

# Climate Change: Understanding the Frail Associations Between Scientific Evidence and Public Perception



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## 1 Introduction

The general public's awareness and understanding of climate change and global warming have been debated and appraised since the 1980s [4, 7]. Over the years, studies show considerable progress regarding what people know about climate change. Nevertheless, there are misperceptions around the topic, and several kinds of research have been conducted to improve the effective communication of science-backed climate information to the general public [17]. Although, much of the scientific focus has been given to understanding climate change science, very few efforts have been spent in educating people and to comprehend how they see and perceive the causes and impacts of climate change at the local scale [5]. Since India has a centralized federal system that has a significant role in policymaking and implementations, most of the Indian climate policies show a strong emphasis on national-level strategies and adaptations [1, 2, 8, 15]. However, emerging literature highlights the importance of developing subnational and local policies on climate actions and their implementation along with the national policies [9, 13]. Though, climate change is largely seen as an important issue that needs society's addressing but, is often considered as a distant problem from common person's everyday lives [21]. Most public engagement on climate action fails owing to this emotional disconnect of people from the issues pertaining to climate change at the local scale [25]. Finding methods to reduce psychological and emotional disconnect and to improve public awareness of climate change impacts are the key research and policy objectives in recent times

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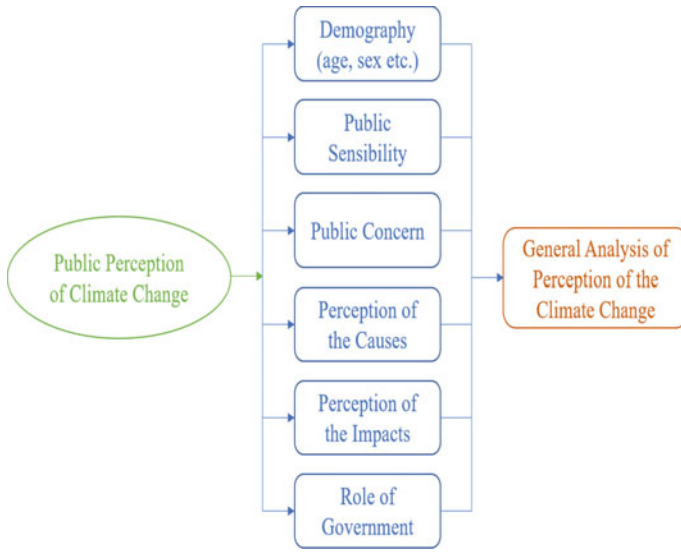
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[10, 22]. Although most people are conscious of “Climate Change”, it is only the majority of those in the meteorological sciences understand the concept of climate change [20], Similarly, [12] argued that effective and informed scientific policies on climate action can be formulated by the understanding of public perceptions and level of understanding about climate change issues.

Understanding how people apprehend information on climate change and what inspires them to take individual action to respond to climate change has key relevance in designing and implementing effective climatic policies [6]. A substantial volume of studies has been carried out on largescale public opinion surveys from developed nations in the Americas and Europe. And these studies help in differentiating views, attitudes, depth of understanding, and apprehension among a diverse set of populaces [3, 14, 16]. It is apparent that numerous researches have been conducted to understand the science behind climate change and to recognize the cause, impact, and mitigation tactics [23], but still the public perception about this development is still at its infancy, at least in the developing countries. People’s awareness of climate change could be the most important influence on their readiness to accept the scientific inferences on climate change effects [18]. And this could encourage to adapt to climate-positive behavior, which would aid in the designing and implementation of approaches to tackle the climate change effects. This study will provide new information on public perception of climate change and other environmental issues. Besides, the survey will identify the significant incentives for and challenges to climate-conscious behavior. The results should also shed light on the gaps in the mass media on disseminating climate change related information.

## 2 Method of the Study

For this survey, we have used a combination of qualitative and quantitative methods to assess people’s perception of climate change. A random quantitative survey was conducted, and a set of qualitative methods were conjointly applied to get a full understanding of people’s insights. A structured survey form was designed based on the survey followed by Whitmarsh, 2005 to gauge public consciousness and awareness of climate change in the Indian Himalayan State of Uttarakhand. The survey was conducted online, and one hundred and sixty respondents took the survey until August 2020 from all over the state. The respondents were requested to fill out the online form and to provide a response to each of the queries. The survey form comprised of 22, largely close-ended queries, categorized into 2 sections. The first section focused on socio-demographic details of the participants, such as their age, sex and education level. The second section explored the perception of changes in the environment and participants’ familiarity with the climate change actions. Further, this section analyzed whether participants thought about the environment and climate change before making everyday choices, as well as their incentives and barriers to environmental- and climate-friendly behavior.



**Fig. 1** Research framework

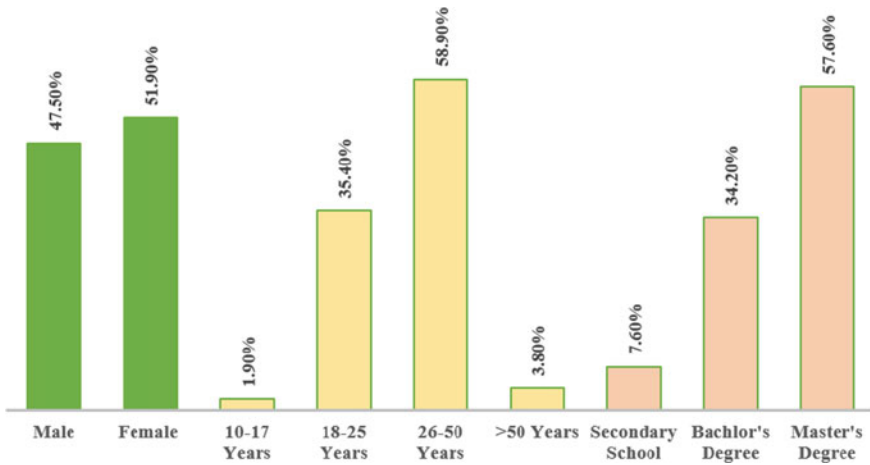
We conjointly collected answers about the participants’ comprehension of climate change, their favored sources of the climate information, their personal observations on changing climate. Aside from the first section, most of the queries were of a multi-response type and had fields accessible for added comments. The form was hosted on the Google Forms platform, as this provides automatic analysis and insights into the answers provided by the participants [11]. the general public was invited to participate through social networking sites including Facebook and Twitter.

The research framework of this study is to analyses the public awareness, concerns, their understanding of the causes and impacts of changing climate and their response to climate change (Fig. 1).

### 3 Results and Discussion

#### 3.1 First Part of the Survey Form: Demographic Information

A total of one hundred and sixty respondents participated in the online survey. Figure 2 shows the basic demography of the respondents. Of the respondents, 47.5% were male, while 51.9% were female. 58.9% of the respondents were falling in the age group of 25–50 years old, 35.43% between 18 and 25 years old, 1.9% were between 10 and 17 years old and 3.8% were above 50 years old. Concerning educational qualification, 57.6% of the respondents reported they have master’s degree



**Fig. 2** Basic demographic information of the respondent

and 34.2% with bachelor’s degree, and 7.6% accomplished secondary level education. 0.6% of the respondents had no formal education. This indicates that the major percent of the respondents were educated and between the young and middle age groups. This might be justified by the fact that Uttarakhand has an average literacy rate of 76.31% [24].

### 3.2 *Second Part of the Survey Form: General Questions About the Environment*

The first part in the form deals with basic general knowledge about environmental and issues around climate change. Although there are numerous environmental issues when asked to rate the issues that concern the respondents the most, the results (Table 1) show the respondents are most concerned about air pollution (67.90%), poor waste management (62.90%), and water pollution (53.50%). Interestingly not many people

**Table 1** Most concerning environmental issues

Q. 8. What are the environmental issues that concerns the most?	
Air pollution	67.90%
Poor waste management	62.90%
Pollution of rivers and seas	53.50%
Climate change	48.40%
Overpopulation	45.90%
Extinction of species	21.40%

are very concerned about climate change (48.40%), overpopulation (45.90%), and extinction of species (21.40%).

The results also revealed that 95% of the participants agreed that they are aware of the term “Climate Change” and some basic scientific knowledge on the subject while the remaining 1.9% indicated that they have not heard the term, whereas the rest 3.1% was not sure. Most of the respondents (94.3%) agreed that that the pattern of weather has changed. While only 5% believe that the weather pattern has not changed remaining 0.6% were not sure of it.

### 3.3 Third Part of the Survey Form: Perception on Climate Change

When the respondents were asked about possible causes of climate change, most of them (74.8%) agreed it is the combination of human activities and natural processes, wherein 54.1% relates climate change directly to human activities including agriculture activities and industries (Fig. 3).

Most of the respondents (87.4%) agreed that climate change might have serious consequences on their lives and 85.5% of them believe in curtailing the effects of climate change through climate actions. Of these respondents, most of them are convinced that climate change will lead to catastrophic implications including flood, desertification, and drought (Fig. 4).

In the form, the respondents were asked about who they sense to be responsible for responding to climate change, and the results are shown in Fig. 5. The results show 78% of respondents agree that individual actions play an important role in response to climate change, followed by the national government (59.7%) and local government (54.7%). Interestingly, only 40.9% of respondents felt businesses and industries play a major role in responding to climate change.

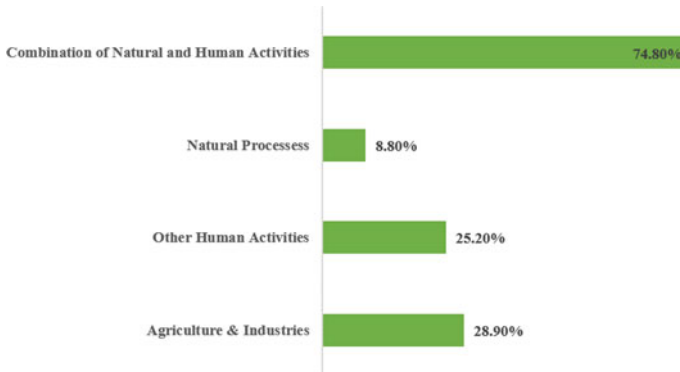


Fig. 3 Possible causes of climate change

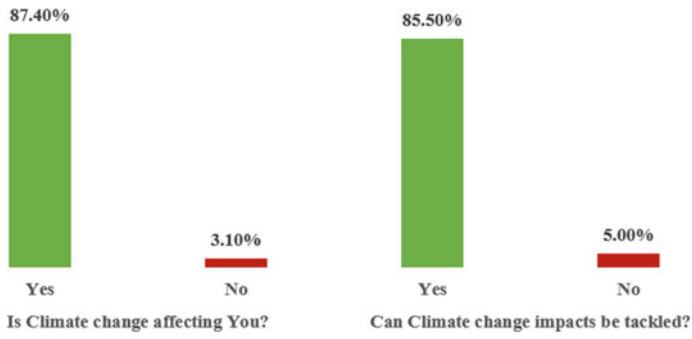


Fig. 4 Climate change impacts

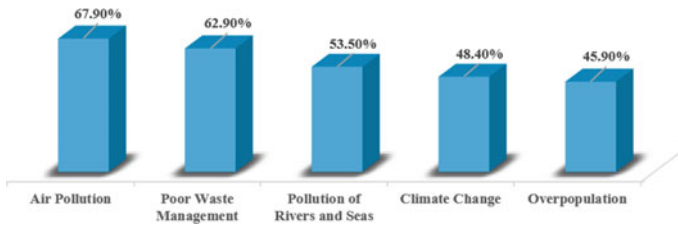


Fig. 5 Responsible for climate action

### 3.4 Fourth Part of the Survey Form: Climate Change Information

The different climate information sources the respondents preferred are shown in Fig. 6. The figure shows that the most widespread information source on climate

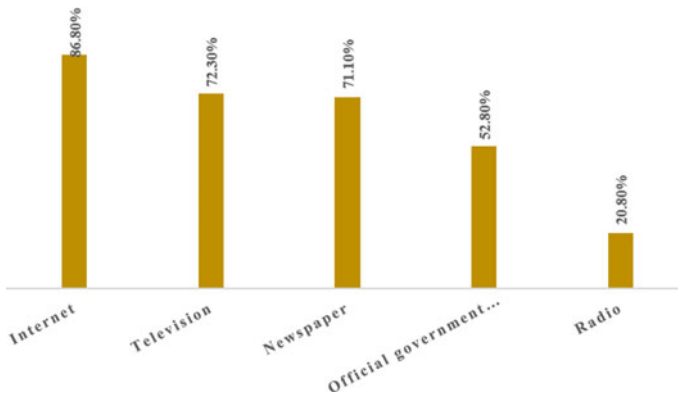


Fig. 6 Sources of climate information

**Table 2** Trusted source for climate information

Q. 12. How much do you trust information about climate change if you heard it from?					
	A lot	A little	Not very much	Not at all	Cannot decide
A. A family member / friend	18.87	59.75	17.61	1.89	1.89
B. A Scientist	87.42	8.18	2.52	1.89	0.00
C. Government Agencies	43.40	38.99	15.72	1.26	0.63
D. Newspaper	38.99	42.14	18.24	0.63	0.00
E. Internet	46.54	38.36	13.21	1.89	0.00

change is the Internet (86.8%). Then comes Television where 72.3% of the samples have pointed out and the Newspaper with 71.1%. At the bottommost of the information source is Radio (20.8%) followed by official government sources and environmental agencies (52.8%). When the respondents were asked who they would consider as a trusted source for climate information (Table 2), 59.75% said they would trust a little if the climate information is shared by a family member or a friend. Whereas if the information is from a scientist 87.42% of the respondents said they trust the information a lot. Remarkably, the responses show that the public view is to not strongly trust when the information is shared by the government agency or by newspaper and over the Internet.

### 3.5 Fifth Part of the Survey Form: Climate Change Action

In this part, various climate-conscious actions that may be undertaken to reduce the impacts of climate change were asked to be rated by the respondents. Most of the individuals surveyed (65.6%) are in agreement that they take regular action out of concern for climate change, whereas 19.1% aforesaid they never took any action and 15.3% weren't sure about any actions. The overwhelming majority of the respondents stated they recycle to protect the environment (60.49%); buy organic food for health reasons (45.83%); buy energy-efficient light bulbs to protect the environment (43.29%); turn off the unused lightbulbs to protect the environment (37.13%); use public transport as a result of its convenience (36.82%), and walk or cycle to work attributable to the health reasons (Fig. 7).

The following Table 3 shows the general trends of responses on the questionnaire and the questions are adopted from Whitmarsh and Özdem et al. [19, 26].

From the responses we received for the above questions, it is very evident that most of the participants believe that individual actions matter against climate change (78.48%); reducing their energy consumption will limit the climate change effects (50.63%). 42.41% of the respondents settled that climate change is going to be catastrophic and 48.73% of them agreed that climate change is something that frightens them. Of the participants 66.46% strongly believed climate change to be a real problem and agreed that humans are abusing the planet (60.13%), they also

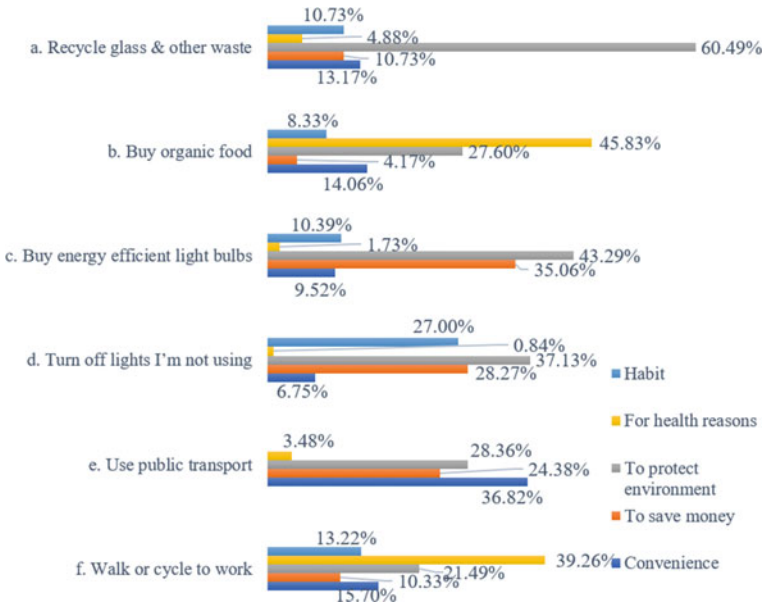


Fig. 7 Climate change actions

strongly believe that all lifeforms have the same rights as humans to exist on the Earth (74.05%).

### 4 Conclusion

Regardless of being a country with an ambitious Intended Nationally Determined Contribution (INDC) commitments to influence global climate actions, reinforced by plans and programs, the common people of India are not aware of these strategies and in most cases are not been included in these plans. Despite being well aware of the term ‘climate change’, the common people and the stakeholder’s understanding of what causes the climate to change and what will be effects of changing climate, varied widely. Regardless of the common populace’s varied understanding of climate change science, the study found people are highly aware of the consequences of changing climate. The survey outcomes are relatively important not just for evaluating the current state of society’s awareness concerning climate change in the Indian Himalayan state of Uttarakhand but also to enhance the awareness campaigns on other environmental issues in general. Furthermore, this study provides baseline data to the policymakers with regard to the climate change awareness and perception among the general public in Uttarakhand. Consequently, relevant stakeholders will use these results to direct the future climate action strategies and climate information policies for efficient and constructive adaption and mitigation processes.



**Table 3** General trends of responses on the questionnaire (%)

Questions	Agree strongly	Agree	Neither agree nor disagree	Disagree	Can't choose
1. Can individual action reduce the effects of climate change?	78.48	18.99	1.27	1.27	0.00
2. Climate change is inevitable because of the modern development	25.95	43.67	15.82	14.56	0.00
3. Climate change is just a natural fluctuation in earth's history	8.86	17.09	29.11	40.51	4.43
4. Energy consumption reduces climate change	50.63	34.18	12.66	1.90	0.63
5. Incentives should be given to people who take up climate actions	43.67	36.08	13.92	5.06	1.27
6. I would do take up climate actions only if everyone else did the same	18.35	20.89	12.66	43.04	5.06
7. Humans have no significant impact on the globe	8.23	7.59	22.15	53.80	8.23
8. Climate change is something that alarms me	32.91	48.73	13.92	3.80	0.63
9. Developing countries are to be blamed for climate change	17.09	31.65	29.11	18.99	3.16
10. Leaving the lights on when not in use adds to climate change	33.54	43.67	16.46	1.27	5.06
11. The climate change effects are likely to be catastrophic	37.34	42.41	12.03	1.90	6.33
12. I cannot change the outcome of climate change one way or another	2.53	16.46	27.22	46.20	7.59
13. Industrial pollution is the main cause of climate change	27.22	52.53	15.19	5.06	0.00
14. Do you believe that climate change is a real problem	66.46	24.68	6.96	1.90	0.00
15. The government is not doing enough to intercept climate change impacts	33.54	37.97	21.52	6.33	0.63
16. Humans are severely abusing the natural resources	60.13	28.48	7.59	3.80	0.00
17. All life forms have the same rights as humans to exist on the Earth	74.05	18.35	5.06	1.90	0.63
18. The balance of nature is highly dynamic and easily gets disturbed	43.67	38.61	11.39	5.06	1.27
19. Nature is strong enough to cope with the unchecked human activities	15.82	24.05	24.05	32.28	3.80

Although media has immense potential to bring change in the society, the current study reveals a lost opportunity in triggering actions and decisions from the public and decision-makers. While the media depends on the government as the main source of information, the government's climate actions don't involve individuals' actions on the ground, thus failing to stimulate adaptation and mitigation from the bottom up. This gap is even more evident in the academia, where although there is a growing number of publications on climate science, only small efforts have been made to translate scientific publications to communications that are accessible to the public and that attract the attention of media. This calls for more research in the areas of translating the climate communication strategies and improving the efficiency of the communications that emerge from the government and academia.

The study also recommends collaboration and partnerships between various relevant stakeholders as an essential constituent of the climate change mitigation and adaptation process. The partnership will help build powerful movements and innovative solutions needed to overcome the climate challenges and ensure the involvement of common people in the climate change mitigation and adaptation plans right from the development phase. In addition, climate change science and sustainable environmental practices should be incorporated into the school and universities' course curriculum. If the individuals are well informed on climate change effects that would reassure the people to accept and act on the government's mitigation and adaptation strategies. Also, this knowledge will motivate the general public to adhere to climate positive and sustainable behavior that would help achieve sustainable socioeconomic and environmental management.

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