

Original Research Article

Knowledge on Climate Change and its Impact in Human Health among Health Sciences Students of Pokhara Valley, Nepal

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ABSTRACT

Background: Climate change is the biggest global health threat of the 21st century. Studies show that mountain regions like Nepal is more vulnerable to increased global warming as well as extreme changes in altitude over small distances.

Aim and Objective: The objective of this research study was to assess the knowledge of undergraduate students of different health science courses on climate change and its possible impact in human health.

Methodology: The descriptive cross-sectional study was carried out in January-February 2015 among 182 undergraduate students of different health science courses of Pokhara Valley, Nepal. Multistage proportionate sampling was done. Self administered semi structured questionnaire was used and analysis was carried using SPSS 16.0 version.

Results: All most all of the respondents had heard about climate change and school/college alone (64%) was the most repeated source of information followed by radio, television and newspaper according to the respondents. 61.6% of the respondent showed average level of knowledge and 29.3% showed good level of knowledge remaining being poor. Year of study showed significant relation with level of knowledge ($p < 0.01$). Similarly, school/college alone and mass media (television, radio, newspaper), both showed significant relation with level of knowledge ($p < 0.01$)

Conclusion: As the respondents were undergraduate students of health science, level of knowledge was quite unsatisfactory. Many of the students weren't aware climate change can have some effect even in their respective field of work. Hence they need to be prepared well as future health professionals to combat any consequences that may arise due to climate change.

Keywords: Climate change, Health, Consequences, Knowledge.

INTODUCATION

Climate change is the biggest global health threat of the 21st century. ⁽¹⁾ The World Health Organization's report on 2009 declared bottom line of any climate change strategies is protection of human health. ⁽²⁾ Weather-related natural disasters have more than tripled since the 1960s

according to report from different sources, globally. ⁽³⁾ Every year, these disasters result in over than 60,000 deaths, mainly in developing countries. In addition climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050; 38,000 due to heat exposure in elderly people,

48,000 due to diarrhea, 60,000 due to malaria, and 95,000 due to childhood under nutrition.⁽³⁾

About 97% of the climatologist claims that climate change is caused by human activities, particularly fossil fuel combustion and tropical deforestation.⁽⁴⁾ Long term measurements of tidal gauge and recent satellite data show that global sea level is rising, with best estimates of the global-average rise over the last two decades centered on 3.2 mm per year (0.12 inches per year).⁽⁵⁾ Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.⁽⁶⁾ The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere, where such assessment is possible.⁽⁶⁾

Although global warming may bring some localized benefits, such as fewer winter deaths in temperate climate and increased food production in certain areas, the overall health effect of a changing climate are likely to be overwhelmingly negative.⁽³⁾ Climate change will not introduce new causes of morbidity and mortality, but will change the factors such as disease vectors and environmental exposures that affect the occurrence of morbidity and premature mortality.⁽⁷⁾ Warmer temperature may lead to more frequent heat waves that may cause heat stroke and other heat related diseases.⁽⁸⁾ Increase in frequency of extreme weather events like flood, landslide, and drought possess direct as well as indirect threat to people and property. Warmer temperature could increase pollution of air and water and changes in temperature, precipitation pattern and extreme events could enhance the spread of some diseases.⁽⁸⁾ Climate change may also increases the incidence of mental and social disorders, including depression and anxiety, post traumatic stress, substance abuse, suicides and violence.⁽⁹⁾

Studies shows that mountain regions like Nepal is more vulnerable to increased global warming as well as extreme changes in altitude over small distances.⁽¹⁰⁾ According to Global circulation model (GCM) the temperature over Nepal will increase between 0.5°C and 2.0°C with multi-model mean of 1.4°C, by 2030.⁽¹¹⁾ Rising temperatures in the north of the country could increase the rate of glacial melt and increase the risk from GLOFs (Glacial Lake Outburst Floods).⁽¹²⁾ There is some evidence of introduction of infectious diseases in previously unaffected geographic areas such as spread of mosquito vector into highland regions such as Himalayan regions where the vector did not exist previously.⁽¹³⁾ Drought and many other climatic variations induced agricultural production imbalance are considered as contributing factor for the child growth defects in Nepal where about 48% of children are underweight, 50% are stunted and 10% are wasted.⁽¹⁴⁾ Reports suggest that crop production has reduced by 12.5% in 2005-06 on national basis.⁽¹⁵⁾

Objective of this study is to assess the knowledge on climate change and its possible impact on health among health science students of Pokhara valley, Nepal.

MATERIALS AND METHODS

This descriptive cross sectional study was carried out in three health science colleges namely, La Grandee International College, Novel Academy and Janapriya Multipurpose Campus within Pokhara Valley, Nepal. Undergraduate students studying Bachelors in Public Health were selected from La Grandee International College, students studying Microbiology were selected from Janapriya Multipurpose Campus and undergraduate students of Pharmacy and Nursing were selected from Novel Academy. Data was collected using a structured questionnaire with most close ended and few open ended question. Most

of the questions were multiple choice question and students were asked to fill as many as they know. Multistage proportionate sampling was employed and total number of sample was 182. All colleges with Allied Health courses, excluding Medical, courses within Pokhara Valley was sorted out and four streams were chosen i.e. Bachelors in Public Health, Bachelors in Pharmacology, B Sc. Nursing & B Sc. Microbiology.

Knowledge and perception are the dependent variable which was compared with independent variables. Knowledge scale was used in measuring knowledge, whereby each item was awarded a point then scores were added. Highest possible score was 27. Those who gained less than 40% of the highest possible score were categorized as one with poor level of knowledge, score between 40% and 60% were categorized as those having average level of knowledge whereas, those scoring more than 60% were categorized as one having good level of knowledge. Data analysis was carried out using SPSS version 16.0. Descriptive frequencies was used to simply gain the frequency and chi

square test to seek statistical significance if exist any.

Experts from Eternal University validated the tool of the study. Approval was taken from authorities of each College before conduction of survey. Informed consent was taken from each student.

RESULT

Of the 182 participants who participated in the study, majority (72.5%) were female. They ranged in age from 17 years to 34 years with mean (\pm SD) age of 20.81 (\pm 2.5) years. Majority of the respondents belonged to nuclear family whereas about 17% said they live in extended family. About 56 (31%) of the respondents said their parents are involved in some kind of business, whereas 17% said their parents were teacher and 17.1% said others as their parents' occupation. Number of students from B Sc. Nursing, BPH, Pharmacy and Microbiology was 27.5% (n=50), 26.9% (n=49), 23.6% (n=43) and 22% (n=40) respectively. Majority of student i.e. 36.3% (n=66) were students of first year. (**Table 1**)

Table 1: Socio Demographic Characteristics of respondents.

Characteristics		Frequency (N=182)	Percentage
Sex	Male	50	27.5%
	Female	132	72.5%
Age	<20 years	63	34.6%
	20-25 years	112	61.5%
	25-30 years	6	3.2%
	>30 years	1	0.54%
Parents Occupation	Business	56	30.8%
	Teacher	3	17.0%
	Governmental job	30	16.5%
	Laborer	2	1.1%
	Farmers	28	15.4%
	No job	3	1.6%
	*Others	31	17.0%
Type of Family	Nuclear	151	83.0%
	Extended	31	17.0%
Faculty	Nursing	50	27.5%
	BPH	49	26.9%
	Pharmacy	43	23.6%
	Microbiology	40	22.0%
Year of study	First	66	36.3%
	Second	44	24.2%
	Third	49	26.9%
	Fourth	23	12.6%
College	Novel Academy	93	51.1%
	La Grandee International	49	26.9%
	Janapriya College	40	51.1%
	*Army or job in foreign nation		

Almost all i.e. 98.9% (n=180) of the respondents said they have heard about climate change. About 64% (n=116) students said school/college was the main source of information, whereas 126 students said they gained information regarding climate change and global warming from different means of mass media like television, radio & newspaper.(Figure 1)

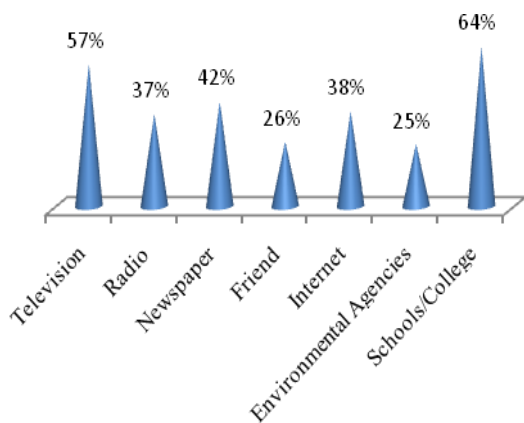


Figure 1: Source of Information on Climate Change

About 92% (n=167) of the respondents said climate change can impact them personally and 75.8% (n=138) said they have actually observed its impact in their surroundings. Most of the respondents i.e. 92.3% think increased temperature is the major consequences of climate change. 2 of the respondent didn't know about the consequences of climate change. This was multiple choice questions. When asked about the causes of climate change 62.2% (n=114) respondents identified deforestation as the cause behind it and 4 of the respondents didn't knew about it. (Table 2)

Almost all of the respondents 97.3% (n=177) were aware that climate change would have some impact in their health. Most of the respondents 62.6% (n=114) identified increase in communicable disease as the effect of climate change, and about 17% identified anxiety and depression as the health effect of increase in temperature. 13.2% chose

other as option and most of them specified skin cancer as the major health effect of climate change. (Table 2)

Significant number of respondents i.e. 96.2% (n=175) said climate change can be prevented. Talking about the measure of prevention, majority (n=102) thinks afforestation or at least decrease in rate of destruction of trees could be effective to prevent global warming & small number of respondent (n=11) think controlling population growth can help to prevent climate change. When respondents were asked about actions they can carry about in local level to mitigate the effect if climate change, most of them replied they can aware general people about the global warming, its causes & measures of prevention. (Table 3)

While assessing overall students, 29.3% (n=53) showed good and 9.4% (n=17) showed poor level of knowledge others being showing average level. Though faculty wasn't significantly associated with level of knowledge, in comparison to the students of BPH and Microbiology, students of Pharmacy and Nursing depicted good level of knowledge. Year of study showed significant relation with level of knowledge. Both mass media and school/college as the source of information showed significant relation with level of knowledge Occupation of the parents also showed significant relation with level of knowledge at 5% level of significance. (Table 4)

Students were also asked about their perception regarding possible effect of climate change in their respective field of study. 76% (n=138) of the students think climate change would have some impact in their field of study as well, whereas 24% deny it. About 62% of the respondent thinks they don't have adequate knowledge to prevent and combat the effect of climate change while 38% are confident that their knowledge is sufficient.

Table 2: Respondents knowledge on Climate change causes and effects

Characteristics		Frequency (N= 182)	Percentage
Observed any impact of in your area?	Yes	138	75.8%
		(N= 138)	(%among 138)
Observed impacts	Flood/Landslide/Drought/Strom/Other disaster	49	35.5%
	Fluctuation in temperature & Seasonal change	52	37.68%
	Irregularity in rainfall pattern	27	19.56%
	Health effects	15	10.86%
	Effect in vegetation	10	7.24%
	Melting of snow & Avalanches	8	5.79%
		(N=182)	Percentage
Possible Major Consequences of Climate Change & Global Warming	Flood	60	33.0%
	Drought	52	28.6%
	Increased Temperature	168	92.3%
	Excessive Rain	61	33.5%
	Strom	43	23.6%
	Others*	20	11.0%
	Don't know	2	1.1%
Causes of Climate change & Global Warming	Green House Gases	91	50%
	Excessive use of fossil fuels	69	37.9%
	Deforestation	114	62.4%
	Use of CFCs	82	45.1%
	Ozone layer depletion	97	53.3%
	Others**	10	5.5%
	Don't know	4	2.2%
Can it affect health?	Yes	177	97.3%
		(N=177)	(% among 177)
	Heat Stroke	57	31.1%
	Waterborne diseases	80	44.0%
Effect on Health	Depression	30	16.5%
	Malaria & other vector borne diseases	40	22.0%
	Communicable diseases	114	62.6%
	Anxiety	31	17.0%
	Malnutrition	28	15.4%
	Others*	24	13.2%
	Don't know	2	1.1%

*Landslide, acid rain, melting of snow, **Use of pesticides, air and water pollution, ***Skin diseases, Respiratory disorders

Table 3 : Respondents knowledge on preventive and mitigation approach on climate change

Characteristics		N (Total N=182)	Percentage
Can climate change be prevented?	Yes	175	96.2%
		(N=175)	(%among175)
If yes, measures of prevention	Afforestation	102	58.28%
	Use of renewable energy/Eco friendly development	33	18.85%
	Awareness	41	23.42%
	Decrease emission of green house gases, CO ₂ & fossil fuel consumption	82	46.85%
	Population control	11	6.2%
	Control pollution and Environmental sanitation	32	18.28%
		(N=182)	Percentage
Possible personal action to mitigate effect of climate change.	Decrease use of fossil fuel & green house gases.	14	7.69%
	Afforestation	40	21.97%
	Awareness	76	41.75%
	Environmental sanitation & pollution control	24	13.18%
	Use of eco friendly product and renewable source of energy	7	3.84%

Table 4 : Significant relation of different independent variable with level of knowledge

		Level of Knowledge			χ^2 value	df	p-value
		Poor	Average	Good			
Faculty	BPH	16% (n=8)	55% (n=27)	29% (n=14)	9.275	6	0.159
	Microbiology	15% (n=6)	59% (n=23)	26% (n=10)			
	Pharmacy	2% (n=1)	70% (n=30)	28% (n=12)			
	Nursing	4% (n=2)	62% (n=31)	26% (n=17)			
Year of study	First	12% (n=8)	62% (n=40)	26% (n=17)	17.155	6	0.009*
	Second	5% (n=2)	77% (n=34)	18% (n=8)			
	Third	12% (n=6)	59% (n=29)	29% (n=14)			
	Fourth	4% (n=1)	35% (n=8)	61% (n=14)			
Occupation of Parents	No job	-	100% (n=3)	-	31.758	12	0.002*
	Business	5% (n=3)	66% (n=37)	29% (n=16)			
	Teacher	3% (n=1)	65% (n=20)	32% (n=10)			
	Farmers	11% (n=3)	41% (n=11)	48% (n=13)			
	Laborers	100% (n=2)	-	-			
	Governmental job	13% (n=4)	65% (n=20)	20% (n=6)			
	Others**	10% (n=3)	65% (n=20)	26% (n=8)			
Mass media	Yes	6% (n=7)	57% (n=72)	37% (n=47)	16.790	2	0.000*
	No	18% (n=10)	71% (n=39)	11% (n=6)			
School/College	Yes	5% (n=6)	56% (n=64)	39% (n=45)	17.955	2	0.000*
	No	17% (n=11)	51% (n=47)	12% (n=8)			

*Statistically highly significant at $p < 0.01$. **Armies (British, Indian), whose parents work in foreign.

DISCUSSION

This study shows most of students were aware about climate change, though only 29.3% depicted good level of knowledge, others being average or poor. There is still gap regarding student's knowledge on climate change which needs to be fulfilled. Study carried out by Yale Project on Climate Change Communication regarding Knowledge of general American on Climate change showed one percent of respondent scored 90% & above, seven percent gained 80-89%, fifteen percent people scored 70-79%, twenty five percent gained 60-69% and more than half i.e. fifty two percent respondents gained 59% & below of the total possible score. (16) Though our study population were quite educated, as they were all undergraduate students of health sciences, result is not satisfactory in comparison to study of Yale Project.

There was no significant difference between level of knowledge between boys and girls, though boys showed good level of knowledge in comparison to girls. This finding contrast with the study conducted in United States by Mc Cright which concluded that women had a better understanding of the impact of climate change than men. (17)

Here, school/college alone was main source of information followed by other means of mass media like television, radio, newspaper. Both school/college and mass media had significant relation with level of knowledge of the students. Study carried out among post graduate students of Tripura, India revealed nearly 86.3% of the respondents have seen/heard or read something on climate change through mass media like radio & television and they were aware of it. (18) Similarly, study by Nalaka Gunawardene in Sri Lankan public showed most Sri Lankans had first heard about climate change from the mass media, or while in school. Mass media is also where they would most look for the latest information on what can be done about climate change and how to do it. (19) Hence, not only lessons from teachers but extensive use of mass media in order to spread information regarding climate change, its health effect & role of every individual regarding possible mitigation activities at personal level can be beneficial.

About 75% of the respondents were aware about the fact that climate change can impact them or their surrounding personally. Especially they mentioned recent incident of Seti flash

flood of 2012 and melting of snow in mountain ranges visible from Pokhara valley which awakened them regarding impact of climate change in local level. Increase in number of natural disaster like flood, landslide, drought, storm etc., increase in different health problems like epidemics, communicable diseases, airborne and skin diseases, effect in yielding of crops and melting of snow in mountain were the other impacts mentioned by respondents. In contrast, study by AM Chalise in high school students of Nepal, respondents mentioned about 'Disease and Illness' (67.5%) followed by increasing temperature (23%) and flood, drought, decrease in cultivation and unusual rainfall as felt impact of climate change. ⁽²⁰⁾ Study on Sri Lankan people showed among those who have heard of climate change, 36% were strongly concerned, while another 57% were somewhat concerned about how climate change can personally affect themselves and their families. ⁽¹⁹⁾

Increase in communicable disease was most frequently mentioned impact of climate change followed by waterborne disease, heat stroke & Malaria and other vector borne disease. As like study on Ethiopian students ⁽²¹⁾ lesser number of respondents has mentioned about the indirect impact of climate change like increase in malnutrition, anxiety and depression. Many other studies identify mental health problems like depression is associated with extreme weather events as common disorder resulting from climate change. ⁽²²⁾

About 62% of the respondent thinks they don't have adequate knowledge to prevent and combat the effect of climate change while 38% are confident that their knowledge is sufficient. Similarly, study on general public of America ⁽¹⁶⁾ showed they recognize their limited understanding about climate change that 1 in 10 say they have adequate knowledge and 75 % would

like to know more. Unlike our finding, in study among local health officials in USA two third of 133 claimed to have adequate knowledge to respond to climate change health impacts. ⁽²³⁾

CONCLUSION

Though the overall level of knowledge of climate change was not so satisfactory among the respondents, significant relation between year of study and level of knowledge showed positive sign. The variation in level of knowledge among the students of different faculty can also be observed due to which the necessity is felt that the college curriculum should be developed with view to awaken students, regarding environmental factors that shape human health. Climate change is the burning issue with possible significant effect in the future. Hence, the future health professionals need to be well informed and ready to combat the effect of climate change. Study showed different means of communication play important role to disseminate information in climate change. Hence extensive use of mass media can be beneficial to make those aware about the consequences, possible mitigation activities and adaptive strategies to climate change.

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