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Original Research Article

Assessment of knowledge, attitude and practice of medical students in a Metropolitan city on the role of planetary health in medicine and the impact of climate change on health through a survey

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ABSTRACT

Background: The study identifies medical students as channels of behavior change communication and intends to study the knowledge, attitude and practices of medical students with regard to climate change and its impact on health. The study also aims to address the role of planetary health in medicine.
Methods: A questionnaire adapted from the standard KAP Form published by the UNICEF, aimed at assessing the subjects' knowledge of the effects of climate change on health, their attitude with regard to the present situation, and their involvement in climate friendly activities, was administered upon informed consent. Further, they were enquired about the position of their institution on sustainable practices and climate education. The above was studied through several open and closed ended questions. The data was assessed through relevant tools.
Results: The study showed that 94.02% of the subjects believed that climate change was real and 47.87% of them believe that climate change is equally caused by human and environmental factors while 45.30% of them felt human factors were the primary cause of climate change. Nearly 66.68% of the responders considered planetary health and climate change education highly essential components of the medical curriculum.
Conclusions: Climate change is a serious concern, and has a severe impact on ecosystems and human health. Medical students must be aware of the role that climate change plays in disease pathophysiology, and act as agents of dissemination of climate education and planetary health.

Keywords: Planetary health, Climate change, Climate change and health, Online survey, KAP study

INTRODUCTION

Climate change refers to long-term shifts in temperatures and weather patterns. As the Earth is a system where everything is connected, changes in one area can influence changes in all others, not just the temperature.[1] The consequences of climate change now include, among others, intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity. Climate change can also impact people's health and well-being by altering the frequency or intensity of extreme weather events and spread of certain pests and diseases. The health effects of climate change include respiratory and heart diseases, pest-related diseases like Lyme Disease and West Nile Virus, water- and food-related illnesses, and injuries and deaths. Climate change has also been linked to increases in violent crime and overall poor mental health.[2,3] A study was conducted by the UNICEF in 2021 by the agency Rating from Skopje within the project 'Empowering children and youth to be agents of change in reducing community vulnerability to climate change' implemented by UNICEF with financial support from Sweden. The main goal of this survey was to conduct a nationwide study that will provide a

comprehensive picture of current knowledge, attitudes and practices through topics related to the need for education on climate change and environmental protection. The results obtained were significant, with the data collected indicating a high degree of concern among teachers related to climate change and related activities.[4] The world health organization has concluded that the climatic changes that have occurred since the mid 1970s could already be causing annually over 150,000 deaths and five million disability-adjusted life-years (DALY), mainly in developing countries. The less developed countries are, ironically, those least responsible for causing global warming. To improve risk assessment and risk management of these synergistic processes (climate and land-use change), more collaborative efforts in research, training and policy-decision support, across the fields of health, environment, sociology and economics, are required.[5] As medical students form the bridge for the scientific community through communication with the rural households, research, and community friendly approaches, the awareness that they possess about climate change becomes crucial. If medical students believe in the cause, and acknowledge the detrimental effects of climate change on the environment and health, the progression and amplification of the message to the general population becomes easier and more efficient, which necessitates the requirement of this study.

Objectives

The objectives of the study include: To assess the knowledge, attitude, and practice of students towards planetary health and climate change through a survey form. To determine the awareness and understanding of medical students about the impact of climate change on health and the role of planetary health in medicine and to assess the adequacy of teaching content pertaining to the subject of climate change in medical colleges as per the National Curriculum, through the students' perspective.

METHODS

Study design, type and location

Current study is a cross-sectional study done using online survey questionnaire at M. S. Ramaiah Medical College

Survey method

Questionnaire based survey with open-ended and closed-ended questions.

Duration of project

Period required for data collection: 2 months (May 2023 to June 2023) and period required for analysis of data: 1 month (July 2023).

Sample size

Total 117 participants were included. Considering the population size to be 750 (150 students per batch, 5 batches in total,) the study with the current sample size expected results with 90% confidence interval and 7% margin of error.

Inclusion and exclusion criteria

Subjects are medical students, and between the ages 16 and 28 were included. All who refused to sign the informed consent form were excluded.

Detailed description of method

Students across different years of a medical college were approached and briefed on the objective of the study. An online survey was administered through social media platforms to the participants, upon informed consent. The subjects were assessed on their knowledge of the effects of climate change on health, their concern and attitude with regard to the present situation, and their involvement in climate friendly activities and awareness campaigns through a questionnaire adapted from the standard KAP Form published by the UNICEF. Further, they were enquired about the position of their institution on sustainable practices and climate education. The above was studied through several open and closed ended questions. Open ended questions were analyzed based on the available literature.

Statistical methods and tools

The method used is descriptive analysis of primary data. Data has been tabulated in raw numbers and percentages.

RESULTS

Demographic details

The data that has been collected by an online survey has been represented through tables, graphs and charts. Total 117 participants were included in the study.

Climate change

Climate change based questions responses are depicted in (Table 4).

Planetary health and National curriculum

Planetary health and National curriculum based questions responses are depicted in (Table 5).

Opinion column

Opinion column based questions responses are depicted in (Table 6).

Table 1: Distribution based on age.

Age (years)	N	%
17 or below	16	13.67
18 - 20	24	20.52
21 - 23	66	56.42
24 - 26	7	5.98
27 and above	4	3.41

Table 2: Distribution based on gender.

Gender	N	%
Female	62	52.99
Male	46	39.32
Others	0	0
I do not wish to disclose my gender	9	7.69

Table 3: Distribution based on year of study.

Year of study	N	%
First year	22	18.80
Second year	16	13.67
Third year	18	15.39
Final year	51	43.59
Intern	9	7.69
Post graduate students (PG)	1	0.86

DISCUSSION

Interpretation of the responses related to awareness about climate change

The questionnaire began by assessing the extent of awareness among the surveyed individuals regarding the existence of climate change and what climate change meant to them. 94.02% of the subjects believed that climate change was real and about 44.45% of the subjects defined it as a 'series of events that lead to irreversible changes in the environment' with the other major portion of the subjects 41.03% defining it as 'global warming, erratic weather, and associated events.' Thus, the surveyed students appear to have a basic understanding about the concept of climate change and environmental decline, and could associate events from their timeline to the definition provided. A significant portion of subjects, nearly 47.87% of them believe that climate change is equally caused by human and environmental factors while 45.30% of them felt human factors were the primary cause of climate change. This showed that most of the surveyed individuals were able to appreciate the contribution of anthropological disturbances to climate change. 94.88% of the subjects are of the opinion that climate change does have an impact on health and there is a near half-split in the opinion of the subjects regarding the group of individuals with maximum affection. One-half believes that both upper and lower socio-economic classes are affected equally by this process and the other half favours the lower socioeconomic class as the most affected group. Upon being asked about which socio-economic sector contributes significantly to climate change, most surveyees were of the opinion that the pollution due to the factories, among other components of the industrial sector, was the primary contributor. Only a small portion of subjects identified households, agriculture, and commercial establishments as contributors. This could potentially stem from significant political and media coverage over the mentioned sectors. Having ascertained that climate change could cause health issues, the subjects were asked to identify which organ system could be affected. While most favoured respiratory, infectious and vector borne, and skin and dermatological diseases, only a few subjects were able to identify that nearly every system of the body could be affected by the indirect or direct effects of climate change. This need not represent lacunae in learning, but emphasises the need for climate change education in institutions. The subjects were asked if they found the issue of climate change concerning. As expected nearly 71.80% of the surveyed individuals were highly concerned. In contrast, only a very few subjects had taken definitive steps to tackle climate change, in terms of organising events or influencing legislative action. Nearly 55.56% of the responders only practiced household measures like switching off the lights or conserving water and another 26.49% being passive participants of climate rallies. Planetary health can be defined as the health of human civilization and the state of the natural systems on which it depends. Planetary health encompasses the domains of global health and public health and nearly 72.65% of the responders agree that replacing planetary health with global health can be useful to generate awareness for climate change.

Interpretation of the responses related to the section on planetary health and the national curriculum

Nearly 66.68% of the responders considered planetary health and climate change education highly essential components of the medical curriculum. Further only 21.37% of the individuals surveyed were satisfied with the current national medical curriculum in terms of coverage, involvement, and encouragement of planetary health and climate change education. This indicates a need to restructure the curriculum to amplify the importance of environmental health. The responders indicated that the lack of quality training in planetary health and climate change education was due to several etiological factors, of which, lack of faculty training, inadequate coverage in the present subjects, or the disinterest of curriculum setters to add climate change were perceived to be the most significant reasons. Majority of those surveyed suggested that climate change be integrated into the syllabus through practical measures, including community outreach programmes, discussions and workshops. The above summary indicates that while students were interested in learning about climate change and planetary health, didactic lectures were not a preferred medium of learning.

Table 4: Closed ended questions response representation for climate change (n=117).

Questions	N	%
Do you think climate change exists?		
Yes	110	94.02
No	7	5.98
Which option do you think best represents the definition of climate change?		
Global Warming, erratic weather, and associated events	48	41.03
Series of events that lead to irreversible changes in the environment	52	44.45
An apocalyptic situation destroying humans and the entire planet	13	11.11
A hoax made up by the mainstream media	4	3.41
Which of the following statements do you agree with?		
Climate change is primarily caused by human factors	53	45.30
Climate change is primarily a natural phenomenon	3	2.56
Climate change is caused equally by human and environmental factors	56	47.87
None, because climate change does not exist	5	4.27
Which among the following sectors do you think contributes significantly to climate change? Multiple options are acceptable		
Factories and Industries	85	-
Transport and Traffic	77	-
Energy and Natural Resource Harvesting	61	-
Construction and Development	67	-
Agriculture	28	-
Hospitals and Establishments (IT Parks, Schools, etc)	28	-
Households	21	-
Others not specified	12	-
None	2	-
Does climate change have an impact on health		
Yes	111	94.88
No	2	1.71
Not sure	4	3.41
Which group of people do you think could be affected the most?		
Mostly upper socioeconomic class	11	9.40
Mostly lower socioeconomic class	47	40.17
Both socioeconomic classes equally	59	50.43
None	0	0
Which diseases do you think such people may have? Multiple options are acceptable		
Infectious and Vector Borne Diseases	67	-
Zoonotic Diseases	38	-
Respiratory Diseases	80	-
Nutritional Diseases	47	-
Cardiovascular Diseases	45	-
Neurological and Neuropsychiatric Diseases	57	-
Gastrointestinal Diseases	38	-
Skin and Dermatological Diseases	69	-
Renal and Endocrine Diseases	23	-
Injuries and Accidents	37	-
Conflict and Migration related Diseases	43	-
Others	7	--
None	2	
On a scale of 1 to 5, how concerning is climate change for you?		
1	2	1.71
2	4	3.41
3	27	23.08
4	42	35.90
5	42	35.9

Continued.

Questions	N	%
What have you done to tackle climate change? The options have been divided into levels. Choose the level that is the closest to your answer.		
Level 1: Household Measures	65	55.56
Level 2: Participated in Climate-Related Events	31	26.49
Level 3: Organised in Climate-Related Events	14	11.97
Level 4: Influenced Legislative Action	5	4.27
None	2	1.71
Nowadays, planetary health is a term replacing global health, that aims to study the health of humans and the ecosystem as a whole. Will this change be useful to generate awareness of climate change?		
Yes	85	72.65
No	8	6.84
Not Sure	24	20.51

Total 46.15% of the responders were willing to dedicate an hour a month to planetary health as a subject, while 33.34% of them were willing to devote an hour a week for the same.

Interpretation of the opinions given by subjects regarding the topic of climate change

Total 74 participants felt that climate change had direct implications on their future and that creating awareness could better secure the same. 53 participants felt that personal beliefs required them to advocate for climate change and others felt that this would allow them to set an example for the younger generation. The participants were asked to suggest possible activities that students could do to improve the environment. The most significant responses included generating awareness, promoting environmentally friendly measures like reusing, reducing consumption, and recycling, and influencing legislative actions. Most of the students were supportive of the initiative, while a few others felt that the magnanimity of the issue required a finer and more detailed approach.

Solutions and avenues for change

The overwhelming response received in light of the survey poses the need for solutions. Some possible media of impact have been discussed below. Originally founded in 2019, the Planetary Health Report Card is a metric-based tool for evaluating and improving planetary health content in health professional schools. At each participating institution, student-led, faculty-mentored teams fill out the report card, identifying opportunities for improvement and reaching out to relevant staff and faculty along the way. Results are published in an annual Earth Day report, which helps track institutional change over time. Since its creation, the PHRC has expanded rapidly to evaluate over 100 medical schools in 11 nations, with the fourth annual cycle of evaluation recently published. Though the initiative was developed by medical students to evaluate medical schools, adaptations of the PHRC for nursing and pharmacy training programs have recently been piloted. This initiative inspires planetary health engagement, for our education, for our future, and for our planet.[7] Eco clubs are student-led groups with a primary focus of promoting environmental health awareness. This initiative, if started in every college, can promote the climate change advocacy through dedicated activities such as workshops, competitions, or symposia on the topic. Activities could also include essay writing events, poetry, photography and street plays which could help cultivate interest among students to educate themselves on climate change and the effect it has on health and well-being. Environmental Boot Camps comprise of workshops where students are taught the importance of climate change in heath education and the different modalities in which students can contribute to positive effect. Activities such as event organisation, steps to take legislative action, approach to effective communication, among others can be incorporated into the workshop to maximise the benefit for students and the recipients alike. Teaching Hospitals generate waste in metric tonnes every year, and often biomedical waste management alone is not sufficient for sustainability. Sustainable practices, such as recyclable surgical gloves, instruments, drapes and garments, among others, must be instituted at a large scale to ensure sustenance in the future. Recycling and waste segregation play an important role in preventing the long term consequences that are associated with water, air and soil pollution, which affect the health of all living organisms.[8] Environmental Non-Governmental Organisations (ENOGs) are organisations formed to address environmental issues and promote environmental sustainability. Greenpeace India is an Indian NGO whose reach extends to over 55 countries globally. Greenpeace is an independent campaigning organisation, which uses non-violent, creative confrontation to expose global environmental problems, and to force the solutions which are essential to a green and peaceful future. Greenpeace's goal is to ensure the ability of the earth to nurture life in all its diversity.[9] The Indian Environmental Society focuses on environmental education, biodiversity conservation, information dissemination, solid waste management, eco-technology and heritage conservation. Furthermore, this organisation suggests global solutions for critical environmental issues locally and nationally. The goal of IES is to give an advancement system that is ecologically stable, self-supporting, and evenhanded in the distribution of resources and opportunities.

Table 5: Closed ended questions response representation related to planetary health and national curriculum (n=117).

Questions	N	%
How important do you think planetary health and climate change education is to the syllabus		
1	4	3.41
2	11	9.40
3	24	20.51
4	37	31.63
5	41	35.05
On a scale of 1-5, how satisfied are you with the National curriculum concerning its coverage, involvement, and encouragement of planetary health and climate change education?		
1	19	16.24
2	34	29.05
3	39	33.34
4	18	15.39
5	7	5.98
As a student, what do you think is the reason climate change is not adequately taught in schools/colleges?*		
Lack of Materials on the topic	35	-
Lack of faculty training	52	-
Covered (insufficiently) in other subjects	46	-
There are more important subjects	22	-
May not be the curriculum's requirement to teach it	33	-
Disinterest to create awareness	47	-
On a scale of 1 to 5, how concerning is climate change for you?		
1	2	1.71
2	4	3.41
3	27	23.08
4	42	35.90
5	42	35.90
How do you think planetary health can be further integrated into the syllabus?*		
Workshops and Competitions	59	-
Practical Scenarios and Activities	64	-
Community Outreach Programmes	66	-
Lectures and Seminars	18	-
Separation as an Individual Subject	15	-
None	2	-
How much time would you devote to planetary health as a subject?		
1 hour once in the academic year	23	19.65
1 hour a month	54	46.15
1 hour every week	39	33.34
1 hour every day	1	0.86
To what extent does your college encourage education and activities related to planetary health & climate change?		
0	16	13.67
1	25	21.37
2	26	22.23
3	36	30.77
4	9	7.69
5	5	4.27
Which of the following does your college have to promote climate change and environmental awareness?*		
Celebrates World Environment Day and is environmentally conscious	70	-
Eco Club or similar associations	65	-
Practices sustainability in infrastructure and management practices	39	-
Sustainable hospital and patient care	38	-
Recycling policies, adequate cleanliness and greenery in the campus	49	-
Insists on teaching concepts of planetary health and climate change to students	17	--
Promotes usage of eco-friendly measures of transport and communication	22	-

*Multiple options are acceptable.

Moreover, it has participated in solid waste management and heritage conservation in Himachal Pradesh, and the recycling of marble slurry waste to protect the environment in Rajasthan.[10]

Table 6: Closed ended questions response representation related to opinion column (n=117).

Question	N
Why do u want to advocate for climate change	
Personal beliefs	53
Better future	74
Set an example for the others	34
Solve a specific problem/need	27
Learn new and interesting ways to improve the environment	38
Socialization	8
Unclear/unsure	4
I do not wish to be climate conscious	2

Lastly, the Government of India launched the National Action Plan on Climate Change (NAPCC) on 30 June 2008, outlining eight National Missions on climate change. These include National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Eco-system, National Mission for a Green India, National Mission for Sustainable Agriculture, National Mission on Strategic Knowledge for Climate Change.[11] The Principles of NAPCC include protecting the poor through an inclusive and sustainable development strategy, sensitive to climate change, achieving national growth and poverty alleviation objectives while ensuring ecological sustainability, efficient and cost-effective strategies for end-use demand-side management, extensive and accelerated deployment of appropriate technologies for adaptation and mitigation. new and innovative market, regulatory, and voluntary mechanisms for sustainable development, and effective implementation through unique linkages – with civil society, LGUs, and public-private partnerships.[12] Further, strengthening and expanding programmes like the Swachh Bharat Abhiyan can also act as an important step in improving climate change and environmental education.

CONCLUSION

Climate change is a pressing problem of the current generation and requires active involvement from the grassroots to the legislative level. The subjects have adequate understanding on the impact of climate change on health and know the importance of planetary health in medicine. The study aims to highlight the value of environment-friendly practices and sustainability education, and emphasizes on the role of medical students as conduits of change. Amplifying and replicating the results obtained could improve the standards of Environment Health Education and could train future physicians with skillsets and potential to identify and reduce climate change related illnesses.

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