Self administered questionnaire was used to collect information from 400 randomly selected school children of three different medium. Statistical analyses were performed with the chi-square and Fisher's exact test. Ethical clearance, informed consent and assent were obtained. *Results:* More than three quarters (83.75%) of the participants stated cardiovascular and respiratory problem to be the major health issue due to global warming. Less than half (45.75%) participants ranked green house gases to be the major cause for global warming. Majority of the students (57.5%) were willing to walk or cycle instead of driving and only (12%) students were willing to plant trees for combating global warming. Male and female students exhibited significant difference in respect of their awareness and knowledge towards global warming ( $p < 0.05$ ). *Conclusion:* Periodic health education regarding global warming is still needed to increase awareness and knowledge among the school students.

**Keywords:** Global Warming, Awareness, Green House gases, Knowledge, School Students.

### Introduction

Global warming is a phenomenon of increase in the earth's temperature by making the earth a much warmer place to live in which has brought a major climatic changes across the world and in India. Global warming is considered as a major health issue of 21<sup>st</sup> century [1-2]. Green house gases such as water vapour, carbon dioxide, methane, etc. which exists in the atmosphere trap the rays of the sun and makes the earth temperature warmer. The concentration of green house gases has increased extensively since the industrial revolution [3].

According to Intergovernmental Panel on Climate Change (IPCC) report, global warming will have major impact on Asia in which India is at high risk among Asian countries. Unpredicted human activities are adding billions of tones of CO<sub>2</sub> to the atmosphere each year which is a major green house gas [4]. Climate change has important consequences for health such as re-emergence of malaria, vector borne diseases, food insecurity and malnutrition, heat stroke, water borne diseases, outbreak of diarrhoea and disasters such as tsunamis, floods etc [5-6].

Low level of awareness about global climate change in developing countries is one of the shattering problems for global warming mitigation. In India, the general population has very little knowledge about the burning issues of global warming. Hence the present study was conducted to find out the awareness and knowledge about global warming among the school students.

### Material and Methods

A cross-sectional study was conducted at Ramnagar Urban Health Center (UHC) which is a field practice area of J.N. Medical College, Belagavi, Karnataka. Duration of this study was 9 months from February 2014 to October 2014. Assuming 50% prevalence of good knowledge among the school students, the present study calculated the sample size by the formula  $n = 4pq/d^2$  ( $q=1-p$ ). Hence the sample size came to be 400.

Out of seven high schools in Ramnagar field practice area, 3 schools of different medium i.e. GA Kannada Medium, Mahila Vidyalay

English Medium and Mahila Vidyalay Marathi Medium high schools were selected by lottery method. Proportionate based systematic random sampling was applied to select the sample of 176, 93 and 131 from the GA Kannada Medium, Mahila Vidyalay English Medium and Mahila Vidyalay Marathi Medium high schools in order to acquire required sample of 400. Self administered questionnaire were used to collect information on demographic variables, awareness and knowledge of global warming.

All the students of 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> standard willing to participate were included and students who did not give written assent were excluded from the study. Written informed consent was obtained from the principals of the respected schools. Ethical approval was obtained from the Institutional Ethics Committee of the JNMC, KLE University. Frequency and percentages were calculated. Chi square test and wherever applicable Fisher's exact test was used to see association. Level of significance was set on value of p<0.05. The data was analyzed by SPSS software (Version 20.0).

### Results

Socio demographic findings of this study revealed that there were 218 (54.5%) boys and 182 (45.5%) girls. Majority of participants 198 (49.5%) were of age 14 years. Large proportion of participants 342 (85.5%) were Hindus. About 141 (35.25%) participants were from grade 9<sup>th</sup> followed by grade 8<sup>th</sup> 132 (33%) and grade 10<sup>th</sup> 127 (31.75%). More than a quarter 111 (27.75%) participants belonged to the socio-economic class II.

Cent percent participants in our study were aware about global warming. Majority of the study participants (71.25%) were aware that burning of coals and mines are responsible for producing green house gases whereas a very few (2.25%) felt that use of fossil fuels is responsible for this. More than three quarters female (87.92%) and half of the male (57.34%) knew that burning of coals and mines are liable for producing green house gases. The difference between male and female students in respect of their awareness about human practices responsible for producing green house gases was found to be statistically significant (Table 1).

Practices	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
Burning of coals and mines	125 (57.34)	160 (87.92)	285 (71.25)
Intensive farming	13 (5.96)	2 (1.09)	15 (3.75)
Use of fossil fuels	5 (2.3)	4 (2.19)	9 (2.25)
Don't know	75 (34.4)	16 (8.8)	91 (22.75)
<b>(Fisher's exact test) <math>\chi^2 = 50.533</math>, df= 3, p&lt;0.001*</b>			
*- Significant			

Health effects	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
Cardiovascular and respiratory problem	198 (90.83)	137 (75.27)	335 (83.75)
Death due to heat stroke	3 (1.37)	12 (6.59)	15 (3.75)
Malnutrition	0 (0)	16 (8.79)	16 (4)
Don't know	17 (7.8)	17 (9.35)	34 (8.5)
<b>(Fisher's exact test) <math>\chi^2 = 29.516</math>, df= 3, p&lt;0.001*</b>			
*- Significant			

Majority (90.83%) male and (75.27%) female considered cardiovascular and respiratory problem to be the major health effects due to global warming and a very few (8.79%) female were aware that global warming would cause malnutrition. None of the male was aware that global climate change can result in malnutrition and the difference was statistically significant (Table 2).

Nearly half of the participants (45.75%) stated that green house gases to be a major cause for global climate change while (20.75%) were not

aware about its causes. About (49.54%) male and (41.21%) female also opined that green house gases as a cause of climate change. A statistically significant difference was found between male and female students with respect to their awareness towards causes of global warming (Table 3).

Majority (57.5%) participants were willing to walk/cycle instead of driving and only (12%) of them were willing to plant trees for combating global warming (Table 4).

Causes	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
Green house gases	108 (49.54)	75 (41.21)	183 (45.75)
Burning vegetation	43 (19.73)	41 (22.53)	84 (21)
Holes in the ozone layer	18 (8.25)	32 (17.58)	50 (12.5)
Don't know	49 (22.48)	34 (18.68)	83 (20.75)
$\chi^2 = 9.466, df = 3, p < 0.024^*$			
*- Significant			

Behaviour <sup>#</sup>	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
Walk/Cycle instead of drive	133 (61)	97 (53.3)	230 (57.5)
Recycle	23 (10.55)	43 (23.62)	66 (16.5)
Buy energy efficient vehicles	24 (11)	16 (8.79)	40 (10)
Buy energy saving bulbs	17 (7.79)	24 (13.18)	41 (10.25)
Buy energy saving appliances	26 (11.92)	73 (40.1)	99 (24.75)
Planting trees	35 (16.05)	13 (7.14)	48 (12)
# - Multiple answers were given by the participants			

### Discussion

In the present study, among 400 participants (54.5%) were male students and (45.5%) were female students. Majority of the children (49.5%) were of the age 14 years. About (35.25%) participants were from class 9<sup>th</sup> followed by class 8<sup>th</sup> (33%) and class 10<sup>th</sup> (31.75%). Similar findings were seen in a study conducted on climate change in which (46.1%) were male and (53.9%) were female. Majority (33.2%) of children belonged to the age of 13 years. More than a quarter (35.2%) were from grade 8<sup>th</sup> followed by grade 7<sup>th</sup> (35%) and grade 9<sup>th</sup> (29.8%) [7].

Less than three quarters participants (71.25%) indicated that burning of coals and mines are responsible for producing green house gases while a very few (2.25%) felt that use of fossil fuels is responsible for this. There were more male in compared to female who don't know about the human practices responsible for producing green house gases. A study conducted on college students about global warming showed that (34.2%) students identified automobile emission as a major environmental hazard that threatens the planet and (19.5%) students considered burning of fossil fuel as a cause of environmental hazard [8].

Majority (83.75%) participants considered cardiovascular and respiratory problem to be the major health effects due to global warming and a very few (4%) participants were aware that global warming can cause malnutrition. Female were more familiar with the health effects of global warming in comparison to male. A study conducted by Ali Zameel et al. reported that (53%) of the college students believed global warming affects human health [8]. Another study conducted among medical interns showed (78%) of them stated malnutrition to be the health impacts due to climate change [9].

Less than half (45.75%) participants stated green house gases to be a major cause of global climate change and only (12.5%) felt that holes in ozone layers is also responsible. About (22.48%) male and (18.68%) female were unaware about the causes of global warming. Half of the subjects (50%) were aware that holes in the ozone layer to be the major cause of global warming [10]. Only (21%) student teachers believed green house effect causes global warming [11].

It is interesting to know that in our study, (57.5%) were willing to walk/cycle instead of driving followed by buy energy saving appliances (24.75%), recycling (16.5%), planting trees (12%), buy energy saving bulbs (10.25%) and buy energy efficient vehicles (10%) for combating global warming. Male were more aware than female that planting trees can reduce global warming. A study done by Ali Zameel et al. indicated that majority (48%) students were willing to use public transport to stop global

warming followed by careful use of water and electricity (45%), planting trees (39.5%), recycling (30%) and using energy efficient appliances (26.2%) [8]. In contrast to our study, (64%) students in north west of the UK thought that planting more trees would reduce global warming [12].

A statistically significant difference was observed between male and female students in respect to their awareness about human practices, causes and health effects of global warming. Similar finding has been revealed in a study conducted in Tamil Nadu [13]. While the study conducted by Hegde et al. found no relation between gender and level of awareness towards global warming [14].

### Conclusion

The present study revealed that awareness and knowledge of school students towards causes and health effects of global warming was inadequate. Planting more trees can be more effective in reducing global warming wasn't ranked by the majority of participants. Hence it is recommended that periodic health education programs regarding global warming are still needed to create awareness among the school students.

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